Chapter VIII:

Alternative Enterprises

Chapter VIII: Alternative Enterprises

- *A. General*
- *B. Wildlife*
- *C. Trees/Forestry*
- *D. Livestock*
- *E. Poultry*
- *F. Aquaculture*
- *G. Crops/Horticulture*
- *H. Food Safety*
- *I. Apiary*
- *J. Non-Farm/Farm Residents*
- *K. Education*

Check with your local county cooperative extension agent or Resource Conservation and Development Council to find what is available in your state and to identify local or state leads.

A. General

Farming for Profit, Stewardship and Community Tip Sheets
SARE
All tip sheets are available online at: http://www.sare.org/tipsheet/index.htm
Hardcopies are available from:
Ph: (301) 405-3186 or 202-720-5203.
Email: vberton@wam.umd.edu
Also, Available in the Resource Manual at
www.nrcs.usda.gov/technical/RESS/altenterprise or CD

The two-page tip sheets are devoted to identifying sources of information for following subjects:

- -TIP# 1: Improve Soil Quality
- -TIP# 3: Prevent Pest Problems
- -TIP# 4: Explore Organic Production
- -TIP# 5: Cut Livestock Costs
- -TIP# 6: Manage Weeds Wisely
- -TIP# 7: Plan for Profit
- -TIP# 8: Network
- -TIP# 9: Diversify Crops
- -TIP# 10: Use Trees

Alternative Agricultural Enterprise (Links)
This website contains links to various documents prepared by personnel from land grant universities, federal agencies, and private foundations. The documents each have information needed to help you make an informed decision about alternative agricultural enterprises.
http://aggie-horticulture.tamu.edu/alternatives/alternativelinks.html

Resources from Sustainable Agriculture Network (SAN)
Sustainable Agriculture, Research and Education (SARE)
List of publications and books available through SARE by calling 301-504-5236 or email san_assoc@sare.org. Also, most of the publication are on the web are www.sare.org/htdocs/pubs

The New Frontier of Ranching: Business Diversification and Land Stewardship
Sonoran Institute; June 2000
By Ben Alexander
This is an informational publication that discusses the benefits and methods of applying business diversification and land stewardship to ranching. Case studies are used to present the diversification possibilities.
This publication is available from:
Sonoran Institute
7650 E. Broadway Blvd., Suite 203
Tucson, AZ 85710
Ph: (520) 290-0828
www.sonoran.org

State of the States: Organic Farming Systems Research at Land Grant Institutions 2000-2001
This is a list of organic research and Extension resources in each of the 39 US states that have them. The document may be downloaded using Adobe
Acrobat at: http://www.ofrf.org/publications/SoS/SoS.overview.page.html

Greenbook 2003: Caring for the Land
Minnesota Department of Agriculture
This publication, updated annually, provides information on how farmers are adopting energy and sustainable agriculture alternative enterprises. The publication includes stories about how people are applying alternative sustainable enterprises. See Chapter 3 for table of contents.
Available online at: http://www.mda.state.mn.us/ESAP/Greenbook2003/default.htm
Hardcopies available from:
Ph: (651) 215-0367
Email: Alison.Fish@state.mn.us

USDA Alternative Farming Systems Information Center (AFSIC)
The AFSIC is one of several topic-oriented Information Centers at the National Agricultural Library. This information center specializes provides and accesses

information related to alternative cropping systems, organic, low-input, biodynamic, and regenerative agriculture. Their website offers online versions of their publications, links to other information websites, and a search feature.
Website: www.nal.usda.gov/afsic
10301 Baltimore Ave.
Beltsville MD 20705-2351
Ph: (301) 504-6422 or (301) 504-5724
Email: afsic@nal.usda.gov

Videocassettes in the NAL Collection Pertaining to Alternative Farming Systems
Compiled by Mary Gold, AFSIC
This is a 22-page listing of videos that was published in 1995 and updated in 2000. There are no duplications in the two listings.
Go to: http://www.nal.usda.gov/afsic/afspub.htm for the online publications, email: afsic@nal.usda.gov to request the publication or call (301) 504-6559.

Missouri Alternatives Center (MAC)
University of Missouri Outreach.
The MAC is an alternative enterprise and agritourism information center hosted by he University of Missouri. Their website provides publications, links, and mailing addresses. The MAC also publishes a newsletter, *Ag Opportunities,* which is also available on their website.
Website: http://agebb.missouri.edu/mac/
University of Missouri
531 Clark Hall
Columbia, MO 65211
Ph: 1-800-433-3704 (Missouri Only) or (573) 882-1905
Email: kellyd@missouri.edu

Ideas for Alternative Agricultural Enterprises.
Missouri Alternatives Center (1996)
This publication is a seven-page fact sheet that lists several alternative enterprise ideas and how they can be developed. The publication also provides information on how to develop a business plan.
Available by calling (573) 882-1905

Appropriate Technology Transfer for Rural Areas (ATTRA)
ATTRA is the national sustainable farming information center operated by the private nonprofit National Center for Appropriate Technology. Their website provides information, news, publications and additional links.
Ph: 1-800-346-9140
Website: www.attra.ncat.org

Sustainable Agriculture...Continuing to Grow: Proceedings of the "Farming and Ranching for Profit, Stewardship and Community Conference, March 709, 2000"
Western SARE

This publication contains the proceedings of a conference that addressed sustainable farms, disease, pests and weeds, sustainable ranches, marketing in a sustainable economy and sustaining agriculture. Farmers and ranchers made several presentations on how they are sustaining themselves through alternative enterprises. The proceedings are available online at: http://wsare.usu.edu/ by clicking on the "publications" link.
Hardcopies available at: (435) 797-2257 or wsare@mendel.usu.edu

Adding Value for Profit
Northwest Farm Credit Services
This article in the annual report issue features four producers that diversified to add value to their operations. These entrepreneurs are: customer focused, profit motivated, innovative and responsive, comfortable with change, strategic planners and effective communicators.
Available at www.farm-credit.com and going to the customer button where there are hyperlinks to their web sites. For copies contact
Ben Alexander
Sonoran Institute
201 S. Wallace Street
Bozeman, MT 59715
Ph: 406-587-7331

Example of University Extension Work throughout the U.S.
Most universities have staff devoted to the assistance and development of alternative enterprises and agritourism. Several states also have centers or institutes also devoted to this kind of work. The University of Missouri Outreach and Extension web page is shown as an example of the kind of assistance and information available from land grant universities.
http://muextension.missouri.edu./xplor

Small Farm Center.
University of California, Davis.
The Center provides information that deals with small farm activities and agritourism. Their publications include quarterly newsletter available online.
Website: www.sfc.ucdavis.edu
Ph: (530) 752-8136
Email sfcenter@ucdavis.edu

Small Farms@USDA
This website contains links to other organizations, funding opportunities and information on USDA small farm activities including a newsletter. Go to:
www.usda.gov/oce/smallfarm/hotlinks.htm

USDA Economic Research Service, Organic Farming and Marketing
http://www.ers.usda.gov/briefing/organic

Organic Trade Association (OTA)
OTA is a membership based business association that represents the organic industries in Canada, the United States, and Mexico. Members include growers, shippers, processors, certifiers, farmer associations, brokers, manufacturers, consultants, distributors and retailers. Their website provides news and information, online directories and a website search engine.
Website: http://www.ota.com/
PO Box 547
Greenfield, MA 01302
Shipping: 60 Wells Street
Greenfield, MA 01301
Ph: (413)-774-7511

Organic Production: Recent Publications and Current Information Sources, SRB 96-07
NAL, USDA
Publication contains 30 pages of references on organic agricultural production.
Available by email afsic@nal.usda.gov or
Ph: 301-504-6559

Videocassettes in the NAL Collection Pertaining to Alternative Farming Systems
NAL, USDA
Publication contains 30 pages of references on organic agricultural production.
Available by email afsic@nal.usda.gov or
Ph: 301-504-6559

Ohio Ecological Food and Farm Association
This association holds conferences, and publishes a newsletter .
PO Box 82234
Columbus, OH 43202
Ph: 614-421-2022

Sustainable Agriculture: An Introduction
Appropriate Technology Transfer for Rural Areas (ATTRA)
A 4-page paper on a comparison of sustainable and conventional agriculture.
Available at:
Ph: 1-800-346-9140
Website: www.attra.ncat.org

Choosing Your Enterprises: A Checklist (Reprinted with permission from "Sell What You Sow" by Eric Gibson)
Missouri Alternatives Center, University Extension, Lincoln University
Available in this resource manual at:
www.nrcs.usda.gov/technical/RESS/altenterprise or the CD or
Website: http://agebb.missouri.edu/mac/

University of Missouri
531 Clark Hall
Columbia, MO 65211
Ph: 1-800-433-3704 (Missouri Only) or (573) 882-1905
Email: kellyd@missouri.edu

The New Entrepreneurial Agriculture, Special Report, April 2002
Michigan Land Use Institute
This publication carries stories about farmers in Michigan that have transitioned into alternative enterprises and capitalized on the fresh marketing opportunities.
Available online at www.mlui.org or
Michigan Land Use Institute
205 South Benzie Blvd
Beulah, MI 49617
Ph: 231-882-4723

American Pasturage Inc
Rick Hopkins
President
American Pasturage, Inc.
P.O. Box 190
Marionville, MO 65705
(417) 258-2394

Moderate-sized farms: Is the future bleak or rosy?
Gene Johnston, Managing Editor, Successful Farming
Available in Resource Manual

Sustainable Agriculture...Continuing to Grow: A Proceedings of the "Farming and Ranching for Profit, Stewardship &Community" conference.
Conference addressed sustainability, soils, pests/diseases, and marketing.
Available by contacting
Western SARE Programs
Ph: 435-797-2257

Sustaining Western Rural Landscapes, Lifestyles, and Livelihoods: West-Wide Conference, Sheridan, WY, September 24-26, 2002, Proceedings
This explored agricultural diversification options for ranchers and farmers in the west.
Available from
Boyd Byelich
NRCS/USDA
8416 Hildreth Road
Cheyenne, Wy 82009
Ph: 307-772-2015 X119

USDA Soils Website
http://soils.usda.gov

Sustainable agriculture website with books difficult to find.
www.soiland health.org/index.html and go to agriculture library.

Growing New Farmers: A Northeast Service Providers Consortium
For information go to
www.northeastnewfarmer.org

Alternative Agriculture News
A monthly newsletter addressing national and international policy and legislation as it affects agriculture and trade.
Henry A. Wallace Center for Agriculture and Environment Policy,
Winrock International
1621 North Kent Street, Suite 1200
Arlington, VA 22209
Ph: 703-525-9430
Email: wallacecenter@winrock.org
www.winrock.org/wallace

Community, Food and Agriculture Program Listserv
A very popular eastern and northeast listserv carrying information on research results, conferences, meetings and actions taken for the direct marketing of food and fiber.
Contact Heidi Mouillesseaus-Kunzman at hmm1@cornell.edu or
www.cfap.org

www.Cropchoice.com
Website devoted to providing farmers information on genetically modified crops. It is cosponsored by almost 20 non-profit organizations.

Iowa Organic Farming Mentor Program—A video
Video outlines the structure of the program and highlights some of the successful practices of the mentor farmers.
Iowa Organic Farming Mentor Program
610 South 4th Street
Fairfield, IA 52556

ACRES, USA—A Voice for Eco-Agriculture
Monthly publication addressing, soils, row crops, livestock, poultry, speciality crop, marketing futures, etc.
Call 800-355-5313 for more information.

Small Farmer's Journal
For more information
www.smallfarmersjournal.com

B. Wildlife

Natural Resource Protection
SARE
This is a report on an interdisciplinary study showing that what's good for the wetland and the birds also can be good for a farmer's financial bottom line. The report is written around farmers using the wetlands program to enhance the environment, their farm and their financial bottom line. Available online at: www.sare.org
Hardcopies available by calling (301) 504-6425

Landowners Seek Diversity Income through Wildlife Management
By Tim W. McAlavy
Ag News: News and Public Affairs
Texas A&M University Agriculture Program; April 26, 2001
See Chapter VI for a copy of the news report.
Available at: http://agnews.tamu.edu/dailynews/stories/WFSC/Apr2601b.htm

Incentives for Wildlife Enhancement on Midwestern Farms
Prepared by: Marcos Robles for
Environment and Agriculture Program
Institute for Agriculture and Trade Policy; May 2000
This publication provides ideas, strategies, and examples of incentives that support the enhancement of wildlife.
Available online through the Resources link at: http://www.iatp.org/labels
Cost for hardcopy: $8 (shipping and handling included)
To order, contact: Candace Falk
Ph: (612) 870-3453
Email: cfalk@iapt.org

Wildlife Management for Missouri Landowners, Third Edition.
Missouri Department of Conservation.
This is a 90-page publication about making a wildlife management plan, cropland, grassland, woodland, idle area, wetland, and species management. It lists wildlife management services and presents wildlife management practices.
Available online at: http://www.conservation.state.mo.us/library/wildlife/landown99.pdf
Available from:
Missouri Department of Conservation
P.O. Box 180
Jefferson City, MO 65102

Establishing a Birding-Related Business: A Resource Guide
By David Scott and Ashley Callahan
Texas Agricultural Extension Service – Texas A&M University
B-6093

The first eight pages provide an overview of birding trends, and the last eight pages provide a guide for establishing a birding business or activity in a community. See Chapter VI for the publication.
Available online at: http://agpublications.tamu.edu/pubs/rpt/b6093.pdf
Hardcopies available in Chapter VI or from (979) 845-5419

Fish and Wildlife Habitat Management Leaflets
USDA-NRCS Wildlife Habitat Management Institute in cooperation with the Wildlife Habitat Council
Available electronically at: http://www.ms.nrcs.usda.gov/whmi/technotes.htm

Wildlife and the American Mind: Public Opinion on and Attitudes toward Fish and Wildlife Management
By Mark Duda
Responsive, Management
This is an 800-page book containing results of more than 300 surveys. It presents recommendations, strategies on how to utilize this information to enhance fish and wildlife management programs and policies, as well as how to more effectively manage hunting, fishing, and wildlife watching programs.
130 Franklin Street
P.O. Box 389
Harrisonburg, VA 22801
Ph: (540) 432-1888.

Guidelines for Increasing Wildlife on Farms and Ranches: With Ideas for Supplemental Income Sources for Rural Families.
Great Plains Agricultural Council, Wildlife Resource Resources Committee, Cooperative Extension Service, Kansas State University (1988).
This 500-plus page book was prepared with the input of more than 100 professionals involved in wildlife production, management, economics, and identifying landowner opportunities.
Available from:
Wildlife Habitat Handbook
118 Umberger Hall
Kansas State University
Manhattan, Kansas 66506
Ph: (913) 532-5830
Email: orderpub@oz.oznet.ksu.edu

Farming for Wildlife: Voluntary Practices for Attracting Wildlife to Your Farm
A joint publication of state, Federal and public organizations
This publication presents many wildlife management practices that can be adopted by ranchers and farmers for use on agricultural lands. Available from Wendell Gilgert or Ronald Schultze, NRCS state office at (530) 792-5600

Wildlife Habitat Council (WHC)
The WHC is a nonprofit group of corporations, conservation organizations, and individuals that helps large landowners manage their unused land in an ecologically sensitive manner for the benefit of wildlife. Their website provides information on their programs and their backyard conservation page provides educators with online lesson plans related to wildlife conservation.
Website: http://www.wildlifehc.org
1010 Wayne Ave, Suite 920
Silver Spring, MD 20910
Ph: 301.588.8994
Email: Whc@wildlifehc.org

A Wildlife Manager's Field Guide to the Farm Bill.
Wildlife Management Institute
This guide discusses what programs are available to help manage wildlife on private lands, organizational structure and technical information.
Wildlife Management Institute
1101 14th Street NW, Suite 801
Washington, DC 20005
Ph: 202-371-1808

Backyard Conservation-Wildlife Conservation Tip Sheet
USDA/NRCS
A 6-page paper on how to make a home for birds, butterflies, and nature's other creatures. Nine other tip sheets are available on backyard conservation.
Available on line at www.nrcs.usda.gov or
Ph 1-888-LANDCARE

Land, Leases, and Wildlife
The southern counties in Texas have been holding workshops to introduce new rural landowners to alternative income-producing resources as well as address liability, ethical and tax value concerns. The workshops were sponsored by Texas Agricultural Extension Service, Texas Parks and Wildlife Department, and the Natural Resources Conservation Service. For more information, call Wayne Scholtz, Extension Educator in Hondo, TX at (830) 741-6180 or 1506 Ave. M, Hondo, TX 78861.

A Symposium on the Economics of Wildlife Resources on Private Land
Edited by Rhett Johnson, Auburn University
Papers were presented on general economic impacts, landowner economic impacts, economics of wildlife damage, economic impact of the Endangered Species Act, and economics of wildlife resources. Available by calling (334) 844-4000.

Making Collaboration Work: Lessons from Innovation in Natural Resource Management
By Julia Wondolleck and Steven Yaffee
This book provides information on the role of collaboration in natural resource management, and how to make such collaboration efforts work.

For more information on the book and how to order it, go to:
http://www.islandpress.org

Responsive Management
Responsive Management is a Virginia-based public opinion polling and survey research firm specializing in fisheries, wildlife, natural resource, outdoor recreation and environmental issues.
Website: http://responsivemanagement.com/

Birds on the Web:
Over forty useful and interesting web sites on birds and bird conservation
Texas Partners in Flight
Texas Parks and Wildlife
www.tpwd.state.tx.us/nature
Available in this resource manual at:
www.nrcs.usda.gov/technical/RESS/altenterprise or the CD described above by calling Jim Maetzold at 202-720-0132 or email at jim.maetzold@usda.gov

Southwick Associates Newsletter
Newsletter published by a firm that specializes in data collection and analysis of fish, wildlife and conservation.
Four research reports noted in December 2003 are:

- Methods for Recovering Mussel Kill Damages
- The Sport of Spring Turkey Hunting
- Angler's" Who are they and what they spend
- Economic Impacts of Hunting and Fishing in the U.S.
- Hunting, Fishing and Wildlife Viewing in Missouri

Available at www.southwickassociates.com

A Comprehensive Review of Farm Bill Contributions to Wildlife Conservation
USDA/NRCS Wildlife Habitat Management Institute
A comprehensive review of the scientific literature was undertaken to deter wildlife responses to programs established under the conservation title of the farm bills 1985, 1990 and 1996. See Chapter III for content and executive summary.
www.whmi.nrcs.usda.gov

Quail Unlimited
www.qu.org

C. Trees/Forestry

USDA National Agroforestry Center
The Center's work focuses on agroforestry practices, including riparian buffers. Trees can readily become an alternative enterprise or used to improve the environment and esthetics of the landscape and farm or ranch. Free copies of the publications shown

below can be obtained by calling Ph: (402) 437–5178. For a more complete listing go online at : www.unl.edu/nac

Agroforestry Center Publications

-*Agroforestry: Working Trees for Agriculture*.
-*Working Trees for Livestock.*
-*Working Trees for Wildlife.*
-*Working Trees for Communities*.
-*Working Trees for Treating Waste.*
-*Working Trees for Carbon Cycle Balance*.
-*Living Snow fences.*
-*Growing Carbon: A New Crop That Helps Agricultural Producers and the Climate Too*
-*Diseases of Trees in the Great Plains*
-*Inside Agroforestry—a quarterly newsletter*
-*Several technical notes are also available on the web*

Agroforestry in the United States: Research and Technology Transfer Needs For the Next Millennium
Association for Temperate Agroforestry
Fall 2000
Cost: $1.00
Available from:
P.O. Box 266
Lake Oswego, NY or 970-340-0031

Income Opportunities in Special Forest Products: Self Help Suggestions for Rural Entrepreneurs
By Margaret G. Thomas and David R. Schumann
USDA Forest Service Publication
Agriculture Information Bulletin- 666 (May 1993)
This publication describes special forest products that can be produced by rural entrepreneurs to supplement their income. The publication includes market and competition considerations and profiles of rural businesses marketing each of the products.
Available at: http://www.fs.fed.us/spf/coop/pubs.htm

Productive Conservation: Growing Specialty Forest Products in Agroforestry Settings (#50031702)
Hybrid Hazelnuts: An Agroforestry Opportunity (#510031704)
Marketing Specialty Forest Products (#510031704)
Edible Woody Landscapes for People and Wildlife (#50031701)
The above are titles of free publications produced by the National Arbor Day Foundation and the University of Nebraska's Cooperative Extension and School of Natural Resource Sciences. Copies are available from the National Arbor Day Foundation.
Website: http://www.arborday.org

Ph: (402) 474-5655

Pine Straw: Money Growing on Trees pg. 11 – 13
AgVentures Magazine Feb/March 2001
By Regina G. Burgess
Available from
AgVentures
Phone: 888-474-6397

Log Bucking Video
Produced by: Time & Tide RC&D and Down East RC&D
This video is designed to educate landowners and loggers about woodlot harvesting practices.
Cost: $5 (plus shipping and handling)
Time & Tide RC&D
9 Green Street
Augusta, ME 04330

Small-Scale Alternative Agriculture
Wood lots two-page information sheet.
Available from (301) 504-6245 or san@nal.usda.gov

Cooperative Forestry: State and Private Forestry Economic Action Plan
Forest Service
Cooperative Forestry helps rural communities and businesses dependent on natural resources become sustainable and self-sufficient.
Website: http://www.fs.fed.us/spf/coop/eap.htm
PO Box 96090
Washington, DC 20090-6090
Ph: (202) 205-1389
Fax: (202) 205-1271
Email: sodell01@fs.fed.us

Community Forests: A Collection of Case Studies of Community Forestry
Compiled by Forest Community Research for the Seventh American Forest Congress Communities Committee
Available at: http://fcresearch.org/cfbooktoc.html

The Community Forestry Resource Pages Website
This website provides links to activities, projects, and organizations involved with community forestry.
http://fcresearch.org/communityforestryresourcepages.html

American Tree Farm System
Part of the American Forest Foundation

The American Tree Farm System provides support and education for private forest landowners.
Website: http://www.treefarmsystem.org/
1111 19th St, NW (Suite 780)
Washington DC 20036
Ph: (888) 889-4466

The National Tree Trust
The National Tree Trust is a non-profit group that helps local volunteer groups grow, plant, and maintain trees in rural communities, urban areas and along highways.
Website: http://www.nationaltreetrust.org/
1120 G Street NW, Suite 770
Washington DC 20005
Ph: (202) 628-8733

The National Arbor Day Foundation
The National Arbor Day Foundation provides information on trees in the riparian zone.
Website: www.arborday.org
100 Arbor Avenue
Nebraska City, NE 68410
Ph: (402) 474-5655.

The National Fire Protection Association
The National Fire Protection Association provides information on community wildfire control measures.
Website: www.firewise.org/communities

Proceedings of the North American Conference on Enterprise Development Through Agroforestry: Farming the Forest for Specialty Products
Edited by Scott Josiah
This conference was one of the first efforts to explore the potential for producing and marketing specialty forest products in agroforestry systems.
For copies contact
Erik Streed 1530
Cleveland Ave N.
115 Green Hall
St. Paul, MN 55108
612-624-4299

D. Livestock

Small Scale Agriculture Alternative
These are two page information sheets that can be obtained by emailing san@nal.usda.gov or calling (301) 504-6245.
-Sheep

-Draft Animals
-Exotic Livestock
-Dairy and Meat Goats
-Cashmere Goats
-Angora Goats

Available in this resource manual at:
www.nrcs.usda.gov/technical/RESS/altenterprise or the CD described above by calling Jim Maetzold at 202-720-2307 or email at jim.maetzold@usda.gov

Robinson Defines the New Paradigm
The Stockman Grassfarmer
Available in Resource Manual or call
Ph: 800-748-9808

From the Feed Trough
Woody Lane
The articles are—Opening a Door; Animals and Acres; Not Horsing Around; and Optimistically Speaking.
Available in Resource Manual or
Ph: 541-440-1926

Alternative Field Crops Manual
This field manual provides information on those crops and animals that are considered alternatives to traditional farm commodities.
Available at: http://www.hort.purdue.edu/newcrop/default.html

Managing Grasslands for Profit: A guide to grazing management in the Southeast
Published by the USDA NRCS
This publication provides information about managing grasslands and technical assistance that is available for the management of grasslands.
Available from Pat Paul, NRCS Public Affairs Specialist, at (804) 287-1681

Top 10 Mistakes of New Graziers pg. 36-37
The StockmanGrass Farmer May 2001 vol 58 # 5
By Paul Daigle
Website: http://www.stockmangrassfarmer.com/
Call: 1-800-748-9808
The Stockman Grass Farmer
P.O. Box 2300
Ridgeland, MS 39158-2300
Email: sgfsample@aol.com

Profitable Pork: Strategies for Hog Producers
This publication contains information about low cost and pasture based hog production and marketing niches and options.
Available at www.sare.org/bulletin/hogs or

Hardcopies available by calling 202-720-5203

Grazing Lands Roundup
Informational journal published by the Grazing Lands Technology Institute.
Available at: http://www.ftw.nrcs.usda.gov/glti/glnews.html

The Stockman Grass Farmer: The Grazier's Edge
The Stockman Grass Farmer is a newsletter that provides the latest information on grass farming and features grass farmers across the U.S.
Website: http://www.stockmangrassfarmer.com/
Call: 1-800-748-9808
The Stockman Grass Farmer
P.O. Box 2300
Ridgeland, MS 39158-2300
Email: sgfsample@aol.com

Amazing Grazing Directory
Future Harvest-CASA organization
This is an example of a successful project to help farmers raising grass fed animals gain access to customers, and to educate consumers about locally produced, healthier food choices. This will be achieved through a directory of MD, VA, and WV graziers and their products. The directory is to consumers and restaurants. If you are a grazier in these states and a member you may ask to be included in the directory.
Website: http://www.futureharvestcasa.org/amazing.html
Future Harvest-CASA
106 Market Court
Stevensville, MD 21666
Ph: 410-604-2681
Fax: 410-604-2689
Email: fhcasa@verzion.net

Eat Wild
This website provides information, links, books, and news related to pasture-based farming
http://eatwild.com/

Profitable Pork: Strategies for Hog Producers
Published by the Sustainable Agriculture Network – SARE
This publication discusses various aspects of alternative hog production. It presents the different systems, marketing options, and the environmental and community, family, and lifestyle benefits of alternative hog production.
Available online at: http://www.sare.org/bulletin/hogs/

Alternative Marketing of Pork
This publication addresses alternative production methods, breeds, health, general management concerns, and other management considerations. References and a resource section are provided.
Available online at: http://attra.ncat.org/attra-pub/altpork.html

Designing Feeding Programs for Natural and Organic Pork Production
By Jerry Shurson, Mark Whitney, Lee Johnston, Bob Koehler, Robert Hadad, and Dean Koehler.
This bulletin developed by Swine Center Faculty, discusses topics including, standards for organic pork production, management of organically raised pigs, energy and protein sources, and alternative feeds and use of forage and pasture. The bulletin may be viewed online at: http://www.extension.umn.edu/distribution/livestocksystems/DI7736.html
For a hardcopy, call: (800) 876-8636 or (612) 624-4900 and ask for item 07736-BU.

Bringing Home the Bacon? The Myth of the Role of Corporate Hog Farming in Rural Revitalization
This is a report based on a study conducted by the North Central Regional Center for Rural Development for the Kerr Center for Sustainable Agriculture, based on corporate hog farming.
Available at:
http://www.kerrcenter.com/kerrweb/New%20Folder/BHTB/hog%20report1.pdf

Patchwork Family Farms
Patchwork Family Farms is an economic development project of the Missouri Rural Crisis Center. The program allows hog farmers to market their own products and receive no less than 43 cents per pound or 15 percent above market price. The farmers adhere to strict growing standards and use sustainable farming techniques.
Website: http://www.patchworkfamilyfarms.org/
Lindsay Howerton
Ph: (573) 449-1336
Email: morural@coin.org

Sustainable Goat Production: Meat Goats
Appropriate Technology Transfer for Rural Areas
This publication offers information specific to meat goat production.
Available online at: http://attra.ncat.org/attra-pub/meatgoat.html

Goat World List Serve
This is a list serve for owners of all types, sizes and breeds of goats. For more information go to: http://www.liszt.com/lists/goatworld/?cid=4388
It's the—goat—cheese
Sacramento Bee, June 5, 2002
Available in Resource Manual

Redwood Hill Farm
This is a farm that produces goat cheese.
Website: www.redwoodhill.com
5480 Thomas Rd.
Sebastopol, CA 95472
Ph: (707) 823-8250
Email: contact@redwoodhill.com

Haystack Mountain
This is a farm that produces goat cheese and distributes a newsletter.
Website: www.haystackgoatcheese.com
5239 Niwot Road
Niwot. Colorado 80503
Ph: (303) 581-9948
Email: info@haystackgoatcheese.com

Farmstead Dairy Processing
Small Acreage Options; March 2001
By Paul Dietman
Available at: http://www.uvm.edu/~wagn/archive/dcmarch01.html

The Small Dairy Resource Book: Information Sources for Farmstead Producers and Processors
This publication is a collection of library materials including trade magazines, books, publications and web sites. It contains abstracts on cheese, butter, ice cream, dairy processing, food safety, marketing, animals, feeds and grazing, and appendices of suppliers, consultants, processing courses, and organizations. Available from (802) 656-0484

Cream Line: A new voice for little dairies
Published by Vicki Dunaway
This short newsletter contains dairy-related news, success stories and interest stories.
Cost of subscription: $22 for one year
PO BOX 186
Willis, VA 24380
Ph: (540) 789-7877 (call before 9 p.m. Eastern Time)
Email: ladybug@swva.net

Trends for 21st Century Dairies
AgVentures Magazine, December 2000/January 2001
Available in Resource Manual
Ph: 888-474-6397

Small Acreage Options—Farmstead Dairy Processing
Paul Dietman, University of Wisconsin Extension
Available in Resource Manual

Cowgirl creamery
This is a farm that produces organic cheese.
Website: www.cowgirlcreamery.com/goat.html
P.O. Box 594
80 Fourth Street
Point Reyes Station
California 94956
Phone: (415) 663-9335
Fax: (415) 663-5418
Email: cheese@cowgirlcreamery.com

Oregon Country Beef: Growing a Solution to Economic, Environmental, and Social Needs: an interview with Doc and Connie Hatfield
By Peter Donovan
This is an interview with the owners of Oregon Country Beef, a successful coop that sells $10 million worth of beef each year.
Available at: http://www.managingwholes.com/hatfield1.htm

Horse keeping on a Small Acreage: Facilities Design and Management
By Cherry Hill
This publication is an overview of the responsibilities of horse owners. For more information on the book and how to order, go to:
http://www.horsekeeping.com/horse_books/Horsekeeping_on_a_Small_Acreage.htm

More Horse Than You Can Handle?
Farmstead Stewardship: Guidelines for Horse Owners
Brochure

Good Horse Keeping: Managing Manure to Protect the Environment
Horse Environmental Awareness Program
This video features local citizens sharing their success stories about manure management in Connecticut.
Videos are available from:
NRCS National Employee Development Center
PO Box 6567
Fort Worth, Texas 76115
Ph: (817) 509-3247

Horses for Clean Water
Horses for Clean Water is a program that provides information on conservation and waste management for horse owners. The program offers farm tours, classroom series, workshops and demonstration farms.
Website: http://www.horsesforcleanwater.com/
Ph: (425) 432-6116
Email: alayne.blickle@horsesforcleanwater.com.

New Hampshire Horse Council Inc. (NHHC)
The NHHC is an organization that promotes the interests of the New Hampshire Equine Industry. Their website provides access to the publications, and information on their awards and special events.
Website: http://nhhorsecouncil.com/index2.html
Email: brookee171@hotmail.com

Connecticut Horse Environmental Awareness Program (HEAP)
HEAP is a coalition of federal, state, and local agencies, organizations, and individuals interested in educating horse people on Best Management Practices to protect the environment.
King's Mark RC&D
900 Northrop Road, Suite A
Wallingford, CT 06492-1900
Ph: (203) 284-3663

Dairy Processing Plant: Questions that need to be answered!
These questions are located online at
http://cpdmp.cornell.edu

Farmer's Guide to Processing and Selling Meat or Poultry: What are the rules? Where are the contacts? and Who are the Regulators?
This publication is intended to assist farmers and their advisors in understanding regulations affecting the processing and sale of meat and poultry.
Available online at: http://lehigh.extension.psu.edu/Agriculture/Farmers_Guide.pdf
Hardcopies available from: John Berry, Agricultural Marketing Educator, Penn State University
Ph: (610) 391-9840
Email: jwb15@psu.edu

E. Poultry

Sustainable Chicken Production
This publication addresses the alternative production methods, breeds, health, general management concerns, and other management considerations. References and a resource section are provided.
Available online at: http://attra.ncat.org/attra-pub/PDF/chicken.pdf

Profitable Poultry: Raising Birds on Pasture
Published by the Sustainable Agriculture Network – SARE
This publication discusses various alternative poultry production systems and discusses their potential for profit. It also discusses the marketing options, and environmental benefits of alternative poultry production.
Available online at: http://www.sare.org/bulletin/poultry/

Hardcopies available by calling 202-720-5203.

Pastured Poultry
ATTRA
This publication describes the experiences of 35 southern farmers who from 1996-99 participated in a project to produce and market pastured poultry. Information includes pen-building, brooding, feeding, processing, marketing, legal matters, economics, and several other topics.
Available online at: http://www.attra.org/attra-pub/pasturedpoultry.html
Hardcopies available by calling 1-800-346-9140

Pastured Poultry Provides Healthy Meat, Healthy Profits
By Lori Compas
Available at: http://www.nxlevel.org/Pages/res/res_p/res_ag_ar.html

American Pastured Poultry Producers Association (APPPA)
APPPA is a nonprofit educational and networking organization dedicated to encouraging the production, processing, and marketing of poultry raised on pasture. Their newsletter, Grit!, is available through their website, which also provides information on the Association as well as a listing of other resources relating to pastured poultry.
Website: http://www.apppa.org/
PO Box 1024
Chippewa Falls, WI 54729
Ph: (715) 577-5966
Fax :(715) 667-3044
Email: grit@appa.org (newsletter)

Small-Scale Alternative Agriculture. Poultry
This publication is a two-page information sheet. It can be obtained by emailing san@nal.usda.gov or by calling (301) 504-6245.

Chicken Tractor: The Permaculture Guide to Happy Hens and Healthy Soil
By Andy Lee and Pat Foreman
Good Earth Publications (January 1998)
ISBN: 0962464864
This book is about raising chickens in your backyard or on small acreage. It is an innovative way of raising chickens which could compliment your garden enterprise. It also has a small farm resource list included in an appendix. The book is available from the publisher as well as from other common booksellers.

Raising Emus and Ostriches
NAL, USDA (SRB 97-06)
This publication contains 70 pages of references on emus and ostrich production and marketing. Available at: www.nal.usda.gov/afsic
Available from (301) 504-6559 or afsic@nal.usda.gov

Ranch Diversification Workshop
Sponsored by Sonoran Institute & Sierra Business Council
These proceedings contain information on production, niche marketing, recreation and solar enterprises.
Sonoran Institute
7650 E. Broadway Blvd., Suite 203
Tucson, AZ 85710
Ph: (520) 290-0828
www.sonoran.org

Pastured Poultry Enterprise Budget Link
www.wisc.edu/cias/pubs/poultbud.html

F. Aquaculture

Aquaculture Network Information Center
This website provides access to all electronic aquaculture information, including newsletters and other publications.
http://aquanic.org

Small-Scale Agriculture Alternative
This is a two-page information sheet on aquaculture. The information sheet can be obtained by emailing san@nal.usda.gov or by calling (301) 504-6245.
Available in the Resource Manual at www.nrcs.usda.gov/technical/RESS/altenterprise or CD by contacting Jim Maetzold, 202-720-2307 or jim.maetzold@usda.gov

Aquaculture in Illinois
By Daniel Selock, Southern Illinois University
Small Farm Today (July/August 2000)
For more information, contact Daniel Selock at (618) 536-4451 or dselock@siu.edu

Evaluating an Aquaculture Enterprise
This publication addresses the alternative production methods, specie, health, general management concerns, and other management considerations. References and a resource section are provided.
Available online at: http://attra.ncat.org/attra-pub/aquaculture.html

Neptune's Bounty: Growing Seaweed Pg. 18 -20
AgVentures Magazine Feb/March 2001
By Regina G. Burgess
Ph: 888-474-6397

Purrfecting the Catfish Pg. 21 – 23
AgVentures Magazine Feb/March 2001

By Tara Weaver-Missick
Ph: 888-474-6397

Fish Friendly Farming Farm Conservation Plan Workbook Introduction
Sotoyome Resource Conservation District has organized the Fish Friendly Farming Certificaton Program to improve water quality and habitat in the Russian River area of California.
Available in Resource Manual

Trout Unlimited (TU)
TU is an organization uses an extensive volunteer network to conserve, protect and restore North America's trout and salmon fisheries and their watersheds.
Website: http://www.tu.org/
1500 Wilson Blvd., #310
Arlington, VA 22209-2404
Ph: (800) 834-2419
Email: trout@tu.org

Ponds in United States
There is a list of the ponds in the United States at the following web site:
www.corps_geo.USACE.Army.mil/HO.html

Ponds—Planning, Design, Construction
NRCS (Publication #590)
This handbook serves as a general information resource to the landowner and a reference for the engineer, technician and contractor by describing the requirements for building a pond. Available online at:
http://www.wcc.nrcs.usda.gov/water/quality/common/ponds.pdf
Hardcopies available by calling, 1-888-LANDCARE.

Missouri Pond Handbook
Missouri Department of Conservation.
This publication discusses the design and management of a new or old fish pond. It also provides recommendations for dealing with common pond problems. Available online at:
http://www.conservation.state.mo.us/documents/fish/pondhb.pdf
Hardcopies available by calling, (573) 751-4115

POND
POND is a computer program designed to guide decision making processes relevant to warm water pond aquaculture. The program comes with an economic package for doing enterprise budgets.
Available at http://biosys.bre.orst.edu/pond/pond.htm

For-Fee Pond Fishing: Decision-Making Factors
Sea Grant Aquaculture Fact Sheet September 1991
Cornell Cooperative Extension and State University of New York

By Douglas H. Ververs
This is a checklist designed to help you determine whether or not a fish for fee enterprise is feasible for your particular situation.
Cost: $0.50
Available from New York Sea Grant
Sharon Mullen
Swetman Hall
SUNY College at Oswego
Oswego, NY 13126-3599

Understanding an Urban Fishery: Braunig Lake and Calveras Lake, San Antonio, Texas
By Stephen G. Sutton and Robert B. Ditton
Department of Wildlife and Fisheries Sciences.
This publication is a report based on a mail survey used to determine, among other things, angler demographic, fishing participation, attitudes, experience preferences, and willingness to pay increased costs to fish at the Braunig and Calveras Lakes.
Available at: http://lutra.tamu.edu/hdlab/Docs/braunigpdf.PDF

Economic Impact of Recreational Fishing on Minnesota Waters of Lake Superior
By Jeff Gunderson and Glenn Kreag
University of Minnesota (1991)
ID: Publication F6
Available online at: http://www.msue.msu.edu/msue/imp/modtd/33510310.html

Lake Ontario Angler Satisfaction
Coastal Recreation Fact Sheet
By Nancy A. Connelly, Diane Kuehn, Tommy L. Brown, Barbara A. Knuth
New York Sea Grant (May 1997)
This publication reports on results of a survey.
Available online at: www.msue.msu.edu/msue/imp/modtd/33840030.html

1996 Angler Effort/Expenditures on New York's Great Lakes Waters
Coastal Recreation Fact Sheet
By Nancy A. Connelly, Diane Kuehn, Tommy L. Brown, and Barbara A. Knuth
New York Sea Grant
Available online at: www.msue.msu.edu/msue/imp/modtd/33840031.html

Providing Public Access in Coastal Areas: Options for Landowners
This publication is a fact sheet produced by the Great Lakes Sea Grant Network, Coastal Land Use Committee.
By Mary Bielen, Cynthia Hagley, Leroy Hushak, Michael Klepinger, Glenn Kreag, Diane Kuehn, Frank Lichtkoppler, John McKinney, Jennifer Pultz, and Nancy Riggs
Available from New York Sea Grant
Sharon Mullen
Swetman Hall
SUNY College at Oswego

Oswego, NY 13126-3599

Activities at Free Public Water Sites
By David G. Pitt, Curtis Schatz, David W. Lime, and Leo H. McAvoy
University of Minnesota (1990)
ID: CD-FO-3942
Available online at: www.msue.msu.edu/msue/imp/modtd/33840108.html

Preferred Facilities/Services: Free Public Water Access Sites and Services
By David W. Lime, Curtis Schatz, Leo H. Mc Avoy, and David G. Pitt
University of Minnesota (1990)
ID: CD-FO-3925
Research Summaries No. 9
Available online at: www.msue.msu.edu/msue/imp/modtd/33840419.html

Recreational Boating: Lake Superior
By David W. Lime, Curtis Schatz, Leo H. Mc Avoy, and David G. Pitt
University of Minnesota (1989)
ID: CD-FO-3880
Research Summaries No. 5
Available online at: www.msue.msu.edu/msue/imp/modtd/33840107.html

Boating Patterns and Behavior
By Curtis Schatz, David Lime, Leo McAvoy, and David Pitt
University of Minnesota (1989)
ID: CD-FO-3809
Available online at: www.msue.msu.edu/msue/imp/modtd/33840421.html

Minnesota Boat Owners: A Summary of What They Are and What They Want
By David Lime, Leo McAvoy, David Pitt, and Curtis Schatz
University of Minnesota (1990)
ID: CD-FO-3940
This publication summarizes and highlights some of the most salient findings of the research conducted on Minnesota boat owners and what they want.
Available online at: www.msue.msu.edu/msue/imp/modtd/33842999.html

Boating Safety in Minnesota
By Leo H. McAvoy, David W. Lime, Curtis Schatz, and David G. Pitt
University of Minnesota (1990)
ID: CD-FO-3895
Research Summaries No. 8
Available online at:www.msue.msu.edu/msue/imp/modtd/33840420.html

Water Works Wonders Website
This website provides information on fishing, boating and caring for the water. The website also offers the opportunity to reach a national audience through their free listing.

http://www.waterworkswonders.org/

American SportFishing Association
The ASA is the official trade association for the sportfishing industry. The association is committed to ensuring healthy, sustainable fisheries, increasing participation through education and promotion and helping ASA member companies improve business. Their website contains current fishing statistics, news, and information on government affairs and their conservation programs.
Website: http://www.asafishing.org/
225 Reinekers Lane, Suite 420
Alexandria, VA 22314
Ph: (703) 519-9691
Email: info@asafishing.org

BoatingandFishing.com
This website provides news, magazines, links, and general information related to boating and fishing.
http://www.boatingandfishing.com/

Recreational Fisheries Program
National Marine Fisheries Service
The Recreational Fisheries program works to strengthen the management and conservation of marine resources. Their work involves efforts to improve fisheries conservation, provide more recreational fishing opportunities and to develop policies that work with recreational fisheries to protect endangered species.
Website: http://www.nmfs.noaa.gov/irf/irf.html
1315 East West Highway, 14th Floor
Silver Spring, MD 20910
Email: Miner@noaa.gov

Marine Recreational Statistics Survey Website
http://www.st.nmfs.gov/st1/recreational/pubs.html

Responsive Management
Responsive Management is a Virginia-based public opinion polling and survey research firm specializing in fisheries, wildlife, natural resource, outdoor recreation and environmental issues. Website:
http://responsivemanagement.com/

Dickinson Country Water Improvement Program Website
This website includes information on water improvement and a page of links.
http://www.ikansas.com/~water/index.html

G. Crops/Horiculture

Small-Scale Agriculture Alternatives
These are two-page information sheets that can be obtained by emailing: san@nal.usda.gov or by calling (301) 504-6245.
Available in the Resource Manual at www.nrcs.usda.gov/technical/RESS/altenterprise or CD by contacting Jim Maetzold, 202-720-2307 or jim.maetzold@usda.gov

-Blueberries
-Brambles
-American Ginseng
-Dessert Vines
-Exotic Fruits
-Foliage Plants
-Herbs
-Northern Nut Growing
-Peppers
-Pumpkins
-Specialty Corns
-Specialty Flowers
-Specialty Mushrooms
-Specialty Potatoes
-Specialty Vegetables
-Strawberries
-Wildflowers
-Shiitake Mushrooms
-Mushrooms
-Asparagus

Kenaf. Go to: Yahoo.com and enter "kenaf in Mississippi" in the search feature. There is information on production and processing that is practical and economical.

Diversify Crops to Boost Profits and Stewardship
Sustainable Agriculture Network (SARE)
Available online at: http://www.sare.org/diversify/
Hardcopies available by calling, (301) 504-6559

Alternative Crops.
Compiled by: Karl R. Schneider
NAL, USDA (QB 96-11)
ISSN: 1052-5378
This publication contains 40 pages of references on the production and marketing of alternative crops. Available online at: http://www.nal.usda.gov/afsic/sbjndstr.htm.
Hardcopies available from the AFSIC
Ph: (301) 504-6559
Email: afsic@nal.usda.gov . .

Alternative Field Crops Manual
This field manual provides information on those crops and animals that are considered alternatives to traditional farm commodities.
Available at: http://www.hort.purdue.edu/newcrop/default.html

Alternative Agronomic Crops.
This publication addresses the alternative production methods, varieties, health, general management concerns, and other management considerations. References and a resource section are provided.
Available online at: http://attra.ncat.org/attra-pub/altcrop.html

We're Gonna Be Rich! Growing Specialty Cut Flowers for Market
Frank and Pamel Arnosky
Fairplain Publications
P.O.Box 3747
Lawrence, KS 66046
Ph: (785) 748-0609
Email: growing4market@earthlink.net

Sustainable Cut Flowers: A Horticulture Production Guide
Appropriate Technology Transfer for Rural Areas
By Lane Greer
February 2000
This publication is meant to be used as a complementary piece of information that concentrates on sustainable production techniques.
Available at: http://www.attra.org/attra-pub/altcrop.html

Lavender as an Alternative Farming Enterprise
Publication of the Appropriate Technology Transfer for Rural Areas
By Katherine L. Adam
February 2001
Available at: http://www.attra.org/attra-pub/lavender.html#lavender

Medicinal Herbs in the Garden, Field & Marketplace
By Lee Sturdivant and Tim Blakely
This is a guide written by two of America's foremost medicinal herb growers and entrepreneurs.
Cost: $24.95 (plus shipping and handling)
Order from:
San Juan Naturals
PO Box 642P
Friday Harbor, WA 98250
Ph: 1-800-770-9070
Or visit: http://www.bootstraps.com

American Herb Products Association (AHPA)
The AHPA is the national trade association for the herbal supplement industry. Their mission is to promote the responsible commerce of herbal products.
Website: http://www.ahpa.org/
8484 Georgia Ave., Suite 370
Silver Spring, MD 20910
Ph: (301) 588-1171

Herb Growing and Marketing Network
Website: http://www.herbworld.com
PO Box 245
Silver Spring, PA 17575-0245
Ph: (717) 393-3295

Pennsylvania Hardy Kiwi Development & Marketing
By David J. Jackson Hardy Kiwi Developer/Grower
Kiwi Korners, 1707 Toby Run Road, Danville, PA 17821
This publication provides information on the hardy kiwi including site selection, frost protection, trellising, irrigation, pruning, diseases and pests, etc.

Transgenic Crops: An Environmental Assessment
Henry A. Wallace Center for Agricultural and Environmental Policy at Winrock International
This publication is a report based on a study conducted on the environmental effects of the genetically altered crops.
Available at: http://www.winrock.org/Transgenic.pdf

Greenhouse and Hydroponic Vegetable Production: Horticulture Resources
Appropriate Technology Transfer for Rural Areas
By Steve Diver and Sherry Sue Sparks (student intern)
February 2000
Available at: http://www.attra.org/attra-pub/ghwebRL.html

Commercial Vegetable Production Guides
Oregon State University
Available online at: http://www.orst.edu/dept/NWREC/vegindex.html

Chefs Head to Local Farmer's Market
Available at http://www.restaurant.org/rusa/magArticle.cfm?ArticleID=233

The New Farmers' Market: Farm-Fresh Ideas for Producers, Mangers and Communities
By Vance Corum, Marcie Rosenzweig, and Eric Gibson
Published by New World Publishing
For more information, go to:
http://www.nwpub.net/nfm.html
Cost: $24.95 (plus shipping and handling)

Email: sanpubs@uvm.edu
Ph: (802) 656-0484

Around the World at Farmers' Market
By Steve Salt
This is a handbook for raising and marketing ethnic and old-fashioned vegetables, fruits, herbs, and mushrooms.
Cost: $34.95 (plus shipping and handling)
Order from: Hagoth Press
RR 1, Box 263
Kirksville, MO 63501
Ph: (660) 332-7217
Fax: (660) 332-4434
Email: saltsgvf@istlaplata.net

Growing for Market: news and ideas for market gardeners
A monthly magazine for direct-market farmers.
Website: http://www.growingformarket.com/
Po Box 3747 Lawrence, KS 66046
Ph: (785) 748-0605 or 1-800-307-8949
Email: growin4market@earthlink.net

Backyard Market Gardening, The Entrepreneur's Guide to Selling What You Grow
by Andy Lee
Good Earth Publications (April 1995)
1702 Mountain View Road
Buena Vista, VA 24416
ISBN: 0962464805;
This book discusses how to sell quality garden produce to the public for fun and profit. The production side is discussed in less detail. The book is available from the publisher as well as from other common booksellers.

Northland Berry News
This is a quarterly publication aimed at "berrypreneurs."
Website: http://www.berrynews.com/
Cost: $20 annually
595 Grand Avenue
St. Paul, MN 55102-2611
Ph: (651) 265-3413
Email: pmo@BerryNews.com

Leopold Center Offers New Look at Grapes, an Old Iowa Crop
A copy of the report the article is based on is available from:
Leopold Center
Ph: (515) 294 – 3711
Website http://www.leopold.iastate.edu

Biodynamic Farming and Gardening Association
The Biodynamic Farming and Gardening Association promotes and provides information about biodynamic farming and gardening. Their website provides publications, information about conferences, books, links and a website search engine.
Website: http://www.biodynamics.com/
Building 1002B, Thoreau Center, The Presidio
P.O. Box 29135
San Francisco, CA 94129-0135
Ph: (888) 516-7797
E-mail biodynamic@aol.com

Ohio Fruit and Vegetable Growers Congress and North American Farmers' Direct Marketing Conference Proceedings (Feb. 10 – 12, 2000)
Copies may be obtained by making a check for $10.00 payable to the Ohio Fruit and Vegetable Growers Congress and mailing it to:
PO Box 479
Columbus, OH 43216

Midwest Small Fruit & Grape Net
This website provides information on management, commercial production, harvesting, and marketing of strawberries, raspberries, blackberries, high bush berries, and grapes. The website also contains links to newsletters, current research reports, market prices, and business reports. Additionally specialists in insect, disease, and weed control are available to answer questions through their Ask the Expert link.
http://www.ag.ohio-state.edu/~sfgnet/

Fruit and Nut Orchard Network
Oregon State University
This website is an information resource for fruit and nut growers. It provides information on various aspects of fruit and nut production, including consumer trends. It also provides journal abstracts, newsletters, research information, presentations, extension publications, miscellaneous resources, and a website search engine.
http://www.orst.edu/dept/hort/orchardnet/

UC Davis Fruit and Nut Research and Information Center
Website: http://fruitsandnuts.ucdavis.edu/
Dept. of Pomology
University of California
One Shields Ave.
Davis, CA 95616-8683
Ph: (530) 754-9708
Email: fruitsandnuts@ucdavis.edu

NC Fresh Connection
NC Fresh Connection is a campaign by the North Carolina Department of Agriculture & Consumer Services that works by linking buyers with NC produce growers, cooperatives and processors across the state who can supply seasonal fruits and vegetables.
http://www.ncagr.com/freshconnect/index.htm

Local Harvest
This website allows consumers all over the country to search for community supported agriculture (CSA), farmers' markets, farm stands, and U-pick farms in their area.
www.localharvest.org

South Dakota Master Gardener (Example)
This program offers instruction, in almost every state, that covers topics in: lawn care, selection and care of ornamental trees and shrubs, insect, disease, and weed control, safe use of pesticides, soils and plant nutrition, vegetable, fruit and flower gardening, plant propagation and herbaceous plants. In exchange for the training, participants are required to return 50 hours of volunteer time to their county extension program over the next two years.
Website: http://hflp.sdstate.edu/mg/mg%20training%20info.htm
David Graper
Box 2140A SDSU
Brookings, SD 57007
Ph: (605) 688-6253

Junior Master Gardener Program (JMG) (Example)
JMG is a program that conducts a variety of activities to teach children, in several states, about horticulture and environmental science. Their website is a great resource for kids. It provides information about their programs and how to participate, has an online store, and contains various links.
Website: http://jmgkids.com/
225 Horticulture/Forestry Bldg.
College Station, TX 77843-2134
Ph: (979) 845-8565
Email: jmg@tamu.edu

American Community Garden Association
The ACGA is a national nonprofit membership organization that supports community greening in urban and rural communities. Their website provides information on their programs and conferences, in addition to links to their publications.
Website: http://www.communitygarden.org/
100 N. 20th Street, 5th Floor
Philadelphia, PA 19103-1495
Ph: (215) 988-8785
Email: smccabe@pennhort.org

Hortline
Part of the MBG Kemper Center for Home Gardening Website, Hortline provides a web based 24 hour Help Desk for the home gardener.
http://www.mobot.org/gardeninghelp/hortline/index.shtml

American Mushroom Institute (AMI)
AMI is a national voluntary trade association that represents the growers, processors, and marketers of cultivated mushrooms in the United States.
Website: http://www.americanmushroom.org/
1284 Gap Newport Pike
Suite 2
Avandale, PA 19311
Ph: (202) 842-4344

Rodale Institute
The Rodale Institute's goal is to achieve a regenerative food system that renews and improves environmental and human health. Their website provides general information on regenerative farming and gardening, and regenerative science. The website also has an online bookstore.
Website: http://www.rodaleinstitute.org
Rodale Institute
611 Siegfriedale Road
Kutztown, PA 19530-9320
Ph: (610) 683-14000
Fax: (610) 683-8548
Email: info@rodaleinst.org

Eastern Native Seed Conservancy
The Conservancy is a non-profit organization that heads the Conservation and Regional Exchange by Seed Savers Heirloom Seed Conservation Project and the Native Seeds Project.
Website: http://www.berkshire.net/ensc/seedmain.html
PO Box 451
Great Barrington, Massachusetts 01230
Ph: (413) 229-8316
Email: natseeds@aol.com

Rohrer Seeds
This company sells seeds and horticultural products. You can find out more about the company and their products through their annual seed catalog or their website.
Website: http://www.rohrerseeds.com/
P. L. Rohrer & Bro., Inc.
P.O. Box 250
2472 Old Philadelphia Pike
Smoketown, PA 17576
Ph: (717) 299-2571 or (717) 299-5347

Email: info@rohrerseeds.com

Fedco
Fedco is a seed, organic supplies, trees and bulbs company that is organized as a cooperative. Their website allows you to order their products, or subscribe to receive their catalogues. They annually distribute three different catalogues: the Seeds, Tubers and Organic Growers Supply catalog, which is available in December, the Trees catalog, which is available in October, and the Bulbs catalog, which is available in June.
P.O. BOX 520-A
Waterville, ME 04901
Website: http://www.fedcoseeds.com/

Wildseed Farms
Wildseed Farms is the nation's largest working wildflower seed farm, where you can purchase wildflower seeds direct from the grower. Their catalog is available free, and can also be viewed on their website.
Website: http://www.wildseedfarms.com
Wildseed Farms, Inc.
P. O. Box 308
Eagle Lake, TX 77434
Ph: 1-800-848-0078

Community Harvest
Community Harvest is a nonprofit organization working to create a more local, sustainable food system in the Washington DC region.
Website: http://www.goodfooddc.net/community.htm
2437 15th St., NW
Washington, DC 20009
Ph: (202) 667-8875
Email: communityharvest@mindspring.com

Sunnyside Farms
Sunnyside Farms, located in an historic area of Virginia, produces and markets value-added products and offer educational tours of their farm. They also publish a newsletter, *Market News*.
Website: www.sunnysidefarms.com
P.O. Box 478
Washington, VA 22747
Ph: (540) 675-2627 or (540) 675-2095
Email: bill@sunnysidefarms.com

Greentree Naturals Website
This website offers information on the Greentree Naturals farm and what has helped them become more successful as a small acreage organic farm.
http://www.greentreenaturals.com/

Cornell Horticultural Business and Marketing Program
This program works to enhance the competitive position of the New York fruit, vegetable, and ornamental horticultural industry through targeted, curriculum-driven educational programs. Their website provides additional information on risk management.
Website: http://aem.cornell.edu/special_programs/hortmgt/index.htm
Ph: (607) 255-3688,
Email: wl32@cornell.edu

Organic Production: Recent Publications and Current Information Sources
NAL, USDA (SRB 96-07) 1996
The publication contains 30 pages of references on organic agricultural production.
Available online at: http://www.nal.usda.gov/afsic/ofp/
Hardcopies available from the Alternative Farming Systems Information Center (AFSIC)
Room 304, 10301 Baltimore Ave
Beltsville, MD 20705-2351
Ph: (301) 504-6559
Email: afsic@nal.usda.gov

The National Organic Program
Website: http://www.ams.usda.gov/nop/
Richard Mathews
Program Manager
Room 4008-South Building
1400 and Independence Avenue, SW
Washington, DC 20250-0020
Ph: (202) 720-3252
Fax: (202) 205-7808
Email: NOPWebmaster@usda.gov

Organic Farming Research Foundation (OFRF)
The OFRF is a nonprofit organization dedicated to funding research related to organic farming and educating the public about organic farming and organic farming issues.
Website: http://www.ofrf.org/
P.O. Box 440
Santa Cruz, CA 95061
Ph: (831) 426-6606
Email: research@ofrf.org

Organic Trade Association (OTA)
OTA is a membership based business association that represents the organic industries in Canada, the United States, and Mexico. Members include growers, shippers, processors, certifiers, farmer associations, brokers, manufacturers, consultants, distributors and retailers. Their website provides news and information, online directories and a website search engine.
Website: http://www.ota.com/

PO Box 547
Greenfield, MA 01302
Shipping: 60 Wells Street
Greenfield, MA 01301
Ph: (413)-774-7511

North Florida Research and Education Center (NFREC) – Suwannee Valley
The NFREC provides crop-related information. Their website provides information on their workshops, programs, and on a variety of topics including vegetable, fruit and nut crops, organic production and irrigation, fertilizer and manure management.
Website: http://nfrec-sv.ifas.ufl.edu/
7580 County Road 136,
Live Oak, FL 32060
Ph: (386) 362-1725
Email: nfrec-sv@mail.ifas.ufl.edu

National Integrated Pest Management Network (NIPM)
The NIPM is dedicated to providing the latest and most accurate pest management information available on the World Wide Web.
http://www.reeusda.gov/nipmn/

How to Grow More Vegetables: than you ever thought possible on less than you can imagine.
This book is based on 30 years of experience and research on how to grow biointensive.
John Jeavons
Ten Speed Press
PO Box 7123
Berkeley, CA 94707
Ph: 800-841-2665
www.tenspeed.com

New Look at Grapes
Grapes has the potential for a value-added crop in Iowa.
Leopold Center, Ames, IA
Available in Resource Manual and at www.extension
agron.iastate.edu/sustag/information/newrelgrapes.htm.

Lavender As An Alternative Farming Enterprise
Lavender has a market as an agritourism product, an oil and other uses.
Available in Resource Manual and www.ATTRA.org
Ph: 800-346-9140

Pine Straw: Money Growing on Trees
AgVentures Magazine, February/March 2001
Ph: 888-474-6397

Chestnut Market Opportunities Link
www.foodmap.unl.edu/index.asp

H. Food Safety

Urban Agriculture and Community Food Security in the United States:
Farming from the City Center to the Urban Fringe
Available online at: http://www.foodsecurity.org/urbanag.html

Food Safety Begins on the Farm: A Grower's Guide
Copies of this book are available from the Cornell Good Agricultural Practices Program
Ph: (607) 254- 5383
Email: eab38@cornell.edu
Available online at:
http://www.hort.cornell.edu/commercialvegetables/issues/foodsafe.html

The Penn State Food Safety Website
Introducing Food Safety Throughout the Food System
This is a website created by the Department of Food Science that contains two databases with over 1300 links to online food safety resources.
http://foodsafety.cas.psu.edu

I. Apiary

Small Scale AG. Bees
A two-page information sheet can be obtained by mailing: san@nal.usda.gov or by calling (301) 504-6245.
Available in the Resource Manual at www.nrcs.usda.gov/technical/RESS/altenterprise or CD by contacting Jim Maetzold, 202-720-2307 or jim.maetzold@usda.gov

Bee Culture Magazine
http://bee.airoot.com/beeculture/index.htm

University of Montana Bee Alert Website
http://biology.dbs.umt.edu/bees/default.htm

Beehoo—the world's beekeeping directory
www.beehoo.com

Beekeepers References
www.hive-mind.com/bee/informational.asp

Beekeepers weblinks
http://ourworld.compuserve.com/homepages/Beekeeping/weblinks.htm

University of Nebraska Entomology and beekeeping website
http://entomology.unl.edu/beekpg

BeeSource.com
www.beesource.com
(good resource)

Clemson University Apiculture and Pollination website
http://entweb.clemson.edu/cuentres/eiis/apic/apic.htm

University of Georgia Honey Bees and BeeKeeping website
www.ces.uga.edu/pubcd/b1045-w.html

Beekeeping in Rural Areas
www.idrc.ca/nayudamma/beekeeping_4e.html

www.ingenbees.com

International Bee Research Association
www.cardiff.ac.uk/ibra

Mid-Atlantic Apiculture Research and Extension Consortium
http://maarec.cas.psu.edu

National Honey Board
www.nhb.org

The Internet Apiculture and Beekeeping Archive
www.ibiblio.org/bees

Apiculture News (newsletter)
http://entomology.ucdavis.edu/faculty/mussen/news.cfm

Amercian Beekeeping Federation
www.abfnet.org

Some Books

Keeping Bees

BeeKeeping for Dummies

Hive Management: A seasonal guide for beekeepers

A New Starting Right with Bees: A Beginners Handbook on Beekeeping

Beekeeping: A Practical Guide for the Novice Beekeeper Buying Bees, Management, Rearing, Honey Production

J. Non-farm/ Farm Residents

HandMade in America
HandMade in America is a nonprofit organization that promotes the craft of handmade objects and a means to sustainable community and economic development. See Chapter VII for table of contents
Website: http://www.handmadeinamerica.org/
PO Box 2089
Asheville, NC 28802
Ph: (828) 252-3121
Email: wnccrafts@ail.com

Farms, Gardens & Countryside Trails of Western North Carolina
Backroads and scenic byways to some of the most beautiful farms and gardens in the Blue Ridge Mountains. See Chapter VII for table of contents.
Website: http://www.handmadeinamerica.org/
PO Box 2089
Asheville, NC 28802
Ph: (828) 252-3121
Email: wnccrafts@ail.com

Worms for Composting.
This publication addresses the alternative production methods, varieties, health, general management concerns, and other management considerations. References and a resource section are provided. Available online at: http://attra.ncat.org/attra-pub/vermicom.html

Pellet Fuels Institute
The Pellet Fuels Institute is a trade association which represents the fuel preparation and clean burning technology of renewable bio-mass energy resources. Their webpage provides information on how pellet fuel is made, its features and benefits. It also provides information on pellet fuels manufacturers and suppliers, including a directory of important industry names and addresses.
Website: http://www.pelletheat.org
1601 North Kent Street, Suite 1001
Arlington, VA 22209
Ph: (703) 522-6778
Fax: (703) 522-0548
Email: pfimail@pelletheat.org

K. Education

A Farmer's Guide to Hosting Farm Visits for Children
By Market Cooking for Kids, A project of the Center for Urban Education about Sustainable Agriculture
Available at http://www.sarep.ucdavis.edu/Grants/Reports/Kraus/97-36FarmersGuide.htm

Old McDonald Farms
This is a farm that hosts a variety of educational and entertaining activities.
Website: http://1000islands.com/mcfarm/oldmac.htm

Willing Workers on Organic Farms (New Zealand)
This is a program in New Zealand that allows tourists or interested farmers to stay on their farm and learn organic farming methods by helping their hosts with the various projects they may be working on.
Website: http://www.wwoof.co.nz/
PO Box 1172
Nelson
New Zealand
Ph: 0064 3 544 9890
Email: support@wwoof.co.nz

The Pizza Farm
The goal of this operation is to take less than one acre of land and turn it into an education tool. It tells where food comes from and what it takes to produce it.
Website: www.pizzafarm.org
Ph: (800) 557-1222
Email: pizzafarmer@psnw.com

USDA Ag in the Classroom (AITC)
AITIC is a program coordinated by the USDA that helps students gain awareness of the role of agriculture in both the economy and society. Ag in the Classroom programs are carried out in each state according to state needs and interest. Their website provides information on the various state programs, teacher resources, and an informational website specifically designed for kids.
Website: http://www.agclassroom.org/
United States Department of Agriculture
1400 Independence Avenue S.W.
Agriculture in the Classroom
Stop 2251
Washington, D.C. 20250-2251.
Ph: (202) 720-7925
E-mail: kcullinan@intranet.reeusda.gov

Food Guide Pyramid for Young Children: A Daily Guide for 2-to-6 Year Olds
USDA, Food and Nutrition Service

www.fns.usda.gov

The Food System: Building Youth Awareness through Involvement and Edible Connections: A Planning Guide for Conducting a Food Communications Forum.
This publication is a 142-page guidebook that introduces educators and youth to the concept of the food system. Edible Connections is a publication and a video.
To order, go to: http://pubs.cas.psu.edu/Pubs/agrs79.html

The Most Populous Realm
Life about soil organisms
Available in Resource Manual

You Learn What You Eat: Cognition Meets Nutrition in Berkeley Schools
By David Sobel
Orion Magazine
Available at: http://www.oriononline.org/pages/oa/01-3oa/01-3oa_learn.html

Edible Schoolyard
Edible Schoolyard is a nonprofit organization that works with Martin Luther King Jr. middle school in Berkley, CA. Children who attend the middle school, plans and plants the edible gardens. Use this as another business idea.
Website: http://www.edibleschoolyard.org/

USDA Farmers Market Coloring Book
You can order a free copy at:
http://www.ams.usda.gov/directmarketing/coloringbook.htm
Orders for hardcopies of this publication are no longer available. Anyone may download and personalize the coloring book for their farmers' market, educator activity, direct market businesss, or agricultural association.
www.ams.usda.gov/directmarketing

New York Ag in the Classroom Program
Cornell University
Website: http://www.cals.cornell.edu/dept/education/programs/AITC/index.htm
Ph: (607) 255-9253
Email def4@cornell.edu

Massachusetts Ag in the Classroom Program Website
http://www.aginclassroom.org/

Kentucky Agriculture and Environment in the Classroom, Inc.
http://www.kyagr.com/enviro_out/education/programs/KAEC/index.htm

Wyoming Agriculture in the Classroom
Website: www.wyoagcenter.com/waic/classroom.html
2219 Carey Ave.

Cheyenne, WY 82002
Ph: 307-7776618
Fax: 307-7776593
Email: wyaic@state.wy.us

Maryland Agriculture Education Foundation (MAEF)
MAEF, Inc. is a nonprofit organization that, through various education programs, promotes and enhances understanding and appreciation of the importance of agricultural in our daily lives.
Website: http://www.mdagintheclassroom.com/
12985 Frederick Road, P.O. Box 409
West Friendship, MD 21794
Ph: (800) 205-9737 or (410) 489-9030
Email: admin@mdagintheclassroom.com

The Most Populous Soil
By Ellen Alperstein
This article is a brief, light-hearted look at the science of soil. It mentions the Field Museum's $10 million exhibit called Underground Adventure. The exhibit is available online at: http://www.fieldmuseum.org/ua/default.htm

Dole's 5 a Day Adventure
This is Dole's effort to encourage good nutrition. Their website contains free educational support materials. They will provide a free CD Rom to educators.
Website: http://www.dole5aday.com/

Electronic Farm Website
This website contains an agricultural directory of small farms across the United States.
http://www.co.ha.md.us/economic_development/agriculture/maef.htm

Coalition for Education in the Outdoors
The coalition is a nonprofit network of outdoor and environmental education or related centers, educational institutions, fish and wildlife agencies and businesses who work together to support outdoor education. Their publication, the Taproot Journal features environment and outdoor news and reviews and a list of resources.
Website: http://www.outdooredcoalition.org/
State University of New York at Cortland
P.O. Box 2000, Park Center, Cortland NY 13045
Ph: (607) 753-4971
Email: info@outdooredcoalition.org

GreenWorks
GreenWorks, part of the Environmental Fund for Pennsylvania, is an organization that provides information on and grants for environmental conservation and awareness. Their website contains a search feature, an electronic newsletter, information on their grants

and programs, the largest collection of environmental videos available online, and an educational page for kids.
Website: http://www.greenworks.tv
Ph: 1-800-334-3190 or (215) 545-5880
Email: talktous@greenworks.tv

New York Harvest for New York Kids Week
This week, designated each year by the NY state assembly, is designed to encourage children, their schools and their families to purchase, consume and learn about local foods and agriculture.
NYS Assembly Task Force on Food
Farm and Nutrition Policy
Room 547 Capitol
Albany, NY 12248
Ph: (518) 455 5203
Email: sternr@assembly.state.ny.us

Books helpful for teaching children
Roots, Shoots, Buckets and Boots: Gardening Together with Children
By Sharon Lovejoy

Trowel and Error: Over 700 Tips, Remedies and Shortcuts for the Gardner
By Sharon Lovejoy

Hollyhock Days: Garden Adventures for the Young at Heart
By Sharon Lovejoy

A. GENERAL

Farming for Profit, Stewardship & Community

Part of USDA's efforts to help small-scale farmers and ranchers.

TIP #1: IMPROVE SOIL QUALITY

Build soil fertility, tilth and biological activity — using cover crops, minimum tillage, compost and other organic amendments — to yield profits and long-term value in the land.

MANAGING COVER CROPS PROFITABLY

This 212-page book from the Sustainable Agriculture Network (SAN) explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation. This is the most comprehensive book ever published on the use of cover crops to sustain cropping systems and build soil.

How to order: $19 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082. http://www.sare.org/san/htdocs/pubs

BUILDING SOILS FOR BETTER CROPS, 2ND EDITION

This practical guide to building and maintaining soil organic matter from the Sustainable Agriculture Network (SAN) was written for farmers, extension specialists and others interested in integrated, alternative approaches to controlling pests and enhancing soil quality.

How to order: $19.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082. http://www.sare.org/san/htdocs/pubs

THE REAL DIRT: FARMERS TELL ABOUT ORGANIC AND LOW-INPUT PRACTICES IN THE NORTHEAST

This 264-page book from the Sustainable Agriculture Network and the Northeast Organic and Sustainable Farmers Network offers a snapshot of organic and sustainable farming techniques in the Northeast in the 1990s, based on interviews with more than 60 farmers in eight states. Summarizes practical methods for ecological soil, pest, disease, crop, greenhouse and livestock management.

How to order: $13.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082

THE SOUL OF SOIL: A GUIDE TO ECOLOGICAL SOIL MANAGEMENT

This handbook by Grace Gershuny and Joseph Smillie offers the serious home or market gardener practical concepts that facilitate sound soil management decisions based on ecological principles.

How to order: $16.95 to Chelsea Green Publishing Co., 205 Gates-Briggs Bldg., PO Box 428, White River Junction, VT 05001; 800-639 4099; http://www.chelseagreen.com

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

SUSTAINABLE SOIL MANAGEMENT

This ATTRA publication contains information on soil composition; soil health assessment; organic matter and humus management; soil testing for chemical properties and plant nutrients; use of fertilizer; and tillage.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

USDA NATURAL RESOURCES CONSERVATION SERVICE/SOIL QUALITY INSTITUTE AGRONOMY TECHNICAL NOTES SERIES

Includes information on cover crops, crop rotation effects on soil quality and effects of residue managment & no-till on soil quality, and legumes and soil quality.

How to order: Free from NRCS Soil Quality Institute, 2150 Pammel Drive, Ames, IA 50011; (515) 294-4592. http://www.statlab.iastate.edu/survey/SQI/agronomy.shtml

CREATIVE COVER CROPPING IN PERENNIAL/ANNUAL FARMING SYSTEMS

For information on cover cropping to protect and improve soil fertility, enhance pest control and provide other benefits in orchards and vineyards, request the colorful and informative "perennial farming systems" video from California's Sustainable Agriculture Research and Education Program (SAREP). To learn about the special challenges of cover cropping in row and field crop systems, check out SAREP's "annual farming systems" video.

How to order: $15 each to Univ. of California, DANR Communication Services, 6701 San Pablo Ave., Oakland, CA 94608-1239; 1-800-994-8849; 510-643-547 (fax)

FARM-SCALE COMPOSTING

This booklet from ATTRA offers information on the basics of composting—process, materials, methods and equipment—to help recycle nutrients back to the soil.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

NO-TILL VEGETABLES: A SUSTAINABLE WAY TO INCREASE PROFITS, SAVE SOIL AND REDUCE PESTICIDES

This video by 15-year no-till veteran Steve Groff covers the basics of sustainable no-till vegetable production, detailing methods to control weeds and improve soil using cover crops or plant residue on his 175-acre Cedar Meadow Farm.

How to order: $21.95 + $3 s/h to Cedar Meadow Farm, 679 Hilldale Rd., Holtwood, PA 17532; (717) 284-5152

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

USDA's Sustainable Agriculture Research and Education (SARE) program/ Sustainable Agriculture Network.
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE.
http://www.sare.org

Appropriate Technology Transfer for Rural Areas (ATTRA)
Bulletins, production guides and technical notes are among the information products offered by this national sustainable agriculture information service.
http://www.attra.org

UC Sustainable Agriculture Research and Education Program (SAREP).
Educational resources on various soil quality topics.
http://www.sarep.ucdavis.edu/soil

Alternative Farming Systems Information Ctr's Alternative Soil, Crop, and Pasture Management
Bibliographies on composting, manure management, earthworms, green manures/ cover crops and soil testing.
http://www.nal.usda.gov/afsic/sbjscpm.htm

Sustainable Farming Connection
Offers a forum for farmers to find and share information, including a diverse collection of resources and links on improving soil health.
http://metalab.unc.edu/farming-connection/soilhlth/home.htm

USDA is an equal opportunity provider and employer.

Farming for Profit, Stewardship & Community

Part of USDA's efforts to help small-scale farmers and ranchers.

TIP #3: PREVENT PEST PROBLEMS

Farms & ranches designed to minimize pest pressures — through variety selection, rotations, cover crops and farmscaping — are less dependent on costly inputs.

BUILDING SOILS FOR BETTER CROPS, 2ND EDITION

This practical guide to building and maintaining soil organic matter from the Sustainable Agriculture Network (SAN) was written for farmers, extension specialists and others interested in integrated, alternative approaches to controlling pests and enhancing soil quality.

How to order: $19.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington,VT 05405-0082. http://www.sare.org/san/htdocs/pubs

FARMSCAPING

This technical guide offers information on designing a cropping system that increases plant diversity, disrupts pest life cycles and confuses insect pests,. Describes use of hedgerows, insectary plants, cover crops and water reservoirs to attract and support populations of beneficial organisms such as insects, bats and birds of prey.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

INTEGRATED PEST MANAGEMENT

Meant to provide a basic understanding of Integrated Pest Management (IPM) for individuals interested in agriculture at all levels, this publication includes the steps that need to be taken prior to IPM implementation, the tools used and some ideas about future trends for IPM.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

SUSTAINABLE PRACTICES FOR VEGETABLE PRODUCTION IN THE SOUTH

This 174-page book has been called the bible for southern vegetable producers looking for alternative growing methods. Features information on integrated pest management, cover crops, soil management, conservation tillage and specific tips to raise common southern crops.

How to order: $28.95 + $4.50 s/h to Focus, c/o PBS, Box 390, Jaffrey, NH, 03452, 800-848-7236. http://www.cals.ncsu.edu/sustainable/peet/

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

THE REAL DIRT

Provides information on organic and sustainable farming in the Northeast, based on interviews with more than 60 farmers in eight states. Summarizes practical methods for ecological soil, pest, disease, crop, greenhouse and livestock management.

How to order: $13.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082

MANAGING COVER CROPS PROFITABLY

This 212-page book from the Sustainable Agriculture Network explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation. This is the most comprehensive book ever published on the use of cover crops to sustain cropping systems, break up pest cycles and build soil.

How to order: $19 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082; http://www.sare.org/san/htdocs/pubs/

BENEFICIAL INSECTS IN FIELD CROPS: INTEGRATED PEST MANAGEMENT

This eye-catching fact sheet features photos and descriptions of beneficial insects in crop fields.

How to order: $1.50 + $3.50 s/h from Midwest Plan Service, 122 Davidson Hall, ISU, Ames IA 50011-3080. (515) 294-4337. Specify ISU Extension pub IPM-34. http://www.exnet.iastate.edu/Pages/pubs/

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

USDA's Sustainable Agriculture Research and Education (SARE) program
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE..
http://www.sare.org

Appropriate Technology Transfer for Rural Areas (ATTRA)'s pest management series
http://www.attra.org/attra-pub/pest.html

Alternative Farming Systems Information Center's Alternative Disease, Pest, and Weed Control
Includes bibliographies on crops with pest resistance, biological pest controls and legumes in crop rotations.
http://www.nal.usda.gov/afsic/sbjdpwc.htm

USDA is an equal opportunity provider and employer.

Farming for Profit, Stewardship & Community

TIP #4: EXPLORE ORGANIC PRODUCTION

Part of USDA's efforts to help small-scale farmers and ranchers.

Protect natural resources and take advantage of a growing organic market that offers price premiums for those willing to try a new system.

ORGANIC CERTIFICATION

This ATTRA publication includes information on organic farming and certification, who should apply, legal requirements, choosing a program and references.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

RESOURCES FOR ORGANIC MARKETING: A MARKETING & BUSINESS GUIDE

Organic growers often find that the hardest part of successful farming is securing buyers for their products. This ATTRA technical note provides some starting points.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

SUCCESSFUL SMALL-SCALE FARMING: AN ORGANIC APPROACH

This 144-page book by Karl Schwenke offers information on soil, crop rotations, small-scale equipment and improving yields. With the information here and a little current market research, you can write a complete farm business plan.

How to order: $14.95 + $3 s/h to Storey Communications; 800-441-5700

THE NATIONAL ORGANIC DIRECTORY

This "yellow pages" of the organic industry by the Community Alliance with Family Farmers lists more than 1,000 farmers, wholesalers, farm suppliers, support businesses, and certification/resource groups, and provides details about state and federal laws.

How to order: $47.95 + $3 s/h to CAFF, 1-800-852-3832, http://www.caff.org/caff/publications/nod_1997

ORGANIC FARMING RESEARCH FOUNDATION INFORMATION BULLETIN

This quarterly bulletin by the Organic Farming Research Foundation fosters improvement and widespread adoption of organic farming practices. Features results of OFRF-funded research and education projects.

How to order: Free from OFRF, PO Box 440, Santa Cruz, CA, 95061; (408) 426-6606; http://www.ofrf.org

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

THE ORGANIC PAGES: 1998 N. AMERICAN RESOURCE DIRECTORY

This annual directory covers the entire organic industry, listing growers, manufacturers, brokers, importers/exporters and their contact information. Includes sections on suppliers, consultants, certifiers and web sites.

How to order: $44.95 + $6 s/h to Organic Trade Association, P.O. Box 1078, Greenfield, MA 01302; (413) 774-751; (413) 774-6432; http://www.ota.com

THE REAL DIRT

Provides information on organic and sustainable farming in the Northeast, based on interviews with more than 60 farmers in eight states. Summarizes practical methods for ecological soil, pest, disease, crop, greenhouse and livestock management.

How to order: $13.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082

FARM SUPPLY CATALOGS

The following examples of commonly used suppliers should not imply that USDA endorses specific commercial products. Catalogs, however, can be a great source of information about organic production practices. We suggest you check with local companies first when buying supplies.

Peaceful Valley Farm Supply. 200 seed varieties, 60 fertilizers, soil test options, kelps and foliar feeds, soil, compost and seed inoculants, pest controls, row covers and season extenders, propagating supplies and more. P.O. Box 2209, 125 Springhill Blvd., Grass Valley, CA 95945; (530) 272-4769

Harmony Farm Supply. This organic farm supplier specializes in drip- and sprinkler-irrigation design and sales, organic fertilizers, ecological pest controls, books, horticultural supplies and wildflower and cover crop seeds. 3244 Highway 116 North, PO Box 460, Groton, CA 95444; (707) 823-9125.

Fedco. This catalog divides information into: seeds, moose tubers and organic growers supply, trees and bulbs, and sends out three catalogs annually. Each is packed with information about varieties and planting methods, with indexes to lead you to the information you seek. Fedco Seeds, P.O. Box 520, Waterville, ME 04903-0520; (207) 873-7333.

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

Organic Farming Research Foundation
Showcases research related to organic farming practices, disseminates research results to organic growers and farmers interested in adopting organic production systems.
http://www.ofrf.org

USDA's Sustainable Agriculture Research and Education (SARE) program
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE.
http://www.sare.org

Alternative Farming Systems Information Center
Includes directories, guides and electronic sources on certification, soil and crop management, pest management, economics and marketing, and associations and organizations.
http://www.nal.usda.gov/afsic/sbjorgfd.htm

Organic Farmers Marketing Association
Includes informational bulletins, a calendar of events, information on certification and public policy updates.
http://web.iquest.net/ofma/

Appropriate Technology Transfer for Rural Areas (ATTRA)
Bulletins, production guides and technical notes are among the information products offered by this national sustainable agriculture information service.
http://www.attra.org

USDA is an equal opportunity provider and employer.

Farming for Profit, Stewardship & Community

Part of USDA's efforts to help small-scale farmers and ranchers.

TIP #5: CUT LIVESTOCK COSTS

Switch to management-intensive grazing and other cost-reduction strategies — along with innovative marketing — to restore profits in beef, dairy, poultry and hogs.

THE SMALL DAIRY RESOURCE BOOK: INFORMATION SOURCES FOR FARMSTEAD PRODUCERS AND PROCESSORS

This annotated bibliography of books, periodicals, videos and other resources on farmstead dairy processing offers a wealth of information for family farmers interested in adding value to dairy products.

How to order: $8 + $3.95 s/h from the Sustainable Agriculture Network (SAN), Box 10, Hills Bldg., Univ of VT, Burlington, VT 05405-0082; http://www.sare.org/san/htdocs/pubs/

PROFITABLE DAIRY OPTIONS

This free, eight-page publication presents practical information about grazing, marketing strategies and nutrient management, highlighting techniques successful graziers use in intensively managed rotational grazing systems.

How to order: Free from the Sustainable Agriculture Network (SAN), Box 10, Hills Bldg., Univ of VT, Burlington, VT 05405-0082; http://www.sare.org/san/htdocs/pubs/

GREENER PASTURES ON YOUR SIDE OF THE FENCE: BETTER FARMING WITH VOISIN GRAZING MANAGEMENT

This 385-page book explains how to use management-intensive grazing for most kinds of livestock. Author Bill Murphy covers producing milk, beef, and lamb on pasture alone, nutrient cycling, grounding energizers, recovery periods and economics.

How to order: $30 + $2.50 s/h to Arriba Publishing, 212 Middle Road, Colchester, VT 05446

SALAD BAR BEEF

This 368-page how-to guide by Joel Salatin leaves nothing to your imagination, from choosing breeds, building fences and setting up a rotation to marketing. Explains how a cattle-poultry rotation breaks up parasite cycles and helps produce superior beef.

How to order: $30 from ACRES U.S.A. 1-800-355-5313

STRATEGIES OF RESOURCEFUL DAIRY FARMERS

This collection of farmer interviews and research results explores grass-based dairying, manure management, low-cost facilities, fly control alternatives and renewable energy.

How to order: $10 to Ctr for Rural Affairs, PO Box 406, Walthill, NE 68067; (402) 846-5428

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to learn how to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

PASTURE PROFITS WITH STOCKER CATTLE

This 224-page book by Allan Nation features information about animal health; cash flow versus inventory valuation; running cows and stockers together; how to determine the correct stocking rate; and finishing cattle on pasture.

How to order: $24.95 + $4.70 s/h to Green Park Press, 800-748-9808

PASTURED POULTRY PROFITS

This how-to, hands-on 330-page manual by pasturing expert Joel Salatin tells you how to raise poultry on pasture, from constructing a pen to relationship marketing.

How to order: $30 from ACRES U.S.A.; 1-800-355-5313

FREE-RANGE POULTRY PRODUCTION & MARKETING

This folksy, 120-page three-ring binder offers a guide to raising, processing and marketing chicken, turkey and eggs by producer Herman Beck-Chenoweth. Includes field production, range considerations, processing facilities and slaughter procedures.

How to order: $39.50 + $4.50 s/h from Back Forty Books, 26328 Locust Grove Road, Creola, OH 45622; (740) 596-4379

HOOPED STRUCTURES FOR GROW-FINISH SWINE & SWINE SYSTEM OPTIONS FOR IOWA

Learn more about outdoor alternatives for raising swine, including details on hog feeding, animal health, housing, bedding and marketing.

How to order: $4 + $3.50 s/h from Midwest Plan Service, 122 Davidson Hall, ISU, Ames IA 50011-3080.;(515) 294-4337. Specify ISU Extension pub AED-41

ATTRA LIVESTOCK SERIES

These ATTRA publications offer information about a variety of low-cost alternative livestock systems: Sustainable Chicken Production, Sustainable Beef Production, Grass-Based & Seasonal Dairying, Sustainable Pasture Management, Hooped Shelters for Finishing Hogs, Sustainable Sheep Production, and Meeting the Nutritional Needs of Ruminants on Pasture.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

American Farmland Trust Grass Farming web site
A comprehensive information site on grass-based farming systems, including grazing tools & grazing economics.
http://www.grassfarmer.com/

USDA's Sustainable Agriculture Research and Education (SARE) program
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE.
http://www.sare.org

Appropriate Technology Transfer for Rural Areas (ATTRA).
Bulletins, production guides and technical notes are among the information products offered by this national sustainable agriculture information service.
http://www.attra.org

Animal Welfare Information Center
Includes bibliographies of housing, husbandry and welfare for all farm animals.
http://www.nal.usda.gov/awic/farmanimals/farm.htm

Sustainable Farming Connection
Offers a forum for farmers to find and share information, including a diverse collection of resources and links pertaining to livestock, grazing and pastured poultry.
http://metalab.unc.edu/farming-connection/livestoc/home.htm

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Farming for Profit, Stewardship & Community

TIP #6: MANAGE WEEDS WISELY

Reduce reliance on herbicides by perfecting use of implements, crop rotations and cover crops

Part of USDA's efforts to help small-scale farmers and ranchers.

STEEL IN THE FIELD: A FARMER'S GUIDE TO WEED MANAGEMENT TOOLS

Weed control demands time, labor and expense for every farmer. This 128-page book shows how today's implements and techniques can control weeds while reducing or eliminating herbicides.

How to order: $18 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082

PRINCIPLES OF SUSTAINABLE WEED MANAGEMENT

This free publication includes information on how to control weeds without excessive use of agri-chemicals.

How to order: Free from ATTRA, 800-346-9140; http://www.attra.org

VEGETABLE FARMERS AND THEIR WEED CONTROL MACHINES

A 75-minute video demonstrating the diversity of tools — from sweeps and rotary hoes to flame weeders and homemade tools — available to vegetable farmers. Features nine farmers from three New England states.

How to order: $12 to the University of Vermont Center for Sustainable Agriculture, 590 Main St., Burlington, VT 05405-0059.

SUSTAINABLE PRACTICES FOR VEGETABLE PRODUCTION IN THE SOUTH

This 174-page book has been called the bible for southern vegetable producers looking for alternative growing methods. Features information on weed control, cover crops, soil management, conservation tillage and tips to raise common southern crops.

How to order: $28.95 + $4.50 s/h to Focus, c/o PBS, Box 390, Jaffrey, NH, 03452, 800-848-7236; http://www.cals.ncsu.edu/sustainable/peet/

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

MANAGING COVER CROPS PROFITABLY

This 212-page book from the Sustainable Agriculture Network explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation. This is the most comprehensive book ever published on the use of cover crops to sustain cropping systems, manage weeds and build soil.

How to order: $19 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082

BUILDING SOILS FOR BETTER CROPS, 2ND EDITION

This practical guide to building and maintaining soil organic matter from the Sustainable Agriculture Network (SAN) was written for farmers, extension specialists and others interested in integrated, alternative approaches to controlling pests and enhancing soil quality.

How to order: $19.95 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082. http://www.sare.org/san/htdocs/pubs

CROP-WEED INTERACTIONS: INTEGRATED PEST MANAGEMENT

This eight-page Extension bulletin from Iowa State University explores ways to manage weeds from a whole-farm perspective.

How to order: Fifty cents + $3.50 s/h from Midwest Plan Service, 122 Davidson Hall, ISU, Ames IA 50011-3080. (515) 294-4337. Specify ISU Extension pub IPM-35

NO-TILL VEGETABLES: A SUSTAINABLE WAY TO INCREASE PROFITS, SAVE SOIL AND REDUCE PESTICIDES

This video by 15-year no-till veteran Steve Groff covers the basics of sustainable no-till vegetable production, detailing methods — such as selecting the proper cover crop mix or plant residue — to control weeds and maintain production on his 175-acre Cedar Meadow Farm.

How to order: $21.95 + $3 s/h to Cedar Meadow Farm, 679 Hilldale Rd., Holtwood, PA 17532; (717) 284-5152

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

USDA's Sustainable Agriculture Research and Education (SARE) program
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE.
http://www.sare.org

Sustainable Practices for Vegetable Production in the South.
View this informative book on the web.
http://www.cals.ncsu.edu/sustainable/peet/index.html

Appropriate Technology Transfer for Rural Areas (ATTRA)'s pest mgmt series
http://www.attra.org/attra-pub/pest.html

Iowa State University Extension Publications
http:/www.exnet.iastate.edu/Pages/pubs/

Alternative Farming Systems Information Center
Includes bibliographies on crops with pest resistance, biolgocial pest controls and legumes in crop rotations.
http://www.nal.usda.gov/afsic/sbjdpwc.htm

Cedar Meadow Farm's New Generation Cropping System
Details ways to incorporate cover crops to control weeds.
http://www.cedarmeadowfarm.com

Sustainable Farming Connection
Includes a diverse collection of weed control links and resources.
http://metalab.unc.edu/farming-connection

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Sustainable Agriculture Research and Education

Part of USDA's efforts to help small-scale farmers and ranchers.

Farming for Profit, Stewardship & Community

TIP #7: PLAN FOR PROFIT

Set goals and monitor changes — on the land, in the balance sheet and in your family & community — to achieve success on *your* terms.

MONITORING SUSTAINABLE AGRICULTURE WITH CONVENTIONAL FINANCIAL DATA

This report from the Land Stewardship Project can help farmers and ranchers evaluate their sustainability using farm records and tax reports. Transfer your data to worksheets and draw your own conclusions.

How to order: $7 to Land Stewardship Project, 2200 4th St., White Bear Lake, MN 55110, (612) 653-0618

THE MONITORING TOOLBOX

This 115-page practical guide for farmers interested in monitoring the impact of management decisions on their land, finances and family describes how to monitor quality of life and farm sustainability with financial data, wildlife, soils and streams.

How to order: $35 + $7 s/h to Land Stewardship Project, P.O. Box 130, Lewiston, MN 55952, (507) 523-3366. (includes Close to the Ground video and newsletter)

HOW TO ESTABLISH GOALS: A GROUP PROJECT FOR FARMERS AND THEIR FAMILIES

Setting goals is the place to start planning for the future of your farm. This 14-page instructional booklet makes establishing goals easy. Includes a tear-out self-assessment worksheet and a reference list.

How to order: $3 to The Minnesota Project, 1885 University Avenue West, Suite 315, St. Paul, MN 55104; (651) 645-6159; http://www.misa.umn.edu/~mnproj/wfp

SUCCESSFUL WHOLE FARM PLANNING

Whole farm planning as a tool to make decisions about environmental, economic and production concerns continues to gain momentum. This guide from The Minnesota Project includes information about what should be part of the planning process, contents of a whole farm plan and how to measure whole-farm planning successes.

How to order: Available on The Minnesota Project web site, http://www.misa.umn.edu/~mnproj/wfp or call (651) 645-6159 for a free copy.

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

[OLISTIC MANAGEMENT: A NEW FRAMEWORK FOR DECISION-[AKING

his 567-page book by Allan Savory introduces people to the concept of holistic ıanagement, from a summation of the decision-making process, to setting holistic ɔals, to testing decisions toward those goals, to monitoring.

low to Order: $30 +$3 s/h to Center for Holistic Management, 1010 Tijeras NW, lbuquerque, NM 87102; (505) 842-5252; http://www.holisticmanagement.org/ (Excerpts available a 24-page special "Intro" issue for $7.)

'ARMING ALTERNATIVES: A GUIDE TO EVALUATING THE 'EASIBILITY OF NEW FARM-BASED ENTERPRISES

'his award-winning workbook from Cornell University's Farming Alternatives 'rogram will help you plan and evaluate a new enterprise. Includes chapters on setting oals, assessing markets and determining production and financial feasibility.

low to Order: $8 +$3 s/h to "Cornell University," Farming Alternatives Program, 17 Warren lall, Cornell U., Ithaca, NY 14853; (607) 255-9832; http://www.cals.cornell.edu/dept/ruralsoc/fap/ ıp.html

⁄IAKING THE TRANSITION TO SUSTAINABLE FARMING

ı key element of success in more sustainable farming is your ability to monitor both ›rogress toward the goal and the overall health of the system. This farmer-oriented eport from ATTRA's Fundamentals of Sustainable Agriculture Series will help.

low to order: Free from ATTRA, 800-346-9140; http://www.attra.org/attra-pub/trans.html

WHOLE-FARM PLANNING FACT SHEET SERIES

:volving from a SARE-funded project helping farm families develop whole-farm plans o balance production and quality of life goals with sustained resource use, this series ›f fact sheets outlines various whole-farm planning tools and concepts and gives ideas 'or applying the concepts to farm businesses.

low to order: Free from the Sustainable Agriculture Team, OSU Extension, Courthouse-119 'ublic Square, Carrollton, OH 44615-1498; (330) 627-4310

FARMING SYSTEMS CRITERIA: TEN PRINCIPLES)F SUSTAINABILITY

[his two-page brochure offers a way to conduct a holistic evaluation of your farming ;ystem.

How to order: Free from The Kerr Center for Sustainable Agriculture, P.O. Box 588, Poteau,)K 74953; (918) 647-9123

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

The Minnesota Project
Working with rural people learning new ways to experience and celebrate community with each other and with the earth.
http://www.misa.umn.edu/mnproj.html

The Vermont Dairy Profitability Project: An Analysis of Viable Grass-Based Options for Vermont Farmers
Examines several grass-based management scenarios that could be used by a dairy farm to improve profitability with little or no additional investment.
http://farm.fic.niu.edu/cae/caepubs/dairy/vt.dairy.html

The Center for Holistic Management
The Center serves as the "hub" of information, gleaning and synthesizing real-life lessons learned world wide in the practice of Holistic Management. Publishes newsletter, books and financial planning software.
http://www.holisticmanagement.org/

Appropriate Technology Transfer for Rural Areas (ATTRA).
Bulletins, production guides and technical notes are among the information products offered by this national sustainable agriculture information service.
http://www.attra.org

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Sustainable Agriculture Research and Education

Part of USDA's efforts to help small-scale farmers and ranchers.

Farming for Profit, Stewardship & Community

TIP #8: NETWORK

Learning from other producers or tapping the experts pays off with new strategies to improve farming practices, enhance quality of life and strengthen the bottom line.

SOURCE BOOK OF SUSTAINABLE AGRICULTURE

This comprehensive resource lists free and low-cost books, newsletters, conference proceedings, bulletins, videos, reports and web sites about sustainable agriculture—and how to order them. Includes lists of university centers studying sustainable agriculture and relevant web sites.

How to order: $12 +$3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Univ. of Vermont, Burlington, VT 05405-0082. http://www.sare.org/san/htdocs/pubs

SUSTAINABLE AGRICULTURE DIRECTORY OF EXPERTISE

The third edition of this popular list of experts is somewhat dated, but still contains valuable information connecting readers with groups and individuals who are changing the way America farms. Soon to be updated on the web at http://www.sare.org/san/htdocs/pubs/

How to order: $12 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Building, Univ. of Vermont, Burlington, VT 05405-0082.

EDUCATIONAL AND TRAINING OPPORTUNITIES IN SUSTAINABLE AGRICULTURE, 11TH EDITION

The institutions, organizations and farms listed in this directory were selected based on their involvement in organic, alternative or sustainable agriculture and a willingness to provide education and training or share information. Includes university courses, intern opportunities, sustainable agriculture centers and farmer organizations.

How to order: Free from Alternative Farming Systems Information Center, (AFSIC), National Agricultural Library, Rm 304, 10301 Baltimore Ave., Beltsville, MD 20705-2351; (301) 504-6559; www.nal.usda.gov/afsic/AFSIC_pubs/edtr11.htm

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

SUSTAINABLE AGRICULTURE ORGANIZATIONS AND PUBLICATIONS

Includes comprehensive list of farmer groups and organizations working in sustainable agriculture. Features key resources and publications available from each group.

How to order: Free from ATTRA, P.O. Box 3657, Fayetteville, AR 72702; 800-346-9140; www.attra.org/attra-rl/susagorg.html

SANET-MG INTERNET MAILING LIST

This on-line discussion group moderated by the Sustainable Agriculture Network (SAN) includes farmers, researchers, activists, policymakers and others who share news, events listings, production tips and electronic publications.

Address to subscribe/unsubscribe: majordomo@ces.ncsu.edu
Message body to subscribe: subscribe SANET-MG Your Name
Message body to unsubscribe: unsubscribe SANET-MG
E-mail to group: SANET-MG@ces.ncsu.edu

NEW CROPS INTERNET MAILING LIST

This on-line discussion group centers on alternative crop production.

Address to subscribe/unsubscribe: listserv@vm.cc.purdue.edu
Message body to subscribe: subscribe NEWCROPS your name
Message body to unsubscribe: unsubscribe NEWCROPS
E-mail to group: newcrops@vm.cc.purdue.edu

GRAZING INTERNET MAILING LIST

This on-line discussion group is for people interested in management-intensive rotational grazing, seasonal dairying and closely related topics. http://grazel.taranaki.ac.nz/grazel/join.html

Address to subscribe/unsubscribe: majordomo@taranaki.ac.nz
Message body to subscribe: subscribe GRAZE-L
Message body to unsubscribe: unsubscribe GRAZE-L
E-mail to group: graze-l@taranaki.ac.nz

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http://www.sare.org/san/htdocs/pubs

Alternative Farming Systems Information Center
Includes bibliography on sustainable agriculture institutions, organizations and farm training opportunities.
http://www.nal.usda.gov/afsic/AFSIC_pubs/edtr11.htm

Appropriate Technology Transfer for Rural Areas (ATTRA)
Resource list of sustainable agriculture organizations and publications
http://www.attra.org/attra-rl/susagorg.html

Sustainable Farming Connection
Includes a list of contacts to help you find information "just down the road." Listings by state.
http://metalab.unc.edu/farming-connection/localcon/home.htm

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Farming for Profit, Stewardship & Community

TIP #9: DIVERSIFY CROPS

Improve profit & protect natural resources by adding new crops and retaining natural features on the landscape

Part of USDA's efforts to help small-scale farmers and ranchers.

DIVERSIFY CROPS TO BOOST PROFITS AND STEWARDSHIP

As farmers and ranchers contend with low commodity prices, it's an apt time to consider diversifying. This 12-page, color publication encompasses alternative cash crops, cover crops and agroforestry — and how producers have used these strategies to increase profits. Featured producers also explain how they've improved their stewardship of natural resources by introducing rotations to help fix nitrogen, reduce pest pressures and slow erosion. A detailed list of expert sources round out the publication.

How to order: Free from the Sustainable Agriculture Network, c/o AFSIC, 10301 Baltimore Ave., Beltsville, MD 20705-2351; (301) 504-6422. http://www.sare.org/san/diversify/

MANAGING COVER CROPS PROFITABLY

This 212-page book explores how and why cover crops work and provides all the information needed to build cover crops into any farming operation. This is the most comprehensive book ever published on the use of cover crops to sustain cropping systems and build soil.

How to order: $19 + $3.95 s/h to Sustainable Agriculture Publications, Box 10, Hills Bldg., Room 12, Univ. of Vermont, Burlington, VT 05405-0082. http://www.sare.org/san/htdocs/pubs/

ALTERNATIVE FIELD CROPS

Considerations before diversifying, marketing alternative crops and source of additional information from ATTRA.

How to order: Free from ATTRA, 1-800-346-9140. http://www.attra.org

NEW CROP COMPENDIUM CD ROM

This CD contains full text proceedings of three national new crops conferences.

How to order: $75 to the Center for New Crops and Plant Products, Purdue University, 1165 Horticulture Building, West Lafayette, IN 47907-1165; (765) 494-1325

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to learn how to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

ALTERNATIVE FIELD CROPS MANUAL

This detailed guide provides information on production methods and management strategies for more than 50 alternative crops in an easy-to-reference three-ring binder.

How to order: $45 to the Center for Alternative Plant and Animal Products, University of Minnesota, 352 Alderman Hall, St. Paul, MN 55108; (612) 624-4217

THE FLOWER FARMER: AN ORGANIC GROWER'S GUIDE TO RAISING AND SELLING CUT FLOWERS

This 207-page book by Lynn Byczynski presents information on growing, harvesting and marketing both fresh and dried flowers. Includes detailed description of 95 recommended varieties and an appendix with sources for seeds and supplies.

How to order: $25.95 to Chelsea Green, Publishing, 205 Gates-Briggs Bldg., PO Box 428, White River Junction, VT 05001; 800 639-4099; http://www.chelseagreen.com

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
North Central SARE, (402) 472-0266; ncrsare@unl.edu
Northeast SARE, (802) 656-0471; nesare@zoo.uvm.edu
Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

Center for New Crops and Plant Products, Purdue University
http://www.hort.purdue.edu/newcrop/
To subscribe to the Purdue New Crops Listserve, visit
http://www.hort.purdue.edu/newcrop/ListServ/listserv.html

Center for Alternative Plant and Animal Products
http://capap.coafes.umn.edu

Missouri Alternatives Center
http://agebb.missouri.edu/mac/

Sustainable Agriculture Research and Education (SARE) program
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE..
http://www.sare.org

Alternative Farming Systems Information Center
Comprehensive bibliographies on alternative farming systems.
http://www.nal.usda.gov/afsic/

Appropriate Technology Transfer for Rural Areas (ATTRA).
Bulletins, production guides and technical notes are among the information products offered by this national sustainable agriculture information service.
http://www.attra.org

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Farming for Profit, Stewardship & Community

TIP #10: USE TREES

Integrate agroforestry practices to increase profits and protect your land.

Part of USDA's efforts to help small-scale farmers and ranchers.

AGROFORESTRY FOR FARMS AND RANCHES: AN INTRODUCTION TO USING TREE AND SHRUB PRACTICES IN SUSTAINED AGRICULTURAL SYSTEMS

Agroforestry is the intentional growing of trees and shrubs in combination with crops or forage. Properly designed agroforestry systems protect crops and forage, increase their production, protect soil and water resources, conserve energy, improve ecosystem "richness," create additional wildlife habitat and increase landscape diversity. They also provide additional farm or ranch products, such as: timber, pulpwood, firewood, posts, fruit, nuts and fodder. This technical note from the National Agroforestry Center provides an introduction to using tree and shrub practices in sustained agricultural systems.

How to order: Free from the National Agroforestry Center, East Campus-UNL, Lincoln, NE 68583-0822; http://www.unl.edu/nac/pubs.htm

AGROFORESTRY TECHNICAL NOTE SERIES

Five main practices make up agroforestry. Several technical notes describing their application are available from the National Agroforestry Center, including:

- Alley Cropping: Growing annual crops between rows of trees;
- Riparian Forest Buffers: Protecting waters for nutrients, pesticides and sediments;
- Forest Farming: Producing specialty products like ginseng or shiitake mushrooms;
- Windbreaks: Providing conservation plus protecting crops, livestock and communities;
- Silvopasture Systems: Integrating timber production with livestock grazing; and
- Special Applications: Growing hybrid poplars; better managing wastewater and wildlife

How to order: Free from the National Agroforestry Center, East Campus-UNL, Lincoln, NE 68583-0822; http://www.unl.edu/nac/pubs.htm

The tools listed here can help you apply this tip to improve your farm or ranch. See the "How to order" section under each reference to obtain your free or low-cost copy. This partial list was compiled by USDA's Sustainable Agriculture Research and Education (SARE) program in March 1999. Other resources not listed may also be suitable. See the "Education" link at http://www.sare.org for a complete set of tip sheets.

AGROFORESTRY WORKING TREES SERIES

Trees can perform many jobs for communities, farms and ranches. They can increase farm or ranch income as well as promote conservation of land, water and wildlife. Brochures illustrating a variety of uses for trees in those settings include: Working Trees for Agriculture, Working Trees for Communities, Working Trees for Wildlife, and Working Trees for Livestock.

How to order: Free from the National Agroforestry Center, East Campus-UNL, Lincoln, NE 68583-0822; http://www.unl.edu/nac/pubs.htm

ATTRA'S NUT CROP SERIES

Learn how to raise black walnuts and pecans using these free resources from ATTRA.

How to order: Free from ATTRA, 1-800-346-9140; http://www.attra.org

SHELTER AND SHADE: CREATING A HEALTHY AND PROFITABLE ENVIRONMENT FOR YOUR LIVESTOCK AND TREES

This 160-page book by John and Bunny Mortimer details how to use trees and landscape features as shelter belts, fodder and beneficial habitats for livestock.

How to order: $20 + $4.70 s/h to Stockman Grass Farmer, PO Box 2300, Ridgeland, MS 39158, (800) 748-9808

DIVERSIFY CROPS TO BOOST PROFITS AND STEWARDSHIP

As farmers and ranchers contend with low commodity prices, it's an apt time to consider diversifying. This 12-page, color publication encompasses alternative cash crops, cover crops and agroforestry — and how producers have used these strategies to increase profits. Featured producers also explain how they've improved their stewardship of natural resources by introducing rotations to help fix nitrogen, reduce pest pressures and slow erosion. A detailed list of expert sources round out the publication.

How to order: Free from the Sustainable Agriculture Network, c/o AFSIC, 10301 Baltimore Ave., Beltsville, MD 20705-2351; (301) 504-6422. http://www.sare.org/san/diversify/

Administered by USDA-CSREES, SARE has funded more than 1,400 projects looking at ways to farm more sustainably. To learn more about project findings by category, search SARE's national database on the web at www.sare.org/san/htdocs/research/ or contact Kim Kroll at (301) 405-5717. To obtain print versions of SARE research by region, contact a SARE regional office and request a copy of their most recent annual report or project list.
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Southern SARE, (770) 412-4787; kberry@gaes.griffin.peachnet.edu
Western SARE, (435) 797-2257; wsare@mendel.usu.edu

RELEVANT WEB SITES

National Agroforestry Center
Develops and applies agroforestry technologies, publishes "Inside Agroforestry" newsletter and informational fact sheets.
http://www.unl.edu/nac/

Natural Resources Conservation Service
Technical notes and briefs on a variety of agroforestry topics.
http:/www.nhq.nrcs.usda.gov/BCS/forest/tnote1.html

USDA's Sustainable Agriculture Research and Education (SARE) program/ Sustainable Agriculture Network
Features on-line books and a database of more than 1,400 research projects funded by USDA-SARE.
htttp://www.sare.org

Appropriate Technology Transfer for Rural Areas (ATTRA).
National sustainable agriculture information service.
http://www.attra.org

Alternative Farming Systems Information Center's Agroforestry Bibliographies
Includes information on alternative tree crops.
http://www.nal.usda.gov/afsic/sbjagrof.htm

Sustainable Farming Connection
Offers a diverse collection of resources and links on agroforestry.
http://metalab.unc.edu/farming-connection/agroforc/home.htm

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AFSIC Publications

AFSIC staff create and publish information resource guides that focus on topics of current interest. Some are issued as parts of National Agricultural Library Series, including **Quick Bibliographies** (QBs) and **Special Reference Briefs** (SRBs). Others are published as **AFSIC Notes** and miscellaneous documents. To help clarify the kind of publications we offer:

- Bibliographies are *lists of references* to books, articles, papers, and audio-visual materials. Most of the listed materials may be found in the NAL collection or through your local or university library system.
- Reference Guides provide a broader picture of a topic, including descriptive text, contacts for Internet and organizational resources, as well as suggested reading lists.

Search our online AGRICOLA database to locate additional resources in the National Agricultural Library collection.

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- **Featured Web Pages:**
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  - Organic Food Production
  - Sustainable Agriculture
- Alternative/Sustainable Agricultural Systems
- Alternative Soil, Crop, and Pasture Management
- Alternative Disease, Pest, and Weed Control
- Alternative Marketing and Economic Issues
- Alternative and Industrial Crops
- Alternative Energy for Agriculture
- Agroforestry
- Aquaculture
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Publications Alphabetized by Title or by Publication Date

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Great Places to Find Information About Farming Alternatives

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[Available in print only. Order a free copy from the Alternative Farming Systems Information Center.]

Publications (alphabetized by title)

- Acid Rain, QB 95-03 (January 1995) [547kb]
- Adopting Sustainable Alternatives, AFSIC Notes no. 1 (January 1992) [9.4kb]
- Agriculture and the Environment, AFSIC Notes no. 2 (March 1992) [13.7kb]
- Agroforestry Systems, QB 92-28 (February 1992)[257kb]
- Air Pollution Effects on Crops and Forests, QB92-24(February 1992) [318kb]
- Allelopathy: The Effects of Chemicals Produced by Plants, QB 94-56 (September 1994) [331kb]
- AFSIC no longer has copies available of "Alternative Agriculture" by the Committee on the Role of Alternative Farming Methods in Modern Production Agriculture, National Research Council, published in 1996. The 1989 edition of this title may be read free online at National Academies Press, http://books.nap.edu/books/0309039851/html/.
- List of Alternative Crops and Enterprises for Small Farm Diversification (May 2001) [23kb]
- *Agri-environmental Indicators: Literature Review and Annotated Bibliography*. (April 1998) A joint Economic Research Service - AFSIC publication. [Available in print only. Order a free copy from the Alternative Farming Systems Information Center.
- Alternative Crops, QB 96-11 (September 1996, covers June 1993-June 1996) [165kb]
- Alternative Crops, QB 93-53 (August 1993, covers January 1991-June 1993) [117kb]
- Alternative Farming Systems: Economic Aspects, QB 98-01 (September 1998, covers July 1996-June 1998) [613kb]
- Alternative Farming Systems: Economic Aspects, QB 96-08 (September 1996, covers March 1993-June 1996) [2 linked files: 504kb and 287kb]
- Alternative Farming Systems: Economic Aspects, QB 93-17 (February 1993, covers January 1991-January 1993) [255kb]
- Amaranths for Food or Feed, QB 92-40 (March 1992) [153kb]
- Aquaculture Resources Menu. Includes links to aquaculture contacts, Internet sites, and publications.
- Beekeeping in the United States, QB 93-30 (May 1993) [117kb]
- Biotechnology and Sustainable Agriculture: A Bibliography, SRB 94-13 (September 1994) [86.5kb]
- Breeding and Selecting Crops for Insect Pest Resistance, QB 92-25 (February 1992) [390kb]
- Community Supported Agriculture (CSA) Page (1999-2001)
- Community Supported Agriculture (CSA): Resources for Farmers or Producers (Revised and updated September 2003).
- Community Supported Agriculture (CSA): An Annotated Bibliography and Resource Guide, AT 93-02 (September 1993) [34kb]
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- Compost: On-farm Systems, QB 97-12 (September 1997) [275kb]
- Compost: Small-scale and Backyard Systems, QB 97-11 (September 1997) [105kb]
- Computers and Information Technologies in Agricultural Production and Management, Part I.,

QB 97-09 (September 1997) [644kb]

- Computers and Information Technologies in Agricultural Production and Management, Part II., QB 97-10 (September 1997) [709kb]
- Conservation Tillage, QB 94-13 (March 1994) [368kb]
- Cultural and Mechanical Weed Control, QB 94-52 (August 1993) [234kb]
- Dairy Farm Manure Management, QB 95-02 (January 1995) [124kb]
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- Earthworms in Agriculture (Covers 1994-1996, September 1996) [191kb]
- Educational and Training Opportunities in Sustainable Agriculture Directory (15th ed., December 2002; revised September 2003) [266kb]
- Electronic Databases and other Information Search Tools Available at the Alternative Farming Systems Information Center (December 2001) [27kb]
- Ethnobotany and Medicinal Plants, Part I, QB 92-66 (September 1992) [347kb]
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- Evaluation of Best Management Practices, QB 93-66 (September 1993) [161kb]
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- Farming Systems Research, QB 92-27 (February 1992) [151kb]
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- Farming in Arid and Semiarid Lands, QB 94-54 (September 1994) [205kb]
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- Forage Legumes, QB 93-04 (November 1992) [245kb]
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- Ginseng, QB 96-07 (August 1996) [210kb]
- Great Places to Find Information About Farming Alternatives (Revised September 2003) [21kb]
- Green Manures and Cover Crops, QB 93-68 (September 1993) [266kb]
- Growing for the Medicinal Herb Market Selected Sources and Resources (August 20, 1998) [38.0kb]
- Herbicide Tolerance/Resistance in Plants, QB 96-14 (September 1996) [305kb]
- Herbicide Tolerance/Resistance in Plants, QB 94-60 (September 1994) [453kb]
- Herbs and Herb Gardening: An Annotated Bibliography and Resource Guide, SRB 96-06 (August 1996) [306kb]

- Horticultural Journals Currently Received at the National Agricultural Library (April 1993) [71kb]
- Hydroponics-Nutrient Film Technique, QB 94-55 (September 1994) [216kb]
- Integrated Pest Management-Biological Control: Natural Enemies, AFSIC Notes no. 3 (March 1992) [89kb]
- IPM and Biological Control of Plant Pests: Field Crops, QB 93-69 (September 1993) [333kb]
- IPM and Biological Control of Plant Pests: Horticultural Crops (October 1996 update) [228kb]
- IPM and Biological Control of Plant Pests: Horticultural Crops, QB 94-12 (March 1994) [295kb]
- IPM and Biological Control of Weeds, QB 93-05 (November 1992) [340kb]
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- Legumes in Crop Rotations, QB 94-38 (June 1994) [540kb]
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- Non-point Source Pollution Issues, QB 95-01 (January 1995) [205kb]
- Organic Agricultural Products: Marketing and Trade Resources. (March 2003) [541kb]
- Organic Farming and Marketing: Publications from USDA (October 2002; updated May 2003) [34kb]
- Organic Food Production Page (Revised December 2001). Includes Organic Agriculture Search Tips.
- Organic Foods: Markets and Marketing (July 2001) [60kb]
- Organic Gardening: A Guide to Resources 1989-September 2003 (September 2003) [158kb]
- Organic Gardening (Agri-Topics, October 1989) [19kb]
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- Organic Production: Recent Publications and Current Information Sources, SRB 96-07 (September 1996) [77kb]
- Organic Production: Terminology / Descriptive Phrases (December 2001) [10.5kb]
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- Oyster Mushroom, QB 97-07 (July 1997) [162kb]
- Part-time Farming, Small Farms and Small-scale Farming in the United States, QB 97-03 (NAL Quick Bibliography supplement, January 1999. Covers 1996-September 1998)
- Part-time Farming, Small Farms, and Small-scale Farming in the United States, QB 97-03 (June 1997, covers June 1993-March 1997)[179kb]
- Part-time Farming, Small Farms, and Farming in the United States, QB 93-64 (September 1993, covers January 1989-June 1993) [210kb]
- Paulownia: Potential Tree Crop, QB 93-25 (April 1993) [57kb]

- Potential New Crop: Kenaf, Commercial Fiber and Pulp Source, QB 92-54 (July 1992) [121kb]
- Precision Farming, AT 95-01 (December 1994) [27.8kb]
- Proceedings of National Small Farm Conferences sponsored by USDA.
  - First National Small Farm Conference, Nashville, TN on September 10-13, 1996
  - Second National Small Farm Conference, St. Louis, MO on October 12-15, 1999
  - Third National Small Farm Conference, Albuquerque, NM on September 17-20, 2002
- Resource Guide to Growing and Using Herbs, SRB 93-01 (November 1992) [42kb]
- Raising Emus and Ostriches, SRB 97-06 (August 1997 and supplement February 2001) [337kb]
- Raising Snails, SRB 96-05 (August 1996; Revised online April 2001) [151kb]
- Riparian Zones and Filter Strips in Agricultural Operations, QB 95-09 (February 1995) [165kb]
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- Rotational Grazing and Intensive Pasture Management, QB 93-50 (August 1993) [138kb]
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- Societal Impacts of Adoption of Alternative Agricultural Practices, QB 93-01 (October 1992) [182kb]
- Soil Testing and Plant Analysis for Fertilizer Recommendations, QB 96-12 (September 1996, covers March 1993-June 1996) [361kb]
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- Sustainable Agriculture in Print: Current Periodicals, SRB 95-08 (September 1995) [359kb]
- Sustainable Agriculture: Definitions and Terms, SRB 99-02 (September 1999) [173kb]
- Sustainable or Alternative Agriculture, QB 93-03 (November 1992) [288kb]
- Sustainable Agricultural Resources for Teachers, K-12 (Updated and revised July 2002) [86kb].
- Tracing the Evolution of Organic/Sustainable Agriculture (November 1988) [35.6kb]
- Urban Agriculture: An Abbreviated List of References and Resource Guide 2000 (September 2000) [72kb]
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- Wastewater Irrigation, QB 93-55 (July 1993) [212kb]
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- Where to Find Sustainable Agriculture Research Online (November 2001) [13kb]
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- Educational and Training Opportunities in Sustainable Agriculture Directory (15th ed., December 2002; revised September 2003) [266kb]
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- Part-time Farming, Small Farms and Small-scale Farming in the United States, QB 97-03 (NAL Quick Bibliography supplement, January 1999. Covers 1996-September 1998)
- Proceedings of Second National Small Farm Conference held in St. Louis, MO on October 12-15, 1999
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- 1997 Sustainable Agriculture in Print: Current Books, SRB 97-05 (August 1997) [370kb] [See 1993 update above.]

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- Alternative Crops, QB 96-11 (September 1996, covers June 1993-June 1996) [165kb]
- Alternative Farming Systems: Economic Aspects, QB 96-08 (September 1996, covers March 1993-June 1996) [2 linked files: 504kb and 287kb]
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- Solar Energy Alternatives for Agriculture, QB 96-06 (August 1996, covers May 1993-June 1996) [225kb]
- Sustainable Agriculture in Print: Current Periodicals (June 1996 supplement) [75.8kb]

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- Alternative Farming Systems: Economic Aspects, QB 93-17 (February 1993, covers January 1991-January 1993) [255kb]
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- Community Supported Agriculture (CSA): An Annotated Bibliography and Resource Guide, AT 93-02 (September 1993) [34kb]
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- IPM and Biological Control of Plant Pests: Field Crops, QB 93-69 (September 1993) [333kb]
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- Ethnobotany and Medicinal Plants, Part II, QB 93-02 (October 1992) [468kb]
- Farming Systems Research, QB 92-27 (February 1992) [151kb]
- Integrated Pest Management-Biological Control: Natural Enemies, AFSIC Notes no. 3 (March 1992) [89kb]
- IPM and Biological Control of Weeds, QB 93-05 (November 1992) [340kb]
- Potential New Crop: Kenaf, Commercial Fiber and Pulp Source, QB 92-54 (July 1992) [121kb]
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- Societal Impacts of Adoption of Alternative Agricultural Practices, QB 93-01 (October 1992) [182kb]

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AFSIC no longer has copies available of "Alternative Agriculture" by the Committee on the Role of Alternative Farming Methods in Modern Production Agriculture, National Research Council, published in 1996. The 1989 edition of this title may be read free online at National Academies Press, http://books.nap.edu/books/0309039851/html/.

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University of Missouri: 3 Whitten Hall, Columbia, MO 65211
Call: 1-800-433-3704 (Missouri Only) 1-573-882-1905 (In Columbia)

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Compiled By:
Mary V. Gold
Alternative Farming Systems Information Center

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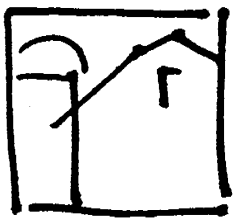

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ORGANIC PRODUCTION: RECENT PUBLICATIONS AND CURRENT INFORMATION SOURCES

Compiled by Mary V. Gold, Assistant Coordinator
Alternative Farming Systems Information Center

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Introduction

The activities of the U.S. Department of Agriculture's National Organic Standards Board, coupled with growing consumer support for organic foods, have made farming organically an increasingly viable alternative for many U.S. farmers. In addition, there has been renewed awareness of organic agriculture on the part of public interest groups, marketing organizations, and agricultural researchers. This interest is reflected in the many requests for information received each month at the Alternative Farming Systems Information Center (AFSIC).

The attached list of resources is provided as a starting point for information seekers. The inclusion or omission of a publication or resource is not meant as endorsement or disapproval. Most listed publications are still in print and available for purchase. Individual contacts for publication information are given for difficult-to-find resources. A publisher contact list is provided for books from more conventional sources. **Starred items (*) are available electronically either through the publisher or through sources listed under "Electronic Resources".**

Many of the cited publications are available through local public or university libraries. For information about Interlibrary Loan, consult your local library system or contact the Document Delivery Branch, National Agricultural Library, 10301 Baltimore Ave., Beltsville MD 20705-2351, phone 301-504-5755, fax 301-504-5675, e-mail lending@nal.usda.gov.

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Current Status of Organic Production in the United States

During 1994, the U.S. Department of Agriculture embarked on its first survey and analysis of organic food growing and marketing practices. Their Agricultural Marketing Service (AMS) documented approximately 1,127,000 acres, or just over one tenth of one percent of total US agricultural land, as being used for certified organic production in 1994. (By limiting the survey to certified farmers these numbers "may significantly underestimate total organic acreage," notes the project's leader, Julie Anton Dunn, because many farmers who grow and sell organic produce are not officially certified.) The survey confirmed the existence of 44 different U.S. organic certification organizations, 11 of which were state agencies and the remainder, private groups.

The report resulting from the 1994 AMS project (Organic Food and Fiber: An Analysis of 1994 Certified Production in the United States, by Julie Anton Dunn, USDA/AMS, 1995) also verified that organic farms are, on average, much smaller than their conventional counterparts, using about half the acreage of non-organic operations. 57% of organic cropland was used for food crops and 26% percent for livestock feed. The remainder was in fallow, cotton, CRP land, nursery and floral crops, tobacco, and/or miscellaneous crops.

Although the USDA Food Safety and Inspection Service (FSIS) does not, to date, allow the term "organic" to be used on animal product labels (a situation that should change with the implementation of National Organic Standards), a few certifying agencies do certify livestock. This 1994 survey found 110,000 organically grown chickens and turkeys, 47, 700 layer hens, 6,100 dairy cattle, and 3,330 beef cattle.

> *For more information about the AMS report, contact **Marketing and Transportation Analysis, Transportation and Marketing Division**, AMS, USDA, Rm. 1207, Box 96456, Washington DC 20090-6456, phone 202-690-0310.*

In 1996, USDA's Economic Research Service (ERS) revealed further details about U.S. organic production (AREI Updates: Updates of Agricultural Resources and Environmental Indicators, Number 4, May 1996). The information was derived from the National Agriculture Statistics Service (NASS) 1994 Vegetable Chemical Use Survey. From the Update:

- Most certified organic producers in the 13 major vegetable-growing states had become certified within the past 8 years (81%) and farmed on less than 4.9 acres (62%). Most were between the ages of 36 and 55, college educated, and listed farming as their primary occupation.

- About half of those surveyed marketed their produce directly to the consumer, 14% sold to a wholesaler, and 10% to a retailer. Crops most widely grown by organic farmers were tomatoes (21%), sweet corn (18%), lettuce (11%), and strawberries (8%).

- The most commonly used methods of disease and insect control were crop rotation and resistant varieties. Manure and compost were the principal sources of nutrients.

*For more information about the data from this Update, contact Jorge Fernandez-Cornejo, **Natural Resources and Environment Division, ERS/** USDA, 1301 New York Ave. NW, Rm. 524, Washington DC 20005-4788, phone 202-219-0463, e-mail jorgef@econ.ag.gov.*

USDA National Organic Program (NOP)

The National Organic Program (NOP) is part of USDA's Agricultural Marketing Service. It is the agency developing and implementing uniform Federal standards related to the production, processing, and marketing of organically-produced foods. NOP coordinates the appointment of National Organic Standards Board (NOSB) members and reviews NOSB recommendations regarding all aspects of national standards for organic certification. NOP is responsible for interim rules, preparing final regulations, and submitting the environmental impact assessment related to these regulations.

In addition, NOP staff will accredit state and private certifying agencies under the new National Organic Standards, as well as conduct on-site evaluations of certifiers and of selected farms and food handlers that use accredited services. Staff members track information related to the impact of food production and processing on the environment and human health by working with the Environmental Protection Agency and the Food and Drug Administration, and they participate in the development and modification of international guidelines for trade in organic products.

National Organic Standards

In August 1994, the United States Department of Agriculture published an historic document: a set of "Final Recommendations" released by the USDA's National Organic Standards Board (NOSB). Established by the 1990 Farm Bill, the board was mandated to present recommended standards to the Secretary of Agriculture regarding implementation of the Organic Foods Production Act of 1990. With 14 appointees selected from the organic farming and foods industry, environmental and consumer groups, and the scientific research community, the NOSB has labored together for almost five years.

The newly-released recommendations "..constitute an historic collaboration between the public, private sector and government to openly hammer out national standards. We have held well-attended public-input sessions at each of our deliberative board and committee meetings. During the last two and a half years, we have met in Washington DC, Virginia, Minnesota, Colorado, Maryland, California, Maine, Arkansas, Pennsylvania, Oregon and New Mexico. We have encouraged and received comments at every stage, from committee drafts to draft board recommendations. This process has not been perfect; it can use much improvement. But we believe that this process does set a new standard for USDA advisory board performance and public participation.

"These recommendations signal a new era. Never before has the government been given this responsibility: to describe and preserve integrity of organic food and fiber products from seed to consumer." (unsigned letter accompanying Final Recommendations as cited above, August 1, 1994)

Crop and livestock production, processing and labeling, accreditation, and importation standards are all addressed by the recommendations. Pesticide residue testing requirements, split operations (farms with both organic and conventional production areas) certification, planting stock policy, emergency spray alternatives, and a recommended materials list have also been developed. Other facets of production and distribution are still being assessed. The current recommendations will be the foundation for a uniform program regulating organic food and fiber production and processing. Through the Organic Foods Productions Act, the standards will be administered and enforced by the USDA. Final implementation of the Act will probably take place in 1997.

> *For publications, to be put on a mailing list to receive proposed regulations coming from the NOSB, or to send questions or comments, contact the* ***National Organic Program Staff****, USDA/ AMS/ TMD, Room 2510-South, P.O. Box 96456, Washington DC 20090-6456, phone 202-720-3252, fax 202-205-7808. URL: http://www.usda.gov/ams/tmdnop.htm*

Definition of "Organic"

The NOSB has also agreed upon a definition of the term organic. That definition, which follows, was drawn up in April 1995.

"Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony. 'Organic' is a labeling term that denotes products produced under the authority of the Organic Foods Production Act.

"The principal guidelines for organic production are to use materials and practices that enhance the ecological balance of natural systems and that integrate the parts of the farming system into an ecological whole. Organic agriculture practices cannot ensure that products are completely free of residues; however, methods are used to minimize pollution from air, soil and water. Organic food handlers, processors and retailers adhere to standards that maintain the integrity of organic agricultural products. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people."

The Organic Market

There are several commercial organizations that track sales of natural and/or organic products. According to a recent survey published in Natural Foods Merchandiser ("Widening Market Carries Organic Sales to $2.8 Billion in 1995", by Ken Mergentime and Monica Emerich, Natural Foods Merchandiser, June 1996), organic industry sales have grown by more than 20% each year for the past six years. Overall sales were $2.8 billion in 1995; organic produce accounted for 21% of this total. Popular processed organic foods included frozen items, soy and rice drinks, apple juice, yogurt, and milk. Total organic dairy sales for 1995 were $30 million.

Although most organic sales take place in natural food stores, supermarkets are adopting organic lines at an increasing rate. The Packer, in its "Fresh Trends" report ("Fresh Trends 1996: A Profile of the Fresh Produce Consumer", The Packer, Vol. CII, #54, 1996) found that 54% of consumers surveyed said that their supermarket sold organic produce. Twenty-three percent reported that they had purchased organic produce sometime during the past six months. Organic sales are growing most quickly in the West and Northeast regions of the U.S.

> *For more information on sales and marketing statistics for organic products, consult the above publication and/or their publishers. Contact information for each is listed under* "Journals and Newsletters", *below. There is an expanded edition of The Packer publication called "Fresh Trends '96 Demographic Data Report" available from the publisher. Other contacts: the* ***Organic Trade Association****, P.O. Box 1078, Greenfield MA 01301, phone 413-774-7511, fax 413-774-6432, e-mail ota@igc.apc.org* or *New* ***Hope Communications****, Research Department, 1301 Spruce St., Boulder CO 80302, phone 303-939-8440, fax 303-939-9559.*

Educational Opportunities in Organic Production

There are many institutions and organizations offering opportunities to learn about different phases of organic production. While the term "organic farming" may not appear in their catalogs, several colleges and universities now offer organic-related programs in sustainable agriculture, integrated pest management, alternative agriculture, and agroecology. Organic farming associations, environmental groups, and related organizations often offer courses, seminars, or workshops.

Hands-on experience, in the form of volunteer positions, internships, and apprenticeships, is available from many non-profit organizations and working farms. These work experiences range from a couple of weeks as a farm hand to on-going field or food processing research projects.

> *The best sources of information about educational programs include organic* ***certifying agencies*** *who may offer courses themselves, or who maintain lists of member farmers offering apprenticeships and internships. The* ***Alternative Farming Systems Information Center*** *publishes an annual directory entitled Educational and*

Training Opportunities in Sustainable Agriculture which contains institutional, organizational, and commercial offerings.

*The **Appropriate Technology Transfer for Rural Areas (ATTRA)** Information Center keeps a list of Internship and Apprenticeship openings. For contact information for the above resources, see listings under "Other Resources including AFSIC Publications" in this publication.*

Books

National Directories and Guides

A Guide to Spanish Language Sustainable Publications: Summaries, compiled by Beatriz Cabezon. Davis CA: UC Sustainable Agriculture Research & Education Program, Univ. of California, 1995. 89 p. (NAL Z5074 S92C33 1995) [Contact: UC Sustainable Agriculture Research & Education Program (SAREP), Univ. of California, Davis CA 95616, phone 916-752-7556]

Healthy Harvest: A Global Directory of Sustainable Agriculture and Horticulture Organizations 1994. Published in cooperation with the Healthy Harvest Society/ National Institute for Science, Law & Public Policy. Davis CA: agAccess, 1992. 192 p. (an updated version is due out during 1996) (NAL S605.5 H43) [Contact: agAccess, 603 Fourth St., Davis CA 95616, phone 916-756-7177, fax 916-756-7188, e-mail agaccess@davis.com]

The Herbal Green Pages: A Publication of the Herb Growing & Marketing Network. Lancaster PA: The Network (published annually). (NAL SB351 H5H3714) [The Herbal Connection, P.O. Box 245, Silver Spring PA 17575, phone 717-393-3295, fax 717-393-9261

The Humane Consumer and Producer Guide: Buying and Producing Farm Animal Products for a Humane Sustainable Agriculture, edited by Terry Gips et al. Minneapolis MN: Humane Sustainable Agriculture Project of the International Alliance for Sustainable Agriculture; Washington DC: The Humane Society of the U.S., 1993. 368 p. (NAL S494.5 S86H86) [Contact: Humane Society of the U.S., 2100 L St. NW, Washington DC 20037, phone 202-452-1100]

International Federation of Organic Agriculture Movements, Organic Agriculture Worldwide: Directory of the Member Organizations and Corporate Associates of IFOAM. Tholey-Theley, Germany: IFOAM, 1994/95 (published annually). (NAL S605.5 I572) [Contact: IFOAM, Oekozentrum Imsbach, D-66636 Tholey-Theley, Germany, phone 49-6853-5190, fax 49-6853-30110, e-mail IFOAM-SECRETARY@OLN.COMLINK.APC.ORG]

The 1995 Organic Resource Guide, Ottawa: Canadian Organic Growers, 1995. [Contact: COG, Box 6408, Station "J", Ottawa, Ontario, K2A 3Y6 Canada, fax 705-444-0380, Attn. Cathy Lamarche, membership and publications]

1996 National Organic Directory: A Guide to Organic Information and Resources. Davis CA: Community Alliance with Family Farmers, 1996 (published annually). 370 p. (NAL HD9003 O74) [Contact: CAFF, P.O. Box 464, Davis CA 95617, phone 916-756-851[illegible] or 1-800-852-3832, fax 916-756-7857]

Organic Suppliers Directory: A Directory of Suppliers Serving Organic Farms, Gardens, Orchards and Homesteads, With Organic Industry Thesaurus, edited by Scott R. Williams. Plymouth OH: Ohio Ecological Food and Farm Assn., 1994. 123 p. (NAL S605.5 O76 1993) [Contact: OEFFA, Organic Suppliers Directory, P.O. Box 82234, Columbus OH 43202, phone 614-294-3663]

*The Resources of International Permaculture: TRIP. Vol. VI. (Volumes are chronological; updated between editions) Jacksonville FL: Yankee Permaculture, 1995. (also available electronically on diskette) (NAL S494.5 P47R47) [Contact: Yankee Permaculture, P.O. Box 672, Dahlonega GA 30533-0672]

*Showcase of Sustainable Agriculture Information and Educational Materials. Burlington VT: Sustainable Agriculture Network Publications, 1994. 201 p. (also available electronically on IBM compatible diskette) (S494.5 S86S56 1993) [Contact: Sustainable Agriculture Publications]

*Sustainable Agriculture Directory of Expertise, 3rd Edition: Profiles of More Than 700 Organizations and Individuals Who Can Help You Meet Your Farming Stewardship and Profitability Goals, compiled by the Appropriate Technology Transfer for Rural Areas (ATTRA) Directory Project Team. Burlington VT: Sustainable Agriculture Network Publications, 1996. unpaged (also available electronically on IBM compatible diskette) (NAL S494.5 S86S874 1996) [Contact: Sustainable Agriculture Publications]

Whole Foods, Informing and Educating Whole Foods Retailers. Monthly magazine, issues available separately. May issue: Source Book, August: Consumer Survey, November: Retail Survey. (NAL HD9003 W46) [Contact: Whole Foods, 3000 Hadley Road, South Plainfield NJ 07090, phone 908-769-1160, fax 908-769-1171]

Overviews

Agronomic, Economic, and Ecological Relationships in Alternative (Organic), Conventional, and Reduced-till Farming Systems, edited by James D. Smolik, et al. (Bulletin 718). Brookings SD: Agricultural Experiment Station, South Dakota State University, 1993. (NAL 100 So82 (1)

B718) [Contact: South Dakota State University, Lincoln Music Hall, Box 22128, Brookings SD 57007, phone 605-688-5628]

Bender, Jim, Future Harvest: Pesticide-Free Farming. (Our Sustainable Future series, vol. 5) Lincoln: University of Nebraska Press, 1994. 159 p. (NAL S494.5 S86O97 vol.5)

Bird, Elizabeth Ann R., Gordon L. Bultena, and John C. Gardner, Planting the Future: Developing an Agriculture that Sustains Land and Community. Ames IA: Iowa State University Press, 1995. 276 p. (NAL S441 P58 1995)

Dunn, Julie Anton, Organic Food and Fiber: An Analysis of 1994 Certified Production in the United States. Washington DC: US Dept. of Agriculture, Agricultural Marketing Service, Transportation and Marketing Div., 1995. 5p. (NAL aS441 D86 1995) [Contact: National Organic Program Staff, USDA/ AMS/ TMD, Room 2507-South, P.O. Box 96456, Washington DC 20090-6456, phone 202-720-3252, fax 202-205-7808]

Edwards, Clive, Rattan Lal, Patrick Madden, Robert H. Miller and Gar House, Sustainable Agricultural Systems. Ankeny IA: Soil and Water Conservation Society, 1990. 696 p. (NAL S495.7 S86S86)

The Economics of Organic Farming: An International Perspective, edited by N.H. Lampkin and S. Padel. Wallingford UK: CAB International, 1994. 463 p. (NAL S605.5 E26 1994)

Environmentally Sound Agriculture: Proceedings of the Second Conference, edited by Kenneth L.Campbell, Wendy D. Graham and A.B. "Del" Bottcher. St. Joseph MI: American Society of Agricultural Engineers, 1994. 578 p. (NAL S589.7 E57 1994) [Contact: ASAE, 2950 Niles Road, St. Joseph MI 49085-9659, phone 616-428-6324]

Food for the Future: Conditions and Contradictions of Sustainability, edited by Patricia Allen. New York: Wiley, 1993. 328 p. (NAL HD1415 F633 1993)

Gates, Jane Potter, *Tracing the Evolution of Organic/ Sustainable Agriculture: A Selected and Annotated Bibliography. Beltsville MD: USDA, National Agricultural Library, 1988. 20 p. (Also available in electronic format on computer diskette or via the AFSIC Web Site) (NAL aZ5076 A1U54 no. 72) [Contact: AFSIC]

*Getting Started in Organic Farming, published jointly by Environment Canada and Manitoba Environment, 1992. (Free handbook available electronically from Manitoba Environment's Web Site; also available in French) [Contact: Electronic versions, in WordPerfect 5.1 or Microsoft Word 6.0, available for downloading at URL http://www.mb.doe.ca/ENGLISH/ POLLUTION/PESTICIDES/farm.html]

Long Ashton International Symposium (Long Ashton Research Station, Univ. of Bristol, UK), Ecology and Integrated Farming Systems: Proceedings of the 13th Long Ashton International Symposium, edited by D.M. Glen, M.P. Greaves, and H.M. Anderson. Chichester, UK; New York: Wiley, 1995. 329 p. (NAL S589.7 L64 1993)

Newton, Jon, Profitable Organic Farming. Oxford UK; Cambridge MA: Blackwell Science, 1995. 142 p. (NAL S605.5 N48 1995)

Organic Agriculture: Building the Community. 1994 Conference Proceedings...sponsored by Canadian Organic Growers. Guelph Ont.: University of Guelph, 1994. 24 p. (NAL S605.5 O662 1994)

The Organic Tradition: An Anthology of Writings on Organic Farming 1890 - 1950, edited by Philip Conford. Hartland, Devon UK: Green; Shaftesbury, Dorset UK: Distributed by Element Books, 1988. 224 p. (NAL S605.5 O75)

Pimentel, David and Hugh Lehman. The Pesticide Question: Environment, Economics, and Ethics. New York: Chapman and Hall, 1993. 444 p. (NAL QH545 P4P4793 1993)

Soule, Judith D. and Jon K. Piper. Farming in Nature's Image: An Ecological Approach to Agriculture. Island Press, 1992. 286 p. (NAL S441 S757)

Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future. Washington DC: President's Council on Sustainable Development, 1996. 186 p. (NAL HC110 E5S87 1996) [Contact: Available for purchase from the U.S. G.P.O., Supt. of Docs.]

Transition to Organic Agriculture Conference, Transition to Organic Agriculture Conference: October 31 and November 1, 1990, coordinated by University of Saskatchewan's Extension Div., Crop Development Centre and Saskatchewan Agriculture and Food, Soil and Crops Branch, Organic Crop Improvement Assn., Saskatchewan: s.n., 1990. 217 p. (NAL S605.5 T73 1990) [Contact: U-Learn Centre, Extension Division, 143 Kirk Hall, 117 Science Pl., University of Saskatchewan, Saskatoon SK S7N 5C8 CANADA, fax orders 306-966-5567]

Government Policies and Certification

California Certified Organic Farmers...Certification Handbook. Santa Cruz, CA: California Certified Organic Farmers (published annually). (NAL S605.5 C3) [Contact: CCOF, 1115 Mission St., Santa Cruz CA 95060, phone 408-423-2263, fax 408-423-4528]

*Database of State Alternative Laws, prepared by Whitney Chamberlin, John Sullivan and Nan Kim. Washington DC: Center for Policy Alternatives, 1994. (photocopies and/or diskettes

available) [Contact: Center for Policy Alternatives, 1875 Connecticut Ave., NW, Suite 710, Washington DC 20009-5728, phone 202-387-6030, fax 202-986-2539]

Farming and Clean Water: A Community Action Guide. St. Paul MN: The Minnesota Project/ The Midwest Consortium on Groundwater and Farm Chemicals, 1993. (NAL TD427 A35F37 1993) [Contact: The Minnesota Project, 1885 University Ave. W., Ste 315, St. Paul MN 55104, phone 612-645-6159]

Hansen, Maren, Increasing Organic Agriculture at the Local Level: A Manual for Consumers, Grocers, Farmers and Policy Makers, with Phil Boise and Jim Hagen and the Santa Barbara County Safe Food Project: prepared by the Community Environmental Council. Santa Barbara CA: Community Environmental Council, Inc., 1992. 110 p. (NAL S605.5 H37 1992) [Contact: Community Environmental Council, 930 Miramonte Drive, Santa Barbara CA 93109, phone 805-963-0583]

National Organic Standards Board, Final Recommendations, Adopted June 1 - 4, 1994, in Santa Fe, New Mexico: Organic Crop Production Standards. Washington DC: USDA, 1994. (NAL in process) [Contact: National Organic Program Staff, USDA/ AMS/ TMD, Room 2510-South, P.O. Box 96456, Washington DC 20090-6456, phone 202-720-3252, fax 202-205-7808]

Riddle, Jim and Joyce Ford, Organic Inspection Manual and Organic Inspection Manual Appendix. Winona MN: Independent Organic Inspectors Association., 1995. 121 p. (NAL S605.5 R532 1995) [Contact: IOIA, Rt. 3, Box 162-C, Winona MN 55987-9514, phone 507-454-8310]

Soil and Crop Management

Alternative Field Crops Manual. Madison WI: University of Wisconsin Cooperative and Extension Services; University of Minnesota Center for Alternative Plant and Animal Products, 1990. Looseleaf, unpaged. (NAL SB187 U6A47 1990) [Contact: Center for Alternative Plant and Animal Products, 340 Alderman Hall, Univ. of Minnesota, St. Paul MN 55108]

Chaney, David E., Laurie E. Drinkwater and G. Stuart Pettygrove, Organic Soil Amendments and Fertilizers. Oakland CA: UC Sustainable Agriculture Research and Education Program, University of California, Division of Agriculture and Natural Resources, 1992. 36 p. (NAL S654 C42 1992) [Contact: UC ANR Publications, 6701 San Pablo Ave., Oakland CA 94608-1239, phone 510-642-2431, fax 510-643-5470]

Coleman, Eliot, The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener. Rev. and expanded edition. White River Junction VT: Chelsea Green Pub., 1995. 340 p. (NAL SB324.3 C65 1995)

Conservation Tillage: Planning (AE-3054). One in a series of pamphlets dealing with conservation tillage practices, including Effects on Soil Erosion (AE-3050), Effects on Water Quality (AE-3051), No-till Systems (AE-3052), Ridge-till Systems (AE-3053), Fertility Practices and Equipment for No-till and Ridge-till (AE 3054), Cultivators for No-Till and Ridge-till (AE-3055), Planters for No-till (AE-3056), and Planters for Ridge-till (AE-3057). Ames IA: Iowa State Univ. Extension, 1990. (NAL S671 A22) (some titles no longer available) [Contact: Iowa State University, Extension Distribution Center, 119 Printing & Publishing Bldg., Ames IA 50011-3171, phone 515-294-5247, e-mail pubdist@exnet.iastate.edu]

Denckla, Tanya, The Organic Gardener's Home Reference: A Plant-By-Plant Guide to Growing Fresh, Healthy Food. Pownal VT: Storey Communications, 1994. 273 p. (NAL SB324.3 D46 1994)

Facciola, Stephen, *Cornucopia: A Source Book of Edible Plants. Vista CA: Kampong Publications, 1990. 677 p. (also available electronically on diskette) (NAL SB175 F33) [Contact: Kampong Publications, 1870 Sunrise Drive, Vista CA 92084]

Farm Scale Composting. ("A Biocycle Publication") Emmaus PA: JG Press, 1995. 80 p. (NAL S661 F37 1995)

Gershuny, Grace and Joseph Smillie, The Soul of Soil: A Guide to Ecological Soil Management. 3rd ed. Davis CA: agAccess, 1995. 174 p. (NAL S623 G47 1995)

Growing Fruits & Vegetables Organically: The Complete Guide to a Great-tasting, More Bountiful, Problem-free Harvest, edited by Jean M.A. Nick and Fern Marshall Bradley. Emmaus PA: Rodale Press; New York: Distributed in the book trade by St. Martin's Press, 1994. 532 p. (NAL SB324.3 G75 1994)

Harrison, John B., Growing Food Organically. West Vancouver BC: Waterwheel Press, 1993. 138 p. (NAL SB453.5 H378 1993)

Introduction to Water Harvesting. Auburn AL: International Center for Aquaculture, Auburn University, 1991. 10 p. (NAL S494.5 W3I57) [Contact: International Center for Aquaculture, Swingle Hall, Auburn University AL 36849-5419]

Jeavons, John, How to Grow More Vegetables Than You Ever Thought Possible on Less Land Than You Can Imagine: A Primer on the Life-giving Biointensive Method of Organic Horticulture. Rev. ed. Berkeley CA: Ten Speed Press, 1995. 201 p. (NAL SB324.3 J43 1995)

Jenson, Tom, Legume Green Manuring. Edmonton, Alta.: Agriculture Canada, Alberta Agriculture, 1993. 7 p. (NAL S661 J46 1993)

Khourik, Robert, Drip Irrigation for Every Landscape and All Climates: Helping Your Garden Flourish While Conserving Water. Santa Rosa CA: Metamorphic Press, 1992. 118 p. (NAL S619 T74K69 1992)

Kirschenmann, Frederick, Switching to a Sustainable System: Strategies for Converting from Conventional/Chemical to Sustainable/ Organic Farming Systems. Windsor ND: Northern Plains Sustainable Agriculture Society, 1988. 18 p. (NAL S494.5 S86K5) [Contact: NPSAS, HC 5 Box 104, Langdon ND 58249, phone 701-256-2424]

Magdoff, Fred, Building Soils for Better Crops: Organic Matter Management. Lincoln NE: University of Nebraska Press, 1992. 176 p. (NAL S592.8 M34 1992)

Managing Agricultural Residues, edited by Paul W. Unger. Boca Raton FL: Lewis Publishers, 1994. (NAL S604 M28 1994)

*Managing Cover Crops Profitably. (Sustainable Agriculture Network Handbook #1) Washington DC: USDA; Burlington VT: University of Vermont, 1992. 114 p. (NAL sSB284.3 U6M36 1992) (also available electronically on IBM compatible diskette) [Contact: Sustainable Agriculture Publications]

Mars, Ross and Jenny Mars, Getting Started in Permaculture. Hovea, W. Australia: Candlelight Trust, 1994. 60 p. (NAL S494.5 P47M37 1995) [Contact: Candlelight Farm, 100 Falls Road, Hovea, Western Australia, Australia, phone 09-295-4627]

McRobie, George, Tools for Organic Farming: A Manual of Appropriate Equipment and Treatments. London: Intermediate Technology Publication; New York: The Bootstrap Press, 1990. 77 p. (NAL S656 T66)

Michalak, Patricia S., Vegetables, text by Patricia S. Michalak; plant by plant guide by Cass Peterson. Emmaus PA: Rodale Press; New York: Dist. by St. Martin's Press, 1993. 159 p. (NAL SB324.3 M53 1992)

Mollison, Bill, Permaculture: A Designer's Manual. Tyalgum, Australia: Tagari, 1988. 576 p. (NAL S605.5 M6)

Nilsson, Jon, in collaboration with Miranda Smith, Warren Hubley, and Judith Gillan, The Passively Aerated Windrow System of Composting: A Guide to PAWS Composting for Farmers. Belchertown MA: New England Small Farm Institute, 1994. 22 p. (NAL S661 N56 1994) (updated version available) [Contact: The New England Small Farm Institute, Box 608, Belchertown MA 01007, phone 413-323-4531]

Ogden, Shepherd, Step by Step Organic Vegetable Gardening. 1st ed. New York: HarperCollins Pub., 1992. 299 p. (NAL SB324.3 O43 1992)

On-farm Composting Handbook, edited by Robert Rynk. Ithaca NY: Northeast Regional Agricultural Engineering Service, 1992. 186 p. (NAL S661 O53 1992) [Contact: NRAES, Cooperative Extension, 152 Riley-Robb Hall, Ithaca NY 14853-5701, phone 607-255-7654, fax 607-255-4080, e-mail nraes@cornell.edu, URL: http://rcwpsun.cas.psu.edu/NRAES/pubs.html]

Organic Fertilizers: Facts, Figures and Resources, American Horticultural Society. Alexandria VA: Gardeners' Information Service, American Horticultural Society, 1992. 4 p. [NAL S654 O72 1992) (Contact: AHS, 7931 E. Boulevard Dr., Alexandria VA 22308, 1-800-777-7931]

Organic Field Crop Handbook, a Project of Canadian Organic Growers, Inc., editor, Anne Macey; prepared by Dee Kramer et al. Ottawa, Ont.: Canadian Organic Growers Inc., 1992. 192 p. (NAL S605.5 K722 1992) [Contact: COG, Box 6408, Sta. J, Ottawa, Ont., K2A 3Y6 Canada, fax 613-256-4453; Attn. Cathy Lamarche, membership and publications]

Page, Stephen and Joe Smillie, The Orchard Almanac: A Seasonal Guide to Healthy Fruit Trees. 3rd ed. Davis CA: agAccess, 1995. 154 p. (NAL SB608 F8P33 1995)

Parnes, Robert, Fertile Soil: A Grower's Guide to Organic & Inorganic Fertilizers. 2nd ed. Davis CA: agAccess, 1990. 190 p. (NAL S633 P33 1990)

Penhallegon, Ross H., Values of Organic Fertilizers. Rev. ed. Eugene OR: Lane County Extension Office, 1993. 10 p. (NAL S654 P46 1993)

Poisson, Leandre and Gretchen Vogel Poisson, Solar Gardening: Growing Vegetables Year-round the American Intensive Way. White River Junction VT: Chelsea Green Pub., 1994. 267 p. (NAL SB324.3 P65 1994) [Contact: Real Goods Trading Co., 966 Mazzoni St., Ukiah CA 95482-3471, phone 1-800-762-7325]

Proceedings of the Northeast Farmer to Farmer Information Exchange....Apple... Sweetcorn... Greenhouse Bedding Plants... Livestock... Strawberries... meeting 1992-1993, edited by Enid Wonnacott. (Each crop meeting was compiled and published separately) Massachusetts: Northeast Organic Farming Assn.: University of Massachusetts Cooperative Extension System, 1994. (various NAL call numbers) [Contact: any NOFA chapter]

Rateaver, Bargyla and Gylver Rateaver, Organic Method Primer Update: A Practical Explanation: The How and Why for the Beginner and the Experienced. Special ed. San Diego CA: The Rateavers, 1993. 596 p. (NAL 605.5 R37 1993) [Contact: The Rateavers, 9049 Covina Street, San Diego, CA 92126]

The Real Dirt: Farmers Tell About Organic and Low In-put Practices in the Northeast, edited by Miranda Smith and Members of the Northeast Organic Farming Assn. Burlington VT: Northeast Region Sustainable Agriculture Research and Education (SARE), 1994. 164 p. (NAL S605.5 R43 1994) [Contact: Sustainable Agriculture Publications]

Rodale's Encyclopedia of Organic Gardening: The Indispensable Resource for Every Gardener, edited by Fern Marshall Bradley and Barbara W. Ellis. Emmaus PA: Rodale Press; New York: Dist. by St. Martin's Press, 1992. 902 p. (NAL SB453.5 R633 1992)

Sattler, Friedrich, Bio-dynamic Farming Practice. Translated from the German by A.R. Meuss. 1st ed. Clent, Stourbridge UK: Bio-Dynamic Agriculture Assn., 1992. 333 p. (NAL S605.5 S2713 1992)

Schwenke, Karl, Successful Small-Scale Farming: An Organic Approach, 2nd edition. Pownal VT: Storey Communications, 1991. 134 p. (NAL S501.2 S33 1991)

Soil Amendments: Impacts on Biotic Systems, edited by Jack E. Rechcigl. Boca Raton FL: Lewis Publishers (CRC Press Imprint), 1995. 321 p. (NAL S589.7 S621 1995)

Splittstoesser, Walter E. Vegetable Growing Handbook: Organic and Traditional Methods. 3rd ed. New York: Van Nostrand Reinhold, 1990. 362 p. (NAL SB321 S645 1990)

Sustainable Farming Guide Book. St. Paul MN: Minnesota Dept. of Agriculture, Energy and Sustainable Agriculture Program, 1990- (new chapters/ updates sent periodically). (NAL S494.5 S86S89 1990) [MN Dept of Agriculture, 90 W. Plato Blvd., St. Paul MN 55107, 612-296-7673]

Water for Every Farm: Yeomans Keyline Plan, compiled, updated and edited by Ken B. Yeomans. Southport Queensland: Keyline Designs, 1993. 261 p. (NAL 494.5 W3W374 1993) [Contact: agAccess]

Waste Management and Utilization in Food Production and Processing. Ames IA: Council for Agricultural Science and Technology (CAST), Task Force Report no. 124, October 1995. 125 p. (NAL TD930 W36 1995) [Contact: CAST, 4420 West Lincoln Way, Ames IA 50014-3447]

What Really Happens When You Cut Chemicals?, edited by Christopher Shirley and the staff of The New Farm. Greg Bowman et al. Emmaus PA: Rodale Institute, 1993. 156 p. (NAL S494.5 S86W48 1993) [Contact: Rodale Institute, 611 Siegfriedale Road, Kutztown PA 19530-9749, phone 610-683-1421, fax 610-683-8548]

Pest Management

Altieri, Miguel A., Biodiversity and Pest Management in Agroecosystems. New York: Food Products Press, 1994. 185 p. (NAL SB933.3 A38 1994) [Contact: The Haworth Press, Inc.]

Biological Control of Weeds: A World Catalogue of Agents and their Target Weeds, edited by M.H. Julien. 3rd ed. Wallingford, Oxon UK: CAB International, 1992. 186 p. (NAL SB611.5 B54 1992)

Biological Controls: Facts, Figures, & Resources, American Horticultural Society, 1992. Alexandria VA: Gardener's Information Service, American Horticultural Society, 1992. 4 p. (NAL SB975 B5635 1992) [Contact: AHS, 7931 E. Boulevard Dr., Alexandria VA 22308, phone 1-800-777-7931]

Ecologically Based Pest Managment: New Solutions for a New Century. Washington DC: National Research Council, 1996. [Contact: National Academy Press, 2101 Constitution Ave. NW, Washington DC 20418, phone 1-800-624-6242]

Flint, Mary Louise, Pests of the Garden and Small Farm: A Grower's Guide to Using Less Pesticide. Oakland CA: Statewide Integrated Pest Management Project, University of California, Division of Agriculture and Natural Resources, 1990. 276 p. (NAL SB950 F57) [Contact: IPM Education and Publications, University of California, Davis, CA 95616-8620, phone 916 752-7691, fax 916 752-9336]

Hoffman, Michael P. and Anne C. Frodsham, Natural Enemies of Vegetable Insect Pests. Ithaca NY: Cornell University, 1993. 63 p. (NAL SB608 V4H64 1993)

Hart, Rhonda Massingham, Bugs, Slugs and Other Thugs: Controlling Garden Pests Organically. Pownal VT: Storey Communications, 1991. 214 p. (NAL SB974 H37)

Hunter, Charles D., Suppliers of Beneficial Organisms in North America. Sacramento CA: California Environmental Protection Agency, Dept. of Pesticide Regulation, Environmental Monitoring and Pest Management, 1994. 30 p. (SB933.3 H85 1994) (new edition is planned for October 1996) [Contact: Dept. of Pesticide Regulation, Environmental Monitoring and Pest Management Branch, 1020 N Street, Room 161, Sacramento CA 95814-5604, phone 916-324-4100, fax 916-324-4088]

Mahr, Daniel L. and Nino M. Ridgeway, Biological Control of Insects and Mites: An Introduction to Beneficial Natural Enemies and Their Use in Pest Management. Madison WI: Cooperative Extension Publications, 1993. 91 p. (NAL SB933.3 M35 1993) [Contact: Michigan State University, Bulletin Office, 10-B Ag Hall, East Lansing MI 48824-1039, phone 517-355-0240, fax 517-355-1804]

Robinson, Raoul A., Return to Resistance: Breeding Crops to Reduce Pesticide Dependence. Davis CA: agAccess, 1996. 480 p. (NAL SB123 R653 1996)

Thomson, W.T., A Worldwide Guide to Beneficial Animals (Insects, Mites, Nematodes) Used for Pest Control Purposes. Fresno CA: Thomson Publications, 1992. 92 p. (NAL SB975 T49 1992)

Walters, Charles, Jr., Weeds: Control Without Poisons. Metairie LA: Acres U.S.A., 1996. (1991 edition, 321 p., NAL SB611.5 W35)

Wintersteen, Wendy and Marlin E. Rice, Beneficial Insects in Field Crops: Integrated Pest Management. Ames IA: Iowa State University, University Extension, 1993. unpaged. (NAL SF517 W56 1993) [Iowa State University, Extension Distribution Center, 119 Printing & Publishing Bldg., Ames IA 50011-3171, phone 515-294-5247, e-mail pubdist@exnet.iastate.edu]

Livestock Management

Benson, Laura Lee and Robert Zirkel, Organic Dairy Farming. Gays Mills WI: Orang-utan Press, 1995. 87 p. (NAL SF239 B46 1995) [Contact: Kickapoo Organic Resource Network/ Community Conservation Consultants, RD 1, Box 96, Gays Mills WI 54631, phone 608-735-4717]

Controlled Grazing: Energy-Saving Ideas and Technology for Improving Pasture Productivity and Cutting Forage Costs. Lewiston MN: Land Stewardship Project, 1991. 8 p. (NAL SB199 C66) [Contact: LSP, 14758 Ostlund Trail North, Marine MN 55047, phone 612-433-2770, fax 612-433-2704]

Corbett, Pat and Connie Corbett, North American Exotic Directory of Animal & Bird Owners. ("the "Yellow Pages of the Exotic Industry") 4th ed. Sydney MT: Pat & Connie Corbett, 1992. 148 p. (NAL SF27 N7C67) (8th edition due out in 1996) [Contact: North American Exotic Directory of Animal & Bird Owners, Dept. NA, HC 57, Box 4028, Sydney MT 59270, phone 406-482-7196 or 1-800-736-5342]

Evaluation of Low-input Crop/Livestock Production Systems: Final Report. North Dakota State University; in Cooperation with University of Illinois et al. Carrington ND: North Dakota State Univ., 1991. various pagings (NAL S451 N9E93 1991)

Extensive and Organic Livestock Systems: Animal Welfare Implications: Proceedings of a Symposium Organized by Universities Federation for Animal Welfare and Humane Slaughter Assn., held at the Royal Agricultural College, Cirencester, 10th - 11th Sept. 1990. Hertfordshire, England: Universities Federation for Animal Welfare, 1993. (NAL HV4757 E98 1993)

Fritz, Sandy and Thomas Andresen, Organic Animal Husbandry. Sydney Australia: Fritz & Associates, 1994. 62 p. (NAL S605.5 F75 1994)

Gralla, Shawn, Fit for a Pig: Low-cost/Sustainable Strategies of Resourceful Hog Farmers. Hartington NE: Beginning Farmer Support Network, Center for Rural Affairs, 1991. 46 p. (NAL SB395 G73 1991) [Contact: Center for Rural Affairs, P.O. Box 406, Wathill NE 68067-0406, phone 402-846-5428, fax 402-846-5420]

Lee, Andrew W., Chicken Tractor: The Gardener's Guide to Happy Hens and Healthy Soil. Shelburne VT: Good Earth Publications, 1994. 230 p. (NAL SF487 L44 1994)

Nation, Allan, Quality Pasture: How to Create It, Manage It, and Profit from It. Jackson MS: Green Park Press, 1995.285 p. (NAL SB199 N37 1995)

Salatin, Joel, Pastured Poultry Profits. 1st ed. Swope VA: Polyface, 1993. 330 p. (NAL SF487 S16 1993) [Contact: Polyface, Inc., Rt.1, Box 281, Swope VA 24479, phone 703-885-3590]

Salatin, Joel, Salad Bar Beef. Swope VA: Polyface, 1995. 368 p. (NAL SF203 S37 1995) [Contact: Polyface, Inc., Rt.1, Box 281, Swope VA 24479, phone 703-885-3590]

Taking Stock: The North American Livestock Census. Donald E. Bixby et al.; The American Livestock Breeds Conservancy. Blacksburg VA: McDonald & Woodward Pub. Co., 1994. 182 p. (NAL SF105.3 T34 1994) [Contact: ALBC, P.O. Box 477, Pittsboro NC 27313, phone 919-542-5704, fax 919-542-2460]

Thear, Katie, Free Range Poultry. Ipswich, England: Farming Press, 1990. 179 p. (NAL SF487 T48)

Tranel, Larry F., Dollars and Sense: A Handbook for Seasonal Grass Dairying. Jackson MS: Green Park Press, 1994. 102 p. (NAL SF239 T79 1994)

Economics and Marketing

Gibson, Eric L., Sell What You Sow! The Grower's Guide to Successful Produce Marketing. Carmichael CA: New World Pub., 1994. 302 p. (NAL HD9005 G53 1994) [New World Publishing, 3085 Sheridan St., Placerville CA 95667, phone 916-622-2248, e-mail newworld@innercite.com, URL: http://www.innercite,com/~newworld]

Guide to Planning the Farm Retail Market: 1994, by Carl L. German et al. Newark DE: University of Delaware, College of Agricultural Sciences, Agricultural Experiment Station, Cooperative Extension, 1994. 85 p. (NAL 275.29 D37Co no. 52) [Contact: Delaware Cooperative Extension Service, University of Delaware, Newark DE 19717-1303]

Hall, Charles, Richard A. Edwards and Jeff L. Johnson, A Guide to Marketing Organic Produce. College Station TX: Texas Agricultural Extension Service, 1991. unpaged. (NAL HD9007 T4H35 1991)

Handbook of Organic Food Processing and Production, edited by Simon Wright. 1st ed. London: Blackie Academic & Professional, 1994. 204 p. (NAL TX369 H36 1994)

Klonsky, Karen et al., Production Practices and Sample Costs for Organic .... (Series detailing production inputs and costs of specific crops/ locations including Almonds..., *Wine Grapes--With Resident Vegetation...and With an Annual Sown Cover Crop, *Rice--No-till Drill

Seeded...and Water Seeded..., Apples for the Fresh Market..., Processing Tomatoes, Sacramento Valley, Walnuts... and Cotton, Northern San Joaquin Valley) Davis CA: Univ. of California Cooperative Extension, 1993- . (NAL various numbers) [Contact: Department of Agricultural Economics, Cooperative Extension, University of California, Davis CA 95616, phone 916-752-9376]

Lee, Andrew, Backyard Market Gardening: The Entrepreneur's Guide to Selling What You Grow. Burlington VT: Good Earth Publications, 1993. 351 p. (NAL SB324.3 L44 1993)

Making the Connection: The CSA Handbook for Producers. Auburn CA: University of California Extension Service, 1995. [Contact: Univ. of California Cooperative Extension Service, CSA Handbook, 11477 E. Ave., Auburn CA 95603, phone 916-889-7385]

The Organic Trade Association Member Handbook and Directory. Greenfield MA:. OTA, 1995. [Contact: OTA, P.O. Box 1078, Greenfield MA 01301, phone 413-774-7511, fax 413-774-6432, e-mail ota@igc.apc.org]

The Packer Produce Availability and Merchandising Guide. (annual issue #53 of The Packer periodical) Shawnee Mission KS : Vance Pub. Corp., 1971- . (NAL 286.8 N483) [Contact: Vance, 7950 College Blvd., Overland Park KS 66210, phone 913-451-2200]

Schroeder, Lee Anne Dust and Stephen B. Lovejoy, Agricultural Economics: Opportunities for Organic Crop Production. Lafayette IN: Purdue, 1995. [Contact: Purdue University, Ag Comm Service, Media Distribution Center, 301 S. Second St., Lafayette IN 47901-1232, phone 317-494-6794, e-mail juanita@ecn.purdue.edu]

Sellen, Daniel, et al., A Comparison of Financial Returns During Early Transition from Conventional to Organic Vegetable Production. Guelph Ontario: Dept. Of Agricultural Economics and Business, Univ. Of Guelph, 1994. Unpaged. (NAL HD1781 W67 no. 94/12)

Sturdivant, Lee, Flowers for Sale: Growing and Marketing Cut Flowers: Backyard to Small Acreage. Friday Harbor WA: San Juan Naturals, 1992. 197 p. (NAL SB443 S87 1992) [Contact: San Juan Naturals, Box 642S, Friday Harbor WA 98250]

Sturdivant, Lee, Herbs for Sale: Growing and Marketing Herbs, Herbal Products, and Herbal Know-how. Friday Harbor WA: San Juan Naturals, 1994. 246 p. (NAL SB351 H5S77 1994) [Contact: San Juan Naturals, Box 642S, Friday Harbor WA 98250]

Taylor, T.M., Secrets to a Successful Greenhouse Business: A Complete Guide to Starting and Operating a High-profit Business that's Beneficial to the Environment. Melbourne FL: Green Earth Publishing, 1991. 135 p. (NAL SB415 T39 1991) [Contact: Green Earth Publishing Co., P.O. Box 500544-E, Malabar FL 32050]

Van En, Robyn, Basic Formula to Create Community Supported Agriculture. Great Barrington MA: Robyn Van En, 1992. unpaged. (NAL HD9225 A2V35 1992) [Contact: Robyn Van En, CSA Indian Line Farm, RR 3 Box 85, Great Barrington MA 02130]

Publisher Contact Information

Acres, U.S.A.
P.O. Box 8800
Metairie LA 70011
1-800-355-5313, fax 504-889-2777

Blackwell Scientific Publications
238 Main St.
Cambridge MA 02142
617-876-700; orders 1-800-759-6102

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Chelsea Green Publishing Co.
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Ithaca NY 14850
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e-mail Dist_Center@cce.cornell.edu

CRC Press, Inc.
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407-994-0555; orders 1-800-272-7737

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704-863-2288, orders 1-800-499-3201

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607-722-5857; orders 1-800-342-9678

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http://www.islandpress.com

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University Park PA 16802
814-865-6713

Rodale Press
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Emmaus PA 18098
610-967-5171, 1-800-527-8200
(Distributor: St. Martins Press)

Soil and Water Conservation Society
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1-800-THE-SOIL, or 515-289-2331
fax 515-289-1227
e-mail SWCS@netins.net
http://www.netins.net/showcase/swcs/

St. Martins Press
Macmillan Publishing Co., Inc.
175 Fifth Ave. Rm. 1715
New York NY 10010
212-674-5151; orders 1-800-221-7945

Storey's Books for Country Living
Dept. 84
P.O. Box 38
Pownal VT 05261-9989
1-800-441-5700, fax 413-664-4066

Sustainable Agriculture Publications
Hills Bldg., Rm. 12
University of Vermont
Burlington VT 05405-0082
802-656-0471 (bulk orders only)
http://www.ces.ncsu.edu/san/

Ten Speed Press
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510-559-1600; orders 1-800-841-2665

Thomson Publications
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209-435-2163; fax 209-435-8319

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916-752-7556

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Oakland CA 94608-1239
510-642-2431

John Wiley & Sons, Inc.
605 Third Ave.
New York NY 10158-0012
212-850-6000; orders 1-800-225-5945
(Orders to: Eastern Distribution Center,
1 Wiley Dr., Somerset NJ 08875-1272)

Other Resources including AFSIC Publications

Alternative Agricultural Opportunities: A Bibliography. St. Paul MN: **Center for Alternative Plant and Animal Products**, University of Minnesota, 1991. 106 p. (NAL Z5074 A815A57 1991) [Contact: Center for Alternative Plant and Animal Products, University of Minnesota, 340 Alderman Hall, St. Paul MN 55108, phone 612-624-4217, fax 612-625-5747]

Appropriate Technology Transfer for Rural Areas (ATTRA) Resource Center, Information Packages. Fayetteville AR: ATTRA, 1992- (NAL various numbers) (multi-paged free information packets on various organic techniques and crops, e.g., "Organic Vegetable Production", "Organic/ Low-Spray Apple Production", "Organic Strawberry Production", "Sustainable Hydroponics", "Sustainable Dairy Production", etc. ATTRA staff also respond to specific informational requests) [Contact: ATTRA, P.O. Box 3657, Fayetteville AR 72702, phone 1-800-346-9140, e-mail askattra@ncatfyv.uark.edu]

European Community Regulation EC 2092/91. All aspects of ecological farming regulation and certification within and between EC member countries are addressed by this regulation and its

amendments. [Contact: EC headquarters in Brussels, Belgium, or for an English version, **United Kingdom Register of Organic Food Standards**, Ministry of Agriculture, Fisheries and Food, Nobel House, 17 Smith Square, London SW1P 3JR, United Kingdom]

Gardner, Melanie, *A Guide to Funding Resources. Rev. ed. ("..information from both government and private sources on funding opportunities available to local governments, small businesses, organizations, associations, groups and individuals.") **Rural Information Center** Publication Series; no.49., Beltsville MD: USDA, National Agricultural Library, 1995 (NAL aHN49 C6R873 no. 38) (also available electronically via RIC's Web Site URL: http://www.nal.usda.gov/ric) [Contact: Rural Information Center, National Agricultural Library, USDA, 10301 Baltimore Ave., Room 304, Beltsville MD 20705-2351, phone 1-800-633-7701 or 301-504-5547, e-mail ric@nal.usda.gov]

Klonsky, Karen and Laura Tourte, Statistical Review of California's Organic Agriculture, 1992-1993: Report Prepared for California Department of Food and Agriculture, Organic Program. Davis CA: Cooperative Extension, **Department of Agricultural Economics, University of California, Davis**, 1995. (NAL S605.5 K67 1995) [Contact: Laura Tourte, Department of Agricultural Economics, University of California, Davis CA 95616, phone 916-752-9376, fax 916-752-5614, e-mail tourte@primal.ucdavis.edu]

1995 National Organic Farmers' Survey. Santa Cruz CA: **Organic Farming Research Foundation**, 1996. (1993 edition, NAL S605.5 O745 1993) [Contact: OFRF, P.O. Box 440, Santa Cruz CA 95061, phone 408-426-6606, fax 408-426-6670, e-mail research@ofrf.org]

Office for Small-Scale Agriculture, USDA, *Small-Scale Agriculture Alternatives Series. Washington DC: OSSA/USDA, 1992- (NAL various numbers) (pamphlet series on various alternative crops, e.g. "Wildflowers", "Mushrooms", "Exotic Livestock", etc.) [Contact: USDA/ CSREES, Office for Small-Scale Agriculture, Ag Box 2244, Washington DC 20250-2244, phone 202-401-1805]

U.S. Organic Certification Organization Directories. There are several sources for up-to-date directories of certifying agencies. **USDA Agricultural Marketing Service**, described under "Current Status of Organic Production in the United States" in this publication, maintains and distributes a current list. On the Internet, both **agAccess** and the **Organic Trading and Information Center**, listed in the "World Wide Web/ Homepages" section below, maintain excellent directories.

Weintraub, Irwin, "Alternative Agriculture: Selected Information Sources - Part I: Databases, Abstracts and Indexes, Periodicals, and Newsletters and Newspapers" in Journal of Agricultural and Food Information, Vol. 1 (3), pp. 41-100, 1993. (NAL S494.5 I47J68) [Contact: Haworth Press, Inc., 1-800-3-HAWORTH]

Weintraub, Irwin, "Alternative Agriculture: Selected Information Sources - Part II: Bibliographies, Reports, and Directories" in Journal of Agricultural and Food Information, Vol. 1 (4), pp. 33-96.(NAL S494.5 I47J68) [Contact: same as above]

Alternative Farming Systems Information Center (AFSIC), National Agricultural Library, USDA, *List of Information Products. Beltsville MD: National Agricultural Library, updated monthly. (list of "Quick Bibliographies" on various alternative ag topics, e.g. "Legumes in Crop Rotations", "Cultural and Mechanical Weed Control", "Rotational Grazing and Intensive Pasture Management", etc. AFSIC staff will perform individual database searches and information retrieval on request.) [Contact: AFSIC, 10301 Baltimore Ave., Rm. 304, Beltsville MD 20705-2351, 301-504-6559, e-mail afsic@nal.usda.gov]

Also from AFSIC:

AFSIC Staff, *Sustainable Agriculture in Print: Current Books. (Special Reference Brief 96-04) 1995. (published annually) (NAL aS21 D27S64 no. 96-04)

DeMuth, Suzanne, *Sustainable Agriculture in Print: Current Periodicals. (Special Reference Brief 95-08) 1995. (NAL aS21 D27S64 no. 95-08)

Gates, Jane Potter, *Educational and Training Opportunities in Sustainable Agriculture. 8th ed., 1995. (NAL aS605.5 E38 1993)

Stevens, Raymond and AFSIC staff, *Videocassettes in the NAL Collection Pertaining to Alternative Farming Systems. (Special Reference Brief 95-03) 1995. (NAL aS21 D27S64 no. 95-03)

Journals and Newsletters

*For a detailed directory of journals and newsletters related to organic/ alternative/ sustainable agriculture, with subscription information for each title, please consult the free AFSIC publication, *Sustainable Agriculture in Print: Current Periodicals, listed above.*

Some titles of particular interest to organic producers:

Acres U.S.A. (monthly/ $20 yr.), from Acres U.S.A., P.O. Box 8800, Metairie LA 70011-8800, phone 504-889-2100, fax 504-889-2777 e-mail acresusa@aol.com. (NAL S601 A1A25)

American Journal of Alternative Agriculture (quarterly/ $24 yr.), from Henry A. Wallace Institute for Alternative Agriculture, 9200 Edmonston Road, Suite 117, Greenbelt MD 20770-1551, phone 301-441-8777, fax 301-220-1551. (NAL S605.5 A43)

American Small Farm (10 issues/ $18 yr), from Magnet Communications, Inc.9420, Topanga Canyon Blvd., Suite 202, Chatsworth CA 91311-5759, phone 818-727-2236, fax 818-727-1358.

Biodynamics (bimonthly/ $14-$75 yr.), from Bio-Dynamic Farming and Gardening Association, Inc., P.O. Box 550, Kimberton PA 19442, phone 610-935-7797 (800-516-7797 for CSA/BDA farms information), fax 610-983-3196, URL: http://www/his.com/~claymont/bda.html (NAL 56.8 B52)

Common Sense Pest Control Quarterly (quarterly/ $30 yr.), from Bio-Integral Resource Center (BIRC), P.O. Box 7414, Berkeley CA 94707, phone 510-524-2567. (NAL SB950.A1C62)

Countryside & Small Stock Journal (bimonthly/ $18 yr.), from Countryside & Small Stock Journal; N2601 Winter Sports Rd., Withee WI 54498 (to subscribe: W11564 Hwy. 64, Withee WI 54498), phone 1-800-551-5691 (715-785-7979 for editorial, advertising). (NAL S521.C62)

Ecology and Farming (quarterly/ $29 yr.), from International Federation of Organic Agriculture Movements (IFOAM), Oekozentrum Imsbach, D-66636 Tholey-Theley, Germany, phone +49 6853 5190, fax +49 6853 30110 (U.S.: telephone 215-863-6700, fax 215-863-4622).

Farmer to Farmer (bimonthly/ $15 yr.), from Community Alliance with Family Farmers (CAFF) Foundation, P.O. Box 73674, Davis CA 95617, phone 916-756-7428, fax 916-756-7857, e-mail f2f@igc.apc.org.

Farmer's Information Network Organic Market News (formerly Organic Wholesale Market Report: Organic Market News and Information Service (OMNIS)) (bimonthly/ mail $65/ fax or e-mail $75 yr.), from FIN, P.O. Box 2067, Santa Clara CA: 95055-2067, phone 408-247-2067, fax 408-247-5823, e-mail FarmerNet@aol.com.

The Furrow (8 to 10/ complimentary to qualified farmers), from Deere & Company, John Deere Rd., Moline IL 61265-8098, phone 309-765-5403, fax 309-765-4498 (NAL S441.F97).

Growing for Market (monthly/ $26 yr.), from Fairplain Publications, P.O. Box 3747 Lawrence KS 66046, phone/fax 913-841-2559 (also telephone 1-800-307-8949).

Journal of Pesticide Reform (quarterly/ membership $15 or $25 yr.), from Northwest Coalition for Alternatives to Pesticides (NCAP), P.O. Box 1393, Eugene OR 97440, (office: 1249 Willamette St., Eugene OR 97401) phone 541-344-5044, fax 541-344-6923, e-mail ncap@igc.apc.org (NAL SB950.2 A1J58), url: http://www.efn.org/~ncap/.

The Natural Farmer (quarterly, $10 yr.), from Northeast Organic Farming Association (NOFA), 411 Sheldon Rd., Barre MA 01005-9252, phone 508-355-2853. (NAL S605.5 N3)

Natural Foods Merchandiser (monthly, includes Organic Times annual supplement/ $48 yr.), from New Hope Communications, 1301 Spruce St., Boulder CO 80302-4832, phone 303-939-8440, fax 303-939-9559, URL: http://devel.newhope.com/public/nfm/NFM_home.html.

Organic Commodity Price Bulletin (weekly fax service), from Organic Food Business News, Hotline Printing & Publishing, P.O. Box 161132, Altamonte Springs FL 32716-1132, fax 407-628-9935

Organic Food Business News (monthly/ $48 yr.), from Hotline Printing and Publishing, P.O. Box 161132, Altamonte Springs FL 32716-1132, phone 407-628-1377, fax 407-628-9935.

Organic Food Matters (quarterly/ membership, sliding scale from $20), from Committee for Sustainable Agriculture (CSA), P.O. Box 838, San Martin CA 95046, phone 408-778-7366, fax 408-778-7186. (NAL S494.5 S86O7)

Organic Gardening (9 issues/ $25 yr.), from Rodale Press, Inc., 33 E. Minor St., Emmaus PA 18098, phone 610-967-5171 (610-967-8715 for advertising). (NAL S605.5.O74)

The Organic Report (monthly/ free with membership; non-members $50 yr), from Organic Trade Association (OTA), P.O. Box 1078, Greenfield MA 01302, (office: OTA, 20 Federal St., Suite 3, Greenfield MA 01301), phone 413-774-7511, fax 413-774-6432, e-mail ota@igc.apc.org.

The Packer (weekly; semi-weekly at end of each quarter/ $55 yr.) (special issues: "Packer's Produce Availability and Merchandising Guide" and "Fresh Trends: A Profile of the Fresh Produce Consumer" available separately), from Vance Publishing Corp., 10901 W. 84th Terr., Lenexa KS 66214-1631, phone 913-438-8700. (NAL S86.8 N483)

The Permaculture Activist (quarterly/ $16 yr.), from Permaculture Activist, P.O. Box 1209, Black Mountain NC 28711.

Rural Heritage (bimonthly/ $19 yr.), from Allan Damerow, Publisher, 281 Dean Ridge Lane, Gainesboro TN 38562-5039, phone 612-268-0655. (subscription includes annual supplement "The Evener Work Horse, Mule, and Oxen Directory and Guide") (NAL SF311 E9)

Small Farm Today (bimonthly/ $21), from Missouri Farm Publishing Inc., 3903 W. Ridge Trail Rd, Clark MO 65243, phone 800-633-2535 or 314-687-3525, fax 314-687-3148. (NAL S1.M57)

Small-Scale Agriculture Today (quarterly/ complimentary) from Office for Small Scale Agriculture (OSSA), c/o Bud Kerr, Editor, USDA/CSREES, Ag Box 2244, Rm. 3349, South Bldg., Washington DC 20250-2244, phone 202-720-5245, fax 202-205-2448, e-mail bkerr@reeusda.gov. (NAL aHD1751 S532)

The Stockman Grass Farmer (monthly/ $24.50 yr.) from Mississippi Valley Publishing Corporation, 5135 Galaxie Drive, Suite 300C, Jackson MS 39206, phone 601-981-4805, fax 601-981-8558, (to subscribe: SGF, P.O. Box 9607, Jackson MS 39286-9909, phone 800-748-9808, fax 601-981-8558). (NAL SF1.M5)

Sustainable Farming: The Magazine of Resource Efficient Agricultural Production (quarterly/ membership C$20 or C$17.12 yr., US rates on request), from Resource Efficient Agricultural Production (REAP)-Canada, Box 125, Glenaladale House, Ste-Anne-de-Bellevue, Quebec H9X 3V9, Canada, phone 514-398-7743, fax 514-398-7972 (advertising: phone 705-444-0923). (NAL S494.5.S86S96)

In addition to the above publications, many local/ regional organic grower and certification groups, university research projects, and regional environmental and SARE organizations provide excellent newsletters and other publications. Check directories for more contacts and information.

Electronic Resources

What are they? Where are they?

Increasingly, excellent agricultural information is available electronically: research papers, how-to publications, catalogs, market reports, surveys, directories, journals, pictures, even computer software. This flood of material is coming to us via computer diskettes and CD's, commercial on-line services, electronic bulletin board systems (BBS), as well as the Internet's electronic mail (e-mail), "gophers", telnet, and World Wide Web systems. The information superhighway has opened for business; it is ever-widening, and reaching new destinations every day.

Using the technology and information available electronically presents many challenges. For example, electronic media relay all kinds of information: valuable as well as inane, reliable as well as unsubstantiated. Sources change daily, reflecting "hot" topics, terminated programs, new technology, etc. Gathering information electronically is not like reading a book: advanced knowledge may precede the basics, the end of the story may come before the beginning. Copyright restrictions apply to electronic publications as well as to printed ones. Increased use of the Internet has slowed down response time considerably. Try non-business hours for fastest results.

For help, there are many excellent books on how to effectively use this constantly changing technology. They are available at libraries and bookstores. The Internet itself is a bottomless source of self-explanation, from "help" screens and searching tips to discussion groups and newsletters dedicated to using the Internet.

Gopher Servers

Non-graphical resources with many layers of information, often with links to other gophers. Many gopher sites are currently being displaced by the World Wide Web. To search for gopher information by subject/ keyword, try search engines called Veronica or Archie available on most gophers.

EcoGopher (University of Virginia): ecosys.drdr.Virginia.edu
Of interest: environmental interest group discussion groups and publications, also Environmental Protection Agency (EPA) Toxics Factsheets.

Minnesota Gopher Central (University of Minnesota): gopher.tc.umn.edu
Of interest: large collection of gopher information including searching tools and links around the world.

North Carolina State University Cooperative Extension Service Gopher (NCSU/CES): gopher.ces.ncsu.edu
Of interest: main repository of materials originating from the Sustainable Agriculture Research and Education (SARE) program. From the main NCSU/CES menu, choose National CES Programs / Sustainable Agriculture. In addition to SARE materials (the Directory of Expertise, currently funded SARE projects, etc), one can search the Agricultural Marketing News publications, State Alternative Laws, Pesticide Information Publications (PIP's) from Oregon CES, and the past postings (archives) of several national discussion groups.

PENpages (Pennsylvania State University): psupen.psu.edu
Of interest: large number of agriculturally related resources and documents. You may search PENpages by keyword or alphabetically, as well as by other menu choices. "Small and Part-time Farming" holds full text documents from the USDA Office of Small Scale Agriculture and from the USDA Extension/ PSU Small and Part-time Farming Project Publications list.

USDA Extension Service Gopher: gopher.esusda.gov
Of interest: a searchable "Directory of Professional Workers in State Agriculture Experiment Stations and Other Cooperating State Institutions", USDA press releases, 1995 Farm Bill information, Extension's Water Quality database, and many state Extension Services.

World Wide Web/ Homepages
Graphics oriented, point-and-click information retrieval; homepages usually include links to related informational sites. Subject/keyword searching capability is essential. Among several effective searching tools available on the Web are Digital Corporation's Alta Vista site: http://www.altavista.digital.com or *Metacrawler: http://metacrawler.cs.Washington.edu: 8080/index.html*

agAccess: http://www.mother.com/agaccess
Includes comprehensive directory of US Organic Certification organizations, "Internships, Apprenticeships, and Working Farms Programs in the US" from ATTRA, in addition to their publications catalog/ information.

Aggie Horticulture (Texas A&M): http://aggie-horticulture.tamu.edu
Cooperative Extension information on crop production, etc., plus "Sustainable Practices for the South", IPM Network, and related topics.

Agricultural Network Information Center (AgNIC): http://www.agnic.org
The National Agricultural Library's cooperative effort to compile and link agricultural databases (AgDB), Directories of Expertise, and more.

Alternative Farming Systems Information Center (NAL/ ARS/ USDA):
http://www.nal.usda.gov/afsic
Full text AFSIC bibliographic and reference publications, links.

Aquatic Ecology at the Earth Centre: http://www.shef.ac.uk/~ec/aetec/index.html
One of the few places to find information on "Sustainable Freshwater Aquaculture" and "Sustainable Wetland Production".

Cascadian Farm: http://www.cfarm.com
Commercial site with a Healthfood Store database and a National Organic Standards Board (NOSB) update section.

Center for Sustainable Agricultural Systems (University of Nebraska, Lincoln):
http://ianrwww.unl.edu/ianr/csas
Newsletters, research reports, curriculum materials, etc.

Conservation Technology Information Center: http://www.ctic.purdue.edu/ctic.html
National Crop Residue Survey database and map, National Watershed Network, newsletters.

Cooperative Extension System Information Servers: http://www.esusda.gov/partners/ces-locs.htm
Linked directory of US and Canadian Extension On-line resources, including publications, by state/province.

EcoNet's Agriculture & Trade Directory: http://www.igc.apc.org/igc/www.agritrade.html

IFOAM '96 Book of Abstracts: http://ecoweb.dk/english/ifoam/conf96/index.html
Hundreds of abstracts of papers, posters, etc. presented at the International Federation of Organic Agricultural Movements Conference in Denmark, August 1996. Author and subject indexes included.

Global Entomology Agriculture Research Server (ARS/ USDA): http://gears.tucson.ars.ag.gov/
Text, pictures, and sounds of insects, especially bees.

Midwest Organic Alliance: http://www.midwestorganic.org
Background information for consumers, producers and marketers.

National Integrated Pest Management Network: http://www.reeusda.gov/ipm/ipm-home.htm

New Crops Information System: http://newcrop.hort.purdue.edu
Searchable databases CropSEARCH, CropExpert, CropREFERENCE, plus a U.S. FarmMARKET directory, newsletters, and calendar.

New Hope Group On-line: http://devel.newhope.com/public/Home_Page.html
Commercial site, full-text articles from their publications, commercial links, etc.

Noah's Ark: An Organic Farmer's Homepage: http://www.rain.org/~sals/my.html

Not Just Cows: A Guide to Internet/Bitnet Resources in Agriculture and Related Sciences, by Wilfred Drew: http://www.snymor.edu/~drewwe/njc/njcbeta/njcmain.htm
Just what it says; especially good for listing of agriculture-related Libraries.

Organic Agriculture and Permaculture at Sunsite (University of North Carolina): http://sunsite.unc.edu/london/index.html
Very useful page of links: composting, biodynamics, permaculture, vermiculture, community supported agriculture, livestock, and more.

Organic Farmers Marketing Association (OFMA): http://www.iquest.net/ofma/
Organic laws including NOSB documents, and text of National Organic Marketing Cooperative Feasibility Study.

Organic Trading and Information Center: http://www.organicfood.com/welcome.html
Legislative issues, resource groups, certifying organization as well as consumer and commercial information and links.

Permaculture International: http://nornet.nor.com.au/environment/perma/
Global directory, mail order resources, more.

RotWeb: http://net.indra.com/~topsoil/Compost_Menu.html
Composting how-to and links.

Sustainable Agriculture Network (SAN): http://www.ces.ncsu.edu/san/index.html
SARE research and grant information, SAN Directory of Expertise, sanet-mg archives, more.

Sustainable Agriculture Research and Education Program (SAREP) (University of California, Davis): http://www.sarep.ucdavis.edu/
Two downloadable databases: Cover Crop (PC & Mac) and Dairy Debate (Mac only).

Urban Agriculture Notes (City Farmer, Canada Office of Urban Agriculture): http://www.city farmer.org/

Water Quality Information Center (ARS/ USDA/ NAL): http://www.nal.usda.gov/wqic
Full text bibliographic publications, searchable WQ databases including Agricultural Waste Database from Auburn University.

Discussion Groups/ Mailing Lists:
Receive newsletters and calendars; converse interactively with others. To subscribe generally requires a request to a computer listserv or listproc or majordomo address. For example, to subscribe to Graze-l, below, you would send in the message portion of an e-mail message the phrase "subscribe graze-l your first name your last name" to the subscription address. Use only these words (substituting your own first name and last name), without the quotation marks. Subsequent messages to the group are addressed to the list name and address.

There are several directories of discussion lists on the Internet. Try Clark Consulting International, Inc. for a good one on agriculture: http://www.interaccess.com/consulting/ maillist.html. Here is a sampling.

CSA-l (Community Supported Agriculture networking): Subscriptions to: listproc@prairienet.org Discussion mailings to: csa-l@prairienet.org

Forage-mg (Forage production/ management): Subscriptions to: almanac@oes.orst.edu
Discussion mailings to: forage-mg@oes.orst.edu

Graze-l (Rotational grazing and seasonal dairying): Subscriptions to: listserv@taranaki.ac.nz
Discussion messages to: graze-l@taranaki.ac.nz

Permaculture-mg (US permaculture discussion): Subscriptions to: almanac@ces.ncsu.edu
Discussion messages to: permaculture-mg@ces.ncsu.edu

Smallfruit-mg (berries, grapes, etc. for growers and researchers): Subscriptions to: almanac@esusda.gov Discussion messages to: smallfruit-mg@esusda.gov

Sanet-mg (Sustainable Agriculture Network-SAN): Subscriptions to: almanac@ces.ncsu.edu
Discussion messages to: sanet-mg@ces.ncsu.edu (An informational pamphlet, *Getting Started Electronically with the Sustainable Agriculture Network is available through SAN's NAL office. [Contact: SAN Coordinator, National Agricultural Library, 10301 Baltimore Ave., Room 304, Beltsville MD 20705-2351, phone 301-504-6425, e-mail san@nal.usda.gov]

Electronic Journals and Newsletters:
Full-text publications, selected articles, and abstracts of many periodicals are available. You may also subscribe to hard copy publications via the Internet. Two good directories: Online Agricultural Journals and Magazines: http://www.interaccess.com/consulting/agpubs.html and Oxbridge Communication's Media Finder Directory of Newsletters, Directory of Catalogs, and Directory of Magazines: http://www.oxbridge.com/index.html

A selection of current and back issues of environment-related journals, including several on alternative/sustainable agriculture is available via the ***Sustainable Earth Electronic Library (SEEL)****, URL http://www. envirolink.org/pubs/index.html*

Computer Software for Research and for Farm Management:
Computer programs that help with farm planning and management have been around for some time. Here is one that deals with environmentally friendly practices, and was developed under a Sustainable Agriculture Research and Education (SARE) grant.

PLANETOR Microcomputer Software Module. (for "ecologically sound and economically viable" crop production; demonstration disk available) [Contact: Center for Farm Financial Management, 249 Classroom Office Bldg., Univ. of MN, St. Paul MN 55108, 612-625-1964 or 1-800-234-1111]

Videocassettes in the NAL Collection Pertaining to Alternative Farming Systems

Videocassettes added to the National Agricultural Library collection
since January 1995
Updates Special Reference Brief 95-03

Compiled by Mary V. Gold
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Alternative Farming Systems Information Center

Videocassettes in the NAL Collection Pertaining to Alternative Farming Systems

1. **NAL Call No.: Videocassette no. 2687**
1 Plan.
Pennsylvania Association of Conservation Districts (Pennsylvania, 1991?).
1 videocassette (11 min., 30 sec.): sd., col.
Abstract: Discusses how to provide farmers and land owners with a single coordinated program to guide their day to day management, plan for long term improvements, protect natural resources, and stay in compliance with government rules and regulations.

2. **NAL Call No.: Videocassette no. 1941**
Acres of Oysters.
Studio One (1992?). Distributed by Atlantic Coast Shellfish Producers Association: Soundkeeper Fund.
1 videocassette (ca. 33 min.): sd., col.
"0164.".
Abstract: Presents an overview of the oyster industry in Connecticut through interviews with oyster farmers and Connecticut Dept. of Agriculture, Aquaculture Division inspectors.

3. **NAL Call No.: Videocassette no. 2504**
Agricultural Treasures of Japan.
Norin Suisansho (Japan, 1991?). Distributed by The Corporation.
1 videocassette (ca. 21 min.): sd., col.
Abstract: Shows some of the agricultural products that Japan exports. These include shitake mushrooms, fuji apples, and 20th century pears.

4. **NAL Call No.: Videocassette no. 2527**
Agricultural Wetlands: Values for Landowners.
Quality Productions. Producer/director, Dan Denney (Ithaca, NY, 1995?). Distributed by Cornell Cooperative Extension.
1 videocassette (ca. 38 min.): sd., col. 1 brochure.
Consists of a 10 minute promotional presentation for agriculturists and a 28 minute feature for general audiences.
Abstract: Highlights wetland ecology, management, and programs administered by public and private organizations to assist rural landowners who wish to conserve wetlands on private holdings.

5. **NAL Call No.: Videocassette no. 2523**
Agroecology in Accion: Experiencias En El Diseno De Una Agricultura Sustentable.
Miguel A. Altieri (Berkeley, CA?, 1996?).
1 videocassette (45 min.): sd., col.
Abstract: Miguel Altieri discusses fundamental agroecological principles necessary for the transformation of high input degrading agriculture into low input resource conserving agriculture.

6. **NAL Call No.: Videocassette no. 2118**
Alabama, the Place for Aquaculture!
Alabama Power Company. Video Services (Alabama, c1991). Distributed by Alabama Power Video Services.
1 videocassette (4 min., 9 sec.): sd., col.
Abstract: Profiles the size of the Alabama aquaculture industry and its infrastructure.

7. **NAL Call No.: Videocassette no. 2482**
Aquatic Ecosystems.
Coronet (Northbrook, IL, 1993). Distributed by Coronet/MTI Film & Video.
4 videocassettes (55 min.): sd. col. 4 discussion guides.
Abstract: Illustrates the basic physical features of freshwater and marine ecosystems as well as the plants and animals that depend on the ecosystems for survival. Examines the effects of human activities on the ecosystems.

8. **NAL Call No.: Videocassette no. 2486**
Baitfish Culture in the South.
Texas Agricultural Extension Service (College Station, TX, 1996). Distributed by Texas Agricultural Extension Service.
1 videocassette (30 min., 30 sec.): sd., col.
Funded through the Southern Regional Aquaculture Center.
Abstract: The golden shiner, fathead minnow, and goldfish comprise the majority of fish raised for bait in the South. This video covers the following steps in the production of those three species: facilities, reproduction, pond management, diseases, pests and problems, harvesting, holding and transport, and marketing.

9. **NAL Call No.: Videocassette no. 2166**
Basic Herding.
Burton J. Smith and Graziers Hui (Kamuela, HI, c1993). Distributed by Graziers Hui.
1 videocassette (ca. 50 min.): sd., col. 1 manual + 1 booklet.
Abstract: Discusses stockmanship, herding, and handling of cattle. Includes practice sessions and practical exercises.

10. **NAL Call No.: Videocassette no. 2557**
Bay Scapes.
Alliance for the Chesapeake Bay (Richmond, VA, 1994?). Distributed by The Alliance.
1 videocassette (25 min.): sd., col. 7 brochures + 1 pamphlet
Abstract: Assists homeowners in making practical and environmentally sound decisions regarding their landscapes to reduce nonpoint source pollution that would effect the Chesapeake Bay.

11. **NAL Call No.: Videocassette no. 2509**
Beekeeping in Northern Climates.
Marla Spivak and University of Wisconsin Extension. Cooperative Extension Service (St. Paul, MN, 1996). Distributed by The Service.
1 videocassette (40 min.): sd., col. 1 manual (68 p.: ill. ; 28 cm.)
"VH-6553.".
Abstract: Dr. Marla Spivak discusses basic principles of beekeeping. These include good equipment, good location, queens should be young and prolific, and hives should be disease and mite free.

12. **NAL Call No.: Videocassette no. 2209**
Best Management Practices for Improved Water Quality.
University of Illinois at Urbana Champaign. Cooperative Extension Service (Urbana, IL, c1991). Distributed by The Service.
1 videocassette (ca. 24 min.): sd., col.
Abstract: Discusses methods farmers can use to improve water quality. These include establishing a regular soil testing schedule, managing nitrogen application, constructing buffer strips to protect streams, and using conservation tillage systems.

13. **NAL Call No.: Videocassette no. 2453**
Best Management Practices in Minnesota Forestry.
Minnesota Extension Service (St. Paul, MN, 1991). Distributed by Minnesota Extension Service, University of Minnesota: Educational Development System.
1 videocassette (20 min.): sd., col.
Produced at KDLH-TV, Duluth, MN.
Abstract: Explains the best management practices for forestry in order to reduce or prevent nonpoint source water pollution.

14. **NAL Call No.: Videocassette no. 2510**
Best Management Practices for Nitrogen Fertilizer and Water Use in Irrigated Agriculture.
California. Dept. of Food and Agriculture. Fertilizer Research and Education Program (Sacramento, CA, 1993). Distributed by The Program.
1 videocassette (30 min.): sd., col. 1 study guide (5 leaves ; 28 cm.)
Abstract: Provides growers, consultants and students with information on the efficient use of fertilizers. Nitrogen and water applications, rates and timing; soil and plant monitoring and other practices are discussed in detail. Factors that contribute to nitrate leaching are explored and nitrate sensitive areas in California are also discussed.

15. **NAL Call No.: Videocassette no. 2718**
Billion Dollar Crop.
Film Australia Pty Limited (Sydney, N.S.W.?, 1994). Distributed by Bullfrog Films.
1 videocassette (55 min.): sd., col
Abstract: Although hemp, or cannabis fibre, in its non-toxic form has been used successfully in the production of horse-bedding, building material, clothing fabric, and paper-making, it is a prohibited plant. Doctors, agronomists, farmers and manufacturers comment on its value, especially to the Australian agricultural economy. Archival film supports the points made.

16. **NAL Call No.: Videocassette no. 2427**
Biodiversity for Forests and Farms.
Cornell University. Educational Television Center (Ithaca, NY, c1996). Distributed by Educational

Television Center, Media Services, Cornell University: Cornell Cooperative Extension.
1 videocassette (28 min.): sd., col.
Abstract: Presents concepts of ecosystem management: conservation of biodiversity, specific management for forests and farms. Contains interviews with wildlife and forest ecologists, farmers, and forest owners.

17. **NAL Call No.: Videocassette no. 2467**
Biological Control: Learning to Live With the Natural Order.
National Biological Control Institute (Riverdale, MD, 1995, c1993). Distributed by The Institute.
1 videocassette (25 min.): sd., col.
Abstract: Hosts, Dale Bradley and Jami Morgan, discuss biological control including a brief history as well as aphid control through predator mites, parasitic wasps, ladybird beetle larva and lacewing larva. The video also describes the development of biological control of the Russian wheat aphid for the United States.

18. **NAL Call No.: Videocassette no. 2049**
Biological Control of Weeds in Montana.
Jim Story, Robert M. Nowierski, Charles Quimby, and Montana State University (Bozeman, MT, c1993). Distributed by Montana State University.
1 videocassette (17 min.): sd., col.
Abstract: Program looks at research being done on biological control of rangeland weeds in Montana such as spotted knapweed, leafy spurge and dalmatian toadflax. Scientists Jim Story, Robert Nowierski, and Charles Quimby discuss the work being done by their respective institutions, the Montana Agricultural Experiment Station, Montana State University Entomology Research Laboratory and the USDA-ARS Rangeland Weeds Laboratory.

19. **NAL Call No.: Videocassette no. 2398**
Biorational Pest Control in the 90's.
Sandoz Crop Protection Corporation (Des Plaines, IL, c1990). Distributed by The Corporation.
1 videocassette (11 min., 27 sec.): sd., col.
Abstract: Discusses research efforts at Sandoz aimed at finding new ways of controlling pests without any effect on the environment.

20. **NAL Call No.: Videocassette no. 2757**
Biotechnology in Agriculture: Challenges for the Future: a USDA Millennium Discussion, March 19, 1999, Jefferson Auditorium.
USDA Millennium Discussion (1st: 1999) (Washington, DC, 1999). Distributed by USDA.
1 videocassette (101 min.): sd., col.
Abstract: Discusses the transformation in American agriculture due to crop biotechnology.

21. **NAL Call No.: Videocassette no. 2439**
California Farmed Striped Bass.
Craig Carlson and Kent Seafarms Corporation (San Diego, CA, 1996?). Distributed by The Corporation.
1 videocassette (7 min., 30 sec.): sd., col.
Abstract: Shows the production facilities at Kent Seafarms Corporation where three million pounds of striped bass are produced annually.

22. **NAL Call No.: Videocassette no. 2623**
Catfish Farming in the South. Rev. 1997.
Mississippi State University. Cooperative Extension Service (College Station, TX, 1997). Distributed by Texas Agricultural Extension Service.
1 videocassette (22 min., 25 sec.): sd., col.
Funded through the Southern Regional Aquaculture Center.
Abstract: Provides an overall view of the catfish industry in the southern United States. Covers areas of production cost, pond and water management, pond site selection and construction, hatchery information, and transport of catfish.

23. **NAL Call No.: Videocassette no. 2843**
Close to the Ground.
Land Stewardship Project and Blue Moon Productions for the Land Stewardship Project (Lewiston, MN, 1997, c1998?). Distributed by Land Stewardship Project.
1 videocassette (25 min.): sd., col.
"This video shows how farmers and resource professionals can join together to develop ways for farm families to monitor changes in their management practices"--Container.

24. **NAL Call No.: Videocassette no. 2246**
Commercial Hydroponic Tomato Production.
On Sat One Television Productions (Anderson, SC, 1995?). Distributed by On Sat One Television Productions.
1 videocassette (ca. 40 min.): sd., col.
Abstract: Describes various soilless techniques to produce fresh market tomatoes. These include perlite culture, sand culture, sawdust culture, and nutrient film technique.

25. **NAL Call No.: Kit no. 287**
Community Kitchens.
Laura Kalina and Kamloops FoodShare (Kamloops, BC, Canada, 1994?). Distributed by Kamloops FoodShare.
1 videocassette, 3 booklets.
Titles on booklets: Community kitchens, cookbook and shopping guide; Community kitchens, leader's guide; Building food security in Canada.
Abstract: Contains information necessary to set up a community kitchen. Explains what a community kitchen is, who joins, and how it benefits its members. Also contains information on hunger and food security.

26. **NAL Call No.: Videocassette no. 2742**
Composting for Pork Producers.
National Pork Producers Council (Des Moines, IA, c1997). Distributed by The Council.
1 videocassette (ca. 14 min.): sd., col.
"Composting basics"--Container.
Abstract: Shows how composting can transform swine mortality and manure into a state where storage, handling, and land application can be achieved without adversely effecting the environment.

27. **NAL Call No.: Videocassette no. 1942**
Composting Poultry Mortality.
University of Maryland Cooperative Extension Service (College Park, MD, c1992). Distributed by The Service.
1 videocassette (17 min.): sd., col.
Abstract: Demonstrates the applications of composting as a practical, economical, and environmentally safe alternative method of disposing of normal poultry farm mortality.

28. **NAL Call No.: Videocassette no. 2797**
Conjunctive Use: a Comprehensive Approach to Water Planning.
Water Education Foundation (Sacramento, CA , c1999). Distributed by Water Education Foundation.
1 videocassette (11 min.): sd., col.
"This program is a production of the Water Education Foundation with assistance from the CALFED Bay-Delta Program.".
Abstract: Discusses methods of coordinating management of surface water supplies with ground water supplies.

29. **NAL Call No.: Videocassette no. 2020**
Corn and Soybeans. Fertility, Insects, Compaction, Plus Ridge-Till.
Randall Reeder and Ohio State University Extension (Columbus, OH, c1994). Distributed by Ohio State University Extension.
1 videocassette (120 min.): sd., col.
Title from container.
Abstract: One of a series of programs broadcast via satellite. Includes 21 speakers and includes topics such as manure management, fertilizer management, insect management, ridge-till and no-till compaction. Under ridge-till topics such as machinery selection and modification; cultivation, rotary hoeing, and herbicides; and irrigation are covered.

30. **NAL Call No.: Videocassette no. 2019**
Corn and Soybeans. Mulch-Till and Subsoiling.
Randall Reeder and Ohio State University Extension (Columbus, OH, c1994). Distributed by Ohio State University Extension.
1 videocassette (120 min.): sd., col.
Title from container.
Abstract: One of a series of programs broadcast via satellite. Includes 16 speakers and covers topics such as machinery and residue management, subsoiling and deep tillage, weed control and herbicides, and machinery economics.

31. **NAL Call No.: Videocassette no. 2018**
Corn and Soybeans. No-Till and Zone-Till.
Randall Reeder and Ohio State University Extension (Columbus, OH, c1994). Distributed by Ohio State University Extension.

1 videocassette (120 min.): sd., col.
Title from container.
Abstract: One of a series of programs broadcast via satellite. Includes 22 speakers and covers topics such as machinery selection and management, harvest, weed control and herbicides, and economics and earthworms.

32. **NAL Call No.: Videocassette no. 2677**
Creating a Sustainable Civilization: an Introduction to Holistic Decision Making.
Allan Savory and Center for Holistic Management (Albuquerque, NM, c1996). Distributed by Center for Holistic Management.
1 videocassette (ca. 85 min.): sd., col
"Based on a lecture at the University of New Mexico, Albuquerque, August 1995"--Container.
Abstract: Allan Savory makes a compelling case for the need to change the way we make decisions and introduces you to the new decision-making process on which holistic resource management is based.

33. **NAL Call No.: Videocassette no. 2651**
Creative Cover Cropping in Annual Farming Systems.
University of California. Sustainable Agriculture Research and Education Program (Davis, CA, c1993). Distributed by University of California Communication Services.
1 videocassette (24 min.): sd., col.
"93-V.".
Abstract: Discusses various types of cover crops such as perennial sods, green manures, green leaf manures, catch crops, and scratch crops, and the benefits to growing them.

34. **NAL Call No.: Videocassette no. 2183**
Cultural Weed Control in Vegetable Crops.
Visual Media University of California (Davis, CA, c1993). Distributed by University of California, Visual Media.
1 videocassette (ca. 36 min.): sd., col.
Consists of two 18 minute versions. The first is a straight forward presentation. The second provides a lighthearted "down-home" narration style.
Abstract: Describes proven and experimental methods of controlling weeds. These include cover cropping, crop rotation, solarization, flame weeders, steam weeders, and the use of grazing animals.

35. **NAL Call No.: Videocassette no. 2702**
Deadly Fields.
Nebraska Educational Television Network (Lincoln, NE, c1995). Distributed by GPN.
1 videocassette (58 min., 6 sec.): sd., col.
Abstract: Discusses the risks to farmers when pesticides are used and suggests alternatives to using them.

36. **NAL Call No.: Videocassette no. 1955**
Depleting the Gene Bank.
Films for the Humanities (Princeton, NJ, c1990). Distributed by Films for the Humanities & Sciences, Inc.
1 videocassette (26 min.): sd., col.
Originally copyrighted in 1988.
Abstract: Speaks to the problems and dangers of selecting and breeding better and better, and fewer and fewer varieties.

37. **NAL Call No.: Videocassette no. 2654**
Dig It!: Biointensive Sustainable Mini-Farming.
John Jeavons (Willits, CA, c1997). Distributed by John Jeavons.
1 videocassette (ca. 2 hrs.): sd., col.
Abstract: Learn how to prepare your soil much more easily and effectively. Using double-dug beds and the Biointensive method you can get higher yields while conserving the Earth's valuable resources. As you use Biointensive mini-farming techniques you will be actively participating in a worldwide movement to create a sustainable soil base for future generations.

38. **NAL Call No.: Videocassette no. 2710**
Eastern Gamagrass: From the Past to the Future.
United States. Natural Resources Conservation Service. Mid Atlantic Interdisciplinary Resource Team (Dover, DE, 1998?). Distributed by The Team.
1 videocassette (17 min., 45 sec.): sd., col.
Abstract: Discusses the potential of eastern gamagrass as a forage crop, a tool to improve soil, and as a buffer plant.

39. **NAL Call No.: Videocassette no. 2668**
Emu Farming: A Guide to Hatching and Raising Emu.
1993?).
1 videocassette (ca. 30 min.): sd., col.
"Handling, tattooing, and sexing emu"--Cassette label.

40. **NAL Call No.: Videocassette no. 2783**
Environmental Liability.
Industrial Training Systems Corporation (Marlton, NJ, c1991). Distributed by The Corporation.
1 videocassette (20 min.): sd., col. 1 leader's guide.
Abstract: Discusses the role that employees play in ensuring a company's compliance with environmental laws and regulations.

41. **NAL Call No.: Videocassette no. 2044**
Farm Animal Welfare.
Fisheries and Food. Video Unit Great Britain. Ministry of Agriculture (London?, 199-?). Distributed by Ministry of Agriculture Fisheries and Food.
1 videocassette (17 min., 11 sec.): sd., col.
Abstract: Discusses various issues of animal welfare for farm animals in Great Britain.

42. **NAL Call No.: Videocassette no. 2222**
Farmer to Farmer: Rotational Grazing: Talking With New York's Grassland Farmers.
Catskill Center for Conservation and Development (Arkville, NY, c1994). Distributed by Catskill Center for Conservation and Development.
1 videocassette (28 min.): sd., col.
Abstract: Grassland farmers from New York state talk about rotational grazing of livestock. Video footage shows examples of their pastures, fencing arrangements, etc.

43. **NAL Call No.: Videocassette no. 2648**
Farming a New Fish: Hybrid Striped Bass.
North Carolina State University. Agricultural Communications Video Productions. (Raleigh, NC, c1995). Distributed by Agricultural Communications Video Productions, NCSU.
1 videocassette (22 min., 30 sec.): sd., col.
Abstract: Describes how to build fish ponds and the harvesting and marketing of hybrid striped bass.

44. **NAL Call No.: Videocassette no. 2032**
Farming in Harmony With the River
Researched and written by Robin E. Kinney (St. Paul, MN, c1994). Distributed by Minnesota Department of Agriculture.
1 videocassette (12 minutes): sd., col. ; ½ in.
Abstract: Discusses the impact of farming on water quality and describes agricultural practices that protect the environment.

45. **NAL Call No.: ArU QH87. 3.F37 1991**
Farming With Wetlands: How to Turn Those Nuisance Areas into Profit for Farmers While Improving the Environment.
Sierra Club. National Wetlands Committee (Cincinnati, OH, c1991). Distributed by Videoworks.
1 videocassette (9 min.): sd., col.
Abstract: Farming techniques compatible with habitat enhancement and wetland management.

46. **NAL Call No.: Videocassette no. 2396**
Farmscaping.
San Luis Video Publishing (Los Osos, CA , c1996). Distributed by San Luis Video Publishing.
1 videocassette (33 min.): sd., col.
Abstract: Shows tactics that enhance a farm's biological diversity, enrich its soil fertility, drainage & tilth, achieve biological weed and insect pest management, and reduce the need for agricultural chemicals.

47. **NAL Call No.: Kit no. 185**
Field Scout Manual.
Robert J. Wright, Keith J. Jarvi, Ronald C. Seymour, and Nebraska Cooperative Extension Service (Lincoln, NE, 1990?). Distributed by Cooperative Extension Service, University of Nebraska--Lincoln, IANR.
1 set of reading materials, 2 videocassettes.
Videocassettes titles: Insect scouting in corn, and Insect scouting in soybeans & alfalfa.
Abstract: Identifies various field crop pests, weeds, and diseases, and discusses how integrated

pest management can work to control and reduce crop losses. Focuses on corn, sorghum, soybeans, alfalfa and wheat, as well as some specialty crops. Emphasizes the importance of a regular scouting program to identify pests and diseases.

48. **NAL Call No.: Videocassette no. 2522**
The Flame.
Dick Young and Dick Young Productions. (Little Rock, AR, c1995). Distributed by Heifer Project International.
1 videocassette (14 min., 27 sec.): sd., col.
Abstract: Shows how one of Heifer Project's programs, Women in Livestock Development (WiLD) is assisting women by providing them with animals which will produce food for them as well as an income.

49. **NAL Call No.: Videocassette no. 1313**
Food for Thought
Robert Dean, Roger Bingham, and Bullfrog Films (Oley, PA, c1990). Distributed by Bullfrog Films.
1 videocassette (29 min.): sd., col. ; ½ in.
Abstract: This film features science writer Roger Bingham in a update of information first presented in Bullfrog's "Diet for a small planet" about the environmental consequences of a meat-centered diet. Using the example of an automobile, Bingham explains the inefficiency of using meat as fuel for the human body, especially in the light of the environmental impact of raising all that meat - from loss of topsoil and groundwater depletion and pollution, to methane's contribution to global warming, and the growing gap between the rich and poor nations.

50. **NAL Call No.: Videocassette no. 2822**
Food Safety: Pesticides, Antibiotics, Hormones, Food Additives, and Biotechnology.
Health Science Institute (McLean, VA, c1997). Distributed by The Institute.
1 videocassette (15 min.): sd., col. 1 teacher's guide (42 p.)
Abstract: Introduces popular concerns about carcinogens, pesticides, antibiotics, hormones and food additives. Discusses HACCP systems, and how food is monitored by the FDA, EPA and USDA to ensure its safety from crops to your table.

51. **NAL Call No.: Videocassette no. 2709**
Forest Stewardship at the Urban/Rural Interface.
Pennsylvania State University. College of Agricultural Sciences (University Park, PA , c1992). Distributed by The College.
1 videocassette (26 min., 30 sec.): sd., col.
"Development and funding of this video was coordinated by: the Pocono Northeast Resource Conservation and Development RC&D Council for and in cooperation with the Pike County Conservation District"--Container.

52. **NAL Call No.: Videocassette no. 2487**
Fresh From the Family Farm: Where Our Food Comes From.
ZMedia Inc. (United States, c1995). Distributed by ZMedia Inc.
1 videocassette (30 min.): sd., col.
Abstract: Aimed at children, this video shows how fruit and vegetables grow on a family farm.

53. **NAL Call No.: Videocassette no. 2395**
From Barnyard to Field: Manure Management and Clean Water.
University of Wisconsin Extension (Madison, WI, c1990). Distributed by The University.
1 videocassette (16 min., 55 sec.): sd., col.
Abstract: Describes how the proper handling of manure by farmers can help maintain good water quality.

54. **NAL Call No.: Videocassette no. 2556**
From the Ground Up.
Green & Growing (Association) (Winnipeg, Man., Canada, c1994). Distributed by Green & Growing.
1 videocassette (28 min., 28 sec.): sd., col. 1 teacher's guide (45 p. ; 28 cm.)
Abstract: Discusses sustainable development issues in modern agriculture in North America through interviews with farmers, agricultural experts, and students.

55. **NAL Call No.: Videocassette no. 2068**
Garden Song: Alan Chadwick's Vision of Abundance.
Alan Chadwick and Bullfrog Films, Inc. (Oley, PA, c1980). Distributed by Bullfrog Films.

1 videocassette (28 min.): sd., col.
Abstract: Focuses on actor, gardener, and inventor, Alan Chadwick, who has developed an agricultural technique that produces four times the amount of food of conventional gardening methods and that requires only a fraction of the chemical and technological resources.

56. **NAL Call No.: Videocassette no. 2572**
Genetic Time Bomb.
Oregon Public Broadcasting (Ben Lomond, CA, c1994). Distributed by Video Project.
1 videocassette (50 min.): sd., col.
Abstract: Explores the loss of genetic diversity in food crops as farmers around the world grow hybrids instead of local varieties. Looks at efforts to collect, save, grow, and distribute rare and threatened seeds.

57. **NAL Call No.: Videocassette no. 2665**
Goat Breeding and Kid Rearing.
Hilary Matthews and Farming Press Videos (Ipswich, UK; Alexandria Bay, NY, c1995). Distributed by Diamond Farm Enterprises (in No. America).
1 videocassette (63 min.): sd., col.
Abstract: This video focuses on the management of breeding for the domestic goatkeeper. It covers mating, pregnancy, kidding, and care of young stock. Hilary Matthews demonstrates the techniques that she has successfully used for many years to control the breeding cycle, detect pregnancy accurately, and keep a healthy breeding goat herd.

58. **NAL Call No.: Videocassette no. 2179**
Good Farming in Karst Country.
University of Illinois at Urbana Champaign. Office of Agricultural Communication & Education. Information Services (Urbana, IL, c1992). Distributed by University of Illinois at Urbana-Champaign, College of Agriculture, Office of Agricultural Communications & Education, Information Services.
1 videocassette (20 min.): sd., col.
"OACE #002"--Container.
Abstract: Discusses techniques farmers can use to protect groundwater and reduce soil erosion in karst areas. These include using no-tillage or conservation tillage, controlling the use of nitrogen fertilizers, and stabilizing sinkholes.

59. **NAL Call No.: Videocassette no. 2411**
The Greening of Cuba.
Institute for Food and Development Policy (Oakland, CA, c1996). Distributed by Food First.
1 videocassette (38 min.): sd., col.
Abstract: This video profiles Cuban farmers and scientists working to reinvent a sustainable agriculture, based on ecological principles and local knowledge rather than imported agricultural inputs. In their quest for self-sufficiency, Cubans combine time-tested traditional methods with cutting-edge biotechnology.

60. **NAL Call No.: Videocassette no. 2787**
The Ground Water Adventures of Walter Wet.
Passic River Coalition (Basking Ridge, NJ?, c1998).
1 videocassette (ca. 13 min.): sd., col.
Abstract: Walter Wet describes the hydrologic cycle of water and how we can protect our water supply.

61. **NAL Call No.: Videocassette no. 2795**
Groundwater: Water for California's Future.
Water Education Foundation (Sacramento, CA, c1998). Distributed by Water Education Foundation.
1 videocassette (15 min., 40 sec.): sd., col.
Cassette label shows c1999.

62. **NAL Call No.: Videocassette no. 2027**
Growing Season.
Bullfrog Films, Inc. (Oley, PA, c1992). Distributed by Bullfrog Films.
1 videocassette (25 min.): sd., col. 1 pamphlet.
Abstract: The horticulture program at San Francisco County Jail is teaching prisoners to care for plants, animals, & themselves so they can get a new sense of self-worth & respect for life. The program, created by Catherine Sneed, now goes outside the jail to community gardens.

63. **NAL Call No.: Videocassette no. 2658**
Growing Shiitake Mushrooms in the Mid-South.
Shirley Community Service & Development Corporation (Shirley, AR, c1996). Distributed by

Shirley Community Service & Development Corp.
1 videocassette (27 min., 39 sec.): sd., col.

64. **NAL Call No.: Videocassette no. 2743**
A Guide to Making Safe Smoked Fish.
North Central Regional Aquaculture Center (Ames, IA, c1999). Distributed by The Center.
1 videocassette (21 min., 32 sec.): sd., col.
Funded in part by the North Central Regional Aquaculture Center, USDA-CSREES grant #97-38500-3957.
Abstract: Shows the steps necessary to make safe smoked fish. Provides directions for brining, smoking, cooling, packaging and labeling, and cold storage to ensure safety.

65. **NAL Call No.: Videocassette no. 2219**
A Guide to Poultry Composting.
Polk County Soil & Water Conservation District (Benton, TN, c1994). Distributed by Polk County Soil & Water Conservation District.
1 videocassette (ca. 14 min.): sd., col. 1 brochure (10 identical copies).
Abstract: Describes how to design a poultry compost facility.

66. **NAL Call No.: Videocassette no. 2695**
H2O 2010.
Water Education Foundation (Sacramento, CA , c1992). Distributed by The Foundation.
1 videocassette (ca. 24 min.): sd., col. 1 teacher's guide (18 p. ; 28 cm.)
Abstract: Discusses issues that revolve around water and its use in California.

67. **NAL Call No.: Videocassette no. 2649**
Harness the Wind.
National Film Board of Canada (Oley, PA, c1978). Distributed by Bullfrog Films.
1 videocassette (12 min.): sd., col.
Intended audience: Junior high school students through adults.
Abstract: A lively, animated program that traces the history of wind machines from the ancient Persians to the present. Also shows many variations of the standard horizontal and vertical shaft windmills.

68. **NAL Call No.: Videocassette no. 2199**
Hartz Desire and Steiner Farms.
John Hughes, Ohio Ecological Food and Farm Association, and Shoe String Productions (Vienna, OH, 1989?). Distributed by Shoe String Productions.
1 videocassette (29 min.): sd., col. ; ½ in.
Abstract: Presents a tour of the Steiner and Hartz Desire farms in Ohio.

69. **NAL Call No.: Videocassette no. 1966**
Hemp for Victory.
United States. Dept. of Agriculture (St. Paul, MN, 1990?). Distributed by The Institute for Hemp.
1 videocassette (15 min.): sd., b&w
Originally produced in 1942 as a motion picture.
Abstract: Raw fiber was not available from the Philippines during World War II. This program, intended to encourage farmers to grow hemp in support of the war effort, presents aspects of the early history and the commercial cultivation and production of hemp.

70. **NAL Call No.: Videocassette no. 2740**
Here and Now.
Hound's Head Productions (c1989).
1 videocassette (ca. 13 min.): sd., col.

71. **NAL Call No.: Videocassette no. 2234**
Home Composting: "Turning Your Spoils to Soil".
Connecticut. Dept. of Environmental Protection. Recycling Program (Hartford, CT, c1991). Distributed by The Department.
1 videocassette (17 min.): sd., col.

72. **NAL Call No.: Videocassette no. 2763**
Homecoming--: Sometimes I Am Haunted by Memories of Red Dirt and Clay.
Charlene Gilbert and Kinfolk Productions, Inc. (San Francisco, CA, c1998). Distributed by California Newsreel.
1 videocassette (57 min.): sd., col. with b&w sequences
Abstract: Documentary examines the history of land ownership and rural economics in the South among Afro-Americans from the end of the Civil War to the present. Includes archival footage and photographs and commentary.

73. **NAL Call No.: Videocassette no. 2788**
The Human Electrical System and Flower Essences.
Machaelle Small Wright and Perelandra, Ltd. (Warrenton, VA, c1998). Distributed by Perelandra, Ltd.
1 videocassette (137 min.): sd., col.
Abstract: Talk given by Machaelle Small Wright, researcher into both the human electrical system and flower essences.

74. **NAL Call No.: Videocassette no. 2181**
Integrated Pest Management: A Chance for the Future Produced for Animal and Plant Health Inspection Service, U.S. Department of Agriculture.
United States. Dept. of Agriculture. Video & Film Division. Writer, Lynn Wyvill, Video and Film Division (Washington, D.C.?, 1992?). Distributed by The Division.
1 videocassette (ca. 21 min.): sd., col., b&w sequence
Abstract: Discusses alternatives to pesticides in combating harmful pest infestations. These include the sterile male technique, parasites, and crop rotation.

75. **NAL Call No.: Videocassette no. 2048**
Integrated Pest Management in Agriculture.
Joe Clokey, Jim Harrigan, and San Luis Video Productions (San Luis Obispo, CA, c1990). Distributed by San Luis Video.
1 videocassette (29 min.): sd., col.
Originally produced by San Luis Video Productions; issued by San Luis Video Publishing.
Abstract: Describes why integrated pest management was developed and presents basic strategies of "IPM", including proper pest identification, monitoring, biological, physical and chemical control. Illustrates the use of "IPM" on orchards, vegetables, field crops and strawberries.

76. **NAL Call No.: S441.S855**
Integrating New Cultivation Technology and Photocontrol of Weeds to Reduce Herbicide Use in Vegetables.
R. R. Bellinder (1996). Distributed by Sustainable Agriculture Research and Education SARE research projects Northeast Region.
SARE Project Number: LNE94-40. Record includes computer diskette. Date of report is December 12, 1996. The 14 page report also includes a Videocassette entitled "New tools for mechanical weed control in vegetables".

77. **NAL Call No.: Videocassette no. 2134**
An Introduction to Herbs.
Herbfarm (Fall City, WA , c1993). Distributed by The Herbfarm.
1 videocassette (50 min.): sd., col.
Abstract: You'll learn growing, harvesting, preserving and cooking with: culinary herbs, perennial herbs, shade herbs, salad herbs, tea herbs, everlasting herbs, and dessert herbs.

78. **NAL Call No.: Videocassette no. 2533**
Kansas Farm Women: Growing Out of the Tilth: A Multi-Image Production.
Cynthia Vagnetti and Kansas Rural Center. (United States, c1992).
1 videocassette (18 min., 35 sec.): sd., b&w
"Sponsored by the Kansas Rural Center.".

79. **NAL Call No.: Videocassette no. 2520**
Keeping Ducks: Beautiful Comical Things.
Tom Bartlett and Farming Press Videos Farming Press Videos (Ipswich, UK ; Alexandria Bay, NY, c1996). Distributed by Diamond Farm Enterprises (in No. America).
1 videocassette (ca. 48 min.): sd., col.
Abstract: Tom Bartlett explains his own methods of feeding, housing, breeding, and generally caring for ducks on the farm and at show.

80. **NAL Call No.: Videocassette no. 2319**
Keeping Nature in Balance.
Jay. Novacek and National Cattlemen's Association (Engelwood, CO, c1994). Distributed by National Cattlemen's Association.
1 videocassette (28 min.): sd., col.
Abstract: This documentary features seven award-winning cattlemen and the steps their families are taking to ensure the land is productive for this and future generations.

81. **NAL Call No.: Videocassette no. 2431**
Keeping Our Shores: Shoreland Best Management Practices.
Minnesota Arrowhead Water Quality Team (Two Harbors, MN, c1995). Distributed by Lake County Soil & Water Conservation District.
1 videocassette (ca. 16 min.): sd., col.
Abstract: Discusses preferred actions that shoreland property owners can take to reduce their impact upon the environment. Topics covered include landscaping, septic systems, and lawn care.

82. **NAL Call No.: Videocassette no. 2435**
Kenaf Harvesting.
(United States, 1994?).
1 videocassette (4 min., 53 sec.): sd., col.
Abstract: Discusses harvesting of kenaf in southeast Texas and a new harvester designed specifically for kenaf is demonstrated.

83. **NAL Call No.: Kit no. 291**
Know Your Watershed.
Conservation Technology Information Center (West Lafayette, IN, 1995?). Distributed by Conservation Technology Information Center.
1 videocassette (VHS), 6 sheets, 6 booklets, 1 pamphlet (10 identical copies).
Abstract: Describes what a watershed is and how people can join with state and federal agencies to form a partnership to protect the water quality of their watershed.

84. **NAL Call No.: Videocassette no. 2638**
Land Application: Water Reuse in Agriculture.
Creative Educational Video, Inc. (Lubbock, TX, c1995). Distributed by Creative Educational Video.
1 videocassette (23 min.): sd., col.
"Tape #727.".
Abstract: Examines the agricultural reuse method at Lubbock, Texas.

85. **NAL Call No.: Videocassette no. 2221**
Land Link: A Program to Increase Opportunities for Beginning Farmers and Encourage Sustainable Agriculture.
Land Link Realty (Walthill, NE, 1991?). Distributed by Land Link Realty.
1 videocassette (ca. 29 min.): sd., col.
Abstract: Consists of a series of reports about Land Link (a pilot program in Nebraska that matches up older farmers nearing retirement with younger farmers struggling to get started) that originally aired on television.

86. **NAL Call No.: Videocassette no. 2536**
LEPA: Saving Water for Future Producers.
Texas Tech University. Water Resources Center (Lubbock, TX, c1993). Distributed by Video Services, Texas Tech University.
1 videocassette (30 min.): sd., col.
Abstract: Examines the use of Low Energy, Precision Application, or LEPA, center pivot irrigation systems on farms on the Texas High Plains. LEPA is an irrigation and tillage management system designed to eliminate nearly all evaporation and deep percolation losses. Presents various aspects of LEPA center pivots for producers to consider to be more informed consumers.

87. **NAL Call No.: Videocassette no. 2356**
Llama Reproduction: A Neonatal Clinic.
LaRue W. Johnson and Hartworks Video (Olympia, WA , c1989). Distributed by Juniper Ridge Press.
2 videocassettes (3 hr., 34 min.): sd., col. 1 booklet (70 p.: ill. ; 28 cm.)
Abstract: Through lecture, slides, and live footage, Dr. Johnson presents his clinic covering llama reproductive anatomy, breeding, fetal development, birth, and newborn care. He also covers the delivery of crias in a variety of positions, using plastic uteruses and stillborn crias.

88. **NAL Call No.: Videocassette no. 2362**
Managing Lakes Through Community Participation.
Federation of Lake Associations (Cazenovia, NY, 1993?). Distributed by Federation of Lake Associations.
1 videocassette (25 min.): sd., col.
Abstract: This video highlights interviews with homeowners who have implemented successful projects to restore their lakes. Topics include how lake associations are formed, maintaining ties with

local government and educating the lake community.

89. **NAL Call No.: Videocassette no. 2559**
Managing Riparian Areas on Forest Lands.
Paul W. Adams, Thomas E. McMahon, and Oregon State University. Forestry Media Center (Corvallis, OR, 1991). Distributed by Forestry Media Center, Oregon State University, College of Forestry.
1 videocassette (28 min.): sd., col. 1 script "987 V-T.".
Abstract: This program is designed to show how the functions and benefits of riparian areas often call for active management. It will also show how logging and other forest practices can effect riparian functions and benefits. This program demonstrates the values of careful informal management decisions and finally describes some key challenges and opportunities in management of riparian areas.

90. **NAL Call No.: Videocassette no. 2399**
Managing Woodlands for Wildlife.
Minnesota Extension Service (St. Paul, MN, c1993). Distributed by The Service.
1 videocassette (23 min., 50 sec.): sd., col.
Abstract: Improving habitat for wildlife is a common goal for woodland stewards. Habitat consists of food, water, cover and space. Wildlife species differ in their habitat needs. This program shows how to evaluate woodland habitat and improve it for a variety of wildlife.

91. **NAL Call No.: Videocassette no. 2165**
Managing Your Fish Ponds.
Alabama Cooperative Extension Service (Auburn, AL, 1990?-1995). Distributed by The Service.
1 videocassette (24 min., 30 sec.): sd., col.
Abstract: Discusses pond construction, watershed ponds, ratio of watershed acreage to pond acreage, depth, removal of unwanted fish species, stocking ratios, pond fertilization, pond liming, use of white amur for pond weed control, fish population balance and oxygen control.

92. **NAL Call No.: Videocassette no. 2078**
Maple Sugaring: A Sweeter Future.
Ohio Agricultural Research and Development Center. Section of Communications and Technology (Wooster, OH, c1994). Distributed by Ohio State University, Ohio Agricultural Research and Development Center, Section of Communications and Technology.
1 videocassette (21 min., 30 sec.): sd., col.
Abstract: Maple sugaring produces over 100,000 gallons a year in the state of Ohio, and is a $3,000,000 industry. This video is a history of the practice and shows how its done.

93. **NAL Call No.: Videocassette no. 2666**
My Father's Garden.
Miranda Smith and Miranda Smith Productions (Oley, PA, c1995). Distributed by Bullfrog Films.
1 videocassette (58 min.): sd., col. and b&w
Abstract: In less than fifty years agriculture has been transformed by synthetic chemicals which have had a serious impact on the environment and on the health of farm families. This film tells the story of two farmers. Herbert Smith, championed the new miracle sprays of the 50's in his orange grove in Florida, while Fred Kirschenmann of North Dakota, steered his land through the transition to organic farming to prove, 20 years later, that sustainable organic agriculture is a viable economic alternative for any size farm.

94. **NAL Call No.: Videocassette no. 2274**
My Urban Garden.
National Film Board of Canada (Santa Rosa, CA, c1984). Distributed by Arthur Mokin Productions.
1 videocassette (26 min., 33 sec.): sd., col.
Abstract: Follows a home gardener through the growing season cycle of planting, fertilizing, and weeding to show how anyone can keep one's family supplied with a variety of vegetables.

95. **NAL Call No.: Videocassette no. 2197**
New Rangeland Compact.
(Payson, AZ, 1994?). Distributed by Holistic Resource Mangement.
1 videocassette (20 min.): sd., col.
Abstract: Promotes a holistic management plan of domestic livestock grazing on public lands. Shows how proper grazing procedures benefit grassland and riparian areas.

96. **NAL Call No.: Kit no. 172**
Northeast Network: Food, Agriculture, and Health Policy Education.
Agriculture and Health Policy Education Program Northeast Network: Food (1991?). Distributed by Northeast Network?
1 videocassette, 5 booklets, 5 fact sheets, 5 overviews, 5 briefs, 1 report, 1 facilitator's manual.
Title on videocassette: Food policy education--making connections.
Abstract: Involves both citizens and community leaders in facilitated discussions and activities around three key issues that relate to agriculture, health, and the processing, distribution and marketing of food. These issues are food safety, food costs, and nutrition.

97. **NAL Call No.: Videocassette no. 2047**
Nourish the Roots, Gather the Leaves: Sustainable Taro Culture in the Pacific.
University of Hawaii at Mania. College of Agriculture and Human Resources (Honolulu, HI, 199-?). Distributed by Pacific Agricultural Development Office, University of Hawaii at Mania.
1 videocassette (27 min.): sd., col.
Abstract: Describes how taro is cultivated on tropical Pacific Islands with the use of appropriate technology. Emphasizes the importance of soil conservation, soil fertility, pest and disease control, and crop rotation in the growing of taro.

98. **NAL Call No.: Videocassette no. 2031**
One Second Before Sunrise: A Search for Solutions.
Lynn Redgrave and Bullfrog Films, Inc. (Oley, PA, c1991). Distributed by Bullfrog Films.
5 videocassettes (ca. 60 min.): sd., col.
Abstract: Lynn Redgrave is the on-camera host for programs focusing on solutions to environmental problems, providing viewers with ideas for their own communities.

99. **NAL Call No.: Videocassette no. 1965**
Oral History Interview With Jayne T. Maclean by Jane Gates.
Jane Potter Gates, Jayne T. Maclean, and National Agricultural Library (Beltsville, MD, 1994). Distributed by The Library.
1 videocassette (40 min.): sd., col.

100. **NAL Call No.: Videocassette no. 2067**
Organic Gardening: Composting.
Rodale Press. (Oley, PA, c1972). Distributed by Bullfrog Films.
1 videocassette (11 min.): sd., col.
Abstract: Uses live action and animation to demonstrate how to build a compost heap, what ingredients to use and in what proportions, and how to layer the heap to ensure speedy and uniform decomposition.

101. **NAL Call No.: Videocassette no. 2532**
Ostrich Processing.
American Ostrich Research Foundation (United States, 1996?).
1 videocassette (50 min.): sd., col.
Abstract: Shows commercial slaughter and meat fabrication techniques developed through research at Texas A&M University.

102. **NAL Call No.: Videocassette no. 2704**
Ostrich Ranching: Past, Present, Future.
King Ostrich Ranch, Inc. (Elmwood Park, IL, 1993?). Distributed by Ostriches On Line.
1 videocassette (ca. 35 min.): sd., col.

103. **NAL Call No.: Videocassette no. 2684**
Ostriches and Emus.
Bobbie Floyd, Kenny Page, and Georgia Center for Continuing Education (Athens, GA, c1994). Distributed by Georgia Center for Continuing Education.
1 videocassette (30 min.): sd., col.
Abstract: Veterinarian Kenny Page describes ratites as flightless birds, explains reasons for increased interest in them, and answers questions and gives advice about raising ostriches and emus. Part of a series of programs showing various species of animals found on a farm and intended to give a sense of appreciation for livestock and how it affects and enriches our lives.

104. **NAL Call No.: Videocassette no. 2512**
Our Precious Groundwater: A Celebration.
Nebraska Educational Telecommunications (Lincoln, NE?, 1994). Distributed by The

Foundation.
1 videocassette (13 min., 44 sec.): sd., col.
Abstract: Shows highlights of a groundwater festival held in Nebraska where the purpose was to educate young people about conserving groundwater resources.

105. **NAL Call No.: Videocassette no. 2734**
Outstanding in Her Field.
Media Network Society (Vancouver, BC, Canada, c1995). Distributed by Moving Images Distribution.
1 videocassette (23 min.): sd., col.
Abstract: Women farmers in British Columbia are making a living in organic farming and have established the Moss Street Market to sell their produce.

106. **NAL Call No.: Videocassette no. 2675**
Part-Time Farming.
University of Nebraska Lincoln. Cooperative Extension (Lincoln, NE, c1996). Distributed by The Extension.
1 videocassette (ca. 69 min.): sd., col.

107. **NAL Call No.: Videocassette no. 2318**
Partners With Nature.
Teddy Gentry and National Cattlemen's Association (Englewood, CO, 199-?). Distributed by National Cattlemen's Association and Beef Board.
1 videocassette (27 min.): sd., col.
Abstract: Features seven cattlemen who have incorporated sound conservation practices into their successful cattle businesses.

108. **NAL Call No.: Videocassette no. 2182**
Partnerships for Watersheds.
Conservation Technology Information Center (Washington, D.C.?, 1995?). Distributed by The Division.
1 videocassette (13 min.): sd., col. 1 pamphlet.
Abstract: Describes what a watershed is and how people can join with state and federal agencies to form a partnership to protect the water quality of their watershed.

109. **NAL Call No.: Videocassette no. 2725**
Pathways to a Sustainable Future.
Robert Gilman, Scott Fedale, and Washington State University. Center for Sustaining Agriculture and Natural Resources (Pullman, WA, 1996). Distributed by Cooperative Extension, Washington State University.
1 videocassette (90 min.): sd., col.
Abstract: Scott Fedale interviews Dr. Robert Gilman, who received his Ph.D. in astrophysics from Princeton University. Since 1975, he has devoted himself to the study of sustainability and strategies for positive cultural change. His background includes innovation theory, sustainable economics, and appropriate technology.

110. **NAL Call No.: Videocassette no. 2790**
The Perelandra Garden: A Tour With Machaelle Small Wright.
Machaelle Small Wright and Perelandra, Ltd. (Warrenton, VA, c1998). Distributed by Perelandra, Ltd.
2 videocassettes (221 min.): sd., col.
Abstract: "The famous Perelandra Garden in Virginia comes alive as you join its founder and researcher Machaelle Small Wright for a full personal tour. Learn the new principles of co-creative science as demonstrated in the garden since 1976."--Container.

111. **NAL Call No.: Videocassette no. 2739**
Pfiesteria and the Factory Farm.
Humane Society of the United States (Washington, DC, c1998). Distributed by The Society.
1 videocassette (7 min., 30 sec.): sd., col.
Abstract: Discusses how the disposal of animal wastes, particularly poultry manure, contributes to outbreaks of pfiesteria in the Chesapeake Bay.

112. **NAL Call No.: Videocassette no. 2820**
Phytochemicals.
Health Science Institute (McLean, VA, c1997). Distributed by The Institute.
1 videocassette (15 min.): sd., col. 1 teacher's guide (60 p.).
Abstract: This program explains the chemical structure of phytochemicals, and describes the proposed mechanisms by which these natural food elements might lower risk for cancer.

113. **NAL Call No.: Videocassette no. 2721**
Plant.
BBC Scienceworld (New York, NY?, c1997). Distributed by DK Vision: BBC Worldwide Americas.
1 videocassette (ca. 35 min.): sd., col.
At head of title: Eyewitness.
Abstract: A colorful tour of the world's most dazzling flora-- from the most magical to the most bizarre. Watch buds burst, flowers bloom, and discover the myriad ways plants struggle to survive.

114. **NAL Call No.: Videocassette no. 2097**
Preserving Our Livestock Heritage.
American Minor Breeds Conservancy (Pittsboro, NC, 199-?). Distributed by American Minor Breeds Conservancy.
1 videocassette (13 min., 50 sec.): sd., col.
Abstract: Discusses how many livestock breeds are facing extinction as breeders seek to meet farmer requirements for specialized animal traits. Concludes with a brief description of the work of the American Minor Breeds Conservancy.

115. **NAL Call No.: S441.S8553**
Production of a Videotape Series Demonstrating Improved Grazing Practices to Promote Forage-Based Livestock Production in the Upper Midwest.
J. R. Russell Sustainable Agriculture Research and Education SARE research projects North Central Region 1995).
SARE Project Number: LNC94-71. Date of report is December 1995. Included with this 31 page report are the following videotapes: 1) Managing Grazing: Introduction, 2) Managing Grazing: Animal Management, 3) Managing Grazing: Fencing and Watering, 4) Managing Grazing: Year Around Resource Management and 5) Managing Grazing: Managing Pasture Plants.

116. **NAL Call No.: Videocassette no. 2172**
Profit With Manure
Minnesota Extension Service. University of Minnesota Educational Development System (St. Paul, MN, c1993). Distributed by The System.
1 videocassette (11 min., 40 sec.): sd., col. ; ½ in.
"AG-VH-6082."; Content specialists, Timothy Arlt, Michael Schmitt.
Abstract: Shows how to calculate and adjust solid and liquid manure application rates and demonstrates application methods.

117. **NAL Call No.: Videocassette no. 2440**
Profitable Conservation Cropping Systems: Insights From the USDA-ARS IPM Project.
John Francis, Information Department. College of AG & Home Economics. Washington State University, Washington State University. Cooperative Extension, and United States. Agricultural Research Service Script, Chris Boerboom (Pullman, WA?, c1992). Distributed by Cooperative Extension, Washington State University.
1 videocassette (30 min.): sd., col. ; ½ in.
Abstract: Describes the USDA-ARS IPM project conducted by a group of scientists from USDA-ARS, Washington State University, and the University of Idaho. The project demonstrates that conservation cropping systems with effective pest management can actually be more economical and less risky than conventional systems.

118. **NAL Call No.: Videocassette no. 2438**
The Progress of Our Dreams: Assessing Sustainability for Communities Large and Small.
Alan Atkisson and Washington State University. Cooperative Extension (Pullman, WA, 1995). Distributed by Cooperative Extension, Washington State University.
1 videocassette (90 min.): sd., col.
"VT0070"--Container.
Abstract: Alan Atkisson introduces a comprehensive picture of what sustainable development means both in theory and in practice, drawing on examples from around the Pacific Northwest, the U.S., and the rest of the world.

119. **NAL Call No.: Videocassette no. 2584**
Raising Emus & Rheas.
Ken Wilson and Sportsmen on Film (Kerrville, TX, c1993). Distributed by Sportsmen on Film.
1 videocassette (60 min.): sd., col.

Abstract: Ken Wilson shows how emus and rheas are raised on the Kerrville Ratite Ranch. Topics covered include egg collection, incubation, candling, hatching, housing, and feeding.

120. **NAL Call No.: Videocassette no. 2707**
The Restoration of Bonsall Creek: A Community Co-Operates to Enhance Crops, Cattle, Cutthroat Trout and Coho Salmon.
Wayne Haddow (British Columbia, Canada, c1996).
1 videocassette (ca. 27 min.): sd., col.

121. **NAL Call No.: Videocassette no. 2508**
Restoring the Balance: Biological Control of Purple Loosestrife.
Cornell University. Educational Television Center (Ithaca, NY, c1996). Distributed by Cornell University.
1 videocassette (28 min.): sd., col.

122. **NAL Call No.: Videocassette no. 2664**
Rhea Intensive Farming.
Lea Hosman and Chris Ramsey (Utopia, TX, c1993). Distributed by Hosman/Ramsey Rheas.
1 videocassette (ca. 45 min.): sd., col.

123. **NAL Call No.: Videocassette no. 2383**
Rice: A Better Way.
Haskell Simon and Lower Colorado River Authority (Austin, TX, c1994). Distributed by The Authority.
1 videocassette (11 min., 30 sec.): sd., col. 1 script.
Abstract: A group of rice farmers in Matagorda County, Texas demonstrate production techniques (best management practices) that keep production costs low, yield high, and minimize the impact on the environment.

124. **NAL Call No.: Videocassette no. 2560**
Rodale's Rediscovering Herbs With Cy Hyde at the Well Sweep Herb Farm--Overview.
Cy Hyde and Rodale Press (Oley, PA, c1981). Distributed by Bullfrog Films.
1 videocassette (28 min.): sd., col.
Abstract: Cy Hyde, owner of an organic herb farm, describes the role of herbs in home remedies, cooking, potpourris, pest control in the garden, dyeing, and home decorating.

125. **NAL Call No.: Videocassette no. 2711**
Ruth Stout's Garden.
Arthur Mokin Productions (Santa Rosa, CA, c1976). Distributed by Arthur Mokin Productions.
1 videocassette (23 min.): sd., col.
Abstract: Recounts the life of Ruth Stout, who describes her own gardening methods and her experiences of subjects ranging from growing vegetables to growing old.

126. **NAL Call No.: Videocassette no. 2563**
The Salmon Project.
Pacific Mountain Network Digital Studios (Aptos, CA; Denver, CO, c1996). Distributed by Pacific Mountain Network.
2 videocassettes: sd., col. 1 teacher guide
Additional information about the salmon project is available on the World Wide Web.
Abstract: Teaches students in grades 7-12 to develop critical thinking skills about the preservation and use of natural resources, using the decline of the Pacific salmon population as a case study.

127. **NAL Call No.: Videocassette no. 2028**
The Science of Biological Decomposition: Effective Composting Methods.
Joe Clokey, Jim Harrigan, Mark Skinner, and San Luis Video Productions (Los Osos, CA, c1993). Distributed by San Luis Video Publishing.
1 videocassette (33 min.): sd., col.
Abstract: Discusses the science of composting. Includes information on how the process of composting transforms organic matter into humus.

128. **NAL Call No.: Videocassette no. 2540**
Seeds of Plenty, Seeds of Sorrow.
Manjira Datta and Media Workshop (Oley, PA, c1992). Distributed by Bullfrog Films.
1 videocassette (50 min.): sd., col.
"Developing stories I, environment and development"--Container.
Abstract: This documentary film shows the effects of the once-vaunted Green Revolution in India. Instead of massive harvests of wheat, pesticide

poisoning and fertilizer shortages have turned the revolution's workers into a new serf class and created a bureaucratic nightmare.

129. **NAL Call No.: Videocassette no. 2171**
Shrimp Farming.
Texas Agricultural Extension Service (College Station, TX?, 199-?). Distributed by The Service.
1 videocassette (25 min., 20 sec.): sd., col.
Closed-captioned for the hearing impaired.
Abstract: Discusses shrimp production in the United States. Hatchery and pond facilities are shown.

130. **NAL Call No.: Videocassette no. 2720**
Slow Food: Sustainable Agriculture and Responsible Eating.
Linda Gammell, Michal M. McCall, and Sandra Menefee Taylor (St. Paul, MN, c1997). Distributed by L. Gammell, M. McCall, S. Taylor.
1 videocassette (30 min.): sd., col.
Funding by S.A.R.E., U.S.D.A.
Abstract: Consists of interviews with farmers about sustainable agriculture.

131. **NAL Call No.: Videocassette no. 2639**
Social Capital and Sustainability: the Community and Managing Change in Agriculture.
Iowa State University. University Extension (Ames, IA, c1996). Distributed by Iowa State University, University Extension.
1 videocassette (22 min.): sd., col.
Abstract: Social capital, community interest and sustainable agricultural practices will be critical components in managing agricultural change in the rural communities of the future.

132. **NAL Call No.: Videocassette no. 2500**
Soils & Their Role in Protecting Water Quality.
Cornell University. Media Services (Ithaca, NY, c1996). Distributed by Dept. of Soil, Crop & Atmospheric Sciences, Cornell University.
1 videocassette (20 min., 55 sec.): sd., col.
"T-12229"--Cassette label.
Abstract: Discusses the function, composition, texture, porosity and permeability, and hydrology of soils and their impacts on soil and water quality.

133. **NAL Call No.: Videocassette no. 2025**
Sowing for Need or Sowing for Greed?: The Promises of the Green Revolution: A Film.
Judith Bourque, Peter Gunnarsson, and Bullfrog Films, Inc. (Oley, PA, c1989). Distributed by Bullfrog Films.
1 videocassette (56 min., 15 sec.): sd., col.
Abstract: Examines the effects of the Green Revolution in Third World countries and finds many negative ones.

134. **NAL Call No.: Videocassette no. 2084**
Steps Toward a Humane Sustainable Agriculture.
Michael W. Fox and Center for Respect of Life and Environment (Washington, DC; Old Saybrook, CT, 1989). Distributed by Connecticut Video Productions.
1 videocassette (ca. 33 min.): sd., col.
Abstract: Discusses how agriculture effects the environment and the positive aspects of sustainable agriculture. These include conserving energy, reducing soil erosion and compaction, minimizing the agricultural pollution of the environment, and preserving the family farm.

135. **NAL Call No.: Videocassette no. 2800**
The Stockman's Best Friend.
Charles. Widener and Inc. Boulder Bluff (Greenwood, AR, c1996). Distributed by Boulder Bluff, Inc.
1 videocassette (113 min., 13 sec.): sd., col.
Abstract: Charles Ridener shows how to train dogs to handle livestock.

136. **NAL Call No.: Videocassette no. 2360**
Successful Queen Rearing.
Marla Spivak and Minnesota Extension Service (St. Paul, MN, c1994). Distributed by The Service.
1 videocassette (13 min., 18 sec.): sd., col.
"VH-6335.".
Abstract: Dr. Marla Spivak demonstrates how to rear queen bees.

137. **NAL Call No.: Videocassette no. 1940**
Sunshine Bass From Tank to Market.
Virginia Polytechnic Institute and State University. Dept. of University Relations. Visual Communications (Blacksburg, VA, c1992). Distributed by Virginia Polytechnic Institute and State University, Dept. of University Relations, Visual Communications.
1 videocassette (17 min., 40 sec.): sd., col.
Abstract: Demonstrates a marketing system for sunshine bass. Topics covered include how the aquaculture products will be distributed and what aquaculture products will meet customer expectations.

138. **NAL Call No.: Videocassette no. 2012**
Sustainability: The Quiet Revolution.
Minnesota Extension Service (St. Paul, MN, c1994). Distributed by The Service.
1 videocassette (50 min., 52 sec.): sd., col.
"AG-VH-6349.".
Abstract: Features Minnesota farm families who have changed their way of farming to achieve better quality of life and better stewardship of the land.

139. **NAL Call No.: Videocassette no. 2059**
Sustainable Agriculture.
Jim Harrigan and San Luis Video Publishing (San Luis Obispo, CA, c1991). Distributed by San Luis Video Publishing.
1 videocassette (23 min.): sd., col.
Abstract: Discusses alternative crops, tillage styles and systems, pest management, and soil fertility in terms of improving farms while preserving the environment. Visits several farms managed as sustainable operations.

140. **NAL Call No.: Videocassette no. 2674**
Sustainable Agriculture Perspectives From Across America: Introduction to Concepts and Principles.
Sustainable Agriculture Research & Education (Program). (Lincoln, NE, 1997?). Distributed by University of Nebraska Extension Service.
1 videocassette (24 min., 14 sec.): sd., col. 1 user's guide
"This material is based upon work supported by the CSREES, USDA under special project number 95-ESAG-1-1001.".
Abstract: Discusses sustainable practices that can help a farmer work with the environment as well as reduce farm operating costs. These include conservation tillage, buffer strips, composting manure, and integrated pest management.

141. **NAL Call No.: Videocassette no. 2180**
Sustainable Potato Farming: The Farmers' Side of the Story
Oregon Tilth, Inc. Director/producer, script writers, Sharon Genasci, Harry MacCormack and Paul Thiers (Tualatin, OR, c1993). Distributed by Oregon Tilth.
1 videocassette (ca. 29 min.): sd., col.
Abstract: Several Oregon farmers discuss their experiences growing potatoes without environmentally damaging chemicals and describe their techniques for soil, weed, insect, and disease management.

142. **NAL Call No.: Videocassette no. 1945**
Sweet Corn IPM: Insect Pest Management.
University of Massachusetts at Amherst. Cooperative Extension Service. Integrated Pest Management Program (Amherst, MA, 1994?). Distributed by University of Massachusetts, Cooperative Extension System, Integrated Pest Management Program.
1 videocassette (ca. 35 min.): sd., col.

143. **NAL Call No.: Videocassette no. 2784**
Symposium on Plant Biotechnology Issues: Risk Assessment: Issues in Plant Biotechnology.
College Park, Maryland Symposium on Plant Biotechnology Issues (1996: University of Maryland) (College Park, MD, 1996). Distributed by University of Maryland.
1 videocassette (ca. 120 min.): sd., col.
Funded by the U.S. Department of Agriculture and A*DEC.
Abstract: Four panelists, Terry Medley, Rebecca Goldburg, Alan R. Goldhammer, and Elizabeth Milewski, address the risks associated with the introduction of genetically altered organisms into the environment and how these risks can be evaluated.

144. **NAL Call No.: Videocassette no. 2502**
Take Time? Training Your Dog From Farm Work to Trialling.
H. Glyn Jones and Farming Press Videos (Ipswich, UK; Alexandria Bay, NY, c1995). Distributed by Diamond Farm Enterprises (in No. America).
1 videocassette (ca. 56 min.): sd., col.
Abstract: Glyn Jones demonstrates how a working sheep dog can become a competent trials competitor.

145. **NAL Call No.: Videocassette no. 2275**
Tara's Mulch Garden.
National Film Board of Canada (Santa Rosa, CA, 198-?). Distributed by Arthur Mokin Productions.
1 videocassette (20 min., 35 sec.): sd., col.
Originally released as motion picture in 1976.
Abstract: Explains the principle of mulching and demonstrates planting, transplanting, watering, and harvesting.

146. **NAL Call No.: Videocassette no. 2644**
This Good Earth.
Salwa Khan and VCS, Inc. (Wimberley, TX, c1995). Distributed by VCS.
1 videocassette (35 min.): sd., col.
Abstract: Describes how to bring garden soil to life organically. Includes discussion of microscopic life forms that help release nutrients vital to healthy, productive plants, how to make a perfect compost and the benefits of cover crops.

147. **NAL Call No.: Videocassette no. 2640**
Towns in Transition: Managing Change in Natural Resource-Dependent Communities.
John Cullum and Oregon State University Extension Service. (Corvallis, OR, c1996). Distributed by Oregon State University Extension and Experiment Station Communications.
1 videocassette (30 min.): sd., col. 1 study guide (41 p.)
Subtitle from study guide cover.
Abstract: This video presents how change was dealt with by the citizens of Tulelake, Calif., Astoria, Ore., and Forks, Wash., when their natural resource-based economies went through transitions. It includes insights from framers, loggers, fishermen, and other community residents.

148. **NAL Call No.: Videocassette no. 2484**
Tree Planting on Agricultural Land.
Minnesota Extension Service (St. Paul, MN, between 1989? and 1992). Distributed by Minnesota Extension Service: Educational Development System.
1 videocassette (24 min.): sd., col.
"VH-3743"--Cassette label.
Abstract: Describes the benefits of trees and the design, establishment and maintenance of tree planting on agricultural land.

149. **NAL Call No.: Videocassette no. 2026**
Turn Here Sweet Corn.
Helen De Michiel and Bullfrog Films, Inc. (Minneapolis, MN; Oley, PA, c1990). Distributed by Bullfrog Films.
1 videocassette (38 min.): sd., col.
"VH S0003" on container.
Abstract: A video essay on the Diffley family, organic farmers in Eagan, Minnesota, and their struggle to continue farming amidst rapid suburban development.

150. **NAL Call No.: Videocassette no. 2530**
Unlocking Nature's Secrets.
National Cattlemen's Association (Englewood, CO, 199-?). Distributed by National Cattlemen's Association: Beef Board.
1 videocassette (27 min.): sd., col.
Abstract: Shows how seven cattlemen have unlocked some of nature's secrets by working daily to care for the natural resources that provide for their livelihoods.

151. **NAL Call No.: Videocassette no. 2647**
USDA Slaughter.
American Emu Association (United States, 1995). Distributed by The Association.
1 videocassette (ca. 23 min.): sd., col.
Abstract: Shows what the inspector looks for in the slaughtering process of emus.

152. **NAL Call No.: Videocassette no. 2786**
Use of Constructed Wetlands for Stormwater Runoff.
Cornell University. Educational Television Center (Ithaca, NY, c1999). Distributed by Cornell University.
1 videocassette (20 min.): sd., col.
Abstract: Video shows how properly designed and constructed wetlands moderate flow extremes and improve water quality.

153. **NAL Call No.: Videocassette no. 2276**
The Vacant Lot.
National Film Board of Canada (Santa Rosa, CA, c1977). Distributed by Arthur Mokin Productions.
1 videocassette (17 min.): sd., col.
Abstract: Shows a community garden run by senior citizens.

154. **NAL Call No.: Kit no. 186**
Vanishing Rain Forests.
World Wildlife Fund (Washington, DC, c1988). Distributed by The Fund.
1 teacher's manual, 1 booklet, 1 videocassette, 2 posters.
VHS videocassette titled: Rain forest rap.
Abstract: Presents the rain forest with its exotic plant and animal life as a place of intrigue where valuable scientific discoveries wait to be made. Species potentially useful to medical discoveries, such as a cure for cancer, could be lost forever if steps are not taken to halt rain forest destruction. Tells how to be active in the protection of resources threatened by rain forest loss.

155. **NAL Call No.: Videocassette no. 2524**
Vegetable Farmers and Their Weed Control Machines.
University of Vermont. Extension System (Burlington, VT, 1996?). Distributed by The System.
1 videocassette (75 min., 50 sec.): sd., col.
Funded by Northeast Region of the USDA Sustainable Agriculture Research and Education Program.
Abstract: Features visits with nine New England vegetable farmers. These farmers explain their weed management philosophy and demonstrate the use of custom-built and trade-name weed management equipment.

156. **NAL Call No.: Videocassette no. 2102**
A Visit With J.I. Rodale.
J. I. Rodale and Rodale Press. (Oley, PA, c1972). Distributed by Bullfrog Films.
1 videocassette (15 min.): sd., col.
Intended audience: Junior high school students through adults.
Abstract: J.I. Rodale, pioneer organic farmer, talks about his ideas on organic farming, health, and ecology.

157. **NAL Call No.: Videocassette no. 2168**
Warm Water Finfish: Harvesting, Handling and Transportation Southern Region[al] Aquaculture Center Educational Video Production
Louisiana State University Agricultural Center, Cooperative Extension Service. Producer, H. Red Hebert. (College Station, TX, c1993). Distributed by Texas Agricultural Extension Service.
1 videocassette (ca. 31 min.): sd., col.
Abstract: Shows various fish harvesting techniques. These include using seines, dip nets, and fish pumps. Methods for preparing and loading fish for transport are also shown.

158. **NAL Call No.: Videocassette no. 2108**
Water and Fencing Systems for Streambank Protection.
Northcentral Technical College (Wausau, WI, c1990). Distributed by Northcentral Technical College.
1 videocassette (18 min., 40 sec.): sd., col.
Abstract: Explains the different types of fencing systems, grazing methods, watering systems, and funding programs available to provide protection from erosion for your streambanks.

159. **NAL Call No.: Videocassette no. 2430**
Water Conservation: Managing Our Precious Liquid Asset.
Minnesota Arrowhead Water Quality Team (Two Harbors, MN, c1996). Distributed by Lake County Soil & Water Conservation District.
1 videocassette (21 min., 45 sec.): sd., col.
"Shoreland best management practices"--Cassette label.
Abstract: Discusses simple and inexpensive ways to conserve water in the home.

160. **NAL Call No.: Videocassette no. 2505**
Watershed Management in Virginia.
Cornell University. Media Services (Ithaca, NY, c1995). Distributed by Dept. of Soil, Crop & Atmospheric Sciences, Cornell University: Cornell Cooperative Extension.
1 videocassette (26 min., 45 sec.): sd., col.
Abstract: Describes ways to help protect watersheds in Virginia. These include efficiently applying fertilizers and efficiently utilizing animal manures.

161. **NAL Call No.: Videocassette no.-2241**
Ways to Grow: Alternatives for Small Farmers: Growing Brambles.
Craig. Marberry and North Carolina Agricultural and Technical State University (Greensboro, NC, c1994). Distributed by North Carolina A&T State University, Cooperative Extension Program.
1 videocassette (17 min., 29 sec.): sd., col.
"Agricultural Communications, North Carolina A&T State University"--Container.
Abstract: Discusses the cultivation of raspberries and blackberries. Includes growing tips that cover fruit yields, temperature, soil conditions, water requirements, pruning, and harvesting. Also looks at market research.

162. **NAL Call No.: Videocassette no. 2426**
We All Live Downstream.
Steve Dodrill, Oregon State University Extension Service, and Oregon State University. Agricultural Communications (Corvallis, OR, c1996). Distributed by Oregon State University Agricultural Communications.
1 videocassette (28 min., 30 sec.): sd., col. ; ½ in. + introductory pamphlet (1 folded sheet (12 p.): col. ill. ; 19 cm.)
Abstract: Examines the problems of runoff and nonpoint source pollution in Oregon's Tualatin River and how local residents and government officials are trying to reduce nonpoint source pollution. It also offers tips to help each of us play an active role in cleaning up our nation's drinking water supplies.

163. **NAL Call No.: Videocassette no. 2184**
Welcome to the Fungal Jungle.
Michael S. Mease, Larry L. Evans, Ritch Doyle, and Cold Mountain, Cold Rivers (Missoula, MT, c1993). Distributed by Cold Mountain, Cold Rivers.
1 videocassette (15 min.): sd., col.
Abstract: Illustrates some of the familiar mushrooms of the Pacific Northwest forests and discusses their use as food and medicine. Also emphasizes the importance of fungi in forest ecology.

164. **NAL Call No.: Videocassette no. 2798**
Wetland Restoration: Steps to Success.
Wetlands Conservancy (Tualatin, OR, 1996?). Distributed by The Conservancy.
1 videocassette (21 min.): sd., col.
Abstract: Provides information for planning a successful wetlands restoration project.

165. **NAL Call No.: QH76.5.P4W38 1992**
Wetlands Educational Program and Demonstration Site (at the Peterson Industrial Park).
Robert P. Brooks, Aura L. Stauffer, Gary W. Petersen and Pennsylvania State University. Environmental Resources Research Institute (University Park, Pa, 1992). Distributed by Penn State, Environmental Resources Research Institute.
3 volumes text: ill., maps 1 videocassette (22 min.)
Cover title.

166. **NAL Call No.: Videocassette no. 2022**
Wheat, Small Grains: Conservation Tillage for the Great Plains.
Randall Reeder and Ohio State University. Extension (Columbus, OH, c1994). Distributed by Ohio State University Extension.
1 videocassette (120 min.): sd., col.
Title from container.
Abstract: One of a series of programs broadcast via satellite. Includes 20 speakers and covers topics such as wind erosion, disease and weed management, and crop rotation for the Great Plains.

167. **NAL Call No.: Videocassette no. 2789**
Working With Nature in Soil-Less Gardens.
Machaelle Small Wright and Perelandra, Ltd. (Warrenton, VA, c1998). Distributed by Perelandra, Ltd.
2 videocassettes (252 min.): sd., col.
Abstract: "This is a fascinating, dynamic and humorous talk given by Machaelle Wright for those who wish to apply the principles of co-creative science to every aspect of their lives: business, education, the arts, the home, research, your job, personal and professional projects and goals-- all those gardens in life that are not rooted in soil. By the end of this talk, you will know exactly how to work with nature to achieve any goal you wish with extraordinary efficiency and balance"--Container.

168. **NAL Call No.: Videocassette no. 2262**
A World of Difference.
United States. Soil Conservation Service (Davis, CA?, 1995?). Distributed by The Service.
1 videocassette (30 min.): sd., col.
Abstract: Soil Conservation Service employees describe how they plan and care for the needs of California resources.

169. **NAL Call No.: Videocassette no. 1786**
Xeriscape: A Quiet Revolution.
Elizabeth Gilmore, Jim Knopf, Denver Museum of Natural History, and Denver Water Department (Denver, CO, c1992). Distributed by The Museum and Denver Water.
1 videocassette (28 min.): sd., col.; ½ in.
Abstract: George and Sonja Ek go through the process of converting their yard from thirsty, high-maintenance bluegrass. Landscape architect Jim Knopf helps them plan their new xeriscape.

170. **NAL Call No.: Videocassette no. 1936**
Your Own Back Yard: A Xeriscape Primer.
Judy Closser Cheatham, Luan Akin, Linda Rea, and Linda Rea Productions (Denver, CO, c1992). Distributed by Linda Rea Productions.
1 videocassette (53 min.): sd., col.
"Funding was provided by the Denver Water Department and U.S. EPA with additional support from KRMA-TV.".
Abstract: Shows how to design an attractive water-conserving landscape in your own back yard.

The New Frontiers of Ranching: Business Diversification and Land Stewardship

Sonoran Institute

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Courtesy of Karen Simms

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531 Clark Hall, Columbia, MO 65211
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moac@umsystem.edu • http://www.ext.missouri.edu/agebb/mac

Ideas for Alternative Agricultural Enterprises

Missouri Alternatives Center

Revised November 1996

Sponsored by University of Missouri Outreach and Extension, Lincoln University, MU Extension Division
MU College of Agriculture, Food and Natural Resources, Missouri Department of Conservation

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ALTERNATIVES FOR THE NEW FAMILY FARM

Aquaculture

There are approximately 350,000 farm ponds in Missouri, or about 250,000 acres of water. This existing resource has the potential to support a substantial food-fish industry. Cage culture of catfish is one popular aquacultural enterprise, because aquaculture uses existing water bodies, reduces capitalization costs and makes otherwise unsuitable ponds usable for fish production. Other aquaculture opportunities include fee fishing; cage culture of trout, catfish and other species; fingerling production; carp; bass, bluegill; minnows and other bait fish; raceway culture, crawfish; tilapia; mosquitofish; aquaponics; and paddlefish.

Beekeeping

With a little marketing, beekeeping can be a profitable part of a diversified small farm. Honey, beeswax and other products can be direct marketed through farmers markets, roadside stands, door-to-door, through the local paper, to local health food and stores, and by other methods.

Direct Marketing

Most specialty and alternative crops and livestock have few, if any, established markets. There aren't any catfish sale barns. So the producer must rely on either selling to local retailers, selling through cooperatives, or direct marketing. Some types of direct marketing include pick-your-own, farmers markets, roadside stands, mail order and subscription marketing.

Dogs

Breeding dogs for sale as pets, especially unusual ones like the Chinese Shar-Pei, is a possible rural enterprise. Other possibilities include breeding and training stock dogs or livestock guardian dogs, or operating a boarding kennel.

Exotic Livestock

Increasing demand for exotic animals has led many small-size agripreneurs to find it profitable to raise exotic livestock. Some popular animals include llamas and alpacas, ostriches and other flightless birds, pygmy goats, elk, fallow deer, axis deer, water buffalo, bison, potbellied pigs, mouflon and aouded sheep, miniature animals, watusi, and exotic birds.

Fee Hunting

Charging money to let people hunt on your land is the simplest form of fee hunting. At the other extreme, you may breed either game birds or big game and provide hunting dogs and guides to hunters.

Field Crops

Field crops don't have to mean corn, wheat or soybeans. Some more familiar alternatives are sunflowers, barley, buckwheat, and oats. Examples include: *Amaranth*, a little-known crop native to the Americas, is grown either as a grain crop or as a leafy vegetable. As a grain, it can be found in some multi-grain crackers, cereals and other items produced by small companies. In the garden, it can provide fresh greens in the heat of the summer. Amaranth grows vigorously, resists drought, heat and pests, and adapts readily to new environments. *Crambe*, a mustard-like crop, is a potential replacement for imported high-erucic rapeseed oil used in manufacturing polyethylene, waxes and nylons. Its low cost of production is attractive to growers in the East, the Corn Belt and the Southern Delta; however, unproven commercial yields and a low world market price for rapeseed are limitations. *Canola*, low erucic acid rapeseed, is used for vegetable oil. It has traditionally been the domain of Canadian growers. However, low cost of production and increasing demand from processors has made it more attractive to US growers.

Floriculture

Flowers and ornamental plants make a good combination with a market gardening program. Fresh flowers can be sold to local florists; dried flowers are in demand by craftspeople. Edible flowers and wild flowers are also possibilities.

Forages

There are many alternative opportunities in grazing livestock, such as controlled grazing and other intensive rotational grazing methods for cattle and sheep; using warm-season native grasses; honey locust pods, acorns and other tree crops to feed livestock; grazing lambs on cowpeas; using Angora goats to control brush in pastures; and others.

Forestry

Many small farmers virtually ignore their woodlot. However, with proper management and marketing, an existing woodlot can be a source of revenue from veneer-quality wood, firewood, etc. Christmas trees are also a forestry product with potential for Missouri.

Fur

Mink, fox and chinchilla are possible alternatives for those interested producing furs.

Game Birds

Pheasants, Chukar and Quail can be raised in Missouri to supply gourmet meat, eggs, exotic breeding stock, or to supply hunting preserves.

Ginseng and Goldenseal

Digging and selling ginseng and goldenseal roots has been a traditional source of income for many Ozarkians. Some Missourians are discovering profits in cultivating ginseng under forest canopy. Ginseng is prized in China as an herbal medicine.

Goats

Commercial dairy goat milk producers encounter serious marketing problems, as goat milk cannot be sold for human consumption except through a Grade A Dairy. However, dairy goats can be a welcome addition for milk, cheese and meat for home use.

Some people sell young goats for their meat, (chevon), which, because it is very lean, may have an increasing market in today's health-conscious environment. The tender meat of young goats -cabritos in Spanish -- is beginning to get recognition from gourmet restaurants. This requires some marketing.

Angora goats raised for mohair production have been making profits for farmers in Texas, Michigan, Oklahoma, Missouri and other states. Mohair prices range from S 1.75 to $7.25 a pound, depending on quality. USDA's Agricultural Stabilization and Conservation Service (ASCS) also helps by matching the price with a substantial subsidy under the Wool Act.

A topic of recent interest is the beginnings of a cashmere industry in the United States. Cashmere is produced from the downy undercoat of certain types of goats. Currently most cashmere is produced in Asia, the Middle East and Australia.

Herbs

Growing fresh herbs to sell to local restaurants and grocery stores, to wholesalers or through direct marketing, is a horticultural alternative. Fresh herbs are in increasing demand.

Home-Based Business

Arts and crafts, candy and other food production, custom sewing, bed and breakfasts, and many other enterprises can be run from your home or farm. Adding value to what you produce, such as selling flavored popped corn from popcorn you grow, is an excellent way to build profits.

Horses

Draft horses are finding their way back onto many small farms as an economical and enjoyable alternative to tractors for field work, feeding , forestry work, hauling hay, etc. Horse breeding, whether draft horses or saddle breeds, is also a viable farm enterprise.

Hydroponics

Many Missourians are interested in the hydroponic production (without soil) of fruits, vegetables, flowers, house plants and herbs. Hydroponics allows you to exert greater control over your plants, ensure more uniform results, and grow more plants in a limited space.

Sustainable Agriculture

The term "organic" used to conjure up visions of hippie love beads and health food stores. However, as more consumers are demanding fresh, chemical-free foods, and as more farmers are rebelling against the ever-increasing costs of chemicals, organic, low-input, or sustainable agriculture is gaining ground. Many grocery stores now have organic produce sections. "Natural" branded beef is appearing. People flock to farmers markets for farm-fresh produce and come back for better-tasting organic fruits and vegetables.

Minor Breeds

Until fairly recently in the history of agriculture, the rural landscape was rich in a diversity of livestock breeds. Many were all-purpose animals that fulfilled a variety of needs for small family farms. However, as agriculture has become more industrialized and production-oriented, it has encouraged the development of highly specialized animals. Today there is increasing interest in the minor breeds ignored by agribusiness. Most minor breeds are hardy, and some carry unique traits that would be forever lost if the breed died out. Minor breeds also can play an important role in crossbreeding programs. The Texas longhorn cattle, for example, which once came close to extinction, is now popular in crossbreeding programs for leaner beef.

Beef Cattle: Beef Devon, Belted Galloway, Red Poll, White Park, Scottish Highland.
Dairy Cattle: Dutch Belted, Milking Devon, Canedienne, Dexter, Guernsey, Milking Shorthorn.
Donkeys and Mules: Poitu, Spotted, Miniature; all donkeys and mules.
Draft Horses: Canadienne, Cleveland Bay, Shire, Suffolk Punch, Clydesdale.
Goats: Nigerian Dwarf, Spanish, San Clemente, Tennessee Fainting.
Horses and Ponies: Exmoor, Lipizzan, Bashkir Curly, Hackney.
Poultry: Ancona, Black Jersey Giant, White Jersey Giant, Black Minorca, Brown Leghorn, Delaware, White Wyandotte, Khaki Campbell Ducks, Pilgrim Geese
Sheep: Barbados, Border Leicester, Cotswold, Karakul, Lincoln, Navajo-Churro, Tunis, Vermont Merino, Delaine Merino, Shetland, Mouflon, American Jacob, Oxford, Shropshire, Southdown, Wiltshire Horn, Dorset Horned.
Swine: Mulefoot, Gloucester Old Spot, Tamworth, Red Wattle.

Mushrooms

Shiitake mushrooms, or Japanese forest mushrooms, have received much attention recently as an agricultural alternative. They grow on hardwood logs and sell for $7 to $8 a pound fresh, $4 to $5 a pound dried. A major export in Japan, shiitake production is a relatively new and small industry in the United States. Like

many specialty crops, there are no established markets. However, consumer demand is growing. White button mushrooms and oyster mushrooms may also hold promise as agricultural alternatives.

Nuts

Black walnuts, pecans and hicans (a cross between hickory and pecans) are all grown in Missouri. Butternuts and Japanese walnuts or heartnuts may also have possibilities.

Poultry

At one time, almost every farmer had some chickens, guinea hens, ducks or turkeys. Today, commercial egg and chicken operations have taken over the market. However, there are opportunities in supplying small homestead poultry flocks, locally-marketed country fresh eggs, exotic and fancy breeds, gourmet meat (squab, goose, capon), organic free-range chickens, etc. These, like most alternative enterprises, will require marketing skills.

Rabbits

The meat rabbit industry has faced problems with a lack of markets. Rabbit meat is high in protein and low in fat, so you can find a market niche with good marketing skills. Other opportunities in rabbits include Angora rabbits for Angora fiber, Rex rabbits for fur, and Dwarf rabbits for pets.

Sheep

Sheep can be profitable with good management and creative marketing of meat and wool. The relatively low investment required is an advantage for the small farmer. Some potential specialty markets include colored wool, which commands premium prices, and dairy sheep for milk, cheese and yogurt for gourmet markets. Direct marketing methods such as subscription marketing can be used for sheep products. Hair sheep, which have hair like a goat instead of wool, are an alternative for those who are only interested in meat production.

Small Fruits

Strawberries, grapes, blueberries, blackberries, raspberries, gooseberries, etc., provide good opportunities for direct marketing (pick-your-own, farmers' markets, roadside stands, subscription marketing, etc.). They can also be sold to local grocery stores or through cooperatives. Grapes can be grown to supply wineries. Hardy kiwi is a new fruit that may have possibilities.

Tree Fruits

Apples and peaches are two tree fruit crops common in Missouri. Dwarf fruit orchards are an interesting alternative.

Vegetables

There are many opportunities in vegetable production: traditional crops like tomatoes and carrots, newly popular colored bell peppers, Chinese vegetables, baby vegetables, heirloom varieties and so forth. Direct marketing and organic production are both applicable to vegetable production.

Worms

Worms can be produced by themselves or under rabbit hutches for sale to fishermen and gardeners.

National Sustainable Agriculture Information Service

December 02, 2003

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NOFA/Massachusetts Annual Winter Conference

Tilling the Soil of Opportunity Course

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USDA SUSTAINABLE AGRICULTURE UPDATES

Native American Outreach Program Grants Announced

ASK A SUSTAINABLE AGRICULTURE EXPERT

NEW! Submit questions to our professional staff online

QUESTION OF THE WEEK

The 400ppm of bicarbonate in the irrigation water I use on my vegetables clogs my irrigation equipment. Does it also damage plants and soil, and if so, how can I reduce it?

NEW & UPDATED PUBLICATIONS

Bringing Local Food to Local People

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Appropriate Technology Transfer for Rural Areas

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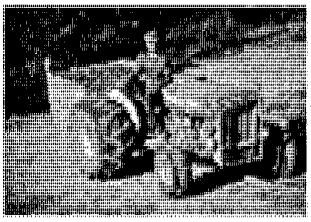
ATTRA - Appropriate Technology Transfer for Rural Areas - is the national sustainable farming information center operated by the private nonprofit National Center for Appropriate Technology (NCAT).



ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals in all 50 states. Topics addressed by ATTRA can be categorized into three broad areas:

- sustainable farming production practices
- alternative crop and livestock enterprises
- innovative marketing

Technical assistance, publications, and resources are provided free of charge to appropriate users. ATTRA is funded through a cooperative agreement with the USDA Rural Business--Cooperative Service agency.

The National Center for Appropriate Technology is a 501(c)3 non-profit organization with programs in sustainable agriculture, rural development, renewable energy, and low-income housing. The ATTRA program is one of several sustainable agriculture projects managed by NCAT.

Appropriate Technology Transfer for Rural Areas
P.O. Box 3657
Fayetteville, AR 72702
1-800-346-9140
M-Th 8:30am-4:30pm CST
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Appropriate Technology Transfer for Rural Areas

MATERIALS LIST

January 2000

Appropriate Technology Transfer for Rural Areas (ATTRA)
P.O. Box 3657
Fayetteville, AR 72702
Phone: 1-800-346-9140 --- FAX: (501) 442-9842

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Soil Series
Resource Series
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Agronomy Series
Pest Management Series
Value-Added & Processing Series
Alternative Farming Systems Series

Introduction

ATTRA is the national sustainable agriculture information service that offers technical assistance and information free of charge to people and organizations involved with U.S. commercial agriculture, including full- and part-time farmers, Extension agents, agricultural support groups, researchers, educators, and agribusiness. Founded by the nonprofit National Center for Appropriate Technology (NCAT) in 1987, ATTRA is funded through a grant from the USDA Rural Business-Cooperative Service.

ATTRA specializes in responding to specific sustainable practices or enterprise questions. Our staff will research the question, summarize findings in writing, and compile supporting literature as appropriate to accompany the report which a caller receives by mail. On this list are ATTRA's current information packets on a host of sustainable agriculture topics.

In addition to providing customized research, we offer five types of standard materials within series, or families, of sustainable farming topics. When you receive our informational packets, you will notice subtitles on each which denote them as:

- **Fundamentals of Sustainable Agriculture Series**, *which covers broad topics of*

importance to sustainable farming advocates.

- **Systems Guides**, *offering broad treatments of topics that include inter-related systems.*
- **Production Guides**, *which focus on a specific crop or livestock series.*
- **Technical Notes**, *targeting specific sustainable ag methods.*
- **Resource Series**, *which identifies many helpful organizations, agribusinesses, services and informational materials.*

To order them, please call ATTRA's toll-free number 1-800-346-9140.

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FUNDAMENTALS OF SUSTAINABLE AG SERIES

Holistic Management: A Whole-Farm Decision Making Framework
A decision making framework that assists farmers and others in establishing a long-term goal, a detailed financial plan, a biological plan for the landscape and a monitoring program to assess progress toward the goal.

Integrated Pest Management
Uses, benefits, IPM and sustainable agriculture, monitoring, economic thresholds, planning, tools & options, microbial pesticides, useful information resources.

Making the Transition to Sustainable Farming
Goals of becoming economically, ecologically and socially sustainable, planning & decision-making, rotations & cover crops, developing a cropping mix, weed & pest management, key ideas.

Overview of Cover Crops & Green Manures
Soil benefits from cover crops, nitrogen production, weed suppression, cover crops in rotations, pest management benefits, economics, many sources of additional information.

Sustainable Soil Management
Covers the components of the living soil, soil organisms, and organic matter, fertilizers, and soil quality. Provides ways to assess soil health, build soil, and manage the soil livestock. Complete with resource list of additional information.

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SOIL SERIES

Alternative Soil Testing Laboratories (available only in print)
Labs are in two broad categories: (1) humus, organic matter, and microbial analysis, and (2) mineral analysis and fertilizer recommendations. References for soil quality and alternative fertility.

Farm-Scale Composting Resource List
Suggested reading, compost references, associations, web links, software, magazines, email lists, bibliographies.

Overview of Cover Crops & Green Manures
Soil benefits from cover crops, nitrogen production, weed suppression, cover crops in rotations, pest management benefits, economics, many sources of additional information.

Nonconventional Soil Amendments (available only in print)
Mineral powders, plant & animal byproducts, seaweed, growth regulators, inoculants, enzymes, micronutrients, dusts/powders.

Sources for Organic Fertilizers & Amendments
A listing of manufacturers, national distributors, major regional distributors, and mail-order sources.

Sustainable Soil Management
Covers the components of the living soil, soil organisms, and organic matter, fertilizers, and soil quality. Provides ways to assess soil health, build soil, and manage the soil livestock. Complete with resource list of additional information.

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RESOURCE SERIES

Sustainable Farming Internships and Apprenticeships

K-12 Sustainable Agriculture Curricula
Education, curricula, publications, electronic resources.

Sustainable Agriculture Organizations & Publications

University Programs and Contacts

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LIVESTOCK SERIES

Avian

Sustainable Chicken Production (available only in print)
Housing, breeds, feeding, health, marketing.

Ratites: Ostrich, Emu, Rhea (available only in print)
Brief history, considerations before investing, marketing options.

Beef & Dairy

Alternative Beef Marketing
Value-added beef, lean beef, direct marketing, cooperatives, niche markets: organic, natural, pasture-finished.

Sustainable Beef Production
Grazing & feeding options, low-stress handling, alternative parasite control, environmental & social concerns.

Beef Farm Sustainability Checksheet
Assessment tool to help plan a whole farm in which beef production is a major enterprise. Management of animals, forage, soil, watershed, marketing, economics and goal-setting are addressed in the 200 questions.

Grass-Based & Seasonal Dairying
Pasture as primary feed source for dairy cattle; seasonal production to reduce feed costs.

Fish & Worms

Evaluating an Aquacultural Enterprise
Considerations (physical, biological, financial), culture and species options, resource lists.

Worms for Composting (Vermicomposting)
Describes systems that use worms to process animal and other organic wastes; gives commercial examples of various types; provides a sample production budget; suggestions about marketing included; lists many further resources, both print and electronic.

Grass Farming

Assessing the Pasture Soil Resource
How to take a soil sample and an easy way to assess soil biological activity and water infiltration. Assessment sheet included.

Matching Livestock and Forage Resources in Controlled Grazing
Grazing objectives, maintaining botanical balance, encouraging rapid growth, compromising between yield and quality, minimizing mowing, producer goals.

Meeting the Nutritional Needs of Ruminants on Pasture
(available only in print)
Impact of grazing management on nutrition, supplemental feeding on high quality pasture, feed profiling, feed budgeting, matching livestock and forage resources for efficient pasture use.

Nutrient Cycling in Pastures
Examines elements of pasture ecology, including soil organisms, plants, and animals. Discusses their interactions and ways to enhance nutrient cycling with minimal losses to air or ground and surface waters.

Introduction To Paddock Design And Fencing-Water Systems For Controlled Grazing
Designing a controlled grazing system, determining paddock size based on forage availability for the number of animals grazed, shape of the paddock based on landscape and other variables, purchasing fencing items, water systems, sources.

Rotational Grazing
How to manage pastures and grazing animals to more profitably utilize the farm's resources.

Sustainable Pasture Management (available only in print)
Managing fertility and pests, grazing systems, conserved forages, maintaining productivity, additional resources.

Hogs & Sheep

Sustainable Hog Production Overview
Breed selection, feed alternatives, odor and dust problems, waste and crop nutrient management, health, humane concerns, vertical integration, identifing an alternative marketing niche, and sources of additional information.

Alternative Marketing of Pork
Commodity vs. direct marketing, what is direct marketing, niche markets such as organic and ethnic, direct market consideration and channels, and sources of further information.

Hooped Shelters for Finishing Hogs
Hooped shelter design, purchasing a complete or noncomplete shelter, deep bedding, cost, sources for additional information.

Sustainable Sheep Production (available only in print)
Pasture & range grazing, alternative health strategies (parasites & diseases), marketing, industrial development, sources for additional information.

Other Livestock

Bison Production
Advantages and disadvantages of raising bison, information on pasturing, fencing, and handling of bison, as well as marketing options, and diseased and parasites of bison. Sources of additional information are also provided.

Pest Management

Integrated Parasite Management for Livestock
A system approach to assess and manage the soil, forages and animals to decrease internal

parasites and their effects.

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MARKETING & BUSINESS SERIES

Holistic Management: A Whole-Farm Decision Making Framework
A decision-making framework that creates a link between sound economics and the environment. Managing people, land, and money in a responsible way. Framework to evaluate sustainability of farm decisions.

Organic Certification
Comprehensive list of organic certification organizations.

Community Supported Agriculture
Examining the full spectrum of CSA arrangements from subscription marketing to "shareholders," including success factors, financial concerns, profiles, management challenges.

Direct Marketing
Importance of marketing, market research, niche marketing, value-added marketing, pricing, promotion, related resources.

Farmers' Markets
Information for organizing a market and for selling at market.

Pick Your Own & Agri-Entertainment
Covers advertising, crops, facilities, and pricing for pick-you-own crops and various forms of agri-entertainment.

Resources for Organic Marketing
Pondering the options, proactive approach, national and regional organic trade organizations and publications, market research studies, many contact sources.

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HORTICULTURE SERIES

Flowers, Mushrooms

Field Grown Cut & Dried Flower Production & Marketing
(available only in print)
Marketing, climate, trade organizations, conferences, literature, species list.

Mushroom Cultivation & Marketing

General review of cultivation technologies (including shiitakes), enterprise evaluation, further research resources.

Phenology Web Links: Sequence of Bloom, Floral Calendars, What's in Bloom
Links to web sites that discuss phenology as a tool for observing seasonal events in nature such as emergence of crop pests. Other sites link to data on sequence of bloom, floral calendars, and what plants are blooming in gardens and arboertums. .

Fruit Crops

Overview of Organic Fruit Production
Fertilization, pests, weed control, obstacles.

Organic and Low-Spray Apple Production
(temporarily available only in print)

Organic Blueberry Production
Highbush, fertility, insect pests, diseases.

Organic Culture of Blackberries and Raspberries
Diseases, pests, resistant varieties.

Organic Grape Production
(temporarily available only in print)

Pawpaw Production
Culture, research, markets, pesticidal properties.

Strawberries: Organic & IPM Options (available only in print)
Fertility, weed control (cultural, biological and mulches), insect and mite control, disease control, symptoms and identification, alternatives to Methyl Bromide, references.

Herbs

Echinacea as an Alternative Crop (available only in print)
Production of Echinacea root as raw material for the herbal supplement industry.

Ginseng, Goldenseal & Other Native Roots
Status of ginseng and related (opplopanax, Siberian ginseng, sarsaparilla), goldenseal and black cohosh (related), and blue cohosh as alternative root crops for the herbal supplement industry. Includes USDA bulletin. (Online copy does not include bulletin.)

Herb Overview
Marketing strategies, trade organizations, literature, conferences, consultants, resource list.

Lavender as an Alternative Crop
Medicinal herb, essential oils, climate zone, uses, resources.

St. Johnswort as an Alternative Crop

Evaluation of St. Johnswort as an alternative U.S. farm crop (raw materials for the herbal supplement industry).

Nut Crops

Agroforestry Overview
Alleycropping, silvopasture, shelterbelts, buffer strips, forest farming, costs, marketing, products, resources.

Black Walnut Agroforestry (available only in print)
Culture of black walnuts for timber/crops, marketing, other resources.

Sustainable Pecan Production
Native pecan groves, papershell orchards, northern varieties, general culture, agroforestry, pests, diseases.

Vegetable Crops

Organic Allium Production
Discusses all alliums (onions) except for garlic. Information is presented on varieties, culture, soils and fertility, irrigation, integrated pest management (including weeds, insects, and diseases), harvest, postharvest, and economics.

Companion Planting
The scientific and traditional bases for plant associations are discussed. A companion planting chart for common herbs, vegetables and flowers is provided, along with a resource list.

Manures for Vegetable Crop Production
Discusses problems associated with using both raw and composted manures for commercial vegetable growing and suggests some solutions.

Organic Sweet Corn Production
This publication features traditional ideas and current concepts for fertility, pest management, and marketing of a popular vegetable crop.

Sprouts and Wheatgrass Production
Hydroponic and shallow bed methods to sprout vegetable and cereal grain seeds. Food safety issues are addressed. Books, seed suppliers, and equipment sources are listed.

Organic Tomato Production
Organic certification, economics, variety selection, crop rotation, fertility, weed management, training systems, insect and disease control, resources and web links.

Related Topics

Alternative Pollinators: Native Bees
Discusses using solitary bees (non-honeybees) for pollination. Includes information on how to attract and raise alkali bees, bumblebees, leafcutter bees, mason bees, sweat bees and

others. A list of suppliers of bees and bee equipment is also included.

Alternative Seed Suppliers: Untreated, Heirloom, Organic
Some sources for hard-to-find untreated, heirloom and organic vegetable seed. Includes electronic contacts.

Organic Potting Mixes
Describes potting mix ingredients and appropriate mixes for organic and sustainable operations; extensive listing of prepared mixes and suppliers.

Postharvest Handling of Fruits & Vegetables
A guide to maintaining produce quality and safety for the market gardener.

Sustainable Small-Scale Nursery Production
Container and field production, irrigation and runoff, weed control, integrated pest management, fertilization, potting media, marketing, costs, sources for additional information.

Season Extension Techniques for Market Gardeners
Cultural practices, mulches, floating row cover, slitted and punched row cover, cold frames, high tunnels, shade cloth, economics, sources for additional information.

Solar Greenhouse Resource List
List of resources available on construction, operation and manufacturers of solar and small-scale greenhouses.

Grass/Turf

Sustainable Turf Care
Least-toxic practices, compost, irrigation, variety selection, mowing, insect & disease management, weed management, references, organizations, reading, databases, supplies.

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AGRONOMY SERIES

Agroforestry Overview
Alleycropping, silvopasture, shelterbelts, buffer strips, forest farming, costs, marketing, products, resources.

Alternative Agronomic Crops
(temporarily available only in print)
Considerations before diversifying, marketing alternative crops, and sources of additional information.

Alternative Soil Testing Laboratories
Supplies a range of soil testing labs and supplies that support the special analytical needs

of farmers using organic or sustainable methods of production.

Intercropping Principles and Production Practices
Implementing nature's principle of diversity on the farm. Intercrop concepts, production, and management with examples.

Principles of Sustainable Weed Management For Croplands
Root cause of weeds, understanding weed banks & germination, monoculture vs biodiversity, management strategies, costs.

Sustainable Corn & Soybean Production
Tips and ideas for successful corn and soybean production with minimal inputs and limited environmental impact.

Use of Baking Soda as a Fungicide

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PEST MANAGEMENT SERIES

Integrated Pest Management
Uses, benefits, IPM and sustainable agriculture, monitoring, economic thresholds, planning, tools & options, microbial pesticides, useful information resources.

Integrated Pest Management for Greenhouse Crops
Monitoring, sanitation, biological controls, biorational pesticides, insect growth regulators, disease control methods.

Greenhouse IPM: Sustainable Aphid Control
Focuses on monitoring sanitation, biological controls, biorational pesticides and insect growth regulators.

Greenhouse IPM: Sustainable Thrips Control
Controlling thrips in the greenhouse with biological controls, biorational pesticides, and planning, tools & options, microbial pesticides, useful information resources.

Alternative Nematode Control
Nematode suppressive cover crops, crop rotations, soil solarization and steaming, nematode suppressive soil amendments, references.

Compost Teas for Plant Disease Control
Diseases for which compost extracts are effective, suppressive effects, active components, fermented versus aerated, Weltzein and Brinton fermentation method, Cantisano and Luebke aerobic method, extraction variations, references, suggested reading.

Disease Suppressive Potting Mixes
How they are developed, suppressing pathogens through general competition or specific

microbial antagonists, using peat moss, compost systems and analysis, other natural disease control methods, suggested reading, suppliers.

Farmscaping to Enhance Biological Control (available only in print)
Description & benefits, strategies & techniques. Tables include Plants that Attract Beneficials, Pests and Associated Beneficial Insects, and Seed Blends to Attract Beneficial Insects.

Late Blight in Potatoes: Alternative Controls
New strains of late blight have given rebirth to an old pest problem. Organic management options are available and are outlined in this publication.

White Mold on Soybeans: Alternative Controls
White mold is a fungal pest associated with intensive soybean production practices. This publication addresses the key strategies and options for control.

Use of Baking Soda as a Fungicide
Discusses the use of sodium and potassium bicarbonate sprays to control powdery mildew and other foliar fungal diseases. Also includes recommendations for use.

Fire Ant Management
Least-toxic options for suppression of fire ants.

Grasshopper Management
Focuses on preventive management, non-chemical strategies, cultural and biological controls.

Management Alternatives for Thrips on Vegetable & Flower Crops in the Field
Organic control options for this common insect pest are described in detail. Information is especially relevant to onion growers.

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Value-Added & Processing Series

Grain Processing
Profiles of farmers who are processing grains, from whole-wheat flour to baked goods. Resource list for additional information, supplies, and equipment.

Overview: Adding Value to Farm Products
Presents the basic concept, keys to success, sources of information on business planning and regulations.

Small-Scale Food Dehydration: A Resource List
Describes dehydration process, equipment and designs and lists resources for more information.

Small-Scale Oilseed Processing
Description of basic process, including a low-tech method for small-scale processing of sunflower seeds. Provides list of sustainable raw materials, sources for equipment, and additional information.

Soy Foods
Introduces a few of the food products made from soybeans, and basic process for tofu. Describes sources for in-depth processing and marketing information.

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ALTERNATIVE FARMING SYSTEMS SERIES

Biodynamic Farming & Compost Preparation
History, concepts, biodynamic preparations, compost preparation, herbal teas, planetary influences, companion planting, community supported agriculture, research, web links and resources.

Introduction to Permaculture
Introduction, definitions, characteristics, practical application, ethics, principles, resources, book, email chat groups, web links.

Radionics in Agriculture (available only in print)
Introduction and history of radionics, instruments for plant and animal diagnosis and treatment, uses (analysis, evaluation of materials, vitalization), resources.

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webmaster@attra.org

Sustainable Agriculture...Continuing to Grow

A Proceedings of the "Farming and Ranching for Profit, Stewardship & Community" Conference

March 7-9, 2000

Funding for this publication was provided by
USDA Western Region Sustainable Agriculture Research and Education (Western SARE).

The SARE program, which was mandated by Congress in the 1990 and 1996 Farm Bills, is implemented by four regional councils in cooperation with the USDA Cooperative State Research, Education and Extension Service. Western SARE is coordinated by Utah State University soil scientist V. Philip Rasmussen and led by an Administrative Council that represents diverse agricultural and public interests.

The Western Region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming and the Island Protectorates of American Samoa, Guam, Micronesia and the Northern Mariana Islands.

For information about Western SARE grant programs, educational resources or funded project results, contact the headquarters office at (435) 797-2257 or wsare@mendel.usu.edu.

Western Region
Sustainable Agriculture Research and Education

Western SARE does not discriminate on the basis of race, religion, national origin, sex, age, handicap or veteran status.

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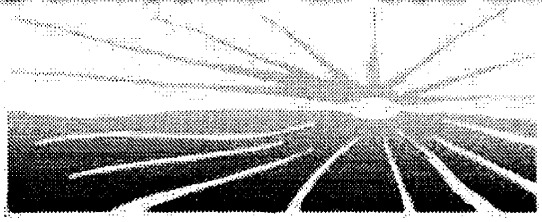
Welcome to

Small Farms @ USDA



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Creating Opportunities
Preserving Choices

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ATTRA
Appropriate Technology Transfer for Rural Areas

SUSTAINABLE AGRICULTURE:
AN INTRODUCTION

ATTRA SUMMARY

ATTRA is the national sustainable agriculture information center funded by the USDA's Rural Business -- Cooperative Service.

A sustainable agriculture provides nourishing food, protects those who work the land, helps stabilize the earth's climate, and safeguards soil and water.

- Asilomar Declaration, California, 1990.

A sustainable agriculture is one that, over the long term, enhances the environmental quality and the resource base on which agriculture depends; provides for basic human food and fiber needs; is economically viable; and enhances the quality of life for farmers and society as a whole.

- American Society of Agronomy

Sustainable agriculture was defined in Public Law 101-624, Title XVI, Subtitle A, Section 1683, Government Printing Office, Washinton, D.C., NAL KF 1692.831 1990. Under that law, "the term sustainable agriculture means an integrated system of plant and animal production practices having a site-specific application that will, over the long term:

A) satisfy human food and fiber needs;
B) enhance environmental quality and the natural resource base upon which the agricultural economy depends;
C) make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
D) sustain the economic viability of farm operations; and
E) enhance the quality of life for farmers and society as a whole."

- Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA)

Agriculture is defined as the science and art of farming, of cultivating the ground, sowing, planting, and caring for plants and harvesting them for the purpose of producing food. In its broadest sense, it includes gardening, horticulture and raising livestock. **Sustainable** means to be able to support or endure continuously. **Sustainable agriculture,** therefore, suggests a system of farming that produces food as benignly as possible without undermining the viability of humans as a species.

The term sustainable agriculture was first used in 1978 by Wes Jackson of the Land Institute in Salina, Kansas, to describe an alternative system of farming based upon resource conservation and quality of rural life. Although it has been defined and discussed vigorously since then, a clear and comprehensive understanding of its meaning still evades us.

The term sustainability is a difficult and elusive concept. What is it that is being sustained and for whom? Is sustainable agriculture a moral crusade by zealots? A matter of food security? A science-based necessity for human survival? A way to redistribute economic wealth?

Advocates of sustainability maintain that the natural environment must be sustained for generations to come. Natural resources must be utilized only within their capacity to regenerate and renew themselves. Modern agriculture, which developed rapidly after World War II "is credited with dramatically increasing the availability of cheap food." This abundance of food, however, has been accompanied by steep environmental and social costs — loss of topsoil, water pollution, loss of bio-diversity, dependence on non-renewable resources, rising farm production costs, and the decline of rural communities, among other things.

Over the past several decades a number of labels for agricultural systems emphasizing the common themes of resource conservation and

Elements of Competing Agricultural Paradigms

Conventional agriculture	Alternative agriculture
Centralization ◆National/international production, processing, and marketing ◆Concentrated populations; fewer farmers ◆Concentrated control of land, resource and capital	Decentralization ◆More local/regional production, processing and marketing ◆Dispersed populations; more farmers ◆Dispersed control of land, resources and capital
Dependence ◆Large, capital-intensive technology and production units ◆Heavy reliance on external sources of energy, inputs and credit ◆Consumerism and market dependence ◆Emphasis on science, specialists, and experts	Independence ◆Smaller, low capital production units and technology ◆Reduced reliance on external sources of energy, inputs and credit ◆More personal and community self-sufficiency ◆Primary emphasis on personal knowledge, skills and local wisdom
Competition ◆Lack of cooperation; self-interest ◆Farm traditions and rural culture outdated ◆Small rural communities not necessary to agriculture ◆Labor an input to be minimized ◆Farming is a business only ◆Primary emphasis on speed, quantity and profit.	Community ◆Increased cooperation ◆Preservation of farm traditions and rural culture ◆Small rural communities essential to agriculture ◆Farm work rewarding, labor an essential to be made meaningful ◆Farming a way of life and a business ◆Primary emphasis on permanence, quality and beauty
Domination of nature ◆Humans separate from and superior to nature. ◆Nature consists primarily of resources to be used ◆Recycling wastes neglected ◆Production maintained by agricultural chemicals ◆Highly processed, nutrient fortified food.	Harmony with nature ◆Humans are part of and subject to nature ◆Emphasis on life cycle; growth and decay balanced ◆Natural ecosystems are imitated.
Specialization ◆Narrow genetic base ◆Monocultures ◆Single-cropping in succession ◆Separation of crops and livestock ◆Standardized production systems ◆Specialized, reductionist science and technology	Diversity ◆Broad genetic base ◆Emphasis on polycultures ◆Multiple crops in complementary rotations ◆Integration of crops and livestock ◆Locally adapted production systems ◆Interdisciplinary, systems-oriented science and technology
Exploitation ◆External costs often ignored ◆Short-term benefits outweigh long-term consequences ◆Heavy use of non-renewable resources ◆Confidence in science and technology ◆High consumption to maintain economic growth ◆Financial success, busy lifestyles, materialism	Restraint ◆Consideration given to external costs ◆Short-term and long-term outcomes equally important ◆Based on renewable resources; non-renewable resources conserved ◆Appropriate use of science and technology ◆Consumption restrained to benefit future generations ◆Simpler lifestyles, non-materialism

From: Beus, Curtis E. and Riley E. Dunlap. "Conventional Versus Alternative Agriculture: The Paradigmatic Roots of the Debate." *Rural Sociology.* Vol. 55, no. 4 (1990): 590-616.

environmental protection have emerged. Although they go by different names — organic, natural, low-input, alternative, regenerative, bio-dynamic or biological farming — some of these labels are occasionally used synonymously with others.

The new models of agriculture aim for ecological soundness. Sustainable systems are diversified and mimic nature as closely as possible – a high degree of bio-diversity predominates, plant nutrients are recycled, soil is mulched, tillage kept to a minimum, livestock are well-integrated into the landscape, and a variety of perennials lend stability to the ecosystem.

To the farmer desperate to survive on the farm, however, sustainability means more than just ecological soundness. It means economic viability, a decent family income and a good quality of life. Sustainable agriculture therefore, at least at the farm level, has increasingly become a balancing act that ensures both the economic ***and*** ecological robustness of the farm; an integrated system of production and marketing that reduces input costs by conserving nutrients, energy and biological diversity, while emphasizing strategies like value-added and niche marketing to enhance profitability.

Some characteristics of a sustainable farm enterprise are:

Economic viability:

A) Reduce production costs, minimize use of costly external inputs by tightening nutrient cycles on the farm, composting and crop rotation.

B) Diversify farm enterprises, emphasize direct marketing and premium specialty markets.

Water management:

Minimize surface and ground water pollution, conservation of water. Reduce use of synthetically-derived pesticides by enhancing conditions that inhibit insect pests and disease. Cultural, physical, and biological measures include monitoring for insect pests, enhancing habitat for beneficial organisms, use of pest- and disease-resistant varieties, crop rotations, improving soil health and other measures.

Bio-diversity:

A high degree of bio-diversity provides control of insect pests and diseases, increases pathways for nutrient cycling and overall system stability.

To facilitate the transition to a more sustaining agriculture, other discussions on sustainability emphasize the need for change in the socioeconomic environment within which farmers operate.

Such changes include but are not limited to:

- More direct connections between farmers and consumers;
- Regional food self-sufficiency;
- Reduced economic concentration in production, processing and marketing (giant hog and poultry operations are an example);
- Policies that encourage resource conservation.

Advocates of alternative agriculture maintain that in the absence of such a society-wide transformation, sustainability, especially for farmers, will remain a myth and a cruel hoax. And so the debate continues. Clearly, sustainability is not just a set of practices but a characteristic of agricultural systems as a whole. It is a continuing quest that is constantly being modified to reflect present realities - political, economic and environmental. Innovative farmers, grassroots activists, and consumers looking for alternatives are quietly working to define this movement and there is reason to hope that the emerging models of sustainability will meet the challenge posed by the unrestrained growth of industrial agricultur

Preliminary resources:

National Agricultural Library (ed.) 1995. Sustainable Agriculture in Print: Current Books.

SRB 95-02. Special Reference Briefs. Alternative Farming Systems Information Center. National Agriculture Library, Beltsville, Maryland. For a copy, contact:

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E-mail: afsic@nalusda.gov
Internet:
http://www.nal.usda.gov/afsic/afsabout.htm

DeMuth, Suzanne. 1995. Sustainable Agriculture in Print: Current Periodicals. SRB 95-08. Special Reference Briefs. Alternative Farming Systems Information Center. National Agriculture Library, Beltsville, Maryland. For a copy, contact the above address.

Hegyes, Gabriel and Charles A. Francis (eds.) 1997. Future Horizons: Recent Literature in Sustainable Agriculture. Extension and Education Materials for Sustainable Agriculture: Volume 6. Institute of Agriculture and Natural Resources, University of Nebraska — Lincoln. 222 p. Contact:

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402-472-2056; 402-472-4104
E-mail: csas003@unlvm.unl.edu
Available on the Internet at:
http://ianrwww.unl.edu/ianr/csas/v6ch8.htm#8int

Internet sites:
(The following are only a handful of the hundreds of Internet sites on sustainable agriculture.)

Alternative Farming Systems Information Center
http://www.nal.usda.gov/afsic

Appropriate Technology Transfer for Rural Areas
http://www.attra.org

Center for Sustainable Agricultural Systems
http://ianrwww.unl.edu/ianr/csas/

Community Alliance with Family Farmers
http://www.caff.org/home

Ecological Agriculture Projects
www.eap.mcgill.ca

Henry A. Wallace Institute for Alternative Agriculture
http://www.hawiaa.org

Intergarden
http://sunsite.unc.edu/london/permaculture.html

Minnesota Institute for Sustainable Agriculture
www.misa.umn.edu/

Missouri Alternatives Center
http://www.ext.missouri.edu/agebb/mac
(also visit
http://www.ssu.missouri.edu/faculty/Jikerd/default.htm

Sustainable Agriculture Network
http://www.ces.ncsu.edu/san or www.sare.org

Sustainability book list
http://sustainable.state.fl.us/fdi/fscc/res/booklist.htm

Sustainable Farming Connection
http://sunsite.unc.edu/farming-connection/

Sustainable Communities Network
http://sustainable.org/economy/agriculture.html

University of California Sustainable Agriculture Research and Education Program
http://www.sarep.ucdavis.edu/

World Sustainable Agriculture Association
http://www.igc.org/wsaala/

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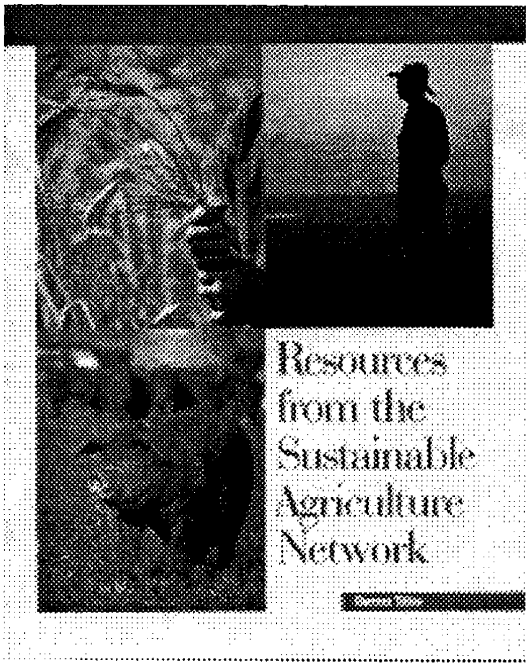

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Vol. 6, No. 3
May–June 1996

Ag Opportunities

• Small Farms
• New Family Farms
• Agricultural Alternatives

"Choosing Your Enterprises: A Checklist"

(Reprinted with permission from "Sell What You Sow" by Eric Gibson)

Personal and family considerations

* Have you identified goals and objectives for your business and personal life?
* Have you conducted a full inventory of your resources (human, physical and financial) which can contribute to accomplishing these goals and objectives?
* Are you willing to make sacrifices required to make this enterprise profitable (time, changes in lifestyle, privacy)?
* What do you wish your business to look like five years from now, and what are some intermediate steps or objectives required to get there?

Inventory resources

Physical resources: land, soils, climate, water, buildings, machinery and equipment;
* Management and labor resources;
* Local marketing options available;
* Financial resources;
* Miscellaneous: sources of information, suppliers, processors and distributors;
* Time

Identify enterprises

* Current and potential buyers, produce managers, books, magazines and publications, seed companies, chefs, etc.

Enterprise feasibility

* Is this enterprise technically feasible for your location given the following factors: climate, soils, water, insects, diseases, growing season?
* What are the building, machinery, equipment, management and labor requirements? If you don't have the necessary resources, what is the cost (in dollars and time) of acquiring them? Do you have the facilities to pack, package and ship the product?

Market factors

* Have you clearly defined what your product/service is (features such as size, quality, varieties, etc. and benefits to buyer or user)?
* Are there markets for the product, and if so, what is your target (niche) market(s)?
* Market outlet alternatives;
* Geographic location of market(s);
* Demographic characteristics (age, income, etc.);
* Behavioral characteristics (lifestyle, etc.);
* How large is the existing market demand?
* Number of potential buyers;
* Annual per capita consumption;
* Average purchase per buyer:
* Can the market be created or expanded to absorb an increased supply of the commodity? Are advertising and promotion efforts worthwhile?
* What are the favorable market windows for the product? (Compare historical prices against projected costs per unit);
* Does the market demand specific grade/quality/size standards?
* What is the cost of transportation to the targeted markets?
* Are there any middlemen services involved (brokers, wholesale distributors, etc.)? If so, do they have any specific requirements (delivery, volume, etc.)?
* How many competitors are located nearby? What do you have to offer to surpass your competitors?
* What prices does the market offer and how steady are those prices? What is the highest price and the lowest price you are likely to receive and what conditions create these price situations?
* What is your expected sales volume? What is the minimum and maximum volume of product you believe you could sell in one year?

If your market research shows that supply already exceeds demand for the product/service being evaluated, or that the trend is one of declining consumption and/or prices, do not pursue the enterprise any further. If your market research is favorable, continue with the following considerations.

Financial considerations

* Once you are in full production, what are the expected costs and returns (enterprise budgets)?
* What will be the impact of varying yields/production levels on profitability?
* What are the costs of production given varying climatological and pest problems?
* Are you able to acquire the necessary start-up capital to establish the enterprise? What about the annual operating funds necessary to continue the enterprise?
* What is the impact of the new enterprise on the profitability of any existing enterprise?
* Is the proposed enterprise complementary or supplementary to existing enterprises, or does it compete with them? If so, what is the impact on the profitability of the other enterprises?
* How will the additional costs and returns of the new enterprise affect the cash flow of the business?
* How will investment of additional resources and the diversion of existing resources from present uses affect the financial risk position of the farm?

Miscellaneous considerations

* Are there any legal restrictions, regulations or liability factors associated with the new enterprise?
* Does the enterprise require any special recordkeeping to provide information for both management decisions and/or government reports?
* Does the enterprise require an abundant or continuous supply of special production inputs?
* Will the proposed enterprise limit off-farm employment opportunities?

If you have satisfactorily answered all of the questions from this checklist, you probably have enough information to make a decision about the new venture. If you decide to go ahead with the enterprise, you should now develop an implementation plan, including a business development plan that specifies a timetable, production schedule, marketing plan, management structure and financial plan.

"The Farmers' & Gardeners' Resource Catalog" has dozens of agricultural, gardening and herb books and reports. For a free copy, contact Eric Gibson, New World Publishing, 3085 Sheridan St, Placerville, CA 95667, 916-622-2248; email-newworld@innercite.com; WWW - http://www.innercite.com/~newworld

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Moderate-sized farms: Is the future bleak, or rosy?

By Gene Johnston
Managing Editor
Successful Farming

The question above was posed to a group of farmers at the Iowa Forage Conference by Fred Kirschenmann, director of the Leopold Center for Sustainable Agriculture. He proceeded to answer his question this way: Your future is probably bleak if you chose to compete as a low-cost producer of commodity products; it may indeed be rosy if you chose to produce higher-value differentiated products in which you become an integral part of the marketing chain.

Kirschenmann said there are several barriers to mid-sized farms being successful in producing undifferentiated commodities such as No. 2 corn.

1. The power of consolidated markets. Big businesses form marketing contracts with big retailers that fully control shelf space, locking out mid-size producers. "The story of David and Goliath is a nice story, but it doesn't always turnout that way," says Kirschenmann.

2. There is generally a lack of infrastructure to support mid-size value chains.

3. Public policies and public investment generally support the low-cost suppliers of undifferentiated commodities.

4. Most mid-size farmers and the value chains they try to create are under-capitalized. In general, there is more capital in the marketing and input sectors of agriculture than there is in the farmer/production sector, and mid-size producers can't compete.

Kirshchenmann showed statistics about what has happened to the farmer's share of economic activity in the last century. A century ago, of all the economic activity in agriculture, 44% was accounted for in the marketing of products (after it leaves the farm gate). Today, that share is at least 67%. A century ago, the input side of agriculture accounted for 12% of economic activity, and now that number is up to 24%. Meanwhile, the farmer's share has gone from 44% a century ago, to only 9% now.

"What farmers need to do is find ways to reduce their input costs, and capture more of the market share," says Kirschenmann. "That means that incr ea si ngly, there is just not a future for mid-size farmers in undifferentiated products. It's very sad in a way, but it's the realistic way to look at things."

Kirschenmann says there are two questions for farmers:

1. Will your farm be better off investing in activities that reduce input costs or add technology?

2. Will your farm be better off selling into niche markets with a marketing relationship that makes the farmer an integral part of the product?

Kirschenmann comes firmly down on the side of question 2 -- invest in a differentiated product in which you have more control through the marketing chain. He gives five examples of farm business that are pushing forward with this model.

1. **Oregon Country Beef (www.countrynaturalbeef.com/)** - This business was started a few years ago by the Hatfield family in Oregon. They and their neighbors produce the grass-fed product, and market it direct through retailers and restaurants on the West Coast.

2. **Dakota Country Meats (www.dakotalamb.com/)** - This business in Jamestown, North Dakota, was started by one rancher. The beef is processed to his standards, and sold through two restaurants. The business has also expanded into lamb meat for Mideastern standards.

3. **Niman Ranch Pork (www.nimanranch.com/)** - This company started with organic beef in California, and it did so well that they decided to branch into pork. They went to Iowa to find farmers to grow hogs in very humane conditions with no hormones or antibiotics. They have formed marketing chain relationships with very exclusive restaurants.

4. **Organic Valley Dairy (www.organicvalley.com/)** - This group started with 15 wisconsin farmers, and is now a nationally-marketed differentiated product that does over $100 million in annual business. Farmer members get a substantial premium for their milk.

5. **Greenstuff Beef** - This is a new company in Great Britain that is now sellling meat with a 4-d ig it c ode on the label. The consumer can go on the Internet and enter the code, and learn information about the actual animal that the beef came from. Reportedly, sales are exploding in Great Britain.

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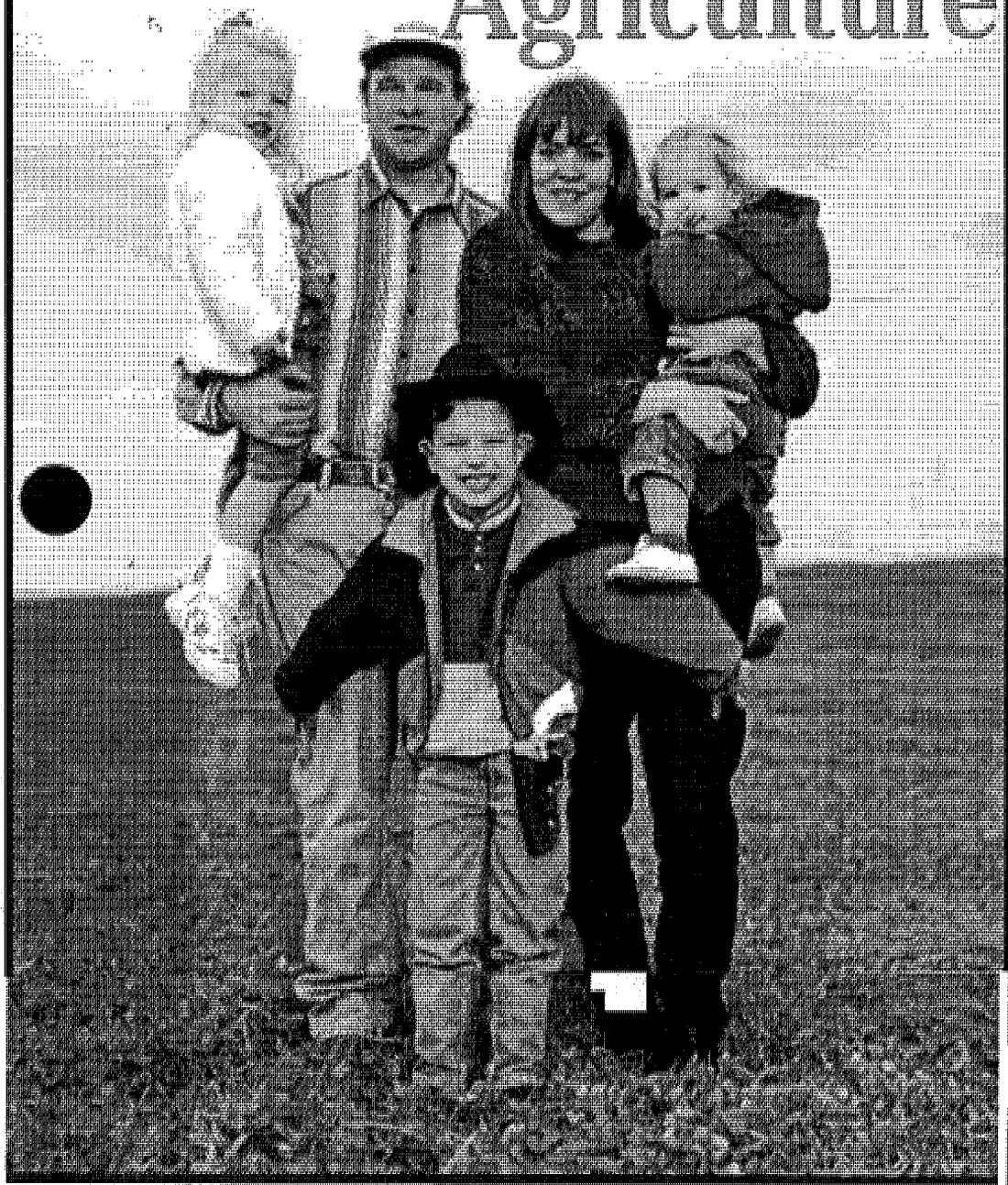

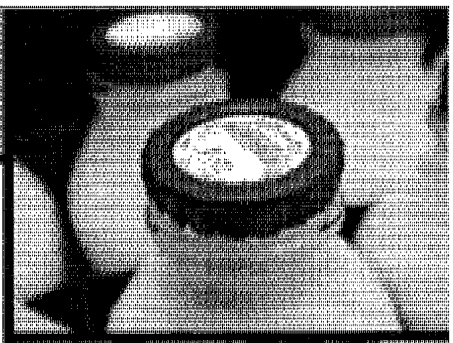

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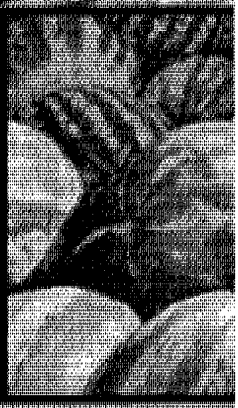

Incentives for Wildlife Enhancement on Midwestern Farms
Prepared by: Marcos Robles for
Environment and Agriculture Program
Institute for Agriculture and Trade Policy; May 2000

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Sustainable Agriculture...Continuing to Grow

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for Missouri Landowners

Third Edition
with updated grass/legume recommendations

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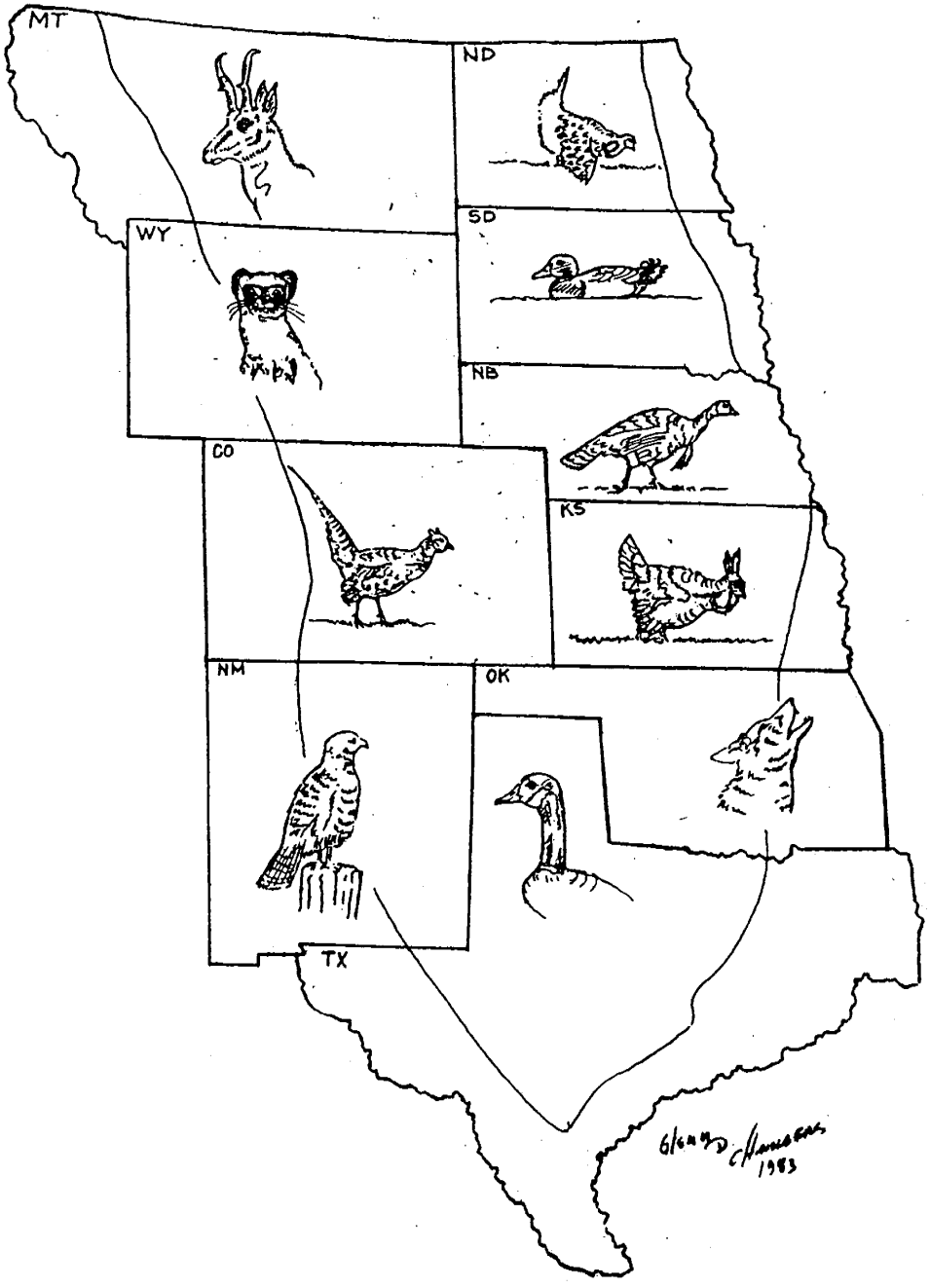
With Ideas for Supplemental Income Sources for Rural Families



Great Plains Agricultural Council
Wildlife Resources Committee

Cooperative Extension Service
Kansas State University

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With Ideas for Possible Supplemental Income Sources for Rural Families

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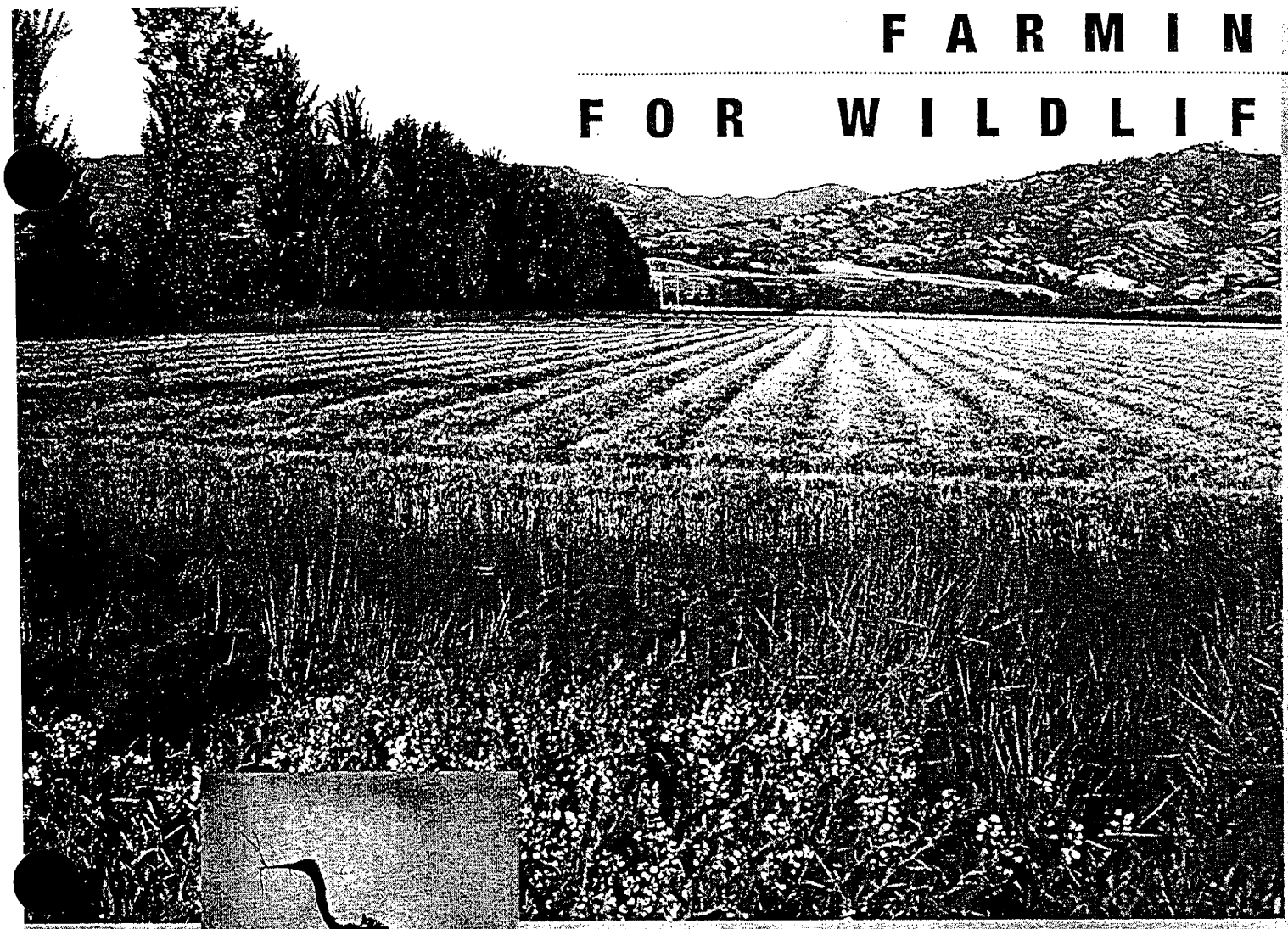

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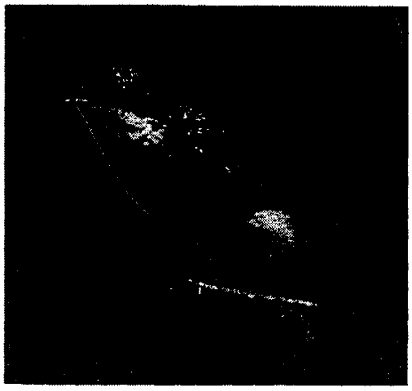
DAVID ROSEN/DUCKS UNLIMITED

MARK SALVESTRIN/DFG PHOTO CONTEST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A SYMPOSIUM ON

THE ECONOMICS OF

WILDLIFE RESOURCES

ON PRIVATE LANDS

SYMPOSIUM PROCEEDINGS
AUGUST 5-7, 1996
AUBURN UNIVERSITY
AUBURN, ALABAMA

EDITOR: RHETT JOHNSON

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Economic Impact and Associated Values of the Wild Turkey in Mississippi - *Stephen C. Grado, George A. Hurst, and K. David Godwin*

The National Wild Turkey Federation Land Stewardship Partnership Program - *Robert C. Maddrey, James Earl Kennamer, and Ron E. Brenneman*

The Pulse of the People: Attitudes, Perceptions, and Human Dimensions in Forest Ecosystem Management - *Deborah T. Yarrow, David C. Guynn, and Patricia C. Calkins*

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Hunting Leases on Institutional Timberland - *Jon P. Caulfield and Marshall Thomas* -

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Economics of Wildlife Resources on Private Lands: Synopsis, Conclusions, and Future Directions - *David C. Guynn*

PREFACE

Four years after a very successful Symposium on Fee Hunting held at Clemson University in 1989, members of the Private Lands Committee of the Southeastern Section of The Wildlife Society began to discuss the possibility of a subsequent meeting, broadening the scope to include all economic aspects of wildlife management on private lands. At the Committee meeting in Biloxi at the 1994 Southeastern, I agreed to help put such a meeting together in Alabama, hosting it at Auburn University. Committee members involved in the planning phase included Rick Busch from Virginia's Department of Wildlife and Inland Fisheries, Fred Kinard of Westvaco Corporation, Mickey Easley of Wyncreek Plantation, Jim Miller, USDA Natural Resource and Environment Extension, Kirby Brown of the Texas Parks and Wildlife Department, and Dave Guynn and Greg Yarrow of Clemson University and coordinators of the 1989 Fee Hunting Symposium. Other early contributors included Pete Bromley and Lee Stribling from N.C. State and Auburn University, respectively.

The response to the "Call for Papers" was excellent and covered the variety of topics we wanted to feature. Topics included evaluations of the economic impacts of hunting and fishing, animal damage costs and control, the economic ramifications of endangered species protection, economic returns from wildlife management, natural resource entrepreneurship, hunting lease values and concerns, and landowner liability. The only disappointment was a dearth of papers on non-consumptive wildlife recreation and the potential economic benefits for private landowners. Papers came from a variety of regional and national universities, game and fish agencies around the region, environmental groups, forest industries and independent biologists.

The audience was equally diverse, with all of the aforementioned represented and attendees coming from nearly every southern state. In addition, requests from non-attendees for these Proceedings come in on a regular basis. The interest displayed by the natural resources community in this relatively newly recognized and evolving aspect of the wildlife profession suggests that subsequent symposia might be appropriate.

Greg Yarrow, Conference Coordinator for the Clemson Fee Hunting Symposium, kicked off the program with an introduction and the rationale for this meeting and we were off and running for three information-filled days. Too many people helped make this meeting a success to recognize all, but particular thanks go to Mickey Easley, Fred Kinard, Dave Guynn, Greg Yarrow, Tommy Counts, Chris Isaacson, Keith Hudson, and Susan Moll for their assistance and support.

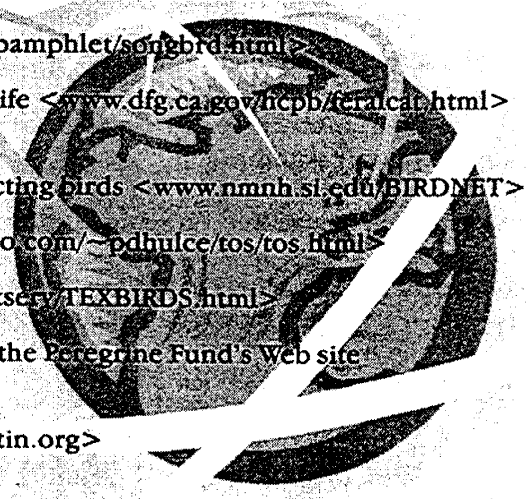
Rhett Johnson

BIRDS on the Web

Over Forty Useful and Interesting Web Sites on Birds and Bird Conservation

(Listed in no particular order)

- Texas Parks and Wildlife Birding Page (lots of great information; don't miss checking out this site!) <www.tpwd.state.tx.us/nature>
- Partners In Flight <www.partersinflight.org> and the Colorado Bird Observatory <www.cbobirds.org/pif/index.html>
- American Bird Conservancy <www.abcbirds.org>
- The Great Texas Birding Classic <www.tpwd.state.tx.us/nature/birding/bclass/index.htm>
- International Migratory Bird Day information and so much more, try the American Birding Association's Web site <www.americanbirding.org>
- World Birding Center <www.tpwd.state.tx.us/nature/birding/wbc.htm>
- North American Bird Conservation Initiative (NABCI) <http://rfi.on.ca/cec/about_frame.htm>
- Conservation and Reinvestment Act (CARA; formerly called Teaming With Wildlife where, if approved/passed, millions of dollars in secured funding will go towards nongame conservation and more) <www.teaming.com>
- Physiographic Regional maps for Partners In Flight <www.cast.uark.edu/pif/main/maincont.htm>
- Bird Species Management Abstracts by The Nature Conservancy's "Wings of the America" project <http://www.tnc.org/wings>
- Breeding Bird Lab <www.mbr.nbs.gov/bbs/bbs.htm> and <www.mp2-pwrc.usgs.gov/bbs/>
- Christmas Bird Count data, Project Feeder Watch, and many other great Cornell Lab of Ornithology citizen science projects <http://birdsource.tc.cornell.edu> and <www.birds.cornell.edu>
- Migratory songbird conservation <www.fws.gov/r9mbmo/pamphlet/songbird.html>
- Free-roaming domestic cats and their effect on native wildlife <www.dfg.ca.gov/hcpb/feralcat.html> and <www.abcbirds.org/catindoo.htm>
- Updates on Legislation, Regulation and Policy matters affecting birds <www.nmnh.si.edu/BIRDNET>
- Texas Ornithological Society (TOS) Web site <http://www.io.com/~pdhulce/tos/tos.html>
- Archives for the listserv "Texbirds" <www.audubon.org/listserv/TEXBIRDS.html>
- Aplomado Falcon reintroduction in Texas information, try the Peregrine Fund's Web site <www.peregrinefund.org/conserv_aplomado.html>
- Purple Martin Conservation Association <www.purplemartin.org>
- Hawk Watches in Texas <www.electrotex.com/aoc/>
- Information on bird diseases, mortality and health <www.emtc.nbs.gov/nwhchome.html>



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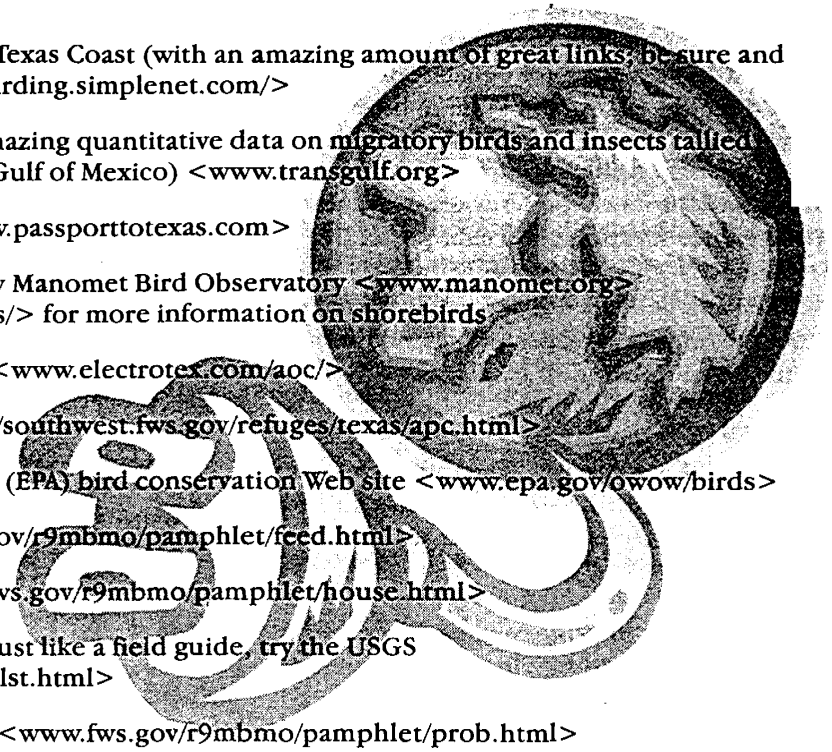
To subscribe, simply send an e-mail message to <listserv@listserv.uark.edu> with the following message in the body: subscribe separt-l *your name* (Example message: subscribe separt-l Cliff Swallow). The character after "separt" is a lower case L, not the number one.



- David Sarkozi's Birds of the Upper Texas Coast (with an amazing amount of great links; be sure and check this one out!) <http://texasbirding.simplenet.com/>
- Migration Over the Gulf Project (amazing quantitative data on migratory birds and insects tallied from off-shore oil platforms in the Gulf of Mexico) <www.transgulf.org>
- Archives of Passport to Texas <www.passporttotexas.com>
- Shorebirds, wetlands, and more, try Manomet Bird Observatory <www.manomet.org> or <www.mesc.usgs.gov/shorebirds/> for more information on shorebirds
- Whooping Cranes at Aransas NWR <www.electrotex.com/aoc/>
- Attwater's Prairie-Chickens <http://southwest.fws.gov/refuges/texas/apc.html>
- Environmental Protection Agency's (EPA) bird conservation Web site <www.epa.gov/owow/birds>
- Backyard bird feeding <www.fws.gov/r9mbmo/pamphlet/feed.html>
- Providing homes for birds <www.fws.gov/r9mbmo/pamphlet/house.html>
- Bird Identification Web site that is just like a field guide, try the USGS <www.mbr.nbs.gov/id/framlst/framlst.html>
- Backyard bird problems/nuisances <www.fws.gov/r9mbmo/pamphlet/prob.html>
- Problems with cormorants, try the USFWS home page <www.fws.gov/index.html> or for a more specific fact sheet <www.fws.gov/r9mbmo/issues/cormorant/fish%5Fimpacts.html>
- Problems with an urban heronry/rookery (coming to this Web site in mid-2000) <www.tpwd.state.tx.us/nature/birding>
- Waterfowl and wetland information <www.ducks.org>
- Alpha Codes used by banders and birders <www.pwrc.usgs.gov/bbl/manual/aspeclst.htm#E>
- Gulf Coast Bird Observatory <www.gcbo.org>
- Land Trust Alliance information <www.lta.org>
- Texas Department of Transportation county maps <www.lib.utexas.edu/Libs/PCL/txdot/TXDOTCounty.html>
- Information on flying birds striking towers, wires, buildings, etc. <www.towerkill.com>
- Information on constructing a wastewater wetland for birds and other wildlife <www.humboldt.edu/~ere_dept/marsh/ownmarsh.html#top>

BACKYARD CONSERVATION
It'll grow on you.

Wildlife Habitat

Make a home for birds, butterflies, and nature's other creatures

In your backyard

Habitat is a combination of food, water, shelter, and space arranged to meet the needs of wildlife. Even a small yard can be landscaped to attract birds, butterflies, beneficial insects, and small animals. Trees, shrubs, and other plants provide shelter and food for wildlife.

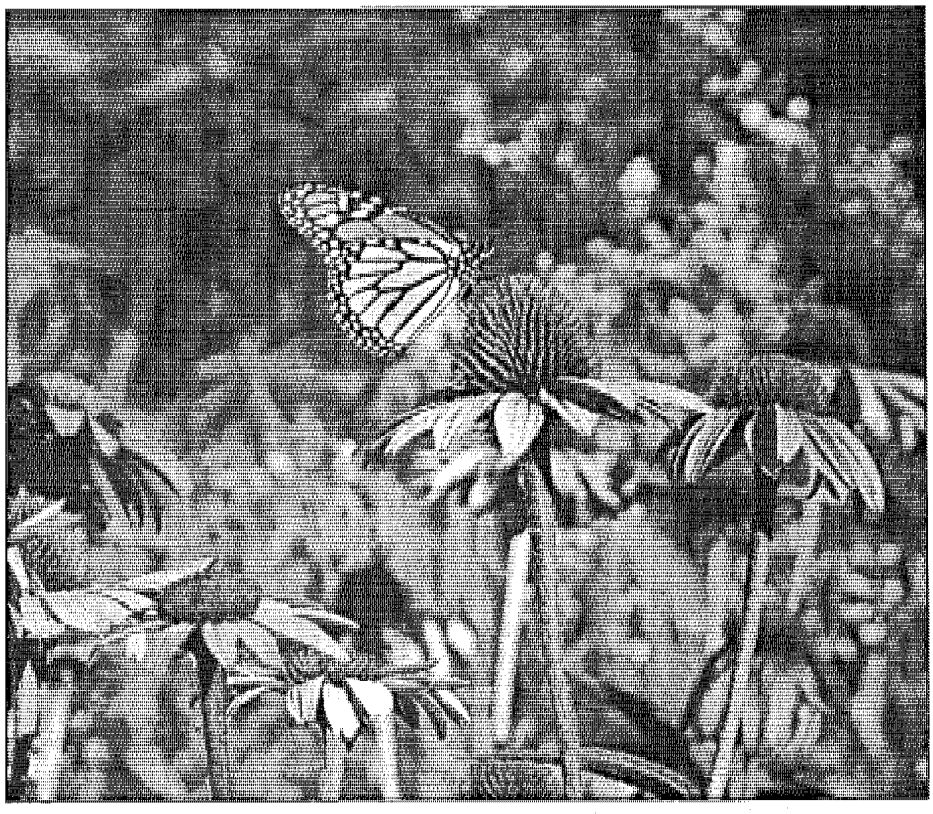
The plants you use for food and cover will help determine the wildlife species attracted to your backyard. Nesting boxes, feeders, and watering sites can be added to improve the habitat.

Planning your wildlife habitat

Planning is necessary for attractive and productive wildlife habitat. You have both a horizontal area to work with–the size of your lot–as well as a vertical area that stretches from your soil to the treetops. The vertical area is composed of the canopy formed by the tallest tree branches; understory vegetation consisting of smaller trees, shrubs, and vines; the floor which is often dominated by low-growing groundcovers; and the basement where a variety of organisms exist in the soil. Different wildlife species live in each of these zones, so numerous habitats can be provided on a small piece of land.

Trees and shrubs are the backbone of any landscaping design and are important for wildlife shelter. Many tree and shrub species are excellent sources of food for wildlife. Proper selection of plant material can meet both the aesthetic needs of the homeowner and the food and shelter needs of wildlife. Remember that you are part of the habitat!

To attract wildlife to your backyard, choose and plant the trees, shrubs, and plants that offer the food and shelter that those species of wildlife need to survive. Add a water source, too.



Lynn Betts USDA

Backyard Conservation

is a cooperative project of:

USDA Natural Resources Conservation Service

National Association of Conservation Districts

Wildlife Habitat Council

April 1998
Rev. October 2002

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One in a series of 10 tip sheets on backyard conservation

BACKYARD CONSERVATION
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Steps to create habitat for wildlife

1. Identify all existing plants. Note:
   - Condition of the plants and their locations.
   - How much shade the trees and shrubs provide.
   - Are trees evergreen or do they drop their leaves in the fall?
   - Do they provide valuable food sources?

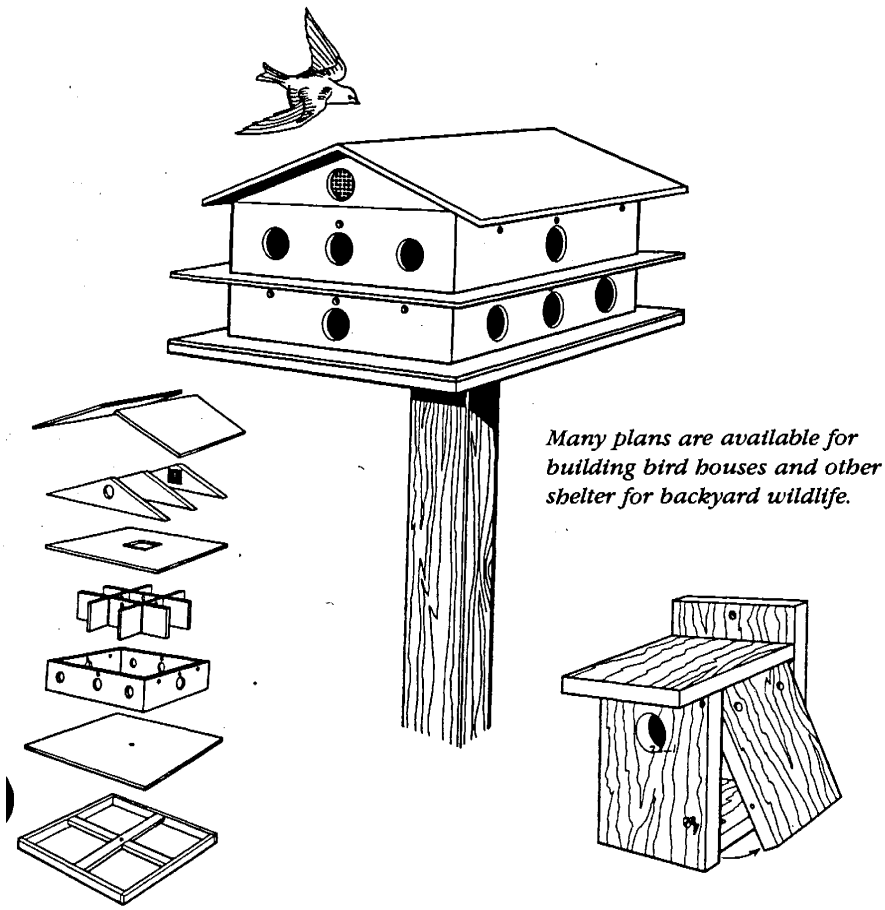
2. Make a sketch of your yard noting all existing plants, buildings, utilities, and pathways. You may even consider removing some plants. In some cases, trees have been planted too close to buildings or have grown much larger than the previous owner envisioned. Some species may be of little wildlife value and may not be particularly attractive. Once you have identified existing plants you want to save, start exploring options for plants that will work well with these species. The existing plants around your yard may be adequate to attract some wildlife, but a few changes can effectively enhance the existing habitat. Diversity in the landscape is necessary. Some plants provide food but very little cover; others provide cover but little food.

3. Add trees, shrubs, flowers, and groundcovers to your plan. Not all the planting needs to be done at once. If money or time is limited, consider it a work in progress.

4. Plant a variety of trees first. Select evergreen species for year-round cover and shelter. Select fruit or nut-bearing plants for a food source. Native species are well suited for providing wildlife habitat because they are adapted to the local soil, climate, and wildlife. Other considerations for choosing and placement:
   - Eventual size. Whether they are evergreen or deciduous (trees that drop their leaves). Deciduous trees planted on the south side of a house will provide summer shade, but will not completely block winter sun.
   - Neighboring properties.
   - Flowering and fruiting habit. Select plants that flower and bear fruit at different times of the year. Some shrubs that produce berries can provide food throughout the year. Trees with nuts and fruit can also provide seasonal foods. (See the tip sheet on tree planting for suggested species.)

5. Fill in with smaller shade-tolerant understory trees and shrubs. Add these to an existing landscape to enhance the vertical structure that is common in natural landscapes. Many smaller trees and shrubs are colorful at spring flowering, and provide berries for fall and winter feed.

6. Flowering annuals (plants that live one growing season) and perennials (plants that live for more than a year) add color to the yard and can be added at any stage to attract birds and butterflies. If your yard is large, consider using part of it for tall native grasses that provide beauty, as well as a natural source of food and shelter. A native wildflower garden provides the same function. Even on a small lot, native wildflowers, as well as some common garden species, can provide habitat for a variety of birds and butterflies. Avoid straight lines and perfect symmetry. Natural habitat has curves and clumps of vegetation. Wildlife is not particularly attracted to a well-manicured lawn. Wildlife is more likely to come out into the open for viewing when the boundary of the yard is designed and maintained as a retreat for animals.



Many plans are available for building bird houses and other shelter for backyard wildlife.

BACKYARD CONSERVATION
It'll grow on you.

Plant Species for birds

Below are some plant species to consider for wildlife habitat. Check with a local nursery on plants suitable for your area. Some of these plants, while suited for wildlife, may have characteristics such as shallow roots or weak limbs that make them inappropriate for small urban properties–or they may not be winter hardy in all locations. Birds eat many flower seeds–depending on the species of bird.

Trees for birds
American beech (Fagus grandifolia)
American holly (Ilex opaca)
Balsam fir (Abies balsamea)
Black cherry (Prunus serotina)
Black gum (Nyssa sylvatica)
Crabapple (Malus spp.)
Flowering dogwood (Cornus florida)
Hawthorns (Crataegus spp.)
Hickories (Carya spp.)
Live oak (Quercus virginiana)
Oaks (Quercus spp.)
Red mulberry (Morus rubra)

Shrubs for birds
Common juniper (Juniperus communis)
Highbush blueberry (Vaccinium spp.)
Hollies–both evergreen and deciduous species (Ilex spp.)
Pyracantha (Pyracantha spp.)
Red-osier dogwood (Cornus stolonifera)
Serviceberry (Amelanchier arborea)
Spicebush (Lindera benzoin)
Sumacs (Rhus spp.)
Viburnums (Viburnum spp.)
Wax myrtle (Myrica cerifera)

Vines for birds
American bittersweet (Celastrus scandens)
Trumpet honeysuckle (Lonicera semper virens and related spp.)
Strawberry (Fragaria spp.)
Trumpet creeper or vine (Campis radicans)
Virginia creeper (Parthenocissus quinquefolia)
Wild grape (Vitis spp.)

Nectar plants for hummingbirds, butterflies, and bees
Aster (Aster spp.)
Azalea (Rhododendron spp.)
Bee balm (Monarda spp.)
Butterfly bush (Buddleia alternifolia)
Butterfly weed and other milkweeds (Asclepias spp.)
Cardinal flower (Lobelia cardinalis)
Clover and other legumes
Columbine (Aquilegia spp.)
Coneflower (Echinacea spp.)
Delphinium (Delphinium spp.)
Fuchsia (Fuchsia spp.)
Honeysuckle (Lonicera spp.)
Jewel weed (Impatiens capensis or I. pallida)
Lobelia (Lobelia spp.)
Lupine (Lupinus spp.)
Penstemon (Penstemon spp.)
Phlox (Phlox spp.)
Salvia (Salvia spp.)
Trumpet creeper or vine (Campis radicans)
Weigela (Weigela spp.)
Zinnia (Zinnia spp.)

Landscaping for birds

Food and cover are essential for the survival of all species. Loss of suitable nesting sites is a major factor in the decline of some bird species. In the wild, many species nest in cavities of dead trees. With the loss of hedgerows in some parts of the country and the removal of dead trees in towns, natural nesting sites are often limited. Also, some highly competitive, non-native species of birds have taken over some of the existing nesting sites once occupied by native birds.

Bird species are extremely variable in their habits. Some like deeply wooded areas; others prefer open fields and meadows. Many species are year-round residents, while others such as the cedar waxwing appear only for a few days a year during migration. Other species such as sparrows, blue jays, cardinals, robins, juncos, and chickadees are highly adaptable and found in many environments.

Many people are not aware of the value of dead, dying, and hollow trees, as well as logs on the ground, for birds and other wildlife. Dead trees provide homes to more than 400 species of birds, mammals, and amphibians. Fish, plants, and fungi also benefit from dead and dying trees. Consider leaving standing dead and dying trees in your yard unless they pose a human safety or property hazard, and use old logs and stumps in gardens and landscaping.

Addtional food and shelter for birds

Few yards will be able to supply sufficient food or shelter for a variety of birds all year long. However, you can improve shelter and food supplies by building or purchasing feeders and houses, and by setting out certain foods.

Most bird species have specific nesting requirements. Because of these requirements, your yard may not accommodate certain species. For instance, Eastern bluebirds prefer nesting sites that border open fields or lawns with a tree or fence post nearby to provide feeding perches. Chickadees prefer to nest in more wooded areas.

Before setting out nesting houses, find out which species are common in your area and can be encouraged to nest in your yard. Make or buy a bird house specifically designed for the bird you wish to attract. The size of the entrance hole is critical to prevent the eggs and young from

being destroyed by larger birds–always check a list of appropriate hole sizes. Other considerations include box size, height above the ground, direction the entrance hole faces, and amount of sunlight. Boxes may need baffles or other protective devices to limit access by cats and other predators. A good reference publication is *Homes for Birds* by the U.S. Fish and Wildlife Service, Office of Migratory Bird Management. It is available at two internet sites: http://library.fws.gov/bird_publications/house.html or http://www.birding.com/backyardhouses.asp.

Many species of birds can be attracted by a variety of feed in different styles of feeders. There are many styles of bird feeders available, from window-mounted feeders to those that hang from branches and stands. Some birds will readily eat right off the ground. Bird feed comes in a variety of choices; however, sunflower seeds appeal to many birds, as well as small mammals.

Woodpeckers, nuthatches, and chickadees are especially attracted to suet. Citrus fruit, chopped apples and bananas, and raisins will be eaten by numerous species, including robins, titmouse, nuthatches, woodpeckers, and mockingbirds.

Feeders may also attract wildlife species you may not want to feed such as starlings, crows, and squirrels. Feeder type and placement and the type of food can help deter unwanted species.

Unlike many other species of birds, hummingbirds rely on nectar as their source of food. These tiny, migratory birds are commonly seen in the summer in northern states gathering nectar from colorful flowers. Hummingbirds are typically attracted to red and yellow tubular flowers, although they frequently visit others. Hummingbird feeders can be purchased and filled with a sugar-water solution, consisting of 1 part sugar to 4 parts water. Every 3 to 4 days, wash the feeder with a little bleach and water, rinse thoroughly, and add new sugar water.

Food and shelter for butterflies

Colorful butterflies and moths add beauty and interest to your backyard. There are hundreds of different species of butterflies and moths in North America. Butterflies and moths are insects. They hatch into larvae (commonly referred to as caterpillars), eventually become pupae, and develop into colorful adults. How long the process takes depends on the species and the climate.

Butterflies and moths are amazingly particular in their food choices. The larval stage of the butterfly may require food quite different from that of the adult. Some larvae consume tremendous amounts of plant material, seemingly devouring plants overnight. A common example in the garden is the tomato hornworm which rapidly strips tomato plants of their leaves. An equally voracious, but beautiful, larvae is the Eastern black swallowtail which is found only on plants in the carrot family, including celery, carrot, dill, and parsley. A close relative is the Eastern tiger swallowtail that eats the foliage of wild cherry, birch, poplar, ash, and tulip trees.

Adult butterflies require food in liquid form such as plant-produced nectar. They get some of it from flowers and from juices of extra-ripe fruit. The types of flowering plants you grow will determine the kinds of butterflies you attract to your backyard. In addition to the plants listed for hummingbirds and butterflies, butterfly bush is especially attractive for butterflies. Find out what species are common in your area and use plants they like. Nectar feeders can be placed in the yard to attract butterflies. Do not use insecticides near plants for butterflies. Learn to recognize larval and egg forms. That large green and black caterpillar eating your dill may one day turn into the gorgeous butterfly you were hoping to attract!

Butterflies, like all insects, are most active when temperatures are warmer. While moths are commonly found at night, most butterflies are active on sunny, warm days. Butterflies will benefit from a basking site where they can warm up on cool mornings. Add a light-colored rock or concrete garden sculpture as a basking site. Butterflies also need a source of water. A shallow dish of water or a depression in a rock that retains water is all they need.

Attracting bees

In the United States, there are nearly 5,000 different species of native bees. Most of them are solitary, friendly bees that nest in holes in the ground or burrows in twigs and dead tree limbs. These bees do not have hives to protect them, so they are not aggressive and rarely sting. Bumblebees, carpenter bees, sweat bees, leafcutter bees, digger bees, and others pollinate many different kinds of plants. They play a critical role in healthy wild plant communities and gardens. About 30 percent of our diet is the direct result of a pollinating visit by a bee to a flowering fruit tree or vegetable plant. Providing bee habitat in your yard can increase the quality and quantity of your fruits and vegetables.

Bees are extremely sensitive to many commonly applied insecticides. If you must use chemical insecticides in your garden, apply them in the evening when bees are less likely to be active.

Bees are attracted to most flowering plants, and are especially fond of blue and yellow flowers. Try planting your garden to have different species blooming in the spring, summer, and fall.

Bee houses

A good use for untreated scrap lumber (at least 3 to 5 inches thick) is to drill holes (from 1/8-inch to 5/16-inch in diameter) about 90 percent of the way into the thick wooden block. Space the holes about 1/2-inch to 3/4-inch apart. The 5/16-inch holes work best as homes for orchard bees which are excellent pollinators of fruit trees. Hang your bee blocks under the eaves of your house or garden shed, protected from direct sun and rain.

Attracting bats to your yard

Bats are a beneficial and interesting mammal. Bats are the single most important controller of night-flying insects, including mosquitoes, moths, and beetles. For example, a single little brown bat can catch up to 600 mosquitoes in an hour. Watching bats fly around light posts catching bugs can be an interesting nighttime activity.

A bat house in your yard will help attract bats and provide them with much-needed roosting habitat. The house should be placed on a pole at least 15 feet high in a spot that receives sun at least 4 to 6 hours a day. Tree trunks are usually too shady for bat boxes. Some bat species such as gray bats, red bats, and hoary bats will use shrubs and trees for roosting under loose bark or in cavities.

Many species of bats migrate in the fall and hibernate throughout the winter months in caves, mines, or buildings. If disturbed during hibernation, their metabolism is increased, depleting fat reserves and reducing their chances of survival.

As with all wildlife, bats should be watched, but not handled or chased. Generally, bats are shy of humans and will not attack or fly after a person. However, if caught or picked up from the ground, a bat may bite.

Attracting reptiles and amphibians

Toads, frogs, lizards, turtles, and snakes all have a place in the backyard. While many people may not want some of these animals in their yards, most species are harmless and often quite beneficial–feeding on destructive insects or rodents.

Reptiles and amphibians are cold-blooded animals. Their body temperature rises and falls as the surrounding temperatures change. Because of this, these animals need a sunny basking spot to warm up in the morning. They also need a shady, cool spot to spend time during the heat of the day and for protection from predators.

Shelter for reptiles and amphibians is easy to provide. Several rocks piled in a sunny spot will provide basking sites. Consider planting shade-tolerant groundcovers under trees and leaving a thick layer of leaves to provide cool shelter. Stumps, logs, and rock piles in a shady spot can be valuable.

Water for wilflife

Clean, fresh water is as important to birds, bats, butterflies, and other wildlife as it is for people. Water in a saucer, bird bath, or backyard pond is adequate for wildlife. Be sure to change the water every few days to keep it fresh. In hot weather, it may be necessary to refill the container daily.

Logs, rocks, and water-holding structures provide drinking and basking habitat for turtles, butterflies, and songbirds. Stones with depressions that collect water will help attract butterflies.

A word about attracting mammals

Squirrels, chipmunks, rabbits, raccoons, opossums, skunks, woodchucks, mice, and deer are commonly found in many urban environments. These species are highly adaptable and, in many cases, are becoming unwanted visitors rather than welcome guests.

As with all wildlife, cover is essential for the survival of these species. Small brush piles intended for amphibians and reptiles will also provide shelter for rabbits and mice. Chipmunks and woodchucks are adept at digging their own burrows. Trees may provide shelter for squirrels, raccoons, and opossums.

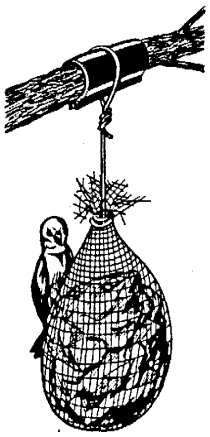
Food set out for birds may attract many of these animals. Squirrels, chipmunks, and mice will readily eat birdseed. Raccoons will feed on suet. Woodchucks and rabbits will eat a variety of vegetation including garden vegetables and flowering plants. Deer are browsers and will nibble at trees, shrubs, hay, and grain.

A few precautions can be taken to avoid unwanted encounters with these animals. Avoid setting out food that may attract scavengers such as raccoons. Keep garbage cans in a secure shed or garage or use metal cans that scavengers cannot chew through. Check the exterior of your house for loose or rotted boards that could allow access by mice or other rodents. Remember that these animals are wild, and if threatened they can bite. Raccoons can be particularly aggressive. All these species can carry diseases. Do not handle them.

Laws vary from state to state on wildlife issues. If you have questions or concerns about wildlife, check with your state's Department of Natural Resources or Conservation Department before taking any action.

Backyard habitat programs

The National Wildlife Federation (NWF) sponsors a certification program designed to help individuals plan and apply a wildlife habitat plan for a home site or small acreage. On request, NWF will send you an application package and instructions for its Backyard Wildlife Habitat Program. If your application and plan meet the criteria, you will receive a certificate and, if you wish, a sign to show your commitment to wildlife conservation. Contact:
Backyard Wildlife Habitat Program
National Wildlife Federation
8100 Wildlife Center Drive
Reston, VA 20190-5362
or http://www.nwf.org/backyardwildlifehabitat



Careful thought, such as using branch protectors for hanging bird food, will create a more lasting backyard habitat.

The U.S. Fish and Wildlife Service's Office of Migratory Bird Management works with groups and individuals to conserve and manage migratory birds. This agency offers information about backyard habitats for birds and wildlife. Several pamphlets are available: *Backyard Bird Feeding, Backyard Bird Problems, Attract Birds, Homes for Birds, and Migratory Songbird Conservation.* (http://library.fws.gov/bird_pubsindex.htm). For more information contact:
U.S. Fish and Wildlife Service
Office of Public Affairs
1849 C. St.
Washington, DC 20240

The Natural Resources Conservation Service, National Association of Conservation Districts, and Wildlife Habitat Council encourage you to sign up in the "Backyard Conservation" program. To participate, use some of the conservation practices in your backyard that are showcased in this series of tip sheets–tree planting, wildlife habitat, backyard pond, backyard wetland, composting, mulching, nutrient management, terracing, water conservation, and pest management. Then, simply fill in the Backyard Conservation customer response form, send a Backyard e-mail request to backyard@swcs.org, or call 1-888-LANDCARE.

On the farm

When most of us think of natural resource protection or wildlife haibtat, images of vast expanses of open land and unbounded water probably come to mind.

But to hundreds of species of animals and insects, home is where they find it. Many of them would love to find their home in your backyard, just as many have found a home in the large backyards of America's farmers and ranchers.

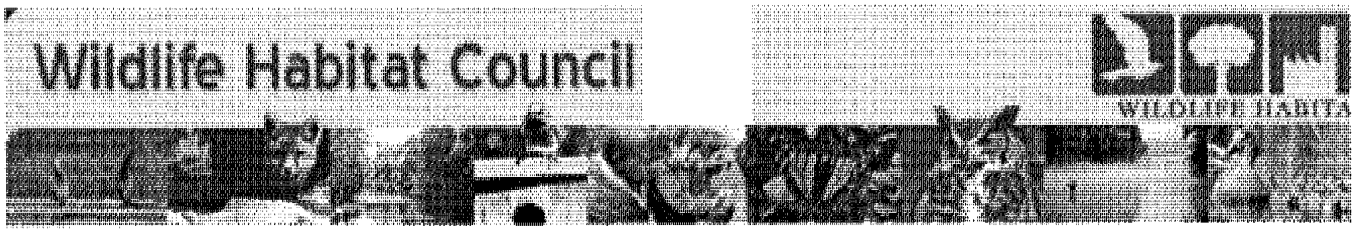
As a matter of fact, pirvate landowners provide the bulk of the food and habitat for wildlife in this country. They deserve the credit for making a home for wildlife on a whopping 70 percent of the land.

Farmers are installing grass, tree, and shrub plantings; ponds; riparian buffer strips; wetlands; and other wildlife habitats at record rates.

On the farm, sometimes the tree, shrub, and grass plantings don't offer enough food or cover for wildlife. So some farmers plant food plots especially for wildlife, or put up structures geese and ducks and birds can use as protected nests.

Some farmers also provide bird and bat houses, while others plant or leave food plots of corn, millet, or other grains specifically for wildlife.

Like your neighbors in the country, you'll soon discover that by making your yard more hospitable to nature, you'll add pleasure to your life, and harmony around your home.



8737 Colesville Road
Suite 800
Silver Spring, MD 20910
Telephone: 301.588.8994
Fax: 301.588.4629
Whc@wildlifehc.org

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Wildlife Teams in Action

About WHC

When the Wildlife Habitat Council was formed in 1988, the founders conceived a new and innovative concept of bringing together - conservation and business.

Today, with our members and partners, we continue to share a vision to conserve and restore natural ecosystems for the benefit of humanity and the earth's biological diversity. Join us in this special anniversary celebration.

The Wildlife Habitat Council (WHC) is a nonprofit, nonlobbying 501(c)(3) group of conservation organizations, and individuals dedicated to protecting and enhancing

Created in 1988, WHC helps large landowners, particularly corporations, manage lands in an ecologically sensitive manner for the benefit of wildlife. WHC also work understanding of wildlife values. Over 120 companies are WHC members as are t conservation organizations, plus many supporters and contributors. Over 2 million states, Puerto Rico, and fifteen other countries are managed for wildlife through W projects.

Habitat projects on these lands are corporate-driven cooperative efforts between r employees, community members, local conservation groups, and local, state, and agencies. Among many honors, WHC has received Presidential recognition for its building partnerships, and in 1994, won the Chevron-Times Mirror Magazines Con Award. Just recently, WHC was recognized in the nonprofit category at the Virgini Stewardship Awards for undertaking initiatives to restore and enhance natural res

The Three Rivers Habitat Partnership, a *Waterways for Wildlife* regional project of awarded a prestigious **2002 Governor's Award for Watershed Stewardship** by Governor Mark Schweiker and PA Department of Environmental Protection Secre Hess.

The Wildlife Habitat Council's main office is located in Silver Spring, MD. To find a area or to contact our Membership, Marketing & Communications and Research E Departments, please contact us at Whc@wildlifehc.org or call 301-588-8994. We several regional offices staffed by expert Wildlife Biologists.

C. Trees / Forestry

C. Trees/Forestry

Proceedings of the

North American Conference on Enterprise Development Through Agroforestry:

Farming the Agroforest for Specialty Products

October 4-7, 1998
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AGROFORESTRY

IN THE UNITED STATES

RESEARCH AND TECHNOLOGY TRANSFER NEEDS FOR THE NEXT MILLENNIUM

THE ASSOCIATION FOR TEMPERATE AGROFORESTRY
COLUMBIA, MISSOURI
FALL 2000

Funding for this project was provided by the USDA National Agroforestry Center.
Photos courtesy of the USDA.

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A Small-Scale Agriculture Alternative

Woodlots

At least 6 million people own woodlot parcels averaging 40 to 50 acres in size that make up 33 percent of the Nation's 348 million acres of private timberland. Many can improve their land management. This factsheet is intended mainly for them rather than for others who may want to try to get into the business.

Many newcomers are farmers who are planting trees on more than 2 million acres under 10-year crop retirement contracts with USDA. They start woodlots under the Conservation Reserve Program (CRP), administered by the Agricultural Stabilization and Conservation Service (ASCS) with assistance from cooperating State foresters. Owners receive cost-share assistance from ASCS and technical advice from the foresters on how to establish timber stands on cropland.

There are other Federal aid programs, such as the Forestry Incentives Program jointly administered by ASCS and USDA's Forest Service, which helped 92,000 farmers with timber management on nearly 3 million acres from 1975 through 1986.

The Forest Service (FS), working through State programs, provides thousands of private landowners with assistance annually for tree planting, seeding, timber stand improvement, and other woodland activities. The FS also is helping to support "Global ReLeaf," an American Forestry Association campaign to urge U.S. residents to plant 100 million trees by 1992.

Some owners may want to improve their management so as to boost timber production. Many others, however, favor production not only of wood but of other goods and services...water, wildlife, forage, esthetics, and recreation, including cross-country skiing. Not so incidentally, they also help with fire protection by way of fire lanes they maintain.

Management Lacking

Experts in the Forest Service and State and industry forestry circles say most woodlot farmers don't fully manage their operations. Their timber growth generally reaches only 50 to 60 percent of potential.

Good timber management means getting each acre to produce the maximum annual growth of trees spaced adequately to maintain good form and quality. It also means regenerating the stand to replace harvested trees.

According to many foresters, the most immediate need in most private hardwood timber operations is for a timber stand improvement cut, according to many foresters. Some State universities and Cooperative Extension departments have published booklets on timber stand improvement.

Several States have forestry officials who, at no charge, will arrange visits by a forester who will suggest plans for improvement of immediate and long-term commercial potential of woodlands. Private commercial foresters may be called in for more detailed plans and to oversee their proper execution.

The latter often work on the basis of a percentage of sales.

Some State foresters will show owners how to spot and mark trees that should be felled rather than left growing. They can review a written contract with a logger hired to harvest trees. Too many landowners have been defrauded and had timber and woodland abused by failing to clarify arrangements.

Officials can give names of professional foresters available for hire, as can the Association of Consulting Foresters, 5410 Grosvenor Lane, Bethesda, MD 20814. (Telephone: 301/530-6795)

Another source of information or help is The American Tree Farmer, official magazine of The American Tree Farm System, which has certified 65,000 tree farmers of 91 million acres. The system is managed by the American Forest Council, 1250 Connecticut Ave. NW, Suite 320, Washington, DC 20036. The magazine goes 6 times a year to persons paying annual dues of $15.

The owner may learn from a State forester how to protect water quality, how large a buffer to put between the logging and a stream, where to locate skid roads, and how to manage "slash" (trash) to avoid fires. Some States require a portion of the sales dollar from logging be set aside for slash management and reforestation. There may be forest practice laws requiring inspection before, during, and after logging to help insure replanting.

State foresters may tell of availability of small, portable mills and other ways to maximize profits. They may give written material and tell of workshops on timber management. Such foresters may provide landowners with plans to achieve double objectives, such as wildlife habitat improvement and increased timber productivity. Usually these two objectives can be accomplished together.

Without professional advice, improper logging may occur that reduces not only beauty but the biologic diversity of a forest by destroying essential wildlife habitat.

If a landowner can't locate the State forester, he or she can contact the National Association of State Foresters (NASF), comprised of the directors of State forestry agencies. NASF is at Hall of the States, 444 N. Capitol Street, NW, Washington, DC 20001. (Telephone: 202/624-5415)

Advice is available from the 33,500-member National Woodland Owners Association. The NWOA is at 374 Maple Avenue E, Suite 210, Vienna, VA 22180. (Telephone: 703/255-2700) Formed by nonindustrial private woodland owners, the NWOA is independent of the forest

products industry and forestry agencies. For $15 a year, members receive 8 issues of the Woodland Report and 4 issues of the National Woodlands Magazine. NWOA can arrange for a visit by a forester to a new member's location.

The Society of American Foresters (SAF), 5400 Grosvenor Lane, Bethesda, MD 20814, lists help professionals can provide:

o Inventory a forest to estimate its extent, quality, and value;

o Reestablish trees on bare land;

o Improve protection from fire, insects, and disease;

o Select timber for harvest;

o Help insure that timber is sold at a fair price;

o Administer harvest activities to prevent soil and remaining tree damage;

o Take advantage of financial incentives and other help offered by public agencies, industrial firms, and tax laws;

o Review the owner's tax situation.

Foresters sometimes specialize. A woodlot owner should select one whose specialty matches the owner's objectives.

Best Prospects

Owners with already-established woodlots often have immediate income potential. Sometimes, however, the return covers decades. An example appeared in the Winter 1989 issue of The American Tree Farmer, in an item from President Nels Hanson of the Washington Farm Forestry Association. He reported that when Lula and Vern Johnson bought their 40-acre Washington farm for $102 an acre, it had a 6-acre patch of 40-year-old Douglas fir. Between 1949 and 1987, as money was needed to clear and plant understocked areas and to supplement their income, they logged and thinned the stand. When the well-managed stand was sold to the Weyerhaeuser Company in 1988, it had 660,000 board feet of lumber. That high bidder paid the widow nearly $382 per thousand, or $252,000. Not everyone can find a timber investment to match that.

Benefits are available not only through selling logs but also through wildlife or other outdoor recreation projects. Information for the latter—such as developing hunting leases—is available from many Extension Service specialists and State and private foresters.

For those wanting to begin a long-term timber growth project, unused areas along creeks or streams often are excellent sites. Depending on the region (and advice from the experts), hardwoods or conifers can be planted. The exact species would depend on local growing conditions. As mentioned earlier, State and Federal officials often offer not only advice but also financial help in planting.

Woodlands along creek areas serve to filter agricultural chemicals from the soil to prevent contamination of the creek and watersheds below. Forested wetlands will become more important over time in controlling farm runoff.

The years it takes to develop a woodlot on idle land depends on the region.

The South produces salable lumber products in 15 to 25 years. In the North and West it usually takes 30 to 50 years. In the South, final harvests usually take place in 30 to 40 years and in the North and West about 60 to 80 years. Fairly intensive management is required to produce sawlogs in those timeframes.

A forester's services can be utilized to help determine proper species for planting, thinning cycles, and the right timing for a final harvest cut, not to mention reforestation plans.

What About Alley Cropping?

In many States, tree farmers can farm more than trees. One farmer plants potatoes in freshly logged areas. Dr Gene Garrett, University of Missouri forestry professor, suggests that in the Midwest, farmers plant Eastern black walnut trees (*Juglans Nigra*) in rows about 40 feet apart and then do "alley cropping." Alley crops can include soybeans or small grain or even vegetables.

In the South, a similar approach might be used with pecan trees. Harvesting the wood as timber takes many years, but in the meantime nut production can provide some income in about a dozen years.

Printed Information

There are many publications and books that a potential woodlot owner can consult. One fairly universally accepted is "The Woodland Steward," by James R. Fazio. A copy may be obtained for $15.55 (including postage) from the American Forestry Association, P.O. Box 2000, Washington, DC 20013.

USDA's Forest Service publishes Agriculture Handbook No. 681, "Forest Owners' Guide to Timber Investments, the Federal Income Tax, and Tax Record-keeping," last issued in July 1989. It includes forms for recording timber transactions. A copy may be obtained for $5 from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325.

West Virginia University's Agricultural and Forestry Experiment Station published a 55-page Circular 148, "How to Estimate the Value of Timber in Your Woodlot," by Professor Harry V. Wiant, Jr. He also explains how owners often lose thousands of dollars by cutting too soon. A copy may be obtained by writing to Mrs. Mildred Spangler, Communications Bldg., West Virginia University, Morgantown, WV 26506.

Prepared by Jared D. Wolfe of USDA's Forest Service and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is: Office for Small-Scale Agriculture, Cooperative State Research Service, Room 342-D, Aerospace Building, USDA, Washington, DC 20251-2200. (Telephone: 202/447-3640)

Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the U.S. Department of Agriculture.

March 1990

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D. Livestock

United States
Department of
Agriculture

Cooperative State
Research Service

Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Angora Goats

Angora goats may be the most efficient fiber producers on Earth. These makers of mohair came from and were named after Ankara (Angora prior to 1930), the Turkish province where they have thrived for centuries. Turkey guarded these goats against exportation until 1849 when seven does and two bucks were imported into the United States. Later, more were imported from Turkey and South Africa, the two principal mohair producers in the 19th century.

But now the United States has become one of the two biggest producers (along with South Africa) of mohair—the long, lustrous, wavy hair that goes into fine garments. The other primary fiber from goats is cashmere. (See "A Small-Scale Agriculture Alternative, Cashmere Goats," December 1992.) Never the twain should meet! To cross Angora with cashmere goats results in a fiber called cashgora, with very limited use and characteristics of neither fine fiber.

The two goat types differ in temperaments, too. The Angoras are pretty laid back and docile, while cashmere and/or Spanish meat goats are often flighty and high strung. (Incidentally, Angora goats, which do produce mohair, do not produce Angora hair; only rabbits can produce that.)

Although Angora goats are somewhat delicate, they grow their fleeces year-round. This puts considerable strain on the animal and probably contributes to their lack of hardiness.

About 90 percent of the U.S. mohair clip originates in Texas, but the goats are raised over wide areas of the United States. They adapt well to many conditions, but are particularly suited to the arid Southwestern States. Central and southwestern Texas have all the major mohair warehouses.

Shear Twice a Year

Angora goats are sheared twice a year, before breeding and before kidding. The hair grows about 3/4 of an inch a month, and adult hair should be 4-6 inches long at shearing. Shearing most often follows the method developed by the Mexicans, with the goats lying down with legs tied. Shearing should be done on a clean-swept floor or sheet of plywood.

Care should be given to keep mohair clean and free from contaminants—weeds, grass seeds, or urine. Buyers severely discount unclean hair and hair showing second cuts. Fleeces should be bagged separately in 6-foot burlap bags. Not acceptable are polyethylene bags or poly twine.

Each bag should show the grower's name marked with a permanent-type felt-tip pen, be tagged, and contain only one fleece type clearly marked: Kid, yearling, young adult, adult, buck, and stained with spring or fall clip. Special problems, such as burrs or coarse, extra long, or short fleece, should also be listed on the tag. Buyers slit the bag's side when inspecting before buying; sellers must present a uniform product.

An adult goat usually will produce 8-16 pounds of mohair a year. Kid mohair should be 4 inches long, is finer, and may yield 3-5 pounds a year. Mohair fiber diameter ranges from 20 to 40 microns.

If kemp fiber (long, straight, hollow and brittle) shows up on any goats, especially along the backbone and thighs, such "kempy" animals should be culled, as suggested by the U.S. Mohair Marketing Board. Kemp fiber breaks easily and does not readily accept dye.

The U.S. Government has a direct-payment program for mohair producers to help maintain a viable industry. The direct payment through the U.S. Department of Agriculture's (USDA) Agricultural Stabilization and Conservation Service (ASCS) is based on the difference between the national average market price and a support price. In one recent year, producers received an average of $2.475 for every dollar's worth of mohair marketed. Details can be found at ASCS offices in many counties.

Selecting Bucks

Bucks should be chosen for body conformation and fine hair. Preferred are open-faced bucks not blinded by hair. Bucks should be left with does for 6 weeks. Angora goats are seasonally in estrus. The normal breeding season is from late September into December.

The gestation period for goats is usually 150 days, but it can vary several days each way. Kids are usually dropped from late February through April or early May. Twins may account for 40 percent of births, with a much lower percentage being triplets.

Fiber Comes First

Angora goats have high nutrient requirements and give nutritional advantage to fiber growth at the expense of other demands. Meeting nutritional needs should be the producer's main concern. Range forage of browse and forbs, protein supplements, grain and crop residues, and cereal crop pastures can help supply needed nutrients for growth and reproduction.

Goats, browsing animals, can be pastured with sheep and cattle; each species prefers different plants. Goats prefer brush, tree leaves, and rough plants. They can improve pasture, clear reforestation areas,

control leafy spurge, and destroy multiflora roses, red cedars, sand burs, knapweed, [redacted]nd's tongue, Canadian thistle, sage- buckbrush, giant ragweed, sunflow-ers, and many other weeds.

When growing plants are not available, Angora goats need supplemental hay and perhaps grain. While gaining at breeding time, young does should weigh at least 55 pounds (sheared weight) and mature does at least 75. Does need extra feed before and after breeding so fetuses can develop hair follicles.

During pregnancy and lactation, does need almost 1/2 pound of crude protein daily. Supplement feeding must start as soon as does begin to lose weight and condition. Improved nutrition brings more and better big growthy kids and heavier fleeces. Poor nutrition is the leading cause of abortion and poor mothering. Young or lighter-weight goats are most subject to abortion. Stress from disease, moving long distances, or cold wet weather also cause abortions.

Goats should be given adequate nutri-efore and after shearing. Angora must be able to take shelter from wet and cold; great death loss can occur without shelter for 4 to 6 weeks after shearing. Goats do not carry layers of body fat, unlike sheep.

Kidding on the Range

Due to lack of labor and facilities, large herds are usually kidded on the range, while many small herds use a more intensive confinement system. For open-range kidding, small pastures with shelter, centrally located watering and supplement feeding areas, and bedding spots reduce numbers of lost kids.

Angora does and kids should be undisturbed for several weeks, since does may abandon their kids. When goats are moved, pastures should be rechecked for kids.

An even more intensive kidding system uses buildings, small individual stalls, heat lamps, and feeder space. This "system " can be done earlier in the year but is ch more labor intensive and therefore more expensive. But a larger kid crop can be realized with good management. Before kidding, does should be outdoors except in cold or wet weather or at night; this helps keep bedding clean and dry and encourages needed exercise.

As does kid, they should be moved into stalls and kids' navels treated with 7 percent iodine. C and D antitoxin should be given. Cold kids will not try to suck and may need a heat lamp. When warm, they will usually suck by themselves but may need help to begin. Angora kids, very sensitive to cold, can die within a short time if too chilled. Immersion in warm water to speed restoration of body temperature and then thorough drying may save severely chilled kids.

After identification with matching paint or ear tags, well-fed does and kids can be moved to group pens or holding areas. Twins and triplets should not be grouped with singles since stronger kids often rob milk from usually smaller multiple-birth kids. Groups should contain kids of similar age.

Parasites Trouble Goats

Among goats, major health problems are internal and external parasites, coccidiosis (in kids before and after weaning), and pneumonia. A good health care program includes vaccination for most diseases and should be established between a grower and a veterinarian.

Goats' hooves may need to be trimmed, depending on walking conditions. Rocky ground may take care of that problem.

Goats may need special 4-foot-high fencing to keep them in and predators out. Goats like to go under or through obstacles. Five-wire electric fences, with three wires hot and two grounded, make a good system. Woven-wire fences may be used with the addition of a 12-inch "outrigger" electric wire about 12 inches above the ground. Small-mesh fencing also may be used.

Horns caught in the fence or the crotch of a tree become life-threatening, not only from predators but also from other goats. While most goats are not aggressive toward humans, they are not always kind to other goats and in seconds can do serious or lethal damage with their horns. A goat raiser may find horns useful—as handles. For safety, both for the handler and for other animals, horns' sharp points may be clipped, using a bolt cutter or similar device.

Following are additional information sources on Angora goat production:

Mohair Council of America
P.O. Box 5337
San Angelo, TX 76902
telephone: 915-655-3161

Ranch Magazine
P.O. Box 2678
San Angelo, TX 76902
915-655-4434

E (Kika) de la Garza Institute
for Goat Research
Langston University
P.O. Box 730
Langston, OK 73050
405-466-3836

Texas A & M University System
7887 North Highway 87
San Angelo, TX 76901
915-653-4576

"Angora Goats the Northern Way"
Susan Black Drummond
Stony Lonesome Farm
1451 Sisson Road
Freeport, MI 49325

By Harriet L. Jensen, R.R. 3, Box 144; Cozad, NE 69130 (Telephone: 308-784-3312) and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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April 1993

United States Department of Agriculture

Cooperative State Research Service

Office for Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Cashmere Goats

The world is beginning to give goats—nature's best herbicide—more attention. Leafy spurge—poisonous to some animals—is causing even people who laughed about goats to take a more serious look. When some Nebraska goats were taken on a demonstration tour, people could hardly believe the sight of goats walking through high brome grass to select out spurge heads!

But while most goats go for spurge, only cashmere goats also have the fiber of kings. And their owners now know better than to cross them with Angoraproducing goats. (Angora hair is another important fiber.) Australia and New Zealand breeders experimented with a cross to try to develop heavier fleeces. It proved to be a mistake. The crossed goats produced—cashgora—with limited uses and characteristics of neither cashmere nor mohair.

Demand Exceeds Supply

Demand for cashmere, the fine underdown from cashmere goats that has long been preferred by royalty, has always exceeded supply. Garments made of cashmere are prized for their unique feel. Cashmere is very soft, warm and long wearing. It feels much softer to the skin than wool, and while not as strong, cashmere outwears wool!

Cashmere goats are a type, not a breed. Most goat breeds, except Angora, can produce this down in varied quantities and may be called cashmere goats. There is no such thing as a "purebred" cashmere goat.

The fleece consists of the very fine, crimpy down and the usually longer, outside, coarse, straight guard hairs. A goat that does not display both types of fiber should be avoided.

Cashmere fibers must be separated, either by combing out the down or by using a commercial dehairer on sheared fibers. The longest, finest down is used in knitted garments and the shorter down in woven fabrics. The separated guard hairs go into rugs or hair canvas used in tailored garments.

The majority of the world supply of cashmere has come from Afghanistan, Iran, Outer Mongolia, India, and China. In recent years, when these countries' political disarray disrupted cashmere supplies, manufacturers began looking for more stable sources.

New Zealand and Australia have been producing cashmere for more than a decade. Breeding selection began even some years earlier with captured feral (wild) goats.

Selecting Breeding Stock

Prospective herd members can be selected from either dairy goat or meat goat sources. Cashmere down growth begins on about the longest day of the year and stops on about the shortest day. (Shortly after down growth stops it will be shed naturally if not combed or sheared.) Best time for goat selection is in the latter part of growth-stopping period; down quality can be easily assessed. The guard hair is parted to determine whether there is down underneath.

If the goat carries the gene for down, it can, over time, be developed into saleable amounts. The crimp is called the character or style of the fiber; a very tightly crimped down is most desirable. The diameter (measured in microns) of the fiber must be under 19 microns to be labeled cashmere. Select goats may have fiber as fine as 14 microns. The usual range is 16 to 19 microns.

A yield of at least 30 percent down is desirable, but is not the average by any means. Buyers pay on the down weight or weight of dehaired fiber, not the weight of the entire fleece. Prices vary over time.

Goats come in many colors and combinations of colors, but solid colored goats are much preferred. Cashmere down is either white, brown, or gray in solid colored goats. The less desirable down from mixed colored goats is classed either as white with color or mixed color.

Some U.S. growers have imported goats from Australia or New Zealand as a herd or as breeding stock to improve selected native goats. This might produce greater returns more quickly than would native stock alone.

Some Natives Are Good

There are, however, many very good goats among native breeds. Their fiber's diameter is apt to be smaller, but the length and yield of fiber are much less. The aim through selective breeding is to keep the finer diameter and increase the length and yield. Dramatic results in fiber are shown in crosses of imported bucks and native does, these crosses are called F1 or bred-on crosses.

The Spanish meat goats from Texas and the Southwest provide cashmere breeding stock that also produces big meaty goats. Of the dairy breeds, Toggenburg, Saanen, and Nubian are being used with good results. Pygmy and Fainting goats are being used by some growers.

Large goats with wide, thick, meaty bodies bring in more income when sold for meat or culled. Large bodies can also produce more hair if they also have dense hair follicles.

The gestation period for goats is usually 150 days, but it can vary several days each way. The first kids can be expected 156 days after the buck goat is turned in the does. Kids are usually "dropped," as the term goes, from late February through April or early May.

As noted above, goats are browsing animals and can be pastured with sheep and cattle, since each species prefers different plants. Goats prefer brush, tree leaves, and rough plants. They are used for pasture improvement and in reforestation areas. Ranchers in the high plains find them most useful in controlling leafy spurge. Goats will also destroy multiflora roses and red cedars.

Breeding Does Need Extra Feed

When growing plants are not available, goats will need to have supplemental feedings of hay and, perhaps, grain. Does also need extra feed prior to breeding. Pregnant does need good feed in order for the fetus to develop hair follicles. To assure big growthy kids, nursing does need good feed.

In does, poor nutrition is the leading cause of abortion and poor mothering, with

younger or lighter weight does most likely to abort. Stress from disease, moving long distances, or cold wet weather also can [redacted] abortions.

[redacted]es should be in good condition and gaining weight at breeding time. Young does should weigh at least 55 pounds and mature does at least 75 pounds sheared weight at breeding.

During pregnancy and lactation, does need almost 1/2 pound of crude protein daily. Supplement feeding must be started as soon as the goats begin to show a loss of top condition and/or weight. The rewards of improved nutrition are more and better kids and heavier fleeces. However, overfeeding of protein can cause fleeces to coarsen prematurely.

Goats should be given adequate nutrition both before and after shearing. Goats have neither the layer of body fat nor lanolin-laden wool that sheep have. So, goats sometimes need shelter from cold rains and chilling winds. If shelter has not been provided, goats may even die. Depending on weather variations, goats may need shelter for 4 to 6 weeks after shearing.

Not Many Triplets

Twins may account for 10 percent of births, most commonly in older does, with a much [redacted]percentage being triplets. With prop-[redacted]agement it is possible to get three [redacted]crops within a 2-year period.

Does may be bred to kid when they are a year old if they have sufficient growth. Since male kids usually reach sexual maturity at 4 months of age, they should be removed from the herd to prevent accidental breeding.

Kidding problems are nothing any experienced livestock person would find unusual. Unless it is a breech delivery or a tough sack that does not break and allow the kid to breath or the doe is too small, there usually are no complications.

Due to lack of labor and facilities, large herds are usually kidded on the range, while many small herds use a more intensive confinement system to handle the goats. For open kidding, small pastures with some sort of shelter, centrally located watering and supplement feeding area, and a bedding area are required. This arrangement reduces the number of kids that get separated from the does.

On the range, does and kids should be left undisturbed for several weeks, since the does may abandon the kids. When goats [redacted]ed, pastures should be rechecked [redacted] that have been left behind.

A more intensive kidding system makes use of buildings, small individual stalls, heat lamps, and feeder space. With this type of system kidding can be done earlier in the year. However, such a system is much more labor intensive and therefore more expensive. A larger kid crop can be realized if the facility is well managed. Before kidding, the does should be outdoors—except in cold or wet weather or at night; this helps keep bedding clean and dry and encourages the does to exercise.

As does kid they should be moved into stalls and the kids' navels treated with 7 percent iodine. C and D antitoxin should be given. Cold kids will not try to suck and a heat lamp may be needed; they will usually suck by themselves when they are warm. Some kids may need help to begin to suck if does' teats are not adequately open. After identification with matching paint or ear tags, does and kids can be moved to group pens or holding areas after the kids are well established. Twins and triplets should not be grouped with singles since stronger kids often rob from the usually smaller multiple-birth kids. Likewise, the groups should contain kids of similar age.

Maintenance Pointers

As with sheep, internal and external parasites and pneumonia are a major health problem with all kinds of goats. Lice can be controlled by spraying after shearing. Coccidiosis is a threat to kids, both before and after weaning, and any kid not growing properly is probably infected.

Their hooves may need to be trimmed, depending on the walking conditions, but wear from rocky ground sometimes helps take care of this problem.

Working with a veterinarian, a grower should establish a good health care program that includes vaccination for most diseases.

Goats need special 4-foot-high fencing both to keep them in and predators—always a threat to kids—out. Goats like to go under or through obstacles. Five wire electric fences constructed with three hot wires and two grounded wires work well. Existing fences can be used with the addition of a 12-inch outrigger electric wire located about 12 inches above the ground.

Horns Handy, Sometimes!

Other types of small-mesh fencing may be used. Horns caught in the fence or the crotch of a tree become life-threatening, not only because of predators but also because of other goats. While most goats are not aggressive toward humans, they are not always kind to other goats who cannot defend themselves. They can quickly do serious or lethal damage with their horns.

A goat raiser soon discovers that horns are useful—as handles! A goat without horns is hard to control; some shearing stands even depend on horns when securing the goat for shearing. Unlike Angora goats, cashmere animals are sheared standing.

Care should be taken not to damage a young goat's horns by rough handling. A frightened or startled goat is apt to jump or flail around and handlers should always use caution to prevent injury from the horns—especially to eyes. For safety, both for other animals and the handler, sharp points of horns may be clipped off using a bolt cutter or similar device.

Sources of Information

The American Cashmere Growers Marketing Cooperative (ACGMC), P.O. Box 1105; Castle Rock, CO 80501 (Telephone: 303-621-2874). Its trade name is Cashmere America. Its manager, Terry Sim, is Australian-born and an Australian fiber classer.

Cashmere Producers of America (CaPrA); 1-800-FOR-GOAT; *Concerning Cashmere* (bimonthly publication from CaPrA).

Ranch Magazine; P.O. Box 2678; San Angelo, TX 76902. (915-655-4434)

Cashmirror Magazine; P.O. Box 639; Toledo, WA 98591. (206-864-4200)

By Harriet L. Jensen, R.R. 3, Box 144; Cozad, NE 69130, and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Cooperative State Research Service, USDA, Room 328-A, Aerospace Building, Washington, DC 20250-2200. Telephone: 202-401-1805; Fax: 202-401-1804

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December 1992

United States Department of Agriculture

Cooperative State Research Service

Office for Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Dairy and Meat Goats

Since pre-Biblical times, goats have been the most useful of domesticated animals, producing milk for drinking or for cheese, gourmet meat (commonly called cabrito in the Southwest and chevon in the North), leather, and fiber for clothing (cashmere or mohair — not to be confused with Angora rabbit fur). Relatively clean, goats make fine pets and show animals, and number as many as 460 million in the world. They can be easily pastured with cattle as they prefer head-high grazing. Goats stress easily, so they need careful protection from dogs, and skillful management is necessary to prevent diseases and internal and external parasites such as lice, mites, and fleas.

According to USDA's Agricultural Research Service, goats produce as much as 4.5 million tons of milk a year worldwide. Goat milk is so popular that some people have begun raising dairy goats before knowing whether they can sell the milk or learning how to make cheese. Yet most major U.S. cities do not have liquid goat milk available in local retail outlets, according to research by Judy Kapture, Dairy Goat Information Services, P.O. Box 298, Portage, WI 53901.

In at least 21 States, goat milk must be pasteurized when retailed. Pasteurization requires a big investment in equipment. Even in areas where milk can be sold raw, producers must be licensed. Selling milk for human consumption requires extensive marketing to overcome resistance among consumers raised on cow milk. Price may be an obstacle, too — the cost of complying with the myriad regulations involved may force producers to raise the cost beyond the means of the average consumer.

Goat Milk Alternatives

Dairy goat owners might well follow the lead of feeder-calf producer Lillian Buckley of Laura, Illinois, who raises calves on goat milk. Originally, she milked the goats, bottled the milk, and then let newborn calves nurse from the bottles their first 10 to 12 weeks. This shortcut, including doe training, allows the calves to do the nursing directly. Ms. Buckley, her husband, Mike, and family raise up to 35 Holstein-Semental or Holstein-Angus crossbred feeder calves, using 25 goats. The family also feeds about 40 to 50 hogs and handles 50 acres of vegetables, emphasizing sweet corn.

Making goat milk soap is a great alternative to selling the milk for food, since soap producers do not have to comply with the costly regulations that pertain to food products. Elizabeth Lauer, a successful entrepreneur, started making goat milk soap because she was allergic to other soaps. Her business grew into the current Does' Pride Natural Goat Milk Soap, Home Soap Works, P.O. Box 317, Millington, NJ 07946; telephone 908-604-2170 or 800-542-7180.

Dairy Goat Information

Do you want to make goat cheese? Get a free catalog from the New England Cheese Making Supply Company. Contact: Ricki Carroll, P.O. Box 85-S, Ashfield, MA 01330; telephone 413-628-3808; fax 413-628-4061. Ms. Carroll advises that although their "Cheesemaker's Journal" is out of print, all back issues are still available. Beginning cheesemakers can refer to the Carroll's "Cheese Making Made Easy - 60 Delicious Varieties" (1982, $9.95 postpaid). "Goat Cheese: Small-Scale Production" ($8.95 postpaid) is also recommended for mold-ripened cheeses. For the more advanced cheesemaker, the Carroll's offer Jean-Claude Le Jaouen's 206-page book "The Fabrication of Making Farmstead Goat Cheeses," available for $22.95 postpaid. Le Jaouen is head of the Goat Research Section, Technical Institute of Sheep and Goat Research, Paris, France.

The American Cheese Society, 1523 Judah Street, San Francisco, CA 94122 (415-661-3844), publishes "A Guide to American Specialty and Farmstead Cheeses," by Barbara Lang, which includes a list of cow and goat cheese producers. Not all producers make all types of goat cheeses, which include blue, caerphily, camembert, cheddar, chevre, feta, semi-aged, soft ripened, shepherd's, tomme, and capriano. The last three are hard aged cheeses.

Don't want to produce cheese? Instead, you might try selling fresh goat's milk curd, which is used in sauces and from which cheese can be made. Coach Farms, the 800-goat farm at Pine Plains in New York's Hudson River Valley, delivers curd to New York City stores, where it sells for $10.98 per pound. Goat curd has a special cooking attribute — it enriches and thickens cooked sauces, yet does not break down or separate like yogurt or sour cream when heated. The fat content of goat curd is 7 grams, about half that of cream, and the curd may be kept in the refrigerator up to 3 weeks. Coach Farms also produces a goat yogurt that retails from $.99 to $1.59 for 4 ounces.

Some dairy goat producers also sell young goats for meat. One example is Hazel McTeer, former president of both the Missouri Goat Breeders Association and the Central States Dairy Goat Marketing Cooperative. Ms. McTeer operates the Fancy "M" Dairy Goat Ranch, Route 1, Box 545, Springfield, MO 65803. She says dairy goat people in her area sell about 500 kids annually, ranging in weight from 17 to 38 pounds. At Easter, when goat meat is very popular, the goats are trucked to New York City. The 1994 price is $1.00 per pound live weight.

Nondairy Goats

Some successful entrepreneurs stay away from dairy goats, concentrating on goats for meat, leather, or fine hair. Those with the greatest chance for success may be already pasturing sheep and/or cattle and can add some meat and/or Angora goats without damaging their pasture improvement programs. Goats eat some plants that sheep and cattle do not seek, so they can be pastured together.

Meat Goats

An economically inviting aspect of goat production is the raising of animals for meat. According to the Agricultural Research Service (ARS), goats of all sizes worldwide produce more meat (1.2 million tons a year) than do cattle or hogs. The tender meat of young goats is especially popular among U.S. communities whose citizens are of Middle Eastern, Asian, African, Latin American, and Caribbean heritage. Gourmet restaurants have long recognized the appeal of goat meat, which tastes almost exactly like venison, but without the "gaminess" some find distasteful.

As immigration rates increase steadily (approximately 60,000 monthly, according to the September 1994 issue of the "Cooperative Farmer"), new processing plants and marketing techniques designed to meet the needs of ethnic consumers are emerging. Chevon can be found nationwide in grocery stores specializing in global foods.

The Halal Meat and Food Corporation, opened in 1993 in the Blanden Industrial Park, 211 Bypass Road, Blandenboro, North Carolina 28320, telephone 910-648-6143, is the first USDA-approved halal plant. The company — whose Arabic name refers to the ritual slaughter of animals according to strict Islamic laws

— processes more than 800 goats and sheep and 90 cattle weekly. Processing plants receive their goats primarily from farms in Texas. The Nation's largest goat auction is at [redacted]n, TX. Other high-volume auctions are [redacted]Angelo and Goldwaithe, TX, Hackettstown, NJ, and Lancaster, PA.

Because the Muslim population is increasing significantly in the United States due to conversion of Americans and to immigration, halal goat meat can be found in most major American cities. According to a recent article in the Washington Post (8/31/94), there are more than 40 butcher shops in the Washington, DC, metropolitan area alone — seven side-by-side in the block-long Build America Skyline Shopping Center in Baileys Crossroads, VA. They cater primarily to international students and diplomats, but also to a growing customer base of non-Muslims who have learned to enjoy goat meat.

The meat goat industry is rapidly developing. Reports from the National Agricultural Statistical Service indicate that more than 300,000 goats were slaughtered for meat in 1993. A decade earlier, only 79,403 were processed. Most goat meat comes from excess dairy goats, spent Angora goats, and "brush" or "briar" goats.

Genetically speaking, except for the South African Boer Goats imported via New Zealand in early 1993, there are no true meat goat breeds in the United States. However, several [redacted]rmers have developed intensive selec-[redacted]grams using Spanish and dairy crosses [redacted]er to pull together genes that would make a meatier goat.

Dr. Morse B. Solomon, at the USDA/ARS Meat Science Research Laboratory in Beltsville, MD, reports that roasted and broiled chevon provides red meat that is 50 to 65 percent leaner than beef and 42 to 59 percent leaner than lamb. These figures apply to choice and prime grades. The low-fat (low cholesterol) goat meat is a boon for nutrition-conscious consumers.

Among the goat producers persevering in the improvement of meat goats are Jay and Gayle Nellsch, P. O. Box 98, Ft. Cobb, OK 73938. They have bred goats for the last 8 years and are producing animals with meat production capabilities far superior to those of the foundation herd.

Since 1972, the 8-Mile Ranch, run by Jim and Elaine Willingham, P. O. Box 1828, Uvalde, TX 78802, has been selecting animals for adaptability to the environment of West Texas, multiple births, and soundness. Another enduring meat goat producer, Robert Kensing, Bowie Spring Meat Goats, P. O. Box 55, Menard, TX 76859, has been selling quality meat bucks since 1985. Due to the growing [redacted]rity of goat meat, the American Boer [redacted]ssociation (address listed below) was chartered in June 1993; breed standards were established and an animal registry was begun.

As the acceptance of goat meat increases in the United States, additional information is certain to be published for both producers and consumers. This publication is one of several from the U. S. Department of Agriculture's Office for Small-Scale Agriculture on various types of dairy and meat goats, and is meant to provide preliminary information only. The following associations and research institutes represent a cross-section of sources throughout the United States.

More Information:

Dairy Goat Journal
W2997 Markert Road
Helenville, WI 53137
414-593-8385

United Caprine News
P.O. Drawer A
Rotan, TX 79546
915-735-2278

American Dairy Goat Association
and
Dairy Goat Products Association
P.O. Box 865, 209 W. Main Street
Spindale, NC 28160
704-286-3801

American Meat Goat Association
P.O. Box 979
Mertzon, TX 76941
Executive Director: Kay Keen
915-835-5704
Southeast Regional Meat Goat Association
P.O. Box 99731
Raleigh, NC 27624-9731
919-676-1917

American Boer Goat Association
P.O. Box 248
Whitewright, TX 95491
1-800-414-0202

"Cooperative Farmer" (September 1994 issue)
Southern States Cooperative, Inc.
P. O. Box 26234, Richmond, VA 23260-6234
Laura H. McBride, Associate Editor
804-281-1317

GEORGIA: Seyoum Gelaye, Director, Dairy Goat Research Center, Fort Valley State College, Box 5744, Ft. Valley, GA 31030; telephone 912-825-6817.

NORTH CAROLINA: M. Ray McKinnie, Extension Research Animal Science, North Carolina Agricultural and Technical State University, Greensboro, NC 27411-1011; telephone 910-334-7500.

OKLAHOMA: Nelson Escobar and Thian Hor Teh, Directors, E. "Kiki" de la Garza Institute for Goat Research, Langston University, Box 730, Langston, OK 73050; telephone 405-466-3836.

TEXAS: Scott D. Horner, International Dairy Goat Research
Center, College of Agriculture, Drawer U, Prairie View A & M University, Prairie View, TX 77446; telephone 409-857-3926.

UTAH: Sheep and Goat Research Center, Utah State University, Logan, UT 84322, telephone 801-797-1000.

VIRGINIA: Terry Gipson and Stephen Wildeus Meat Goat Research Project, Agriculture Research Center, Virginia State University, Box 456, Petersburg, VA 23803; telephone 804-524-6716.

By George B. Holcomb (Retired), Office of Communication, U. S. Department of Agriculture (USDA), and Gail Damerow, Editor of "Rural Heritage" for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244 Washington, DC 20250-2244. Telephone: 202-401-1805; Fax 202-401-1804.

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Cooperative State
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Office for
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A Small-Scale Agriculture Alternative

Exotic Livestock

January 1989

Where's the beefalo? It's still around, but the excitement is gone. Such a query arises because introduction of exotic types of creatures into a country where they are scarce encourages speculators to bid prices extremely high. Breeding stock becomes the focus of attention rather than the basic use of the animal for meat, work, hide, fur, or feathers.

However, restaurant demand for "different" meat has risen to the extent that on February 24, 1988, the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) proposed (in the Federal Register) to expand its voluntary exotic animal inspection program. FSIS would add reindeer (caribou), elk, antelope, water buffalo, and deer, such as red or fallow, under the head of "exotic animal." In the past the program covered only American bison and cattalo or beefalo.

FSIS officials say fewer than 2,000 "exotics" are slaughtered annually in this country compared to more than 32 million cattle per year. In view of the demand, small-scale entrepreneurs find it profitable to market federally inspected meat from certain exotic animals.

For the moment, the biggest dollar demand is for such exotics as ostriches and South American humpless camels such as llamas, alpacas, guanacos, and vicunas. Little demand is noted for Alaska's yaks or musk oxen. African pygmy goats are gaining in popularity, says Pamela Ames, executive for the National Pygmy Goat Association (5621 West Michigan, Tucson, AZ 85746).

In 1987, with almost no advance notice or publicity, a company called "Camelids,Inc.," sold 52 male and female llamas at an estimated cost of more than $1 million, according to the slick 24-page tabloid publication called "Llama Life." It is published quarterly by Terry and Kathy Price at 925 W. Culver, Phoenix, AZ 85007. An annual subscription costs $10 domestically and $15 in Canada.

One buyer paid $100,000 apiece for two studs. Three other males also brought $100,000 apiece at the opening rush, which drew nearly 100 buyers from all over the country.

Some people predict that 3,500 U.S. owners of 12,000 llamas will begin to price themselves out of the market, even if camelid wool is sought by handspinners and weavers and the pack animals are used in all sorts of fund-raising events—shows, fairs, and 4-H projects. Owners contend llamas excel as 300-pound pets.

USDA's Forest Service people traveling into wilderness country often use llamas as pack animals instead of horses or mules, both of which are ecologically more intrusive. You can rent a llama for $20 a day; there are more than two dozen commercial llama packers in business.

Females can bring from $6,500 to $16,000 and up as breeding stock. Males of age 6 months to a year bring $500 and up for training as pack animals. Already trained, they cost about $1,200 apiece.

They are hot investments, says a three-page chapter of the 189-page book called "ADAPT2," published by SUCCESSFUL FARMING magazine after its December 1987 conference on farm diversification. The publication costs $12.95 postpaid from P.O. Box 10652, Des Moines, IA 50336.

Owners have formed the International Llama Association (P.O. Box 37505, Denver, CO 80237). It publishes educational brochures.

The industry has a thick, colorful magazine, LLAMAS, published every 2 months. (Subscription: $20 a year from P.O. Box 100, Herald, CA 95638.) Although covering all camelids (a recently coined word), it emphasizes llamas.

It is expensive and difficult to import llamas or other animals from South America because livestock of some countries of origin have foot-and-mouth disease. USDA's Animal and Plant Health Inspection Service (APHIS) regulates importation.

Camelid experts include Dr. LaRue W. Johnson, an associate professor and veterinarian in the Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523; Dr. William L. Franklin, an associate professor in the Department of Animal Ecology, Iowa State University, Ames, IA 50011; and Dr. Juan Leon, College of Veterinary Medicine, Oregon State University, Corvallis, OR 97331.

Misunderstanding Carabao

Water buffalos, unlike llamas, aren't in great demand, despite such plaudits as a media advisory from Gail Porter for the National Academy of Sciences (NAS) saying the water buffalo may be the most misunderstood and underutilized animal. Despite its intimidating appearance and large size, the water buffalo's gentleness contrasts sharply with the ferocity of the African cape buffalo. Porter noted the former's tameness in "The Water Buffalo: New Prospects for an Underutilized Aminal," published by the NAS's National Academy Press in 1981.

The first commercial herd was imported to the United States in February of 1978. The two major types of water buffalo are the swamp buffalo, or carabao, and the river buffalo. Both are used for work and meat. The carabao is rarely used for milk, while the river buffalo is noted for milk. With either tightly coiled or drooping straight horns, breeds of the latter are commonly found in the temperate climates of Italy, Albania, Yugoslavia, Greece, Turkey; the Georgian and Azerbaijan areas of the Soviet Union; and in cold, mountainous areas of Pakistan, Afghanistan, and Nepal.

Latin America countries are beginning to catch on to their value. About 18 different breeds of both types can work in tropical mud that can bog down a tractor. One of these animals can work as many as 20 years.

Milk from river buffalo goes into mozzarella cheese in Italy. It has a higher content of both butterfat (at about 5 to 8 percent) and nonfat solids (at 16 percent) than cow's milk. River buffalos produce about 170 percent of India's milk; they also produce milk in Italy, Iraq, Turkey, Egypt, and Eastern Europe.

In taste preference tests, water buffalo steaks were judged to be leaner and just as tender as those of cattle.

Water buffalo usually maintain their appetite in hot weather, and thus may be more adaptable to it than cattle; but they may need shade or a pond in summer. Sensitive to some cattle diseases, they are highly resistant to others.

Chief breeders of water buffalo in this country are A.P. Leonards, Route 1, Box 74, Sulphur Springs, AK 72768, and Dr. Hugh L. Popenoe, Director, International Programs, University of Florida, Gainesville, FL 32611. Both are selling unbred young heifers at about $3,500 and bulls at various lower prices.

Another expert in water buffalo management is Dr. W.S. Cripe, College of Veterinary Medicine, University of Florida. Dr. Martin Drost, of the same address, is experienced in water buffalo reproduction matters.

European Fallow Deer

Despite competition from New Zealanders, deer farming and venison production is a business where demand continues to exceed supply, according to members of the North American Deer Farmers Association. Its founder and president, Joseph von Kerckerinck (Lucky Star Ranch, Chaumont, NY 13622), has authored a colorful book, "Deer Farming in North America," and also has produced a videotape on the subject. (Each item is available at $48 apiece postpaid. A set costs $86.)

In 1978, Von Kerckerinck and his wife, Illiana, began the first and largest operating European fallow deer farm in North America. About 3,000 deer roam 1,500 fenced acres of the 5,000-acre ranch. He says, "Deer farming combined with the right marketing approach can give hundreds of farmers the chance to stay on their land and make a decent living."

Part of the Lucky Star's success, he says, rests with the direct marketing program that assures venison is shipped fresh, unfrozen, by overnight express to arrive almost anywhere on the date needed. It also can be shipped frozen, with 3-day delivery. The Lucky Star has its own USDA inspected slaughterhouse.

For the 225-page book, he gathered data from New Zealand and Europe. West Germany has about 2,000 deer farms, with herds ranging from 5 to 500 animals. Yet, West Germany also imports more than 20,000 tons of venison annually; its venison consumption is second to that of beef. He says venison has less cholesterol than beef or chicken and only about a fifth of the fat in most beef. Its caloric content is almost as low as chicken. To preserve tenderness, venison should not be cooked beyond medium rare.

U.S. restaurants import from 500 to 1,000 tons of venison annually, mostly from New Zealand, which has about 3,000 deer farms that mainly produce red deer and North American elk or wapiti, plus hybrids of these breeds.

A problem with deer or elk is the need for fence about 7 feet high, a major expense in getting started.

Jim Hoar, manager of the Lucky Star's deer as well as its Hereford cattle, said it costs 5 to 7 cents a day to feed a deer. A deer needs about a quarter of an acre for healthy roving, but uses only a seventh as much pasture as a cow and can share cattle feed such as corn silage. An animal slaughtered at about 15 months of age yields a 65-pound carcass bringing $5 a pound. Thus a feeding cost of less than $35 can bring a gross of about $325. This, however, does not count the cost of fencing, housing, land, slaughtering, or depreciation, as well as farming disasters such as marauding coyotes or vultures.

Lucky Star sells breeding stock at about $800 a head for does and $1,000 to $2,000 for bucks, depending on age. One buck can tend 40 does.

Like Lucky Star, elk cow-calf farmers Rush and Inez Johnson (R.R. 1, P.O. Box 199, Bucklin, MO 64631), report a 2-year backup on orders for stock from their 200 head of Rocky Mountain elk on their 1,600 acres. Rush has sold most elk calves at $1,200 to $1,500 by weaning time. He said a good manager should get a 20 percent return on investment. Elk meat is usually the highest priced item on restaurant menus, he said. But most of it comes from New Zealand at about $7 a pound, he indicated.

Small-scale entrepreneurs without their own butchering facilities usually can find a cattle slaughtering house to handle deer or elk.

Ostriches

Ostrichskin boots cost a bundle when they can be found. U.S. shoemakers once bought ostrich hides from South Africa. That source has been cut off by trading restrictions.

Several ostrich ranchers are in Oklahoma. First known to raise ostriches were Bob and Bernadine Moore, who bought some in 1981. Bob Moore died in 1987 and his widow and sons Randy and Scott carry on with exotic animals, birds, and catfish. (They had a llama until a "deer hunter" shot it.) In 1987 they began publishing "Ostrich News," an 8-page newsletter. ($18 for 10 issues per year, from Route 2, Box 415, Inola, OK 74036.)

Kenneth and Judy Roberts of Rush Springs, Oklahoma, say pairs of the breeding size adults bring $12,000 to $50,000, depending on age and quality. Ostrich chicks at last reports fetched $1000 apiece at 8 weeks of age, when sex can be distinguished.

Chicks are susceptible to nutritional problems and pneumonia unless kept well fed, warm, and dry. An ostrich hen can lay as many as 50 eggs a year but not all eggs hatch; too few owners have proper hatcheries.

Leon Vandiver (8200 Northwest 32d, Bethany, OK 73008), founder and elected president of the National Ostrich Breeders Association, claims ostrich meat is low in cholesterol and has a taste somewhat similar to beef. But so far, virtually no U.S. ostriches are being eaten or skinned for their hides. That way, they can live as long as 70 years and produce plumes.

Ostriches can become overstressed with abuse or teasing. They should not be left alone with small children; they don't understand the strength of their peck. Their big bills can snatch up a wrist watch, glove, ring, or buttons in an instant, Dale Coody reported in an article in the "ADAPT2" book.

He said 6 or 7 strands of strong, smooth wire is enough for fencing, since most adults with strong forward kicks can protect nests from coyotes or stray dogs. In urban areas, many owners use high chain-link fences.

Ostrich fancier Dale Coody has produced a 36-page how-to manual for beginners called "Ostriches: Your Great Opportunity." ($12.50 postpaid from 4-C Ostrich Farm, Route 1, P.O. Box 71A, Lawton, OK 73501.)

Free information on care and feeding of ostriches can be obtained from Dr. Fred D. Thornberry, Texas Agricultural Extension Service, Texas A&M University, College Station, TX 77843. Veterinarians with expertise include Dr. J.P. Hoover and Dr. Frank V. Lochner, Veterinary Medicine Department, Oklahoma State University, Stillwater, OK 74078.

Predicting prices in a few years at $50 per chick, Thornberry says, "Current prices appear completely unrealistic when related to potential profitability from an as yet unproven demand for skins, meat, and feathers." He expects the farmer's price for skins would not exceed $200.

Veterinarian Lochner treats many sick ostriches because their owners don't know how to feed or care for them. He said he has heard that the minimum operation for profitability under ordinary circumstances should have about 2,000 birds.

Exotic animals are not tax deductible except as part of a genuine commercial farm, according to rulings from the Internal Revenue Service.

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. Kerr, Jr., Program Director). The address is: Office for Small-Scale Agricuture, Cooperative State Research Service/Office of Grants and Program Systems, Room 342-D, Aerospace Building, USDA, Washington, DC 20251-2200. (Telephone: Area Code 202-447-3640.)

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United States Department of Agriculture

Cooperative State Research, Educatation, and Extension Service

Office for Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Draft Animals

The word "draft" represents not a specific kind of animal, but a usage. Although "draft," mentioned in reference to a horse, has become synonymous with "heavy," animals of any size may be trained for draft purposes.

Horses, mules, and oxen are once again an important power source for today's small farms and woodlots.They cost less than mechanized equipment and are environmentally friendly. In fields, they don't compact the soil, and in woodlots, they cause minimal erosion and tree damage.

Unlike tractors, draft animals are not dependent on outside fuel sources. Instead, they help plant and harvest their own feed, and they provide an unending supply of organic fertilizer.

Draft animals are less costly to maintain than mechanized equipment and don't need constant repair. They can work in hilly terrain that would defy a tractor, and in soil wet enough to bog down machinery. They can easily be worked by one person, which you will readily appreciate if you try operating a motorized hay wagon or log skidder by saying "get-up."

Instead of depreciating as they get older, well-trained draft animals increase in value. Although mules don't reproduce because they are hybrids, and oxen don't reproduce because they are castrated, horses make little horses you can sell or keep as replacements. Virginia horse-power proponent Jason Rutledge is fond of pointing out that no farmer has ever gone to the barn to find a newborn tractor.

Horses

Young harness-trained horses, experienced draft teams, and farm implements are available at frequent sales in Indiana, at the Topeka Livestock Auction (Robert Bale, P.O. Box 279, Topeka, IN 46571; telephone: 219-593-2522); in Iowa, at the semi-annual Waverly Midwest Horse Sale (Bill and Ron Dean, P.O. Box 355, Waverly, IA 50677; telephone: 319-352-2804), and in Columbus, OH, at the annual Eastern States Draft Horse Sale (Sally Reed, 17588 Old Mansfield Road, Fredericktown, OH 43019; telephone: 614-694-5730).

Orchards, vineyards, and nurseries worked with draft animals may be planted with twice as many rows, since they can be spaced half as far apart as would be required for mechanized cultivation. Pick-your-own farm operators can attract new and repeat customers through entertainment farming by offering festive hay and sleigh rides.

Lin and Allan Ayers of Faulkner Farms (14292 Telegraph Road, Santa Paula, CA 93060; telephone: 805-525-9293) use Clydesdales for normal farming activities, but are best known for the horse-drawn hay rides offered through their pumpkin patch and Christmas tree farm. Stanley Gilbert offers both horse-drawn and ox-drawn sleigh rides on his upstate New York Christmas tree plantation (336 Partridge Hill Road, Barneveld, NY 13304; telephone: 315-896-2904).

In Wyoming, ranchers use horses to haul cattle feed during winter. From June through September, when the horses would otherwise be idle, Walt M. Korn of Box K Ranch (P.O. Box 110, Moran, WY 83013; telephone: 800-729-1410) leases neighboring horse teams for his Grand Teton Covered Wagon Cookouts; guests ride in a horse-drawn wagon to and from the cookout site.

Jerry Rapp and his Colorado neighbors use horses for summer hay production. During the snow months, Rapp leases neighboring horse teams to give sleigh rides to tourists. When he had trouble finding qualified sleigh drivers, Rapp started 4 Corners Driving School (47 Electra Lake Road, Durango, CO 81301; telephone: 303-247-8923), which now offers instruction in horse-drawn hay making and log skidding, as well as sleigh driving.

Demand for horse loggers is rising among woodlot owners wishing to minimize damage or who haven't enough timber to justify hiring heavy equipment. Horse loggers are regularly hired by the U.S. Department of Agriculture Forest Service to extract timber from environmentally sensitive areas.

In Washington state, Gregg and Deb Caudell run a productive horse-powered ranch and a profitable horse logging business. Although logging with horses is more labor intensive and slower than mechanized logging, the couple find that the income-to-expense ratio can be 10 times greater. The Caudells network through their quarterly publication, *Horseloggers International Newsletter*, Star Route Box 34-CC, Keller, WA 99140; telephone: 509-634-4388.

Another logger's resource is The North American Horse and Mule Loggers Association, c/o Glenn French, 8307 Salmon River Highway, Otis, OR 97368; telephone: 503-994-9765. Regional Director Jason Rutledge of Ridgewind Farm (8014 Bear Ridge Road, Copper Hill, VA 24079; telephone: 703-651-6355) offers horse logging workshops. Rutledge has obtained a grant from the state to develop horse logging as a tool for marketing value-added wood products extracted in an environmentally sensitive manner.

Amish communities in Ohio and elsewhere have long used horses for transportation, as well as for farming and logging. Recognizing the increasing interest in horses as a source of power, Amish farmer Eli J. C. Yoder (445 South Mill Street, Sugar Creek, OH 44681; telephone: 216-852-4603) offers hands-on driving instruction at his horsemanship school for beginners.

While members of the Nation's largest Amish community in Ohio prefer horses, the Lancaster County, PA, Amish favor mules. Differences in local preference, climate, and terrain result in different choices of draft animals in various parts of the country.

Farmers use light horses, donkeys, ponies, and even miniature horses no bigger than a goat for draft work. Indeed, goats can be readily trained to turn garden soil or pull a cart. Goat-sized accessories are available from Hoegger Supply Co., P.O. Box 331, Fayetteville, GA 30214; telephone: 800-221-4628. Even dogs can make handy draft animals, as Colorado's Richard Klimesh and Cherry Hill discovered when they trained their Rottweilers to haul horse feed. Richard designed and now manufactures a small chore cart appropriate for dogs. (Cherry Mountain Forge, P.O. Box 140, Livermore, CO 80536; fax: 303-491-9898).

Farmers who work larger acreages prefer heavy horse breeds standing 16 hands high or more (1 hand equals 4 inches), measured from the ground to the withers, and weighing 1,600 pounds or more. Of the many heavy breeds, North Americans favor five: Belgian (the most popular), Percheron, Clydesdale (the "Budweiser" horse), Shire, and Suffolk (the only breed developed specifically for farming).

For hilly terrain, smaller, more agile breeds include the Haflinger from Austria and the Fjord from Norway. When a horse is used for both farming and transportation, a light-weight, dual-purpose crossbreed, or a pure breed like America's old-style Morgan (Lippitt and Brunk bloodlines), combines the necessary strength and endurance.

Experienced trainers can adopt wild horses through the Bureau of Land Management (BLM) (P.O. Box 12000, 850 Harvard Way, Reno, NV 89520; telephone: 702-785-6586). For a small fee per horse which for training purposes should be no

more than 3 years old, one person may acquire up to four horses per year. At maturity each will weigh 800-1,000 pounds and stand 14-15 hands high.

Lowell Tart (85 Roberts Road, Lexington, [redacted] 38351; telephone: 901-968-8536), [redacted] sells wild horses for harness work. By [redacted] regulation, he must house them in a strong corral and must keep each horse for at least a year before he can sell it. While wild horses are inexpensive to obtain, taming them requires skill and patience and is not a task for beginners.

Horse Reference Materials

A ready source of information on harnessing horses and mules is the Draft Horse and Mule Association of America, (DHMAA), which distributes a variety of written materials and sponsors workshops in Illinois and elsewhere. Since 1994, DHMAA has produced the annual Horse Progress Days trade show, where manufacturers and distributors demonstrate both new and antique horse-drawn implements. For details on upcoming events, contact Phil Farrell, Route 1, Box 98, Lovington, IL 61937; telephone: 217-864-5450.

Guide books include *The Draft Horse Primer*, by Maurice Telleen, ($13.00 from Draft Horse Journal, P.O. Box 670, Waverly, IA 50677; telephone: 319-352-4046) and two volumes by L.R. Miller, *Training Workhorses, Training Teamsters* ($24.95) and *Work Horse Handbook* ($16.45), both from Small Farmer's Journal, P.O. Box 1627, Sis[redacted]97759; telephone: 503-549-2064. [redacted]*Evener Work Horse, Mule & Oxen Dir[redacted]y and Guide* ($6.00) is issued each May by Rural Heritage, 281-A Dean Ridge Lane, Gainesboro, TN 38562; telephone: 615-268-0655. This directory lists sources for harness, implements, and draft animals; schedules of workshops and stock sales; and information on participation in the Good Farming Apprenticeship Network.

Mules

A mule is a hybrid resulting from the mating of a mare (female horse) with a jack (male donkey). An average farm mule measures 13-14 hands and weighs about 1,000 pounds.

Mules have long been a tradition on southern cotton plantations, and are still very popular, because they can withstand steamy weather better than horses. A less well known fact is the ability of mules to endure extremely cold weather as well as, if not better than, a horse. Ongoing studies at the Louisiana State University-Baton Rouge and the University of California-Davis are researching endurance and optimum loads for mules in harness.

Mules favored by the Lancaster County Amish are the result of mating a heavy-br[redacted]are to a Mammoth Jack. Offspring av[redacted]6-18 hands and 1,500-1,700 pou[redacted]

Mules have smaller feet than horses, an advantage for cultivation, especially in hilly terrain. Any mule owner will tell you that a mule is smarter than a horse because it won't do anything to endanger itself. This admirable trait gives mules their reputation for being stubborn.

Unlike a horse, a mule won't overheat or eat so much it will founder (go lame). A mule will thrive on coarser, cheaper, and less feed than is needed by a horse of comparable size. Mules live longer than horses and are more useful as senior citizens—a mule can be productive to 35 years of age, while a horse is "old" at 20.

Sellers and exhibitors of quality harness mules gather each July at Tennessee's Great Celebration Mule Show (Cathy Neal, P.O. Box 1010, Shelbyville, TN 37160-1010; telephone: 615-684-5915). The oldest consecutive draft mule show occurs each August at the Missouri State Fairgrounds, 2503 West 16th Street, Sedalia, MO 65302; telephone: 816-530-5600.

Mule Reference Material

Basic mule and donkey information is distributed by the American Donkey and Mule Society (Paul and Betsy Hutchins, 2901 North Elm Street, Denton, TX 76201; telephone: 817-382-6845), which publishes an informative quarterly magazine, *The Brayer*, and offers a 10-page catalog of donkey and mule literature. *Mules And More* is a monthly magazine edited by Sue Cole, P.O.Box 460, Bland, MO 65014; telephone: 314-646-3934. The definitive book on the history of mules in America is a two-volume set, *The Missouri Mule: His Origin And Times*, by Melvin Bradley ($35.00), from Extension Publications, 2800 Maguire Blvd., University of Missouri, Columbia, MO 65211; telephone: 314-882-7216.

Oxen

An ox is a castrated steer of any breed that has reached 4 years of age and has alertness, tractability, strong bones and muscles for power, and straight, strong legs for traveling. Breeds and crossbreeds vary in popularity according to local custom. New Englanders traditionally favor dairy breeds such as Holstein and dairy Durham, while others may prefer beef breeds such as Hereford and beef Durham, or perhaps such exotics as the giant Chianina or the miniature Dexter.

Oxen in North American can be traced back to French and German settlers. Oxen were once popular for field and forest work across North America, but now are found mainly in New England. Today they are regaining stature throughout the Nation, thanks in part to the efforts of teamster and trainer Drew Conroy, who teaches dairy farm management at the University of New Hampshire (Thompson School of Applied Science, 291 Mast Road, Durham, NH 03824-3562; telephone: 603-862-1024). Conroy advocates oxen as being inexpensive to purchase and economical to maintain, making them ideal for small-acreage farms.

Oxen are similar to mules in their ability to handle rough terrain, but do become lethargic in hot weather. The productive life span of an ox is little more than 10 years.

An excellent introduction to working oxen is *The Oxen Handbook* by Drew Conroy ($13.95), from Butler Publishing, P.O. Box 1390, LaPorte, CO 80535; telephone: 800-728-3826. Workshops in oxmanship are offered by Tillers International, Richard Roosenberg, Director, 5239 South 24th Street, Kalamazoo, MI 49002; telephone: 616-344-3233. Recognizing that not all potential teamsters care to travel to Michigan, Missouri Town 1855 Living History Museum sponsors a Tillers International workshop in Lee's Summit, Missouri, Heritage Museums and Programs, 22807 Woods Chapel Road, Blue Springs, MO 64015; telephone: 816-795-8200 ex. 1- 260.

Other Information Sources

Before acquiring horses, mules, or oxen as a power source, or as a means of increasing the value of your small-farm produce, first find out what's involved. You can increase your knowledge by joining an organization promoting the use of draft animals. Arrange to spend time working with a farmer or logger experienced in using animal power or sign up for a course on handling draft animals, and, of course, read the literature.

Additional sources of information include: Lance Gegner, Technical Specialist, Appropriate Technology Transfer for Rural Areas, P.O. Box 3657, Fayetteville, AR 72702, telephone 800-346-9140.

The Draft Horse Journal, Maurice Telleen, Editor, P.O. Box 670, Waverly, IA 50677; telephone: 319-352-4046.

Rural Heritage, Gail Damerow, Editor, 281-A Dean Ridge Lane, Gainesboro, TN 38562; telephone: 615-268-0655.

Small Farmer's Journal, L.R. Miller, Editor, P.O. Box 1627, Sisters, OR 97759; telephone: 503-549-2064.

Small Farm Today, Ronald E. Macher, Editor, 3903 W. Ridge Trail Road, Clark, MO 65243-9525; telephone: 800-633-2535.

Prepared by Gail Damerow, Editor, *Rural Heritage*, and Melvin Bradley (retired), University Extension, University of Missouri-Columbia for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244; telephone: 202-720-5245; fax: 202-205-2448; Internet: bkerr@reeusda.gov.

May 1995

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United States Department of Agriculture

Cooperative State Research Service

Office for Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Sheep

The relatively low investment and the natural, gradually increasing size of a flock may make sheep ideal for the beginning small and part-time farmer, according to Dr. Clair E. Terrill. An animal breeding specialist, Terrill has been watching the economics of sheep production for years. Terrill, who retired from the U.S. Department of Agriculture's (USDA) Agricultural Research Service, says "the future of sheep is bright."

There are several kinds of markets for small-scale sheep production in the United States: plain white wool, naturally colored wool, "freezer lambs," ordinary slaughter lambs, and sheep-milk products.

According to Paul Rodgers, director of producer services for the American Sheep Industry Association (ASI), the conventional approach of adding 20 to 100 ewes to a farm operation can be profitable. Other approaches require careful marketing and would be more difficult and risky. Still, they might also prove more profitable.

Experts say it takes about 2 hours of work per year to maintain one ewe and her offspring on farm pasture. Farmers caring for 20 to 100 ewes thus would add 40 to 200 more hours of work to their regular duties.

Advantages of Sheep

Where a farmer already has some beef cattle, there are economical and biological advantages to adding some sheep to the operation, Terrill says. Shared pastures can work well, he points out. Sheep tend to prefer finer plants and cattle the coarser ones.

Sheep can be fed out to market on forage alone if it is adequate, thus requiring little outlay for feed. There are many acres of idle pastureland that could be used for sheep—natural meadowland, waterways, woods, orchards, or abandoned cropland, for example—as long as the sheep are protected from predators such as coyotes or dogs.

For small-scale entrepreneurs who prefer the conventional production of slaughter lambs and wool, the ASI is a good source of information.

The *Farm Flock Budget*, one of the Updates that ASI sells, shows a typical budget for a flock of 104 animals—4 rams and 100 ewes. It shows annual costs and returns based on farm prices for slaughter lambs varying from $63 to $75 per hundredweight (cwt). At $75 per cwt, and assuming wool brings $10.10 per ewe, gross annual income per ewe can average $106.98—if 129 lambs can be marketed from 100 ewes. Variable costs, including feed and labor, range from $74.45 to $77.03 per ewe. Fixed costs, including interest, average $12.77 per ewe. This puts total costs at about $87 to $89 per head.

A list of educational materials may be obtained by writing or telephoning ASI at 6911 S. Yosemite St., Englewood, CO 80110-1414; 303-771-3500. ASI also sells subscriptions to its *Research Journal* and its *Sheep Production Handbook*. The journal is published three times a year and sells within the United States for $30 per year. The handbook sells within the United States at $35 each for one to nine copies. Additional pricing and foreign shipment information is available by contacting ASI.

Costs of raising fewer sheep than ASI's example are detailed in *Raising A Small Flock of Sheep in Ohio*, Bulletin No. 654, from Ohio State University and the Cooperative Extension Service (CES). Startup cost of a 30-ewe flock is estimated to range between $187.50 and $235.84 per ewe and the annual cash operating cost at about $51 each. The bulletin makes the point: "To make money with sheep, you must raise more than one lamb per ewe." Local county agricultural extension agents throughout the United States may obtain copies of the 12-page bulletin to answer public inquiries.

The bulletin costs 50 cents to the public.

Problems

Help in dealing with problems can be found in *Recommendations for a Sheep Management Program*, Publication No. 240, of the North Central Regional Office of the CES. The booklet has details on feeding and marketing as well as on common diseases and parasites. A copy may be obtained at no charge from CES offices at the State universities of Iowa, Illinois, Michigan, Indiana, Ohio, Kansas, Missouri, and North Dakota.

One money-saving suggestion: Boundaries are essential, but where predators or thieves are not a problem, inexpensive electric fencing may suffice.

Keeping Track of Prices

A weekly news summary on average lamb and wool prices may be obtained for $35 a year from ASI's *Lamb & Wool Market News*. A similar report may be obtained for $70 a year from USDA's Agricultural Marketing Service (AMS). The AMS Livestock Market News Service (LMNS), P.O. Box 9646, Washington, DC 20090-6456, will also send a list, at no charge, of the numerous markets from which instant livestock market news may be obtained by phone in 36 States. Lamb prices are usually highest in the spring. ASI also publishes an annual Situation and Outlook Report that notes prices, production, and projects trends.

Freezer Lambs

Farmers-suppliers of freezer lambs may earn more profits than the average. They may produce and sell lambs at premium prices somewhat higher than 75 cents a pound for an unbutchered lamb weighing up to about

110 pounds. Sales sometimes can be made directly to individuals of certain ethnic backgrounds. Such buyers are likely to do the [redacted]ng themselves. Slaughter can be done on the farm or at a local freezer-locker plant. Many freezer plants or slaughterhouses will have a butcher available for processing after slaughter. An ASI publication, *Marketing Out of the Mainstream*, explains many aspects of direct and niche marketing of lamb and wool.

Improving Earnings

An entrepreneur can increase earnings by improving flock quality. Higher quality means production of faster growing lambs and more lambs per ewe, for example. The ASI has organized the National Sheep Improvement Program (NSIP) to help producers find superior animals through a computerized evaluation system. Entrepreneurs who want to buy ewes or rams on the basis of NSIP data may do so if the producer from whom they buy keeps NSIP records. Details may be obtained from NSIP by contacting ASI.

Several informational videotapes devel[redacted] assist sheep producers are available f[redacted]coln University. For information contact: University Extension, Lincoln University, Box 29, Jefferson City, MO 65101; telephone 314-681-5544.

Dairy Sheep

Livestock expert Dr. W.J. Boylan of the University of Minnesota, telephone 612-624-1727, says sheep product opportunities are not limited to meat and wool. He suggests cheese making, noting that U.S. consumers buy as much as 45 million pounds of imported sheep-milk cheese annually. Sheep cheeses include Roquefort from France, Feta from Greece, Ricotta and Pecorino from Italy, and Manchego from Spain.

Dr. R.M. Jordan, retired from the University of Minnesota, in his article "Angora Goats: New Home in the North," compared the economics of ewe/lamb operations with Angora goat operations. He found that either can make a profit. But higher lamb prices may give the edge to the ewe/lamb p[redacted]r, he wrote.

[redacted]Boylan will provide lists of publications on sheep milking and cheese manufacturing, equipment, and sources of supply. Write to the Department of Animal Sciences, Peters Hall, Room 122, University of Minnesota, St. Paul, MN 55108. One commercial source of equipment and information on cottage industry cheese is the American Cheese Society, 34 Downing Street, New York, NY 10014; telephone 212-727-7939.

One U.S. dairy sheep pioneer believes that making hard cheeses is not the best option for American producers. He is Ken Kleinpeter (Hollow Road Farms, Box 93, Hollow Road, Stuyvesant, NY 12173). Ken Kleinpeter and his partner, Joan Snyder, concentrate on producing yogurt and fresh cheeses from their sheep's milk, because unlike hard cheeses, these products are not imported from overseas. Kleinpeter notes that there are many imported hard sheep's milk cheeses on the market in the U.S., which sell for less than a domestic producer's cost of production. This is because dairy sheep in other parts of the world produce several times what U.S. breeds are capable of, and many European countries subsidize their cheese producers.

Kleinpeter is within 3 hours of two major gourmet markets, New York City and Boston, MA. Unless a small-scale entrepreneur has a secure market, he cautions, a gourmet item such as sheep's milk yogurt may be a hard sell. It would be difficult to support such an operation in areas not within 2 to 3 hours of a major metropolitan market, he said.

Dairy Sheep People

A few people in 1987 formed the North American Dairy Sheep Association (NADSA), Route 3, Box 10, Hinckley, MN 55037; telephone 612-384-6612. NADSA has grown to 150 members in the United States, England, Canada, Australia, and India. NADSA held annual conferences until 1992, when conferees decided to meet every other year. Depending on status and location, annual dues range from $10 to $25 and include 3 or 4 copies yearly of the NADSA newsletter, *Dairy Shepard*. NADSA has books on sheep topics and videotapes of conferences, available at various prices listed by NADSA. Roger and Lucy Steinkamp have served as NADSA president and treasurer, respectively.

Colored Wool

While everyone knows about black sheep, not so well known are those that produce blond, red, beige, brown, silver, and grey wool.

Breeders of such relative rarities usually belong to the Natural Colored Wool Growers Association (NCWGA), at P.O. Box 487, Willits, CA 95490.

NCWGA spokesperson Carole Sanders says the best fleeces of natural colored wool command premium prices. New colors are being developed, fiber diameter is being refined, and the staple length is increasing.

Sanders also says undyed, unprocessed, natural colored fleece is popular with the fiber industry, weavers, and felt markets. There is a growing recognition of colored wool in boutique clothing manufacture. So far, however, no major woolen mills handle colored wool because of the wide variation in its grade quality and color. All countries are trying to commence colored woolprocessing on a large scale commercial basis, but none have succeeded.

Sanders suggests seeking an outlet for colored wool with schools that have classes in fiber and textile arts.

Another approach: Attend the school and learn to produce yarn, or find spinners who want exotic fleeces.

Besides promoting colored wool sheep classes at fairs, NCWGA publishes a directory and a national newsletter, *The Marker*. One of NCWGA's objectives is to increase flock quality through flock and breeding line registry.

Prepared by George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address is:

Ag Box 2244
Washington, DC 20250-2244
Telephone: 202-401-1805
Fax: 202-401-1804

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Slightly Revised July 1993

The Small Dairy Resource Book

Information sources for farmstead producers and processors

By Vicki Dunaway

"Your search is over. A comprehensive list of resources for small dairies, along with clear concise reviews. *The Small Dairy Resource Book* will help you find what you need and tell you how to get it. This book will save you hours of searching and direct you to books you may have never found otherwise. It is an investment that you will turn to time and again."

Paul Hamby
Weatherby, Missouri
Dairy Equipment Dealer and Alpine dairy goat producer

The Small Dairy Resource Book is an annotated bibliography of books, periodicals, videos and other materials on farmstead dairy processing. The *Resource Book* is intended primarily for the family farmer who is interested in producing value-added dairy products on-farm, but also will provide Extension agents and other agricultural educators with a cohesive guide to information sources on small-scale dairy processing.

Topics include:

- cheesemaking
- ice cream
- dairy processing
- dairy animals
- business & marketing
- butter
- other dairy foods
- food safety
- feeds & grazing

The appendix lists suppliers, consultants, dairy processing courses, related organizations, interesting Web sites and more.

The Small Dairy Resource Book was developed as a product of the Hometown Creamery Revival project, sponsored by the Southern Sustainable Agriculture Research and Education (SARE) program. It is published by the Sustainable Agriculture Network (SAN), the outreach arm of SARE.

To order, please send a check or purchase order for $8 to:

Sustainable Agriculture Publications
Hills Building, Room 12
University of Vermont
Burlington, VT 05405-0082

Be sure to include your name, address, phone number and the name of the publication you are ordering.

To order SAN publications by credit card (VISA or MC) please call (802) 656-0484.

For further information contact: lhendric@zoo.uvm.edu

Visit the SAN publication Web site: www.sare.org/san/htdocs/pubs/

and The Hometown Creamery Revival: www.metalab.unc.edu/creamery

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Published by the Sustainable Agriculture Network (SAN), the national outreach arm of the Sustainable Agriculture Research and Education (SARE) program, with funding by USDA's Cooperative State Research, Education and Extension Service.

Also available at: www.sare.org/publications/hogs

SUSTAINABLE AGRICULTURE NETWORK
THE NATIONAL OUTREACH ARM OF USDA SARE

Profitable Pork: Strategies for Hog Producers

Iowa producer Tom Frantzen employs pasture and cropland in managed grazing strips that allow him to produce a 30-pound feeder pig "for half the price you can indoors."

– Photo by Prescott Bergh, courtesy of Minnesota Department of Agriculture

FOR 14 YEARS, NEW HAMPTON, IOWA, FARMER TOM FRANTZEN reared hogs from farrow to finish, alternating the 1,200 hogs he raised annually from closed buildings each winter to pastures each summer. The buildings, where Frantzen raised the sows in pens with slatted floors, were an unpleasant winter home. In the cold months, the hogs did not gain weight very efficiently and behaved aggressively.

Pig waste fell through the slats into a pit. Frantzen pumped and disposed of manure on his crop fields, where he grew corn, soybeans and hay. "Our manure management was haphazard," he recalls. "I was both over-applying and under-utilizing those nutrients."

Frantzen had to race to the finish line every season. And while he always got everything done, reaching that point was difficult and stressful. In 1992, he decided to create a more environmentally sound system that would be both profitable and allow him to spend more time outside. The linchpin: a combination of pasture and housing that brought his livestock and crops into sync.

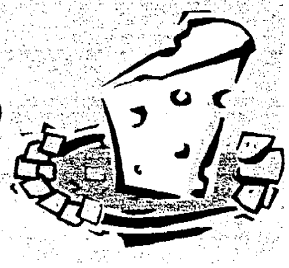
Today, permanent pastures, rotating strip pastures and cropland offer him a plethora of options for feeding pigs, including having them "hog down" – or self-harvest – crops. As they move across the fields, the pigs spread their own manure. Deep-straw bedding in huts or sheds provides warmth and exercise for the animals and produces a pack of solid waste that is far easier to handle and spread on crop fields than the slurry from Frantzen's former liquid manure system.

The new life cycle worked. After receiving a producer grant from USDA's Sustainable Agriculture Research and Education (SARE) program to document the economics of farrowing hogs on pasture, Frantzen found he could halve his feed costs compared to his former indoor/outdoor system. The SARE grant "showed we can produce a 30-pound feeder pig for half the price that you can indoors," he said.

Special Sample Issue

Cream Line

a new voice for little dairies



Making Profitability Part of the Plan

"We came from a generation who thought it was a sin to make money. We had to get past this mental block before we eventually learned that in order to do the things we wanted to do we had to be able to make a living, and that means making enough profit to pay the bills." So began cheesemaker Alyce Birchenough during the Southern SAWG (Sustainable Agriculture Working Group) conference session by the same name as the title of this article.

Alyce and her husband Doug Wolbert operate "Sweet Home Farm" in – where else? – southern Alabama, on the "Redneck Riviera," near Gulf Shores. Although Alyce's cheesemaking began as a hobby after Alyce received her dreamed-for cow as a wedding present, over the years the couple has developed a strong, stable business selling farmstead cheeses from their on-farm store, made from milk produced by a herd of only 10-12 Guernsey cows. They began farming in Michigan, but got tired of shoveling frozen manure, so picked up the whole operation and moved to the balmier climate of Elberta, Alabama. While the two were selling milk to a co-op, they calculated their milk production cost at $11.68/cwt. At $17/cwt from the co-op, they weren't making a lot of money. Adding value by making cheese offered them an opportunity to gross between $40 and $70/cwt, a noticeable improvement.

The couple built their processing business over time, having to take off-farm jobs in the beginning to save enough money to capitalize the business. Alyce advises anyone interested in value-added processing to milk to start small, and start with the inspectors. At Sweet Home they must pass inspection on three different levels – county, state and federal. The inspectors signed off on their plans before they began building; this helped them to avoid problems later. For a cheese vat, Alyce and Doug converted a 200-gallon ice bank cooling tank, in which they can make cheese from three days' production of milk. The conversion consisted of removing instrumentation and the copper coils for cooling, and welding shut any openings that resulted. Then hot water pipes were installed in the jacket to allow for heating the milk. This was a cost-effective way to obtain a cheese vat, but appropriate sized equipment was not easy to come by. Alyce suggests looking for equipment in the Midwest, while noting that it took eight years to find her 30-gallon pasteurizer. They made their own cheese presses using Corian (the countertop material) arms. Bleach bottles filled with water are hung from the arms to apply weight to the presses, an inexpensive and flexible sys-

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Do you know the singular, gender-neutral term for "Cattle"?

See page 2.

February 8 -- Small Dairy Resource Book Released!

The first major publication of the Hometown Creamery Revival, *The Small Dairy Resource Book*, has just returned from the printer. To order, send $8 check or money order to Sustainable Agriculture Publications, Hills Building, Room 12, University of Vermont, Burlington, VT 05405-0082; or call (802) 656-0484 to order with Visa or Master Card. Questions? E-mail lhendric@zoo.uvm.edu for more information.

About *CreamLine:*

This issue is a small sampling of the contents of the first four issues of *CreamLine*. Issue 1 is 8 pages, and issues 2, 3 and 4 each consist of 16 pages. Regular additional features include a chef's column, book reviews, notification of cheesemaking and other dairy processing classes and conferences, and classified ads. *CreamLine* subscribers also receive occasional "surprise" bonuses. Individual back issues may be ordered as part of your subscription.

Issue 1 -- Spring 1999

Making Profitability Part of the Plan
Tour de France for Goat Dairying
Northeast Value-Added Dairy Project
ACS Stands Up for Raw Milk Cheese

Issue 2 -- Summer 1999

Ice Cream for Fun and Profit
So This is Retirement? (Gwamma's dairy goat farm in Ohio)
Chef's Corner - Ricotta cheese
Ice Cream Recipes (chocolate cappuccino gelato, butter pecan, goat milk ice cream, more!)
Book Reviews - five ice cream books
Do Weeds Make Good Feeds?

Issue 3 -- Fall 1999

Raw Milk Cheeses Endangered?
The Other Dairy Animal - features two sheep dairies
Friesian sheep and minor breeds
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Practical Sheep Dairying
Feta Cheese recipe
National Farmers Union Ethnic Cheeses Project

Issue 4 -- Winter 2000

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Dairy Sheep, Other Breeds
Titratable Acidity and pH
Chef's Corner -- Butter
Devonshire Cream and Whey Butter
Butter Resources

CreamLine
P.O. Box 186
Willis, VA 24380

Oregon Country Beef: growing a solution to economic, environmental, and social needs

an interview with Doc and Connie Hatfield by Peter Donovan

BROTHERS, OREGON—Futurists and students of paradigm shifts have observed that the important and significant changes do not originate in the center, but along the edges—of knowledge, of belief, of institutional influence, of economic security. In the following interview, Doc and Connie Hatfield tell how and why the Oregon Country Beef cooperative started, what its goal was, and why it became successful.

In the 1960s, the Hatfields moved from Enterprise, Oregon to a small irrigated ranch in Montana's Bitterroot Valley. Doc's large-animal veterinary practice was mostly occupied with the problems caused by inappropriate genetics and animal management. Connie tended a herd of 150 cows, which depended on heavy inputs of labor, fertilizer, and electricity to pump water to raise forage. In 1974, costs were way up and 500-pound steer calves were down to 28 cents a pound.

They began seeking a place where cattle and land could function together in a more profitable and sustainable manner. In 1976 they bought a 25,000-acre ranch in the juniper-clad hills north of this high desert junction with its gas station, highway maintenance division, and one-room elementary school. Their phone was an 11-party radio phone that didn't always work. Their two children went 12 miles to school in Brothers.

An hour away, the town of Bend was filling and spilling with urban people who cared about health, diet, and the natural beauty of the surrounding rangeland.

Nine years later, in 1985, things still weren't very encouraging in the cattle business.

CONNIE: We were going broke. We were borrowing from the PCA [Production Credit Association] and they gave us a bit of a lecture.

DOC: Cows were our lifeline. We thought the beef industry was going to be a severely declined, marginal business for a long time.

CONNIE: Doc would tell me it rained in Brazil and that made the price of cattle go down. What does that have to do with what we're doing? Just nothing. We needed to do something different.

We'd had six years of down markets. I said to Doc, I don't think we could get our payment made this next year. All you heard was, don't eat red meat, it's bad for you.

FROM THE FEED TROUGH ...
by Woody Lane, Ph.D. © 1998

OPTIMISTICALLY SPEAKING

As I write this, the Chicago Cubs are contending for the wildcard spot in the National League playoffs. The Cubs in the playoffs?!? Well, if the world has gone topsy turvy, I suppose that I can write about almost anything, even a little shameless commentary.

Like about grazing and the meaning of life.

Management Intensive Grazing is all the rage now, at least among those who do it, but not among scientists. MIG trials are not easy. Researchers trying to measure the effects of MIG are a little like the blind men in the fable who tried to "see" the elephant by feeling different parts with their hands — they all came away with strong impressions but no one grasped the entire picture. Graziers, on the other hand, are *forced* to see the entire picture; they have to live with it.

In research, scientists routinely compare grazing animals against confinement animals — growth, milk production, meat quality. Surprise, surprise — MIG never looks great in research. Simple reason: animals fed grain will almost always outperform animals on pasture. Agronomists see equivalent results with their forage plants. Experimental plots composed of pure species are carefully groomed, highly fertilized, and cut at precise intervals. Plants in grazed swards, on the other hand, face a tougher life: they get cut at odd times, they are under greater water and heat stress, and they get stepped on by [illegible]e animals. Plant for plant, grazed forages will almost always seem [illegible]productive for longevity or yield than mechanically-harvested

But those results have limited value. Like the blind men, they miss the whole story, and it's the whole story that matters to a grazier. MIG is more than just giving animals a daily allotment of forage and moving them around from paddock to paddock. MIG is really about sunlight — about trying to maximize the amount captured by forages and ultimately sold as animal products.

To appreciate and practice MIG, a grazier must overcome a common mental hurdle: to think in terms of *output per pasture* rather than *output per animal*. Most research, unfortunately, evaluates treatment response as output per animal. Frankly, I can always increase animal output by feeding more grain. MIG tries to maximize production per acre, not per animal. But producing more pounds of meat or wool or milk per acre means increasing the *efficiency* of harvesting sunlight through the solar panels of forages. And sunlight is cheaper and less risky than grain.

MIG is a way of thinking, *a strategy of intensively managing resources*. MIG attempts to balance the entire system. It requires skill and knowledge and a shrewd analysis of risks. It aims for a sustainable way of life, which is also a sustainable business.

Profit is a funny animal; it can be real or it can be a mirage. I can usually devise livestock budgets which demonstrate that confinement systems will make a larger profits than grazing systems. Animal productivity is almost always higher. But science has [illegible]quivocally demonstrated that sheep and cattle have legs and that [illegible]ure and bedding do not. For all confinement systems, *someone* to haul feed on a daily basis, and *someone* has to haul the manure and bedding and find a place to put it. *Someone* has to build barns and confinement pens, maintain equipment for feeding and harvesting, erect structures for feed storage, and deal with the inevitable health problems caused by reduced ventilation and increased crowding. It's just like a treadmill.Similarly, I can devise crop budgets which demonstrate that annual crops — like corn or soybeans — will outyield perennial forages and often will return a larger profit. But what about risk? Where in those budgets is a line item for the lack of sleep due to worry? How often do you have to replant corn with a short-season variety because the spring was too wet or too cold? Or fear a late freeze or an early freeze or a hailstorm? These may be unpredictable acts of nature, but we know that they *will* occur — we just don't know when. But these problems are *not* catastrophic for grazing systems based on perennial forages like orchardgrass or fescue. Sure, harsh weather can cause a loss of 20% or more of a rotation's yield, but never 100%, and we can adjust our stocking rate or supplementation and keep going. Nature may be predictably unpredictable, but perennial forages will not lose everything to its whims.

Clever. And good business.

But no successful business runs itself; it's people who make things happen. Shrewd, skillful people who recognize a good opportunity and follow it towards the future. For example, I know a fellow here in Douglas County, a grazier, who is really part of this future. He runs 500-1,000 head of cattle, a small flock of sheep, and some goats. He owns the sheep and goats but not the cattle. Every spring he receives truckloads of heifers and steers from eastern Oregon under contract — he gets paid for pounds of gain or on a per month basis. He owns or rents the land and sells the forage. Actually, he raises forage on that land and sells his ability to provide high quality feed and good animal care. He moves cattle every 12-24 hours and creates pastures on the fly with electric fence. He doesn't own a tractor or a large barn. He runs his entire operation with an ATV, a pickup truck, two stockdogs, and a calculator. Especially the calculator. He knows his costs of production as precisely as any corporate accountant.

When he walks his fields — and I've accompanied him many times — he speaks excitedly about grazing. Not about a government program or a new piece of heavy equipment — but about the land itself, the pastures, the forages. He describes how certain grass varieties are outcompeting the thistles, or how phosphorus levels in the soil are increasing, or how he extended his pasture growth into the dry summer by building low dikes to retain runoff water. There is a justifiable pride here. He is running a thriving business.

This is not the traditional image of a farmer. That image was described by Edwin Markham in his poem "The Man With The Hoe":

Bowed by the weight of centuries he leans
Upon his hoe and gazes on the ground,
The emptiness of ages in his face,
And on his back the burden of the world.

That man was definitely not a grazier.

Woody Lane is a livestock nutritionist in Roseburg, Oregon. He teaches Forages and Livestock Nutrition courses and workshops in the US and Canada, and operates an independent consulting business "Lane Livestock Services" 240 Crystal Springs Lane, Roseburg, Oregon 97470, USA.
Phone: (541)-440-1926 Fax: (541)-440-1007 E mail: wlane@rosenet.net

FROM THE FEED TROUGH ...
by Woody Lane, Ph.D. © 1999

NOT HORSING AROUND

Last spring I visited the beautiful area around Lexington, Kentucky and spent time looking at, well, horses. And pastures. I saw fields of early-spring grass with lots of horses playing and galloping. But something intrigued me. At a couple of those horse farms, the owners spoke reverently about their forages. One forage, actually — Kentucky Bluegrass. They said that their horses did wonderfully on it; that it was the most nutritious grass in the world; that it was the basis of their entire farms. Hmm, I don't believe in panaceas, but I also don't argue with success, especially when the successful people are such considerate hosts. So I kept my own counsel and ruminated about it for a while. After considering all sides of the issue, I finally understood why KBG is so important to those farms. It's not the nutritional value. The real reason is far more basic and profound than that. In fact, the reason demonstrates how on a farm, *all the pieces*, including forages, must fit together to make a successful operation.

First, a textbook description of Kentucky Bluegrass (*Poa pratensis*): KBG is a low-growing, persistent, sod-forming, winter-hardy, cool season perennial grass that grows well throughout the northeast and north-central U.S., often in conjunction with white clover (*Trifolium repens*). KBG has slim leaves with a characteristic boat-shape tip. Young shoots are folded. KBG has shallow roots and spreads by rhizomes. It responds well to good fertility, although other forages will easily out-yield it, like the ryegrasses or orchardgrass or timothy. KBG also is quite seasonal: its main growth occurs in the ring and fall. During its unproductive period in midsummer, many r grasses will grow better, such as orchardgrass or tall fescue.

Nutritionally, KBG is nothing to write home about. Like any other grass, KBG is highly nutritious when the leaves are young and vegetative, but its nutritional value drops off rapidly as it matures. And remember that horses — even thoroughbred racehorses — don't have the high nutritional requirements of dairy cows or lactating ewes raising twins. Nearly any reasonable grass hay may be good enough nutritionally for these horses.

KBG excels, however, in one very critical trait. KBG can withstand close grazing well, and it will survive and flourish under set-stocking conditions. This, of course, is one of the main reasons why KBG is so common on many farms around the country.

But a farm is not a farm is not a farm. Kentucky horse farms are quite different from New York dairy farms or Oregon sheep ranches. Kentucky horse farms specialize in raising fine thoroughbred animals. Each horse can be worth hundreds of thousands or even millions of dollars, These farms own their own horses or board horses owned by others. They rear these animals, breed them, train them, and sometimes, they race them.

All these farms contain rolling pastures where horses can run and graze. Their forages must provide feed for grazing, of course, and some hay. KBG hay is no different than other grass hays: it can vary from good to poor, depending on the date of cutting and the rainfall. And KBG is not waterproof — rain will soak it as much as any other grass.

But think about this: what is the real *product* sold by these horse s? And to whom?

These farms don't sell hay. They don't sell feed. Yes, they do sell horses (at least the ones they own). But their real product is something that few other livestock farms can match — they sell an *image*. They sell the smell of liniment and leather; they sell the chance for a horse owner to lean over the railing at a track and watch horses run training laps, blowing steam in the early frosty mornings.

For some markets, image is nearly everything. Remember the *Marlboro Man* or *Joe Camel* — two of the most successful advertising images in history? One portrayed dreams of the great glowing West; the other suggested an urban cool, the cocky boldness of James Dean. We may not all support the products they represented, but we can't deny how they increased sales.

So for those Kentucky horse farms, who is their market? Investors. Investors who have lots of money. Investors who own million-dollar horses. Corporate executives, politicians, lawyers, doctors, investment bankers, professional athletes. And they all must find places to board their horses. Places that will train them, run them in races, and give the chance for a big payoff in the winner's circle.

These are city folk who will come out to the farms on weekends to watch their horses gallop through the pastures and maybe "talk shop" with the trainers. They want to see beautiful colts and fillies playing in lawn-like paddocks. They want to buy into an image.

And these horse farms provide that image. Their investors aren't interested in "grazing cells" or intensive grazing or forage management or the cost of hay. Let's ignore the clubhouse complaints about the price of feed. These farms don't need high-yielding pastures to produce hay. They can buy any hay they need — paying an extra $30 per ton is trivial when compared to getting a contract to board a million-dollar horse.

Therefore, high-yielding forages like orchardgrass or tall fescue would not suit these farms. These are bunch grasses which require careful grazing management, which is not easily possible with horses. No trainer would risk crowding thoroughbred racehorses tight enough for controlled grazing — the animals would hurt each other or run into fences. And using cattle or sheep to graze pastures is not an option, not on these farms, not with their image. But without good grazing management, bunch grasses would become clumpy and rank and weedy. Potential investors don't want to see their horses struggling through a muddy field of turnips.

But KBG will do the job. It forms a tight sod that will hold down the mud and withstand the pounding of flying hooves. It persists year after year even when continuously grazed by horses, which are notorious for destroying pastures. KBG can provide green, manicured paddocks even though it doesn't yield well under those conditions or provide excess nutrients for the animals. No wonder why my hosts praised it. Better than any other forage, it helps them sell an image.

Young colts galloping on a spring green pasture. Manes flying in the wind. The promise of great races. Crowds rising to their feet as horses thunder into the final stretch.

Kentucky Bluegrass.

Woody Lane is a livestock nutritionist in Roseburg, Oregon. He teaches Forages and Livestock Nutrition courses and workshops in the US and Canada, and operates an independent consulting business "Lane Livestock Services" 240 Crystal Springs Lane, Roseburg, Oregon 97470, USA.
Phone: (541)-440-1926 Fax: (541)-440-1007 E mail: wlane@rosenet.net

FROM THE FEED TROUGH ...
by Woody Lane, Ph.D. © 1997

ANIMALS AND ACRES

In every grazing workshop, someone asks, "How many sheep can I put on my pasture?" Or "How much space does my flock need for grazing?" Or "How long can my flock graze in a 10-acre field?"

These are really all variations of the same question. Let's discuss two principles of pasture growth and then describe a method for calculating a reasonable answer.

Principle #1: Forage grows in stages. When grasses and clovers first come out of the ground, the tiny plants spend their time and energy collecting sunlight, transporting sugars down to the roots, and constructing more solar panels, which we call leaves. Because young plants only have a couple of scrawny leaves, this process takes time. Once enough photosynthetic machinery is in place, however, the carbohydrate assembly line kicks into high gear. Then, with enough sunlight and root-supplied nutrients, these plants make lots of sugars and protein, build more leaves, and grow profusely. Finally the forage plants become tall enough to shade out their lower leaves, which die. New plant growth then just about equals senescence, so the net effect is little or no additional high quality tissue. From a graziers perspective, those plants may be healthy but the pasture is actually gaining very little nutritional mass.

These stages, or "phases," are called *Phase I, Phase II, and Phase III*. For any pasture, we can identify the phase by measuring the amount of dry matter in an acre. As I described last month, pasture height is not the best measure of growth. We really need to describe a pasture in terms of pounds of dry matter. Pastures with less than 1,000-1,200 lbs/acre are in Phase I. Pastures containing more than 3,500-4,000 lbs/acre are usually in Phase III. Everything in between is Phase II.

These are rough estimates, of course. Different types of pastures have different numbers. Height can be misleading. Species that specialize in prostrate growth — like Kentucky bluegrass, Gala grazing brome, and some varieties of white clover, birdsfoot trefoil, and perennial ryegrass — contain more of their biomass in the lower inches of growth than upright forages like tall fescue, orchardgrass, and Ladino clover.

Phase I is a preparatory phase, a lag phase. Plants in Phase I are highly nutritious, but their growth is very slow. Phase II is the grow-like-gangbusters phase. Plants in Phase II are large and robust and still have high nutritional value. Phase III is the inefficient, too-tall-for-good-grazing phase. Hay is almost always Phase III forage. But the initial questions were about grazing, which is definitely not the same as making hay.

In a system of sustainable, controlled grazing, we'd ideally like to keep our pastures oscillating between the high and low ends of Phase II. If possible, we should put animals into a paddock *just before* the plants reach Phase III and take them off *just before* the plants are reduced to Phase I.

Principle #2: My "Five Day Rule": Don't keep animals in a tightly fenced paddock for more than five days. Reason? Because grazing animals eat the most delectable forages first. Consider some of the new, improved forage varieties — bred for palatability and quick growth. Five days after they are munched, if given water and nutrients, these plants will begin to send out new shoots. These are *precisely* the forages that we want in our pastures. But if our sheep are still inside that paddock, what do you think that they will eat? Animals spend all day searching for those new shoots. Yummy! But re-defoliating plants so quickly puts them under severe stress, which ultimately exerts a steady selection pressure *against* the very species that we want to encourage. The answer is really simple: move livestock *before* they can eat those new shoots.

Now the main question: how large an area for our sheep? Let's approach the problem in discrete, logical steps: How many sheep are in the mob? How much do they weigh? How much do they eat (dry matter intake — DMI)? And how much forage dry matter is available for grazing? Then we match the answers, find a balance, and stir in the 5-day constraint.

Our hypothetical flock consists of 25 adult Targhee ewes and their month-old lambs, mostly twins. Let's guess that the ewes weigh approximately 175 pounds. A reference table in the SID Sheep Production Handbook lists an expected DMI at 6.6 lbs, which is 3.8% of their body weight. But that DMI is based on feeding some grain. In reality, I would expect that ewes on pasture would consume (and also stomp and soil) approximately 5% of the body weight, or maybe even 6%. Let's use 5% for this example, which means that the total daily DMI of the entire flock, including stompage, would be 219 pounds (= 25 x 175 x 0.05).

On the pasture side of the equation, our field contains smooth brome, orchardgrass, and white clover, with 2,800 lbs of total dry matter per acre. We'd like to move the sheep off the pasture at the low end of Phase II, so let's decide to leave a residual of 1,200 lbs. By subtraction, therefore, our pasture contains 1,600 lbs of available dry matter. If our ewes use 219 lbs/day, one acre of this pasture will last the flock 7.3 days (= 7 days, 7 hours, 20 minutes, and 30 seconds). This is longer than our 5-day rule. One acre, therefore, is clearly too large.

In five days, our sheep would use 1,095 lbs of DM (= 5 x 219), which is available from 0.68 acres of pasture. But if we wanted to move our sheep after only 3 days (more reasonable) and still leave 1,200 pounds of residual, then our flock would need only 657 lbs of DM (= 3 x 219), which equates to only 0.4 acres. For a three day movement, that's where we could put our fence.

Pasture management: fire up the calculator, move fence, and watch the sheep graze. But one word of warning: although your attention may be focused on pasture weights and grazing areas, just remember that before you move the electric fence, first turn it off.

Woody Lane is a livestock nutritionist in Roseburg, Oregon. He teaches Forages and Livestock Nutrition courses and workshops in the US and Canada, and operates an Independent consulting business "Lane Livestock Services" 240 Crystal Springs Lane, Roseburg, Oregon 97470, USA.
Phone: (541)-440-1926 Fax: (541)-440-1007 E mail: wlane@rosenet.net

FROM THE FEED TROUGH
by Woody Lane, Ph.D. © 1997

OPENING A DOOR

Spring in Douglas County, Oregon: the hills are a vibrant, rich green, as green as the fabled Irish countryside, and the valleys are filled with a lush carpet of grass and clover growing at 80 lbs. per day or more . . .

Huh? Isn't forage growth measured in inches? Well . . . not here, not during the grazing season. Inches are too imprecise; inches don't give us information about forage density, maturity, or carrying capacity; and inches can't be applied to anywhere else. Also, animals eat *pounds* of feed, not inches. *Pounds* are the numbers we need for good grazing decisions. So let's look at forage management in a new way — by the numbers.

Whenever we want to formulate a grazing plan for a specific paddock, *before we put the animals on it*, we should always do one thing first — we should estimate how much forage is really out there. This is not hard. Just take a sample (or a few samples, as defined by your time and energy). Here, we use a simple wooden frame, two feet long and one foot wide (inside diameter). We place the frame on the ground and cut off everything inside it with a pair of hand-shearing blades. Right to the ground. Then we weigh the sample, dry it in a regular oven or microwave until it is dry, and weigh it again. We stop drying it when its weight stabilizes, which occurs after a few hours in a warm oven (but not too hot and not overnight), or after an initial 5-minute period in a microwave plus successive 2-minute periods. Remember to put an open glass of water in the microwave. A tip: first warn the rest of the family about your intentions. The fragrance of drying forage should not catch them by surprise.

Our sample gives us the total amount of forage dry matter in two square feet. For example, if our dried sample weighs 0.16 pounds (we may actually use a gram scale, convert to pounds, and correct for the weight of the paper bag. Everyone does it slightly differently), this equates to 0.08 lbs/square foot (= 0.16 ÷ 2). This is a nice value but not really very useful, unless we are raising a herd of slugs. But since an acre contains 43,560 square feet, we can convert this number to a total dry matter per acre of 3,485 pounds (= 43,560 x 0.08). Now *that's* a number that we can use.

It's a good beginning. Now we must adjust this value for the realities of grazing, because we never let our animals eat *all* the grass in a paddock, not unless we want to batter our fields into a desert. Generally, we open a gate, allow the animals into a paddock, and then pull them off when they graze it down "low enough." This leftover "residual forage" is the amount remaining when the animals leave.

So now we have a fundamental equation for grazing: *the amount of forage available to our grazing livestock is the difference between the total forage and the residual forage.* This amount is called, not surprisingly, the "*available forage*." Therefore, good grazing management is quite simple: we just need to measure the total mass, decide on the residuals, and let the sheep and cattle do the rest. There are, of course, a *few* other details . . . but we'll get to some of them later.

Let's return, for a moment, to our much-maligned height measurement, because height is what we see. In New Zealand, where farmers have made a few zillion measurements on forage height and mass, they've devised a general rule-of-thumb for their type of pasture: the lowest inch of forage contains approximately 1,000 pounds of dry matter per acre, and every additional inch contains 500 pounds (translated from the metric). Now don't rush off to take those height measurements just yet — remember *that those numbers apply only to a very specific type of pasture managed in a very specific way.* Those numbers were derived from well-managed New Zealand pastures composed of perennial ryegrass and white clover, pastures which are very dense, heavily fertilized, and intensively grazed.

Frankly, very few pastures in North America are like that. Our pastures often differ in forage species, grazing management, and fertilizer use. The New Zealand rule-of-thumb, however, gives us a handle, a rough idea about a possible relationship between forage height and forage mass.

We've checked the accuracy of this relationship here in Douglas County, in western Oregon. Many of our improved pastures seem to average 800/300 — that is, 800 pounds in the first inch and 300 pounds for every inch above that. Eight inches of forage clearly means different things in different places: 4,500 pounds/acre on lush New Zealand-type pastures and 2,900 pounds/acre on many local pastures.

Why? Well, our local pastures contain more than perennial ryegrass and white clover. They also contain orchardgrass, tall fescue, bentgrass, subclover, foxtail, and an occasional thistle or two — and these species have different growth forms than perennial ryegrass. Also, we haven't fertilized our pastures as heavily or grazed as tightly as many New Zealand farmers, so our swards aren't as dense. This 800/300 relationship is only a general average, however, and there is quite a bit of variation. Some pastures probably range from much less than that up to, in the very best swards, nearly 1000/500.

So what does this mean? Simple. Pasture weights give us information about forage density and growth. Weight (mass) values allow us to discuss pasture management intelligently with *anyone* in the world and learn from *their* management. For example, if I hear that a successful Irish sheep farmer puts his lactating ewes onto a perennial ryegrass paddock at 3,500 lbs/acre and aims for a residual of 1,200 lbs/acre, I know exactly what he did. I also can assess his management in terms of my own pastures.

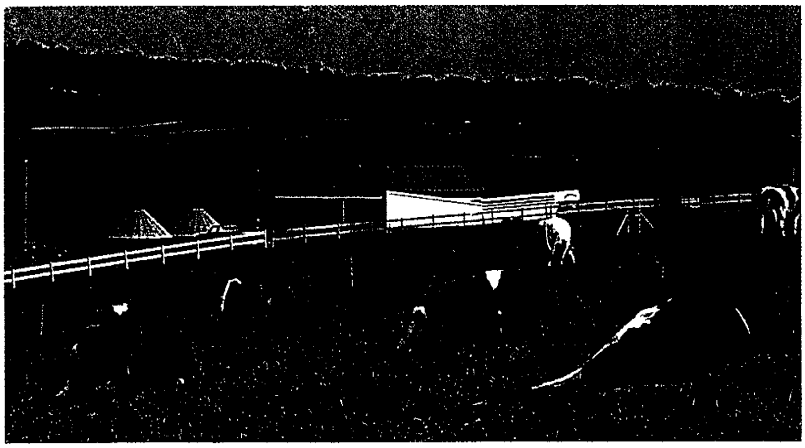
And more than that — with those weight numbers, I can infer how he managed his livestock, what grazing options he faced in that paddock, and how that sward may respond to the next grazing cycle. Compared to that, inches, ahem, just don't measure up.

More next month . . .

Woody Lane is a livestock nutritionist in Roseburg, Oregon. He teaches Forages and Livestock Nutrition courses and workshops in the US and Canada, and operates an independent consulting business "Lane Livestock Services" 240 Crystal Springs Lane, Roseburg, Oregon 97470, USA.
Phone: (541)-440-1926 Fax: (541)-440-1007 E mail: wlane@rosenet.net

MANAGING GRASSLANDS FOR PROFIT

A guide to grazing management in the Southeast



Produced by
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American Farm Bureau Federation
American Farmland Trust
National Association of Conservation Districts
National Association of State Conservation Agencies
National Cattlemen's Beef Association
Southeast Conservation Buffer Campaign
Mississippi Chemical Corporation
Tennessee Valley Authority

Well Managed Grasslands = $$$$

Grazing lands are a very important resource in the eastern part of the United States. Thousands of farming operations in the Southeast depend on grasslands for their livelihood.

Grazing lands cover more than 34 million acres or 10 percent of the land in nine southeast states. The value of the forage alone adds $4.4 billion to the economy of these states. Grazing lands provide the forage that is the heart of the area's beef, sheep, goat, dairy and horse operations.

Whether you farm full-time or part-time, have numerous livestock or few, good grazing management can improve your bottom line. It also helps protect natural resources, improves water quality, benefits tourism and enhances the environment.

Grassland management is more than just moving livestock from one pasture to another. It involves choosing and managing forages, soil fertility, fencing, water development and distribution, harvesting, resting grasslands and much more.

This booklet discusses each of these subjects and takes you through a step by step process to develop a successful grazing plan that will work for you. It shows you options for grassland management, including different grazing systems.

Many producers are interested in taking care of grassland resources, but admit the bottom line is economics. Producers who have implemented some or all of the grassland management practices in this book have increased their profits.

To help producers improve grazing management, a national effort was started called the Grazing Lands Conservation Initiative (GLCI).

This initiative was started by a group of producers representing the following agricultural and conservation organizations:

American Farm Bureau Federation

American Sheep Industry

American Forage and Grassland Council

National Association of Conservation Districts

National Cattlemen's Beef Association

Soil and Water Conservation Society

The goal and purpose of this initiative is to ensure that technical assistance in proper grassland management is continued and enhanced.

For more information about grazing management, contact your state's Grazing Lands Coalition or local USDA Service Center.

Business AGRICULTURE

It's the -- goat -- cheese

Sloughhouse family taps into growing niche

By Cathleen Ferraro and Clint Swett -- Bee Staff Writers
Published 5:30 a.m. PDT Tuesday, November 20, 2001

The Mitchell family faced an unusual dilemma in the 1970s -- give up the goat they were raising or sell their Southern California home and keep the goat.

Linda Mitchell and her son Wayne give their goats a treat of weeping willow leaves at their Sloughhouse farm. They raise about 100 goats and milk 30 of them.

Sacramento Bee/Leilani Hu

They dumped the house, a decision that has had long-lasting changes for the family and, many years later, inspired the launch of a family-run goat cheese business, Mitchell's Melody Dairy.

Today, the small company in Sloughhouse is one of about 15 goat-cheese makers in California -- and the only such producer in Sacramento County.

These companies are finding growing demand for their product and increasing competition from experienced European cheese makers that have aggressively sought market share.

The Mitchell family -- Linda and Rowe and their six adult children -- started raising goats in the early 1970s while living in Simi Valley, outside Los Angeles. The inspiration was more novelty than business: Oldest son Rowe Jr. wanted to enter a goat in 4-H competition at the Ventura County Fair.

CONTENT FOR NE
The Sacram

Farmers feel c on pollution
TULARE -- No one can recall exactly California Legislat specifically exemp machines from sm more than 30 yea state water pollut granted farmers 2 waivers on rules t and streams free

Almond mark
Almond growers C Manhart and Joe M have done withou devastating frost i They lost sizable s crop, as did score almond farmers ir Sacramento Valle

Making A Diff Room to grow
In a remote corne High School camp unlikely oasis, a r the poverty and u that plague much surrounding comn

Gray skies clea cherry farmer
The ugly black clo unseasonably hea pelting hail had th this week.

Growers asses damage from s
Jim Culbertson wa a cherry orchard c on Tuesday morni what he didn't see

At the time, they were boarding the goat, named Melody, at a neighbor's house. But when the neighbor decided to move out of Southern California, the family had to decide what to do.

They opted to sell their home and move to the Sacramento area where Linda's sister had found a Sloughhouse ranch that could accommodate everyone.

Soon, Rowe Sr. landed a job as a computer engineer at Aerojet. Linda occasionally drove a school bus and the five Mitchell sons and one Mitchell daughter all continued to raise goats.

Over the years, they sometimes took on sheep, steers and horses, too, but it was the goats that stayed constant on the ranch.

Today, the Mitchells raise 100 goats and milk about 30 for their budding cheese business.

They have tapped into a trend that began in 1979 when Laura Chenel launched a Sonoma business, Laura Chenel's Chevre (French for "goat cheese"). The field began -- and has remained -- an industry where women predominantly own and operate small production shops.

By the late 1980s, as Americans' palates grew more sophisticated, Canadian and Israeli companies were exporting their goat cheese to the United States.

The French already had been shipping their goat cheese to America for years. But a few firms took things a step further in the 1990s and set up cheese plants in Wisconsin, Pennsylvania and California.

European firms with brand names such as Bresse Bleu, Fleur de Lait and Couturier started buying American goat milk to sustain their cheese production here.

Today, about 100 licensed goat-cheese makers operate throughout the United States, according to the American Dairy Goat Association, with most production clustered in Vermont, Wisconsin, California and Virginia.

"Goat cheese is one small part of the evolution, an awakening or broadening in the U.S. of healthier ways to eat," said Chenel. "We eat better bread, better vegetables that we didn't know about 30 years ago that were common in other countries. ... It's all connected."

Breaking into the goat-cheese industry can be difficult because technical information is often scarce and scattered.

"The goat-cheese market is still considered an alternative form of agriculture," said Judy Schad, vice president of the Louisville-based American Cheese Society. "You can't just call a local university and say, 'Show me how to make goat cheese,' or 'Give me the specifics on animal management.' The technical expertise is just not there in any codified system."

So getting into the field typically comes down to making dozens of phone calls to goat herders wanting to sell an animal, or traveling abroad to study the craft, or apprenticing under a domestic goat-cheese maker willing to share the

No trial in farı death
A Yolo County jud refused to order a Woodland-area gr of involuntary ma the death of a farı

Housing aid a farm laborers
The state budget wiped out $3 milli for a farm worker program, putting plans for an apart for farm workers.

Valley lawmak show wine cau on trip to Eurc
WASHINGTON -- winemakers are fl political muscle in week, thanks to s hopping Central V congressmen.

Editorial: Farı smog
For 26 years, carr struggled to ratch smog-forming che spewing from tail years, businesses from big oil refine corner dry cleane furniture makers t companies -- hav required to install effective pollution devices. For 26 ye counties have scr meet clean-air sta avoid loss of fede funds.

Global compet imperils farm
The chief source c anxiety in Californ the question of wl irrigation water su dry before the las of farmland is con suburbia's sprawl.

knowledge.

The Mitchells started dabbling in specialty cheese production about four years ago, after a fellow goat breeder at the California State Fair encouraged Linda Mitchell to try making goat cheese.

She took that suggestion to heart and eventually completed two classes in cheese making at California Polytechnic State University, San Luis Obispo.

Now most Thursdays Linda Mitchell and 32-year-old son Wayne Mitchell can be found at Sacramento's Ormonde Cheese and Food Co. on Fruitridge Road, mixing their cheeses that come in three flavors -- plain, garlic herb and mild green chile.

Ormonde pasteurizes the Mitchells' goat milk. Linda, most days, handles the addition of vegetable rennet, which makes the cheese coagulate. She watches for the rising curd and drains off the extra whey matter.

The whole process takes about four hours each week and yields about 100 pounds of cheese from 125 gallons of goat milk.

For now, Mitchell's Melody Dairy sells its fresh cheese only at four local farmers' markets -- three in Sacramento and one in Davis.

"We want to stay small. ... We don't want to get too big, too fast," Linda Mitchell said.

So far, sales have been up and down at the Sloughhouse company since debuting two years ago. That uneven pattern, Linda Mitchell , mostly mirrors the attendance levels at local farmers' markets.

Meanwhile, the company has yet to make a profit.

With the aim of reversing that trend, Mitchell's Melody hopes to secure its first traditional retail client sometime next year.

Goat cheese, naturally, will be the main attraction. But the local small business also expects to

offer its latest product the Mitchells hope will become just as irresistible to consumers hooked on goat cheese -- goat milk soap.

About the Reporter

The Bee's Cathleen Ferraro can be reached at (916) 321-1043 or **cferraro@sacbee.com** .

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March 2001

Small Acreage Options

Paul Dietman

University of Wisconsin Extension

Sauk County Agricultural Agent

Farmstead Dairy Processing

Facing increasingly volatile milk prices, some small-scale dairy farmers--and large-scale dairy producers, for that matter--have considered on-farm processing as a way of moving up a link on the food chain to capture a larger percentage of the retail dollar. A farmstead dairy processing conference a group of us put together in Wisconsin in November 1999 attracted more than 250 people who were interested in exploring this option.

There are a number of dairy products that could be produced from cow, goat, or sheep milk in an on-farm processing facility. Cheese and bottled milk are the most common but yogurt, cheese curds, or even kefir, a fermented milk product popular in parts of the Middle East, are other possibilities. (In this article we won't discuss Kumiss, a potent fermented drink made from mare's milk which originated in northern Russia).

On-farm processing is not easy. It requires some highly specialized technical skills in addition to marketing savvy. The regulations governing dairy processing are quite strict. The capital outlay to build and equip a processing facility can run to hundreds of thousands of dollars. It takes time to build the market for farm-processed products; it might be years before all of the herd's production can be sold as farm-processed products. However, a dairy farmer who is able to make it over or around all of these hurdles will find that there is the potential to make a respectable profit selling value-added dairy products.

As with almost any non-commodity farm product, a good place to start is by researching the market potential for your products. There is no sense in going any further if there isn't a strong probability that the market is just waiting for your product to land on the shelf. Market assessment is extraordinarily important with processed dairy products because this business is going to take a large investment of time and money. Also, the products are perishable so must be sold quickly. The products usually can't be held in storage while waiting for a market to develop.

Check with your state's food safety regulatory agency to get the relevant regulations governing the type of processing you would like to do. In Wisconsin, talk to the folks in the Division of Food Safety at the Department of Agriculture. In addition to regulations pertaining to the processing facility, food safety staff can also give you details about any technical training requirements you will have to meet. For example, you will have to complete a pasteurization course to operate a milk pasteurizer on your farm. Another example: Under current Wisconsin law, a person has to complete an 18-month apprenticeship before he or she can make cheese for retail sale (although the WI Department of Agriculture is currently working to relax that rule for farmers making cheese exclusively from their own milk).

It is also a good idea to check with your town or county zoning administrator, particularly if you are considering having an on-farm retail store. Some places may require that part of the farm be zoned commercial or that a conditional use permit be obtained in order to operate.

If you are thinking of bottling milk for retail sale, find out how the Federal Milk Marketing Order will affect your operation. Here in Federal Order 30, a dairy farmer who bottles and sells his or her own milk is classified as a "producer-handler" and is no longer a "producer." The good news is that a producer-handler

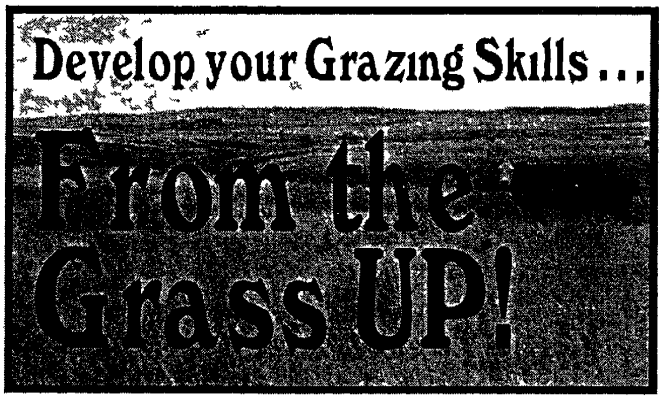
does not have to share with the rest of the pool the (Class I) premium he or she gets for their bottled milk. The bad news is, if the farmer is still selling a portion of their milk as Class III to a plant that participates in the pool, that milk cannot be pooled and thus, is not eligible for a share of the pool's Class I premiums. The plant can essentially pay any price it wants to pay for that milk. You need to negotiate terms with your current plant before you start bottling.

Equipment can be another challenge for the on-farm processor. Smaller-scale equipment tends to be hard to find and relatively expensive. It could easily cost $50,000-$300,000 to set up a basic processing facility, depending on the products to be produced and whether or not the farmer is able to find some used equipment.

There are creative ways to work around some of the regulations and capital costs. Several groups of dairy producers are working with local independent cheese plants to have their milk made into cheese carrying their own label. They are avoiding the apprenticeship requirement, the capital cost, and the time it takes to develop expertise in cheese-making. Instead, they are focusing their efforts on selling the product. There is a dairy farm near Hayward, WI that is leasing cows to people in town and charging a per-gallon "boarding fee" when their leaseholders dip milk out of the bulk tank. It's legal; the milk belongs to the people leasing the cows.

Anecdotal evidence from people who are doing on-farm processing in the upper Midwest suggests that the per hundredweight equivalent price for cows' milk is from $15 to $30 when the products are sold in the retail market. Of course, more labor and other costs are going into processing and marketing than in a conventional dairy operation. However, it appears likely that a producer could get a reasonable return on the investment if he or she does a good job of developing and satisfying their market.

There are some excellent resources available if you would like to explore on-farm processing a bit further. Dr. Gary Frank from the University of Wisconsin-Madison's Center for Dairy Profitability has put together a very helpful decision aid spreadsheet: FarmSTead MILK Processing (FSTMILKP.xls), which is available for free downloading from the Center's website (www.wisc.edu/dairy-profit). The Small Dairy Resource Book: Information sources for farmstead producers and processors by Vicki Dunaway is available from the Sustainable Agriculture Network. Some information from the conference I mentioned above, including a videotape of the presentations, are available from Norm Monsen at the Wisconsin Department of Agriculture (800) 942-2474.



EDITOR S NOTE If you are just starting MiG or want a good review of the basics this column is for you!

Top 10 Mistakes of New Graziers

by Paul Daigle

10 Did not remove all the old worn out fencing and replace it with new superior products Many farmers struggle with old rusty worn out fences The worst is electrified barbed wire that causes more shorts and voltage drop problems than any thing else

Old interior fences that are in the way to properly manage your pastures must also be removed

I encourage the use of decent fences especially perimeter fences Buy quality high tensile fencing products that will last for decades

The name of the game is labor efficiency and flexibility If your old system slows you down or does not work replace it

9 Buy inferior products that don t last In the effort to save a buck many people buy poor qual ity fencing watering products and poor quality seed and seed mixes Many of these products are either hard to work with or break down in a couple of years Seek out the names of high quali ty grazing products from other graziers

You may spend a few more bucks initially but it will save you time and money down the road Remember you are setting this grazing system up to save time w ll c s me ddit l money In this case it pays to spend a little more to make more in the long run—do it right the first time

8 Failure to believe that good management will improve the quality and quantity of the pasture Too many people are looking for the secret recipe when it takes long term commitment and management to create and maintain high quality pastures High quality pastures don t just happen They are the result of years of excellent management not weeks or months or some secret seed mix or some magic fertilizer

7 Believe plowing will improve a pasture Refer to number eight In some cases frost seeding interseeding or reseeding a pasture may help to improve the species of plants that are present in a paddock but it is long term management that will determine what a pasture will look like five or ten years down the road

6 Did not commit an ade quate amount of the best land to grazing Too many people decide to graze but decide they are only going to try a few acres If you study the grass growth curves for the growing season you should realize grass does not grow at a constant rate through out the grazing season Flexibility is the key

Fence in the largest acreage that is feasible mechanically har vest excess growth early in the y d l t th li to k g e more acres late in the grazing season thereby extending your days on grass

5 Spend lots of money on Silver Bullet grasses and legumes No doubt about it there are many better grass and legume varieties to choose from than there were ten years ago Too many people look for that perfect plant for the whole farm and there are plenty of people willing to sell you that perfect seed

In general seed down new fields with late maturing varieties of grasses and legumes that grow on your soils in your climate Again consult other graziers Don t seed your farm down to all of one seed or seed mix Strive to achieve diversity amongst your pastures but not too much with in Now refer back to number eight

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> *Manure is the cheapest source of fertilizer you have, so manage it properly*

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Also be aware that small fre quent applications are more ben eficial than large single season applications of fertilizer espe cially nitrogen

One more thing to watch is excess nutrient buildup

By buying outside sources of commercial fertilizer or feed you are bringing extra fertility on to your farm Make sure that phos phorus and potassium do not build to excessive levels

Remember with good grazing management manure is being applied at a fairly even rate over your pastures and that after three to five years the manure applied by the grazing livestock will meet the needs of the plant for the most part

3 Failure to plan for a decent lane system on dairy farms Ninety percent of the time you can get away with having poor quality lanes but it is that ten percent of the time that is the killer

When your pasture manage ment is dictated by the condition of your lanes you need to spend a few bucks on building some decent lanes for your cows Sooner or later if you don t have good lanes your pasture manage ment will suffer because you can not get your cows out to the pas ture that needs to be grazed

With good lanes I have seen some graziers get nearly a month earlier start on the grazing sea son because they do not have to wait for the mud in their lanes to dry in the spring The same goes at the other end of the calendar when there are beautiful fields of grass ready but the lanes are too muddy and the lanes do not dry off any more that late in the year I have also seen cows not on pas tures in the middle of the summer because we received five to ten inches of rain in the last week and all the cows are belly deep in mud

One of the reasons people graze is that it is hard to put up high quality stored feeds If your cows cannot get to high quality pasture you are no better off than before you were grazing

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implemented and run

If the transition to a grass based livestock system is drawn out the efficiencies of the system are never realized and you may end up with more work If you are transitioning from an existing conventional setup this is espe cially true You may end up just adding another hour to your day if you fail to fully implement your plan and you get stuck between two systems and all your old baggage

If you truly believe in the sys tem and believe you have the skills to implement it DO IT NOW

1 The number one mistake made by new and *experienced* graziers is the failure to con tinue to learn the system It is critical to develop a grazing mindset You must continue to question everything continually improve on what you are doing so you can make the most cost effective decisions possible Many new graziers come to one or just a few pasture walks or meetings and they think they know it all This is probably the biggest mistake you can make

Good grazing is an art as well as a science and it takes many years to learn Granted some basic pasture walks become rep etitious but there are usually a few tips to pick up and the small discussions that take place among graziers at the walks always provide new ideas Advanced grass series are sure to make you think while confer ences book magazines and the Internet are also great places to continue the learning process

At the end of your career don t end up with one year of experi ence thirty times end up with a full thirty years of experience ■

Paul Daigle is a Conservation Specialist for the Marathon County (Wisconsin) Land Conservation Department

Management-Intensive Grazing An Overview

by Will Lathrop and Brian Freking

POTEAU Oklahoma Livestock producers can be viewed as grass farmers They produce the best quality and quantity of forage on a piece of land and har vest the forage with livestock The level of productivity depends not only on how much forage is pro duced but how efficiently it is harvested

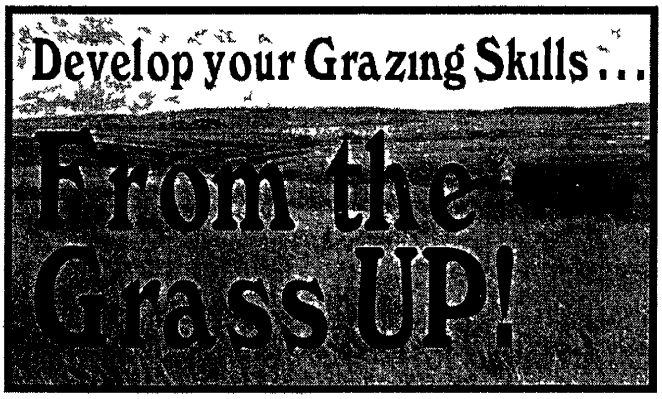
Grazing animals select the most desirable plants and avoid others Controlled grazing is the process of moving a herd of live stock from one paddock to anoth er and allowing each paddock a period of rest before it is grazed again This approach to grazing is also known as rotational or man agement intensive grazing Emphasis is placed on manage ment rather than the system or its components This form of grazing management is gaining popularity because of the need to increase production efficiency to cover the high cost of land labor and operating expenses

Compared to continuous graz ing which is the most widely practiced approach controlled grazing requires a higher level of management The efficiency of the grazing system depends on the amount of time labor and money invested in it

Changing from continuous to controlled grazing allows live stock producers to (1) increase stocking rates (2) extend the grazing season (3) increase nutrient recycling (4) decrease labor and (5) improve animal health and potentially lower para site loads

The management of a con trolled grazing system revolves around the period of rest plants receive during the growing sea son During the rest period plants are allowed to recover from grazing and produce new growth The length of rest varies with season and forage species and is based upon the amount of aboveground growth (residual dry matter) remaining in the pasture after the animals are removed ■

From The Kerr Center for Sustainable Agriculture



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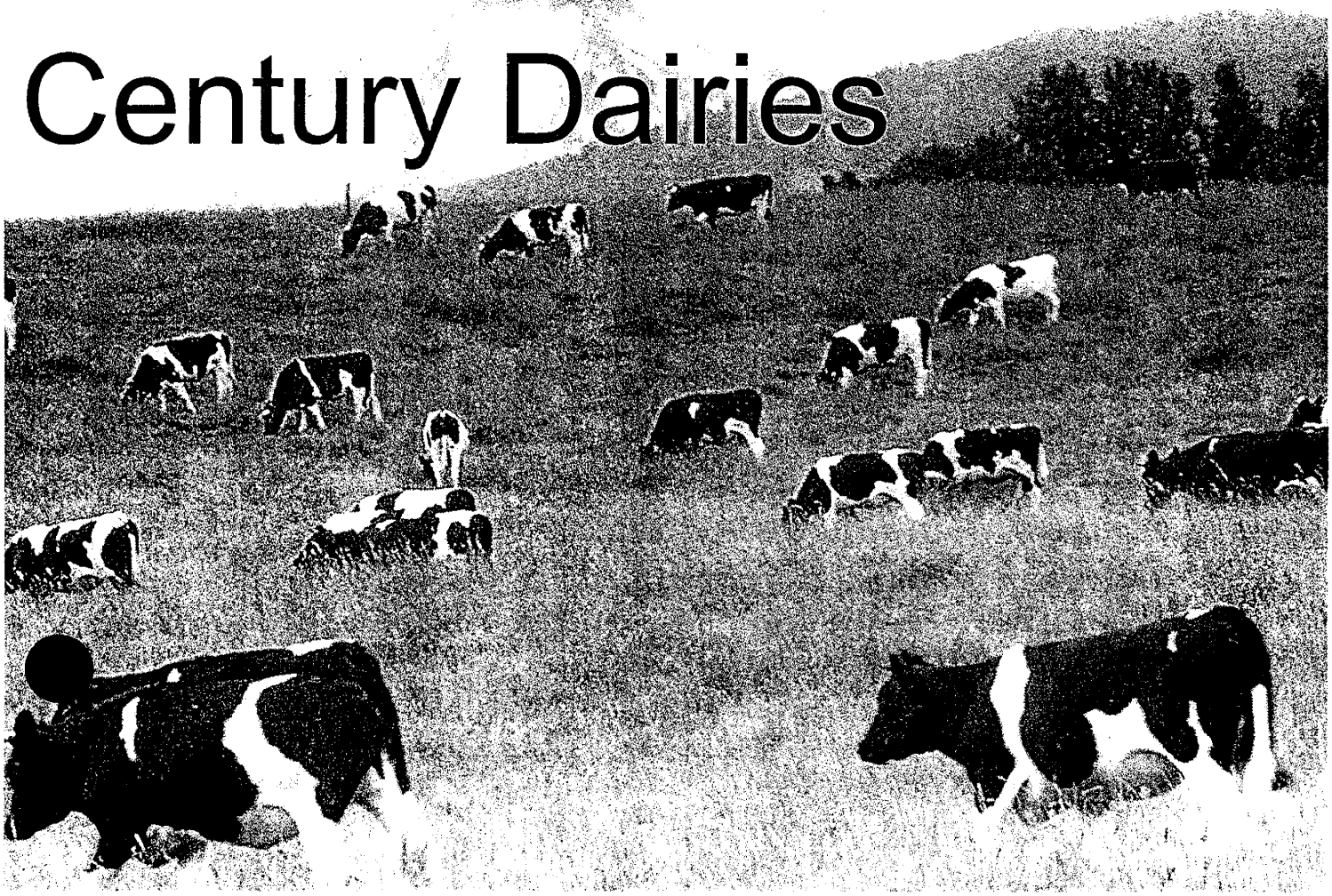
Trends for 21st Century Dairies



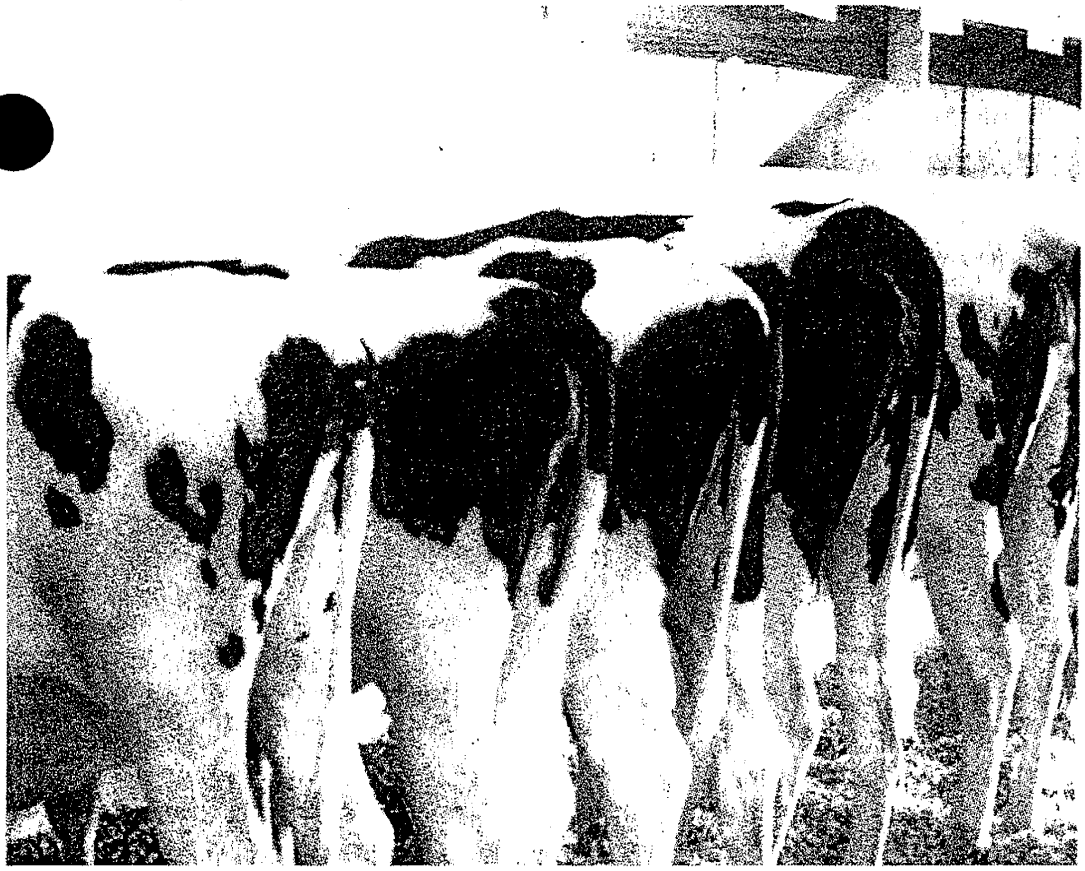
by Barbara Berst

When the dairy industry evolved from 19th century grass-fed local herds to centrally distributed dairy factories, the change crept in slowly at first. But postwar industrial agriculture appeared promising, and sped the desire for change. Old-time pastures of yesterday seemed something to easily toss aside for bigger and better.

But the dairy industry is evolving still, and there are new trends to look for as the 21st century replaces the 20th. Perhaps surprisingly, the new successful dai[illegible]appear to resemble—in many wa[illegible]ose of the 19th century, as though the industrial era is something to now leap-frog over as we return home. But there is a difference. The new, often small and local dairy of a coming new society is based not on simply not knowing another way, but now on scientific facts that prove which is best among many choices. The new dairy's customers—the driving force of any farm—no longer buy dairy products in any form they are handed. Today's customers know they have a choice, and they are purposely choosing a new form of dairy, even if it means higher prices for them to pay. Following are trends and niches in which more and more successful dairies are turning to in this new era. Each one that resembles those of the past has a new 21st century twist attached to it.

Allowing visitors

Long ago, humans may have taken for granted the kinship between themselves and the animals they partnered with to create agriculture 10,000 years ago. Yet even though fads have led humans from farms to cities many times, humans always return to the land again. Today, scientific evidence shows that pastoral scenes and the sight of grazing animals is healthful for humans. And savvy farmers are aware that these scenes draw customers in. Some new century dairies are adding visitors' elements to their farms to inspire a customer following and to add an enjoyable experience to their otherwise



lity dairy product. Citizens in high-tech century will be ng for technology's balancing parallel: nature-related experiences, and the dairy that allows them to get close to animals again will have a 'product' that no internet factory dairy delivery can compete with. This century may well offer more than just the occasional visitors' dairy.

Humane

The farmer of long ago may have hidden his sadness as he led his once prized cow, now too aged to contribute, off to the auction. He may have looked away as calves were hauled off for veal. But dairies of this new century must take note of a deep trend in humankind. Such feelings are now seen as form of human strength and superiority rather than weakness. Veal can be produced humanely, animals past their prime can be butchered anner that causes no fear n. This allows the farmer to both listen to his heart, and to add value to his product by letting his customers know how well his animals are treated, something not to be hidden anymore.

Small and Diversified

The old-time farms were once multi-faceted, with a dairy segment only part of the interwoven whole. The environmental movement that is sweeping the nation now sees the value in this type of system. The dairy farmer can reap benefits by diversifying, adding a strawberry field where a naturally fertile pasture is resting from grazing, adding a sweet corn field where the cows will graze the stocks in fall. U-picks of corn and strawberries draw in customers who see the well-treated cows, and this form of experience begins to create the type of customer appeal that distant corporations cannot compete with. And as far as size, the Trends Research Institute, founded by Gerald Celente who correctly predicted the 1987 stock market crash, the fall of the Soviet Union and corporate downsizing, has predicted this new century will be fed by a network of environmentally friendly small farms of 10 acres or less.

Specialty, locally flavored, or gourmet dairy products

Factory produced generic flavors found everywhere may always be a staple with customers. But people now also want the rare and the one-of-a-kind, the taste of regional or historical cuisine.

Diana McCown runs her five-acre goat dairy near Martell, NE. In a nation of dairy surplus, she sells everything she makes direct to local customers, and has even turned down offers by supermarkets to carry her product. Making feta cheese was part of her grandmother's Greek heritage, and Diana perfected her own version of Greek feta, touring cheese plants in Greece to compare tastes. She even grows the herbs for her cheeses

on her farm. As another example, boutique cheeses of the Pacific Northwest may be flavored with smoked salmon and other west coast flavors. Every region [redacted] every ethnic background can produce its own one-of-a-kind recipe. Wineries, farmers' markets, and gourmet shops are just some of the outlets specially flavored dairy products are successfully sold.

Offering dairy animal products besides milk

Besides adding other crops, dairies of the new century can cash in on the booming home gardening industry, which is currently forecast by Gerald Celente as being only in its adolescent stage, predicted to grow tremendously into the future. Composted manure bagged for gardeners creates a popular product that can be sold direct from the farm, at farmers' markets, and road-side stands. Surplus milk from any dairy animal, or 'weedy' milk from goats can be created into non-perishable products sold as a sideline, if not the main source of income. Karen Cross and Ardena Lonien of Oregon experimented with goat milk soap recipes until they created a perfect bar, which began the "Caprine Essence" soap business that now supplies 10 states. Milk has been a valuable cosmetic ingredient for centuries, and now the natural cosmetic trend has boosted its popularity even further.

Naturally and specially fed herds, including pasture, organic feed, flaxseed and herbs.

Customers are now choosing the taste of, and the knowledge that, the animal products they are eating come from sunshine, sweet grasses and herbs. More and more customers are demanding products produced without hormones, routine antibiotics, and pesticides. Further, new studies, such as research from the University of Manitoba, show that both grass fed and flaxseed fed dairy products contain a higher amount of healthy Omega-3 fatty acids, the oil found most often in cold water fish. Dairies are now touting this result for their Omega-3 enriched products.

Raw and fermented

When a high school science teacher compared store-bought milk with milk purchased straight from a barn-milked udder, he and his students found quite a surprise under the microscope. The store-bought milk was swarming with bacteria, and that fresh from the udder was clean. Now, a new book entitled Nourishing Traditions, by Sally Fallon, explains the enormous research that shows both the cleanliness potential and the health virtues of consuming milk raw or fermented, and direct from the farm as humankind has done up until the last couple of hundred years. In most states, raw milk is illegal. But Sunland Farm of Loveland, Colorado, operates a community supported agriculture farm with a dairy element, and found a legal way to offer raw milk by allowing their customers to buy 'shares' in the dairy herd. As with all community supported agriculture, subscribers essentially buy 'shares' in the farm. In the case of the dairy segment, share holders signed a contract to a share in the dairy herd, paying a boarding fee to cover feed, staffing, and herd health. This entitles the customer to one gallon of milk a week.

According to Fallon, when milk wasn't consumed raw, it was always fermented in some form, making its nutrients even more readily available to humans. Fermented products from yogurt to kefir, freshly fermented on the farm, are catching on in favor of commercial yogurts that have sometimes been repasteurized after fermenting, killing the beneficial bacteria.

Milk from animals other than cows

According to the Minnesota Extension Service, as the last century was coming to a close, Americans imported close to 20 million pounds of sheep cheese annually, yet sheep dairies in America are rare. As well, more people drink the milk of goats worldwide than from any other animal, and goat milk is catching on more in America. Modern studies show that goat milk protein is closer in chemical composition to human milk than that in cow's milk. Further, it's been found by cattle ranchers that goats can pasture quite well right along with cows. The forage they eat tends to be the weeds disliked by the cows, therefore actually providing more grass for the cows. Networking among dairy goatsmen is providing more and more ways to keep goat milk tasting sweet, in spite of nibblings from weeds and cedar trees. One goat dairy woman found that the taste was off only after a sudden change in diet, then the sweetness returned in spite of the diversity of bark and brambles the goats were eating.

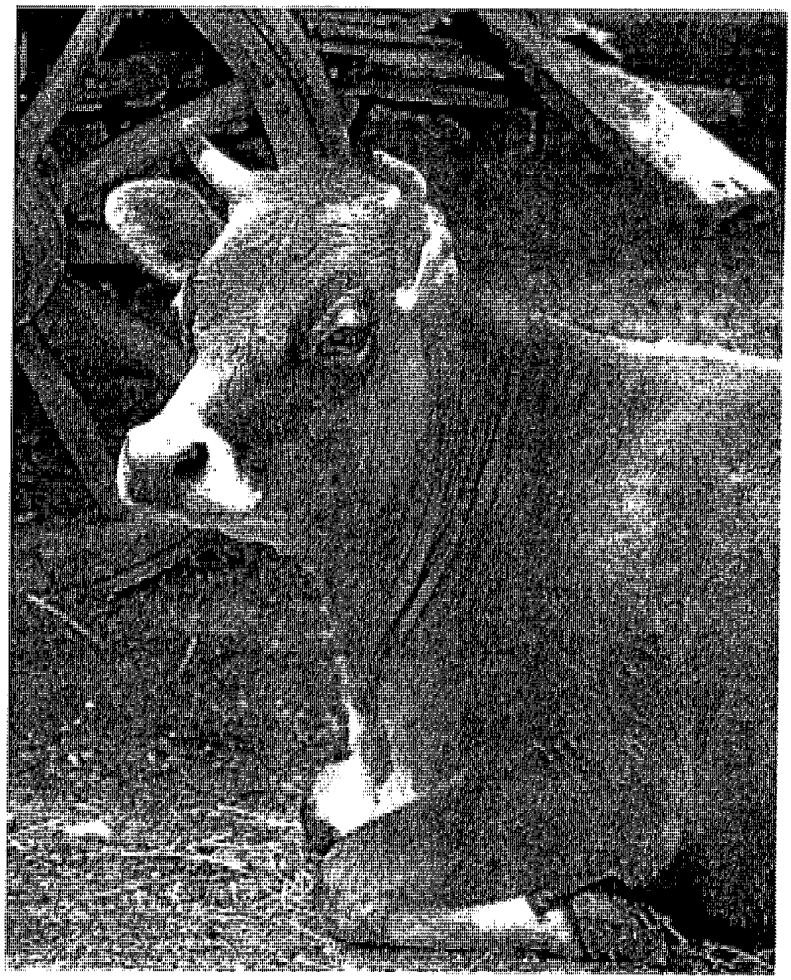
Direct delivery/glass bottles

Home milk delivery in glass appears to be making a comeback. A 21st century trend for humans to get everything from their laundry to their weekly groceries home delivered feeds this trend somewhat. But so does the trend to protect the environment and to get a higher quality product than the factory fed

20th century citizen had to put up with. In that era, glass milk bottles almost disappeared in the 1970s. But when Elmhurst Dairy of Jamaica, NY, reintroduced glass bottles in 1990, more than 3000 customers signed up for service. Harriet Cullen, general manager of Elmhurst home-delivery division, feels nostalgia plays a part in customer preference, with people remembering the fresh taste of milk in glass. But nostalgia, environmental benefits and fresh taste are just part of the appeal. Munroe Dairy of East Providence, RI, has been delivering milk to homes since 1881. Surveys from this farm found that the convenience of home delivery was the top reason for buying milk from this dairy.

Serving only those who sincerely desire dairy products.

The 20th century war continues between the group who insists all humans should consume dairy products daily, and its opposition which says dairy causes allergies and cannot be tolerated by adults. When the dust settles in this new century, it will become more widely known that many groups of people, including those of Northern European decent, developed a survival mutation years ago to adapt to their herds' milk as a source of food. Further, when dairy is organic, fresh and fermented, its digestibility improves for all who consume it. This will certainly leave a large number (even though not all) of humans who will demand dairy products. The ones who serve this group the best, by invitation with superior products rather than force-fed ad campaigns, will surely be the ones to come out successful in the end.



Resources:

Nourishing Traditions
by Sally Fallon
Copyright 1995
ProMotion Publishing,
3368 F. Governor Drive, Suite 144,
San Diego, CA 92122

Trends 2000
How to Prepare for and Profit from the Changes in the 21st Century
by Gerald Celente
Copyright 1997
Warner Books, Inc.,
1271 Avenue of the Americas,
New York, NY 10020

Free Farmed Certification
Beef and dairy products labeling program for farms that treat their farm animals in accordance with the American Humane Association standards.
www.freefarmed.org

Robinson Defines the New Paradigm for Meat and Milk Research

staff Report

ATLANTA Georgia Jo Robinson nutrition maven and author of The Omega Diet told attendees of SGF's Grassfed Meat and Milk onference that most animal scien istists don t seem to think there is a connection between what they eed animals and human health

She said Land Grant Universities were researching the feeding of urban garbage and stale chewing gum (still in the wrapper) to dairy ows She said the USDA Meat Animal Research Center has researched the feeding of poultry manure and chicken feathers to eedlot beef animals

I am here to propose a new paradigm for animal researchers One f it s in their feed it s in our food Two if it s in our food it s affecting our health. The new paradigm is we what our animals eat she said She said Americans currently a gross imbalance of Omega 6 to Omega 3 fatty acids This was largely due to the feeding of wilted orages and grain to dairy cows and to the wide spread practice of grain finishing beef

She said research on people who had at least one heart attack and were put on a high Omega 3 diet showed a 70 percent decline in mortality These same people also showed a 61 percent reduction in cancer deaths

She said Omega 3 is the most important brain fat High Omega 3 diets have also been found to be effective in treating depression

She said grass feeding increased the Omega 3 level in ruminants and in the eggs of pastured poultry and in the meat of pastured hogs as well

In ruminants you also get CLA in addition to the Omega 3 fatty acids She said research in France found a 76 percent reduction in breast can cer from women who ate a diet high in CLA

Currently the USA has the least amount of CLA in its diet of any country in the world However this is a relatively recent phenomenon

Robinson said that in 1947 when she was born 70 percent of all the beef eaten in the United States was from grassfed animals "We don t need artificial designer food We just need to get it back to where it was We want to eat what is normal and natural

She said the Omega 3 fatty acid was extremely volatile and rapidly dissipated if exposed to air This is why hay and wilted silages are low in Omega 3 fatty acids and cannot replicate the healthy meats and milk of direct grazed pasture

She said in addition to lower Omega 3 and CLA levels confine ment-fed animals also show lower levels of Beta-carotene and Vitamin E as well

TVA IS THE LATEST HEALTH DISCOVERY

Robinson said recently a new fat was discovered in ruminant animals called TVA. TVA is a precursor of CLA and while the human cannot make CLA it can convert TVA into CLA internally She said TVA like CLA was much higher in grassfed ruminants as well

The bottom line is that we are getting more CLA from grassfed products than the laboratory has been showing she said

Currently there are 25 patents on how to increase the CLA per centage in confinement fed cows She said it was going to take a pret ty educated public to understand the CLA story because soon every one is going to be touting that their product has it As a result she said grassfed producers needed to talk about the "whole of natural pro duction rather than just about CLA

She said grassfed producers need to continually hammer home the natural aspect of what they are doing She said graziers needed to emphasize that the whole process was beneficial to the envi ronment and produced the optimum health in the animal In turn, humans are perfectly adapted to all the good things in pastured prod ucts

She said confinement researchers never test their prod ucts over time and always concen trate on just one aspect of the health story and ignore the others "You will never have feedlot beef that is high in Omega 3 and CLA and Vitamin A and Beta Carotene.

She said co-option was currently a big problem for grassfed beef pro ducers For example she said she thought a product called Prairie Fresh and Natural Beef would be grassfed but subsequently found out it was grainfed

Oregon Country Beef is another healthy designer food product that many consumers think is grassfed but actually tested for Beta Carotene no better than IBP com modity beef

"These guys want to produce the illusion of what you are producing but it is really just feedlot beef. To whole story

She listed the following five points as the "whole story

1 The grassfed product is natural and wholesome with no artificial hormones antibiotics or pesticides

2 The grassfed product provides superior human nutrition It is low in bad fat high in Omega 3 CLA and vitamins

3 Grassfed animals are healthy and happy

4 Grassfeeding not only is good for the environment but can actually improve the environment

5 Grassfeeding is good for the survival of small farmers

While she said she is convinced more and more everyday that grass feeding is the next big new thing there are problems

A few grassfed producers have what she termed a feedlot mentali ty" and are cutting corners She said one grazier who was on a program with her in Hawaii claimed that grassfed animals were so healthy he could feed all types of byproduct feedstuffs to them with no ill affects

I just stood there with my mouth open I mean this guy just totally blew me away

She said there are bison produc ers who kill their animals in the winter off of hay because the hides are better then Is an animal slaughtered off of hay grassfed?

She said there are others feeding grain on grass and calling their products grassfed. Is this grass fed? she asked.

Robinson said the only way she knew to stop such compromises was to have a third party verifica tion program Someone is going to have to come up with a definition of what grassfed is the minimum quality standards for the product and have some kind of external veri fication program

Another major problem is that buying grassfed products is current ly very inconvenient for consumers She said she currently has to drive several hundred miles to buy her pastured poultry eggs and meat products

"We can t go very far in creating any serious consumer demand with such a marketing model We are going to have to make grassfed prod cts more convenient for the urban consumer ■

An audio tape of Jo Robinson s pre sentation is available see page 26

More Horse Than You Can Handle?

Farmstead Stewardship: Guidelines for

Several breeds and types of horses are used in a wide variety of activities throughout Pennsylvania and surrounding states. Regardless of whether you own one horse or many horses, the decisions you make on your property, can have a significant impact on water quality. The following information is intended to aid you in your management decision making, in furthering the protection of natural resources.

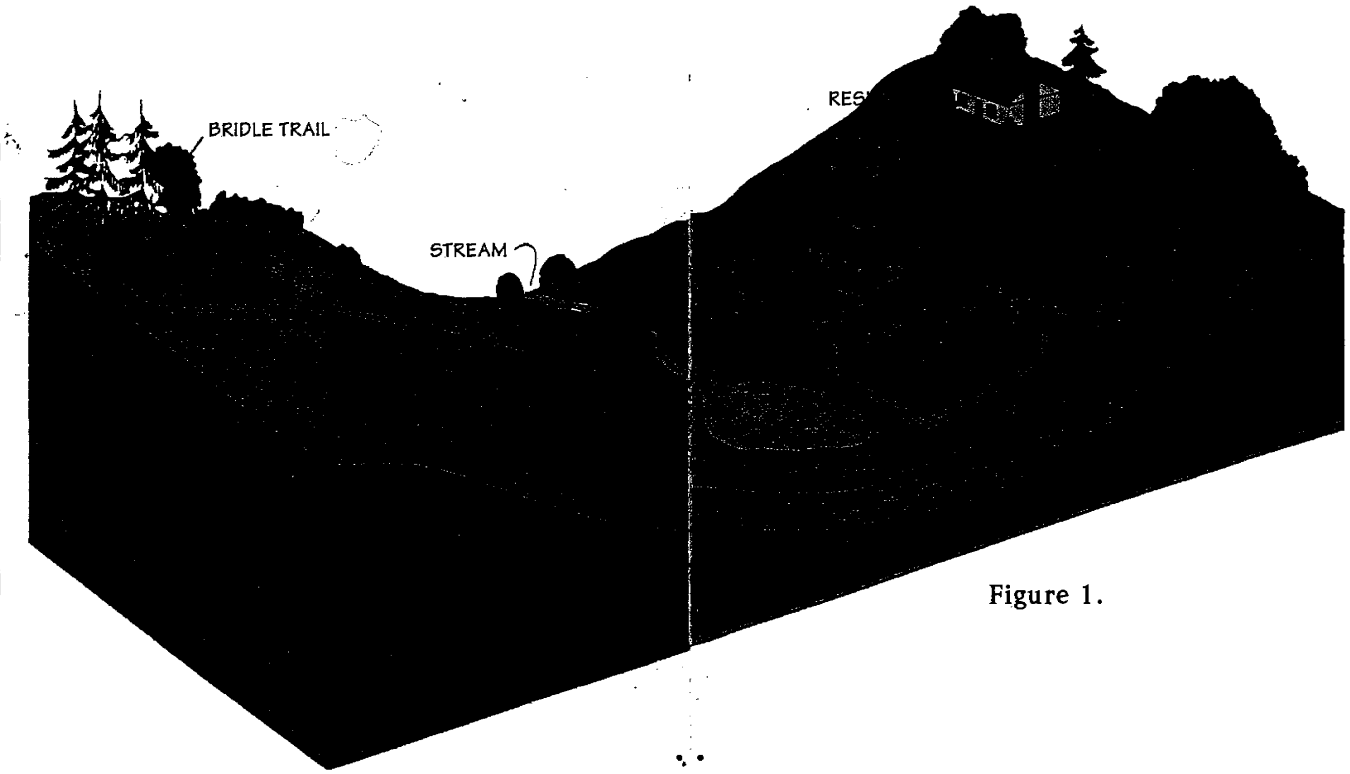


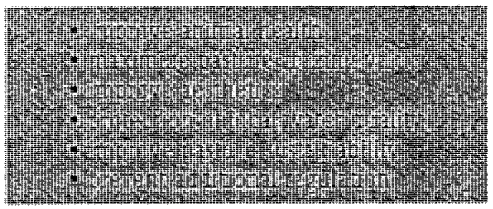
Figure 1.

WATER QUALITY MANAGEMENT PLAN

The goal of a water quality management plan is to reduce runoff and protect groundwater. Runoff from horse farms can carry soil and waste contaminants into waterways, creating a nonpoint source of pollution. Start your water quality management plan by mapping out your watershed (see figure 1).

CRITICAL FACTORS:

THE BENEFITS of FARMSTEAD STEWARDSHIP



2. **Social and Legal Conditions**–reaction to adjacent property owners, building codes, zoning regulations, and water pollution restrictions, etc.
3. **Drainage**–ponding or surface runoff can create serious problems.
4. **Roof Water**–outletting spouting water away from traffic areas and exercise lots.
5. **Nutrient Management**–handling the waste created by the animals.
6. **Image**–the facility should satisfy the owner and create a favorable impression on neighbors.

Reducing runoff and contamination can be accomplished

NUTRIENT MANAGEMENT

The objective of nutrient management is to use nutrients wisely for crop benefit while minimizing impact on the environment. Manure removal, storage and disposal techniques affect water quality. Locate the storage site at least 100 ft. from waterways and drinking water wells. The storage area floor should be cemented or constructed of compacted soil.

The storage site can be roofed or covered with a heavy tarpaulin to decrease the chance of runoff.

Manure should be applied at proper times of the year, when favorable field conditions exist (not frozen or wet). One other avenue to explore, in the allocation of manure, would be to contact local gardeners; they may have interest in the manure for needed nutrients and organic matter.

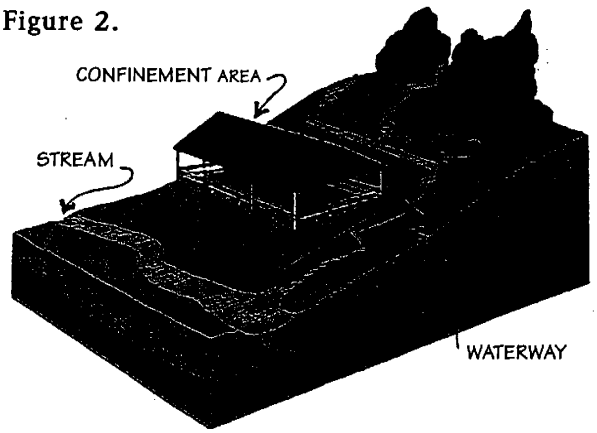
SURFACE WATER RUNOFF CONTROLS

When you develop your watershed map (see figure 1), it should reveal areas of potential soil erosion and nutrient runoff.

The primary cause of runoff on horse farms is overstocking. By overloading a pasture with excessive traffic and grazing a situation is created where surface water has the opportunity to gain velocity and carry soil and manure to nearby streams. In exercise areas, where grass cannot be maintained, surface water controls must be implemented. The following techniques can be used to drastically reduce nutrient laden runoff.

- Divert clean water away from barns, paddocks, manure storage areas and exercise areas (see figure 2).
- Reduce the length of slopes on pastures with the use of terraces and diversions.
- Plant grass in drainage ways to slow down runoff water.

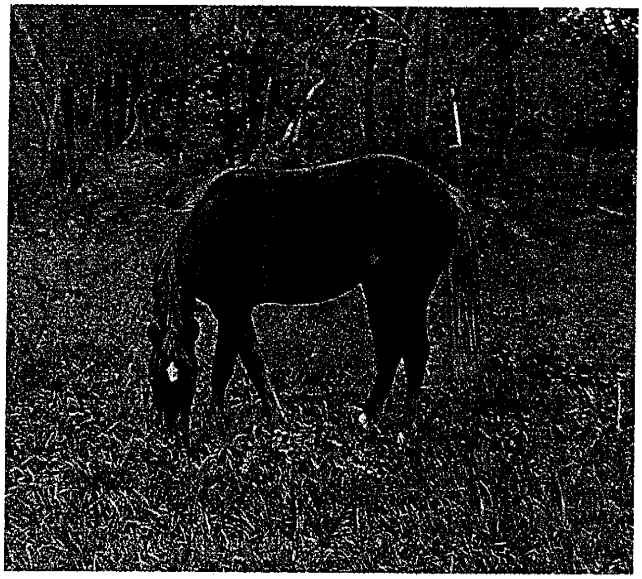
Figure 2.



- Plant a vegetative buffer strip between steep slopes and waterways. The buffer strip filters animal waste and soil out of runoff and slows it down for absorption.
- Filter/Settling channels can be constructed below paddocks that have a great deal of animal traffic. These channels will catch runoff and filter out sediment before entering streams.

PASTURE MANAGEMENT

A high quality, properly-fenced pasture represents one of the least expensive sources of feed for a horse. In addition, a well kept pasture can provide the most natural and healthy environment for exercise and rest. If you already have good stands of desirable grass and legume species, proper soil fertility combined with good management, will be sufficient to assure good horse pasture.



If you plan to renovate an old pasture you should consider the following points:

1. Soil test for lime and fertilizer requirements.
2. Apply required lime several months before seeding.
3. Select a seed mixture that complements the pasture drainage characteristics.
4. Destroy or suppress the old pasture.
5. Use the appropriate method of seeding based on extent of tillage.
6. Protect the seeded area until the new plants are well established.

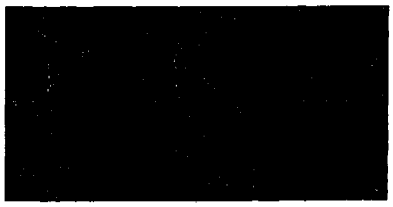
Whether you improve your pastures by the use of lime and fertilizer or by reseeding, sound management is essential to keep the desired species persistent and productive.

Horses are notorious spot grazers. They will seriously damage desired species in some areas unless they are moved into new pastures frequently. Overstocking or overgrazing results in reduced or, in extreme cases, no ground cover; which is vital in controlling soil erosion and nutrient runoff. Therefore, some form of rotational grazing is desirable. The correct acreage per horse changes with the season as well as with other factors. However, a good rule is to provide at least one acre of good quality pasture per horse. Grazing should be restricted during winter and when soils are wet in helping to prevent any unwanted runoff, plant damage, and damage to the soil structure.

With limited pasture acreage, rotational grazing systems are the most effective method to maximize forage production, consumption, and preventing soil erosion. In this system, a group of compatible horses can graze a paddock (area of divided pasture) for approximately 3 to 5 days and then be moved (rotated) to a fresh paddock (see figure 3).

10 acre undivided pasture

Two 5 acre paddocks



Four 2.5 acre paddocks

Figure 3. The relationship between paddock numbers and amount of rest per acre.

There is no "best" number of paddocks. Any number of paddocks is better than grazing a single pasture continuously.

(In addition, by rotating the horses from pasture to pasture, you can break the life cycle of some parasites.)

Dragging pastures with a chain link harrow, at least once per year, will help in spreading manure droppings; which reduces the parasite populations by exposing them to air and sunlight. Dragging is also beneficial in spreading the manure nutrients over a wider area.

STREAMBANK PROTECTION

Protect stream banks from trampling, destruction of vegetation and contamination. Inexpensive electric fencing may be adequate to control access to streams. Water can be provided by constructing ramps or by using gravity flow or pumped water to fill remote watering tanks. Since animals tend to congregate at water sources, nutrients from their wastes become concentrated in one area of the pasture. Providing more than one source of water and shade helps distribute nutrients more widely across the pasture and improves the quality of water the horses drink.

CONCLUSION

Federal and state laws on nonpoint sources of water pollution will become more restrictive with increased concern about the environment. Farm managers and owners need to be informed of local regulations and should participate in local forums concerning zoning and water quality.

ASSISTANCE

Each county has developed solutions to water quality issues. To learn more about the specific guidelines or for technical assistance in your local area, contact your Conservation District office, Cooperative Extension, Natural Resources Conservation Service or local Equine Associations.

This brochure was put together by the York County Conservation District in cooperation with the Natural Resources Conservation Service and Penn State Cooperative Extension.

Funding for this brochure was provided by the U.S. Environmental Protection Agency through Section 319 of the Federal Clean Water Act.

Farmer's Guide to Processing and Selling Meat or Poultry

What are the rules?

Where are the contacts?

Who are the regulators?

Food safety standards for beef, pork, sheep, goat, poultry, rabbit, game and exotic meats

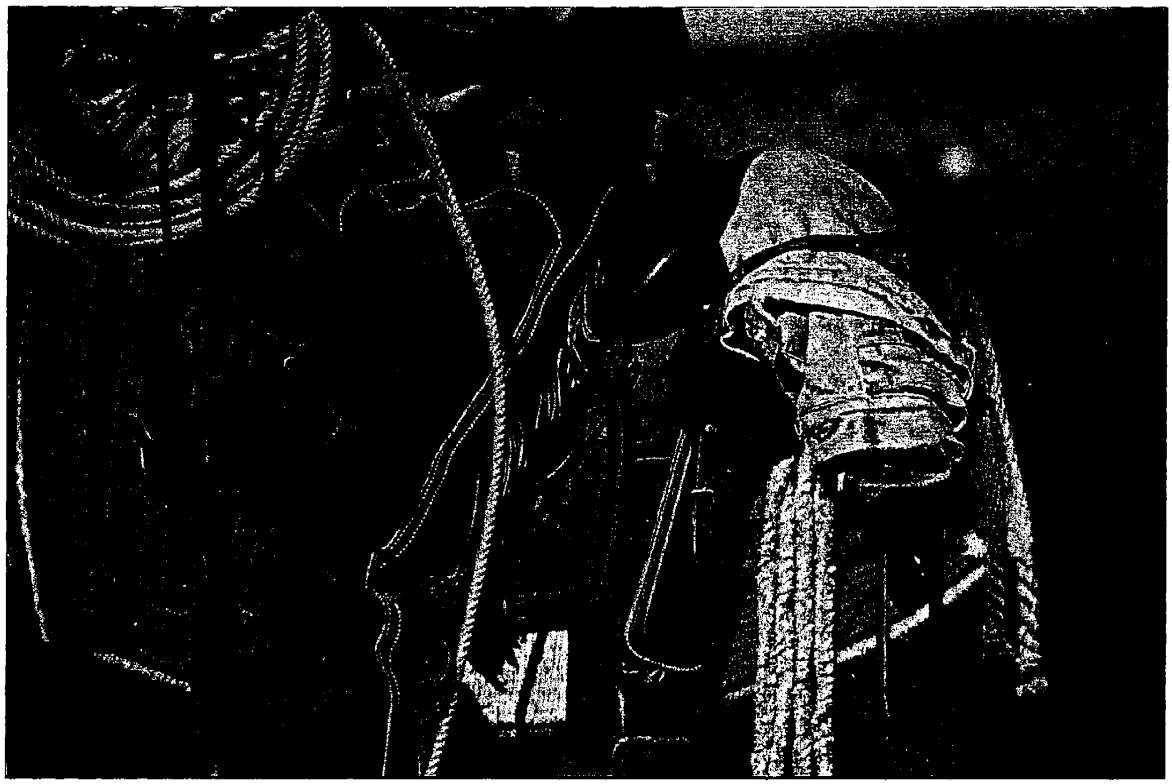
The "Farmer's Guide to Processing and Selling Meat or Poultry" was funded through the Extension Program Priority Initiative.

Several people and organizations contributed in the effort to produce this guide. Some asked a question that required research, some provided the research and some assisted with updates and edits. All comments, ideas, references, contacts, interpretations and reviews were valuable. Most were used in some way during the evolution of this publication.

Dr. Cutter, Food Science, College of Agricultural Sciences, PSU; Dr. Becker, Agricultural Economics and Rural Sociology, College of Agricultural Sciences, PSU; Jeff Feirick, Graduate Research Assistant, Dickinson School of Law, PSU; Pennsylvania Department of Agriculture, Food Safety and Laboratory Services; and especially, John Snyder, USDA, Food Safety Inspection Service, Philadelphia District, are recognized as significantly contributing their time and talent to this project.

I thank Diane, Sheri, Jonas, Ed, Barb, Earl and Karen for their interest and enthusiasm.

John Berry
Agricultural Marketing Educator
Lehigh County Cooperative Extension
4184 Dorney Park Road
Allentown, PA 18104-5798
610.391.9840
www.lehigh.extension.psu.edu
jwb15@psu.edu



Ranch Diversification Workshop

Bridgeport, California — May 17, 2001

Sponsored by

Sonoran Institute & Sierra Business Council

In cooperation with California Cattleman's Association, California Rangeland Trust, U.C. Cooperative Extension—Inyo/Mono Counties

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2. Niche Marketing Considerations
3. Conscience, With a Price Tag

Ranch Recreation

1. Flynn Outline: A Journey in Time – From Pioneers to the Internet
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E. Poultry

United States Department of Agriculture

Cooperative State Research, Education, and Extension Service

Office for Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Poultry

The low investment and small area required to raise a flock of domestic poultry makes this an ideal venture for the beginning small or part-time farmer. Domestic poultry can supplement family food supplies, and small specialized poultry producers can sell to several niche markets. For example, producers can consider selling organic meat and eggs, brown eggs, range-reared meat and eggs, live birds for ethnic markets, and birds for hobby, leisure, and purebred exhibition purposes. Most small specialty poultry enterprises raise chickens or waterfowl.

To ensure profitability, the small specialty poultry producer must do careful research on market opportunities. Successful producers for niche markets usually have unique products, good customer loyalty, limited competition, and the ability to maintain a profit margin when in competition with larger businesses.

Egg Production

Breed Selection

The best chicken breeds include commercial White Leghorn-type hybrids, which produce white-shelled eggs and are the most economical feed-to-eggs converters. Commercial production Reds (e.g., Rhode Island Reds, New Hampshire) or sex-linked hybrids produce large, brown-shelled eggs and are usually preferred for small range flocks. These birds have meaty carcasses and produce a good supply of eggs. The hybrids that lay brown eggs tend to be more docile than those that lay white eggs. All poultry breeds lay eggs, but they are not equally efficient.

Production Tips

To raise chicks, start the flock in late spring to reduce the cost of heating; however, buying started, ready-to-lay pullets is easier and more economical. Chicks should be brooded at 92-95°F for the first week, followed by a reduction of 5 degrees per week until a steady 70°F is reached.

Birds raised in a floor pen should have at least 2 square feet of space per adult bird. Windows or a fan will provide adequate ventilation to keep the pen dry. Keep 3 to 6 inches of litter on the floor and remove it as it becomes wet. Pine shavings provide the best litter for adult birds. To avoid leg problems, do not start chicks on slippery newspapers or pine shavings.

Feed a completely balanced ration. Void table scraps and whole grain, which dilute nutrient intake and decrease production. Use an 18- to 20-percent protein feed starter for the first 6 to 8 weeks, followed by a 14- to 15-percent protein grower or developer until 20 weeks of age. After 20 weeks, feed a 15- to 18-percent protein layer ration, and feed grit and oyster shells in separate feeders.

Provide 3 inches of feeder space per adult bird. To minimize wasted feed, the lip of the feeder should be level with the birds' back height, and trough feeders should be kept less than half full. Waterers must provide at least 5 to 6 gallons daily for every 100 birds. Provide 1 inch of water space per bird. Clean waterers three or four times each week, and provide fresh water daily.

Laying birds require at least 14 to 16 hours of light each day for maximum year-round production. Decreasing the light will stop egg production. Light must be added before sunrise and after sunset during the fall and winter, but be sure to provide several hours of darkness so the birds can roost. Use an inexpensive automatic timer to turn lights on and off. For each 40 square feet of pen space, install one 25-watt bulb at ceiling height above the food and water area.

For floor-reared layers, provide at least 6 inches of roost space per bird, using 2- by 2-inch wooden strips spaced 12 inches apart. Place roosts 24 inches above the floor and provide one 10- by 10-inch nest for every 4 or 5 hens. Nests should be 24 inches above the floor, away from the roosts. Keep nesting materials clean and dry. Collect eggs at least twice daily. Outside runs are not necessary; if used, they should provide 5 to 10 square feet of space per bird.

Meat Chicken Production

Breed Selection

The most efficient meat-producing chickens are the meat-type crosses (Rock-Cornish). Purebred poultry types most commonly raised for white meat are Cornish, Plymouth Rocks, and White Jersey Giants, but these breeds are less efficient than the crosses and take up to 14 weeks to develop a desirable carcass. There are niche markets for red-plumage birds and for the Silkie chicken, which has dark purple skin and is very popular in various ethnic live-bird markets.

Production Tips

Meat chickens can be raised much like laying chickens, except that wet and compacted litter is of even more concern with meat-type birds than with egg producers. These conditions cause breast blisters and leg weaknesses and give the carcasses an undesirable appearance. Never brood chicks on slippery surfaces. Pine shavings or straw are the best materials for giving meat birds the traction and leg support they need.

Feed a totally balanced ration. For fryers and broilers, use a starter mash or crumble pellets containing 20-23 percent protein. Roasters require a 20-percent protein starter for the first 6 weeks and can then be fed a 16-percent protein grower feed. At least 23 hours of light per day is recommended for meat birds. Use one 25-watt bulb per 100 square feet.

Do not use nests and roosts for meat-type chickens. Roosting causes breast blisters, crooked keels, bruises, and lameness in heavy meat birds. Meat-type birds make poor layers, so slaughter them before they reach egg production age. If you raise dual-purpose birds, put nests in place after slaughtering the culls and males. Outside runs are not recommended for meat chickens unless you sell range-reared birds.

Slaughter 2- to 3-pound fryers at 3 to 4 weeks of age; 4- to 5-pound broilers at 7 to 9 weeks; and roasters at 12 to 14 weeks. Remember, as birds get older and larger, they become less efficient and eat more feed for each pound of weight gained. Because older birds produce more meat, allow them to come as close to the desired weight as possible before slaughter.

Waterfowl

Breed Selection

The best breed of waterfowl to raise depends on several factors, including the reason for raising them and the amount of space available.

Ducks are small and require less space than geese. However, they need a year-round grain supplement and are more prone to predators. Geese require twice as much space as ducks, but do well on limited grain when they have plenty of grazing space. They are seldom bothered by predators.

Some waterfowl are raised for meat. They can be purchased from a commercial hatchery or local feed store. Duck breeds

avored for meat production include Muscovy, Peking, and Commercial (Barnyard) Rouens. The most common geese raised or meat are Emden, African, and Pilgrim.

Chinese geese are commonly raised as ve[redacted]geese. Because of their loud, harsh [redacted] startled, they are also used as wa[redacted]r guard geese.

Waterfowl raised for pets or as a hobby can be selected from among 14 breeds of domestic ducks and 11 breeds of domestic geese, covering a variety of shapes, sizes, and colors. A variety of wild, exotic waterfowl are also raised in captivity; however, wild waterfowl usually require special facilities and attention and special permits.

Production Tips

Young waterfowl usually are available only from April through July, while adult birds can be purchased from breeders throughout the year.

Young waterfowl—Waterfowl can be started much like chickens, but some special precautions are necessary.

Do not brood waterfowl on slippery surfaces (like newspapers)—this can cause spraddled legs. Paper towels, cloth, or burlap give the best traction.

Do not raise small breeds of waterfowl on mesh wire; their hocks (leg joints) may get stuck in the wire when they sit down. Mesh wire (approximately 3/8 inch) is acceptable for larger breeds.

Do not let young waterfowl swim or be[redacted]e excessively wet for the first 4 w[redacted]When wet, they chill easily, tend to c[redacted]nd flip onto their backs, causing death.

Do not use litters that mold or compact when wet.

Do not use fine litter until the birds learn to distinguish it from feed. Excessive litter consumption causes death. Instead, use absorbent material like chopped peanut hulls, pine shavings, or straw.

Do not feed medicated poultry feeds to young waterfowl; they may have adverse reactions to some poultry medications. Use starter mash formulated for waterfowl.

Feeding and watering—Crumble and pelleted feeds are usually best, because waterfowl waste feed, especially when it is ground into mash. During the first 3 weeks, feed a 22-percent protein starter ration; then change to a 16-percent protein grower feed. Avoid digestive problems by feeding some grit 1 week before allowing access to green fibrous plants. After 8 to 12 weeks of age, geese and ducks will eat very limited supplemental grain. Most breeders feed a mixture of about 40 percent corn and 60 percent oats until breeding season. Breeding waterfowl require only a 15-percent protein diet. Allow 6 linear inches of feeder space per bird and place feeders away from waterers. [redacted]ide plenty of fresh water at all times. W[redacted]essential for healthy growth. To keep the pen dry, place the lip of the waterer at the birds' back height. Adult birds require a waterer deep enough to get their head under water beyond their eyes. To ensure successful mating, especially in larger breeds, make water available for swimming. An old water heater tank cut in half works well.

Specialty Poultry

Many unique markets exist. Quail, pheasants, turkeys, and guinea fowl are raised for meat markets. Some birds are raised for exhibition. Mallard ducks, quail, and pheasant are raised for hunting preserves and for dog training. Markets are also available for racing pigeons, feathers for fly fishing, guinea hens for tick control, and pickled eggs.

Disease Prevention

Disease prevention—biosecurity—is an important aspect of any domestic poultry operation. Never allow poultry and other fowl to run loose. House them or keep them in a fenced area. Wild or tame waterfowl, cage or pet birds, ratites, and any other exotic birds should be on separate premises from chickens, turkeys, and game birds. If this is not possible, maintain them in separated, nonconnecting pens. It is important to raise all species separately to minimize disease. Wild waterfowl are reservoirs of avian influenza and other diseases; mixed-species poultry operations can serve as a catalyst for virus mutation and increase the risk for disease outbreaks.

A feather or one speck of fecal matter can carry billions of infectious germs. Avoid unnecessary human traffic, and prevent contact with unsanitary crates, equipment, or vehicles. **Always** wear clean clothes and footwear each time you return to your poultry production area. Allow visitors only after they have put on properly sanitized footwear, clothing, and hats. Insist that all poultry buyers bring only clean, disinfected crates, equipment, and vehicles into your farm with no visible fecal material or feathers. Better yet, transfer your birds to buyers at another location and clean your hauling equipment before returning home.

Practice "all-in, all-out" when raising poultry. Get rid of the entire flock before replacements arrive. Wash and disinfect the poultry house and leave it empty for 2 weeks. Replace the flock with healthy chicks from a single source, and do not add any new stock until the next clean-out. Limit the number of age groups on your farm. When all-in, all-out is not possible, bring new stock onto your farm only by hatching fertile eggs you have purchased or by buying Pullorum-Typhoid Clean chicks. Even though they appear healthy, adult birds are often disease carriers.

Buy only adult birds that have been vaccinated against Marek's disease. All chickens, turkeys, game fowl, or waterfowl you buy should be officially classified as U.S. Pullorum-Typhoid Clean. Participate in avian influenza testing programs where available.

Other Information Sources

Contact your local Cooperative Extension Office or State University through local telephone directory listings. If possible, obtain a management guide from a breeder or hatchery.

Growing expertise, innovative technologies, and production supplies can be found through publications such as:

Chicken Tractor: The Entrepreneur's Guide to Happy Hens and Healthy Soil by Andy Lee (250 pages), from Good Earth Publications, P.O. Box 160, Columbus, NC 28722. Telephone 1-800-499-3201.

Chicken Health Handbook by Gail Damerow (344 pages), from Storey Communications, P.O. Box 445, Pownal, VT 05261. Telephone 1-800-441-5700.

Pastured Poultry Profits by Joel Salatin (340 pages), Polyface, Inc., Rural Route 1, P.O. Box 281, Swoope, VA 24479. Telephone 540-885-3590.

Raising Poultry Successfully by Will Graves (186 pages), from Williamson Publishing, P.O. Box 185, Charlotte, VT 05455. Telephone 1-800-234-8791.

Good Neighbors. This free leaflet provides information on a health program for small and specialty poultry flocks. Contact T. Milton Nelson, Cooperative Extension Service, 0126 Symons Hall, College Park, MD 20742. Telephone 301-405-4596.

For general information on all aspects of poultry, contact: Lance Gegner, Appropriate Technology Transfer for Rural Areas (ATTRA), P.O. Box 3657, Fayetteville, AR 72702. Telephone 1-800-346-9140.

National Poultry Improvement Plan (NPIP) Directory of Hatcheries and Testing. To locate individual State contact sources, write to Andy Rhorer, USDA/APHIS, VS, ~~Room 860 Federal Building, Hyattsville, MD 20782~~. Telephone ~~301-436-7768~~. 404-922-3496

By Phillip J. Clauer, Poultry Extension Specialist, Animal and Poultry Sciences Department, 3300 Litton Reaves Hall, VA Tech, Blacksburg, VA 24061-0306, for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone 202-720-5245; Fax 202-205-2448.

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October 1995

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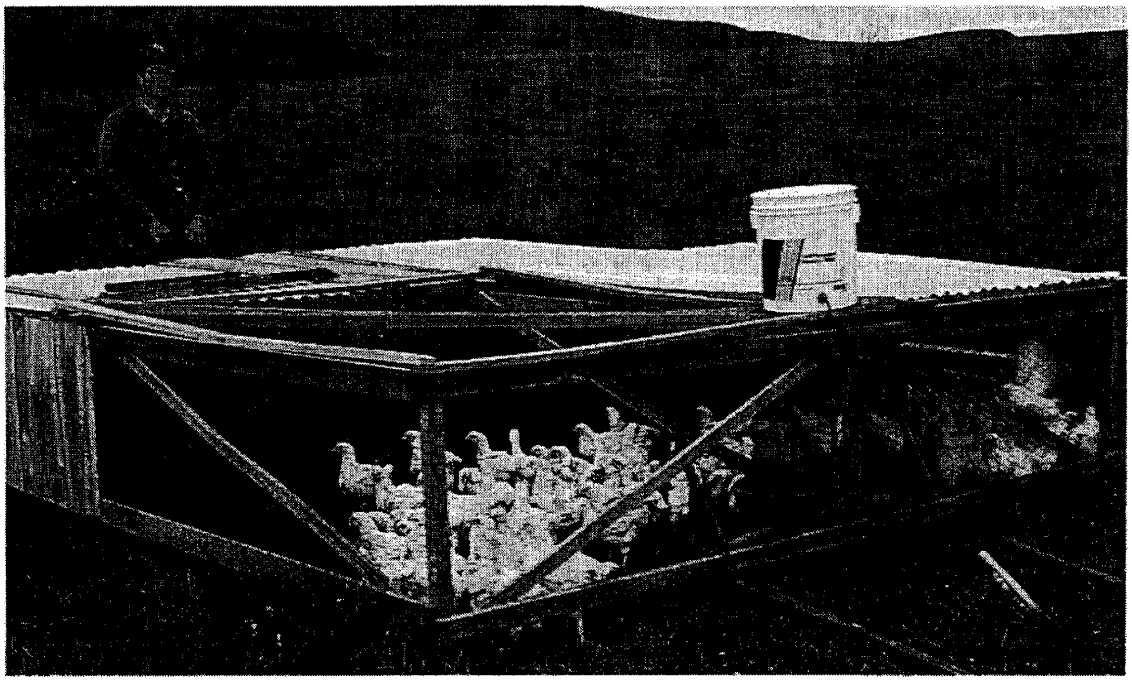
Also available at: www.sare.org/bulletin/poultry

SUSTAINABLE AGRICULTURE NETWORK
THE NATIONAL OUTREACH ARM OF USDA-SARE

Profitable Poultry: Raising Birds on Pasture



Virginia's Joel Salatin, a leader in the movement to expand poultry production outdoors, demonstrates a movable pen, one alternative system detailed in this bulletin. – *Photo by Tom Gettings/Rodale Institute*

LIKE MANY FAMILY FARMERS, CHUCK AND MARY SMITH integrate several diverse enterprises to ensure their continued ability to earn a living on 200 acres in north central Kentucky. "We look for things we can do as a family," Chuck said, including his three daughters. "We want something that'll keep us and them here for a long time."

To the Smiths, that means diversifying into new enterprises and establishing sustainable practices quite unlike the traditional corn and soybean rotations that had nearly stripped the farm's hillsides of topsoil before they bought it. They want to boost their income and increase, not further diminish, the farm's fertility.

At least one enterprise they've adopted in recent years helps them accomplish those goals: pastured poultry. Each year, the Smiths raise 3,000 broilers and 100 turkeys in a pasture-based system, then sell them directly to customers from Louisville, 45 miles away. The enterprise ensures a respectable income for their effort, involves the whole family and blends well with other aspects of their operation, from raising organic beef to growing grapes for a new winery. They graze their 50 cattle on the same pastures used by the chickens and are exploring the idea of turkeys grazing among their grapevines.

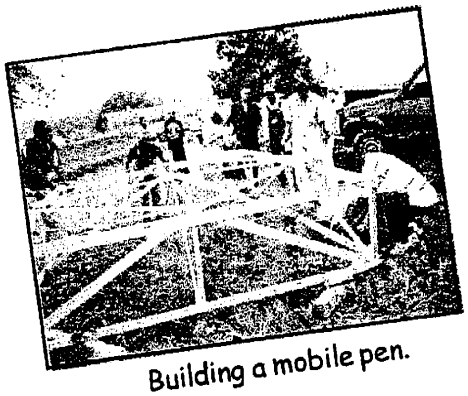
The Smiths also grow organic produce to sell at two local farmers markets and harvest five or six acres of tobacco each year. Of all those efforts, they point to their poultry operation as a remarkably dependable source of income. The family nets 50 percent of the sale price of each bird, with the chickens selling for $1.75 per pound at an average weight of 3.5 pounds, and the turkeys selling for $3 per pound at an average dressed weight of 18 pounds. Compared to the average payments for conventional growers raising chickens under contract – about 22 cents per 3.5 pound bird –

Mobile pens of chickens on the pasture.

Ready to eviscerate!

Pastured Poultry

A Heifer Project International case study booklet



Building a mobile pen.

Laying hen.

Home-grown's <u>the</u> best!

The mechanical plucker.

Sponsored by Southern Region USDA Sustainable Agriculture Research & Education (SARE)

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All New Straw Bale Edition

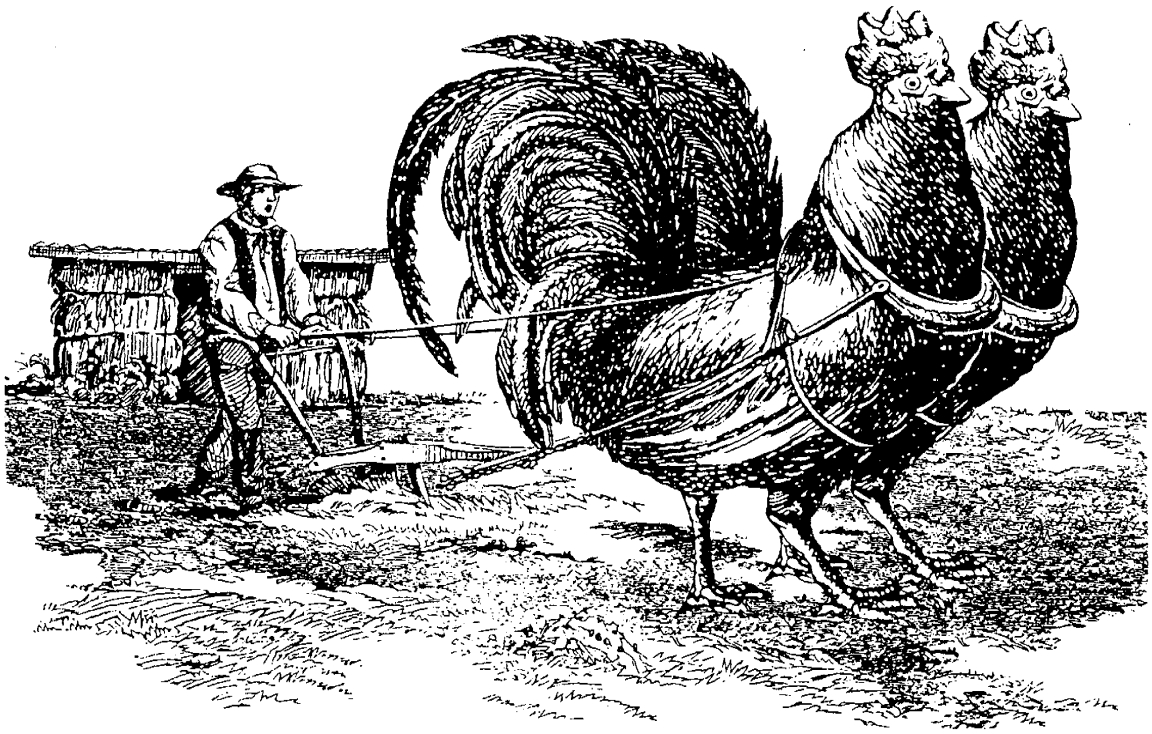
CHICKEN TRACTOR

The Permaculture Guide to Happy Hens and Healthy Soil

by

Andy Lee

Pat Foreman



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Ode to a Chicken Tractor

"Chicken Tractors, Chicken Tractors! I want them Everywhere!"
says Andy Lee, "I want them spreading coast to coast—LA. to Delaware.
What this country really needs — a chicken in every pot;
and with this handy method, well, gosh, that's just what you've got!"

Stick all your chickens in a pen that you can move around;
Take them out into your fields and let them peck the ground.
It may seem silly, but it's not; the benefits abound.

They fertilize, they spread manure, they dig up all the weeds,
and they won't need as much to eat to satisfy their needs.
They're open range, but in a pen so they can't eat your seeds.

You'll make a profit, simple too, it's elegant and neat;
A positive and easy way to help you grow your meat.
As a system, guaranteed, the method can't be beat.

So if you want this great technique, then this is what you do:
Buy the book by Andy Lee; it just came out - it's new.
Chicken Tractor is its name. It's good, and useful too!

by Ron Macher and Paul Berg,

Small Farm Today magazine

Raising Emus and Ostriches

Special Reference Briefs Series no. SRB 97-06

Compiled By:
Rebecca Thompson
Information Centers Branch
National Agricultural Library
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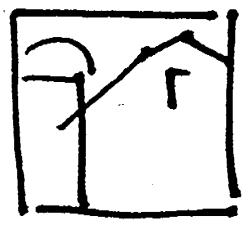

Alternative Farming Systems

USDA, ARS, National Agricultural Library
Beltsville, Maryland 20705-2351

August 1997

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F. AquaCulture

United States
Department of
Agriculture

Cooperative State
Research Service

Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Aquaculture

An ancient science practiced by many major civilizations, aquaculture today produces more than 2,000 different species of plants and animals in fresh and salt waters around the world.

U.S. aquaculture production has dramatically expanded in the past 10 years with pond-raised catfish in the Southeast, cage-raised coho salmon in the Pacific Northwest, pen-raised Atlantic salmon in the Northeast, and farm-raised crawfish in Louisiana and Texas. Freshwater trout dominate the aquatic production of several States, while ornamental fish, plants, and algae abound in others. Emerging species with commercial potential include hybrid striped bass, redfish, yellow perch, and hybrids of trout and salmon.

During the last few years, harvests from capture-fisheries have reached a stable level. At the same time, however, consumer demand for both seafood and freshwater products has continued to increase. Per capita consumption has increased over 25 percent in the past 6 years.

Low-fat product

U.S. consumers are becoming increasingly aware of the advantages of aquaculture products. Trends in seafood consumption, fueled by concern for a contamination-free, low-fat product, suggest a steady annual increase in demand for several years to come.

Imports, many utilizing expensive air freight transportation, represent 46 percent of the U.S. seafood consumption in pounds and 82 percent in U.S. consumer dollars. Recent successful introductions of South American shrimp and Norwegian salmon prove the profitability of good-quality seafood.

Like traditional farming, aquaculture requires hard work, pride in the best product possible, and marketing knowhow to generate an acceptable return. Products are sold whole, processed, and value-added. Markets may be found locally, regionally, and internationally. Growers can market aquaculture crops as bait, ornamentals, pets, or stockers; specimen water plants; environmental grasses, and by-products: feed, fish oils, and fertilizers.

Water experience needed

Small-scale aquaculture is limited less by a lack of information than by farmers with experience working with water crops. There are many parallels with more traditional farming products. For example, problems of quality, shelf-life, and market development are similar to those for any perishable farm product.

Inspection of seafood processing is not yet federally mandated but Congress has seriously considered enabling legislation. Legislation, if approved, would have a direct impact on marketing processed aquaculture products.

One factor complicating aquacultural development is that mandated authorities of numerous State and Federal agencies may overlap and cause conflicts.

Information sources

Aquaculture specialist James W. Avault, Jr. (Louisiana State University, Baton Rouge, LA 70803), emphasizes that getting answers to problem questions is essential for successful aquaculture. His December 1989 article in *Aquaculture Magazine* lists many information sources.

There are a number of multispecies book sources, a list of which is available from the U.S. Department of Agriculture's (USDA) National Agricultural Library, with its AGRICOLA computer database and Aquaculture Information Center (NAL, Beltsville, MD 20705).

Federal sources

The USDA, lead agency in coordinating aquaculture development, also has these information sources: the Extension Service (Washington, DC 20250), the Cooperative State Research Service (CSRS) Office of Aquaculture (Aerospace Building, Suite 342, Washington, DC 20250-2200), the Soil Conservation Service (SCS, Washington, DC 20250) and federally supported Extension and research projects at 1890 and 1862 State land-grant colleges and universities.

Specific information about these and many more contacts also can be found in the "Directory of Small-Scale Agriculture" (Superintendent of Documents, United States Government Printing Office, Washington, DC 20402/$5.50 per copy).

Several other Federal agencies also are involved in aquaculture. The U.S. Department of the Interior's Fish and Wildlife Service (USFWS) may help with questions on hatchery management, fish biology, disease control, and reservoir management.

The U.S. Department of Commerce's National Marine Fisheries Service (NMFS, 1335 East-West Highway, Silver Spring, MD 20910) focuses on saltwater fish, shrimp, oyster, and other shellfish species.

Also within the Department of Commerce is the Office of Sea Grants, administered by the National Oceanic and Atmospheric Administration (NOAA, Rockville, MD 20805) to support research.

The Environmental Protection Agency (EPA, Waterside Mall, Washington, DC 20460) monitors the impact of aquaculture practices on surface and ground water.

The Food and Drug Administration (FDA, 5600 Fishers Land, Rockville, MD 20852) regulates pest control materials, food additives, and processing practices.

Regional sources

Other sources include USDA's five [illegible]nal Aquaculture Centers: (1) the [illegible] Central Regional Aquaculture Center ([illegible]RAC, Room 13 Natural Resources Building, Michigan State University, East Lansing, MI 48824); (2) Southern Regional Aquaculture Center (SRAC, Delta Branch Experiment Station, Stoneville, MS 38776); (3) Tropical and Subtropical Regional Aquaculture Center (TSRAC, The Oceanic Institute, Makapuu Point, Waimanalo, HI 96795); (4) Northeast Regional Aquaculture Center (NRAC, University of Rhode Island, Kingston, RI 02881); and (5) Western Regional Aquaculture Center (WRAC, School of Fisheries, WH-10, University of Washington, Seattle, WA 98195).

State sources

State governments may also provide numerous kinds of information, materials, and experience. Many growers are surprised to discover the great diversity of products their State can culture. State marketing programs often promote local products, such as Mississippi catfish, Maine lobster, Louisiana crawfish, and [illegible]trout.

[illegible] States have a department of natural resources (or fish and wildlife or similar title) that regulates and manages the natural stocks of fish. These departments, particularly in States supporting large fish stocking programs, provide an excellent opportunity for new fish farmers to consult experienced aquaculturists. Information on facilities and research projects often can be obtained through county Cooperative Agricultural Extension (CES), SCS, or other government offices listed in the local telephone book. Land-grant universities, supporting local CES offices, often provide valuable local information.

Aquaculture associations

Associations and trade shows provide current production information and materials. Information on specific groups can be found through growers, manufacturing representatives, NAL, CES, or *Aquaculture Magazine's* "Annual Buyers Guide."

The names and addresses of pertinent publications from private trade sources may be obtained from the NAL, as noted above.

Elsewhere, the "1989 Yearbook of Agriculture" (Superintendent of Documents, United States Government Printing Office, Washington, DC 20402/$10.00 a copy) discusses the management problems on small-scale farm operations.

Tony Mazzaccaro, former Aquaculture Specialist in the CSRS Office of Aquaculture, says aquaculture places "high demands on a farmer for both time and technical ability."

He adds, "The new fish farmer is advised to begin small and make a modest investment. If a trial is successful, larger commitments can be made with a higher level of understanding."

Many aquaculture production systems require large capital investments. However, some areas have begun to diversify with unique products made on a smaller scale.

For example, at the Kirkwood Community College, Curtis Stutzman at the Rural Development Center (P.O. Box 2068, Cedar Rapids, IA 52406) makes use of refurbished swine containment buildings with indoor tanks, using recirculating water. Curtis says, "At the farm of Todd and Darrel Kleppe of Clinton, IA, tanks are producing tilapia whose fillets sell for $7 per pound at local restaurants."

Use of small-scale indoor tanks is also being encouraged by Paul Battistoni, president of AquaMar Industries, Inc. (1945 Pocomoke Beltway, Pocomoke City, MD 21851), who has experience operating a pilot-plant operation at the University of Maryland-Eastern Shore. He also has built a tilapia hatchery and production plant as a demonstration facility for potential "grow-out farmers" interested in producing fish under contract. He also is producing hybrid striped bass.

"We're looking at the successful economic model of the integrated poultry industry," he says. "We could provide fingerlings, feed, technical assistance, and a harvest crew to handle fish produced in indoor tanks."

Use existing resources

"It is important for small-scale producers to utilize existing resources," says Ronald Macher (Ridge Top Ranch, Rt. 1, Box 237 Clark, MO 65243). With a show-me attitude, Macher several years ago saw the Midwest, with 350,000 ponds, including almost a quarter million acres of water, as a potential farm resource. "We demonstrated over a 5-year period that we could economically raise catfish in cages," Macher explains. "Our growing season from May to November could consistently produce 1.5-pound catfish in 21 weeks." His publication, *Missouri Farm* (6 issues per year/$18.00), gives details on such alternative crops.

One overview of the seafood marketing industry is presented by Ian Chaston, "Marketing in Fisheries and Aquaculture," 1984 (State Mutual Book and Periodical Service, 521 Fifth Ave., 17th Floor, New York, NY 10175/$19.95). Specific reports on trout, crawfish, and aquaculture enterprises are in the 189-page book, "ADAPT2,) published by *Successful Farming* magazine (P.O. Box 10652, Des Moines, IA 50336). This publication is available in some libraries.

In farming, raising capital is always a major obstacle. However, one source of financing may be the USDA's Farmers Home Administration (FmHA). FmHA officials accept loan applications for proposed small-scale aquaculture enterprises. Applicants with experience in small production systems, involvement with existing business, and demonstrated familiarity with new technology provide strength to any such proposal.

Prepared by Thomas S. Handwerker, Small-Scale Agriculture Research at the University of Maryland-Eastern Shore, and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is Office for Small-Scale Agriculture, Cooperative State Research Service, [illegible], USDA, Washington, DC 20250-22[illegible] (Telephone: 202/~~401-4640~~) 401-1805

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November 1990

* U.S. G.P.O:1990-282=933:40013/CSRS

Agriculture Handbook 590

Ponds — Planning, Design, Construction

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Missouri Pond Handbook

Written by Ken Perry
Illustrated by Diana Jarrell
Edited by Frank Ryck and Joan McKee

Missouri Department of Conservation

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FISH FRIENDLY FARMING
FARM CONSERVATION PLAN WORKBOOK
INTRODUCTION

The Sotoyome Resource Conservation District (SRCD) has organized the Fish Friendly Farming Certification Program to improve water quality and habitat restoration and management for the recovery efforts for the federally-listed threatened coho salmon and steelhead trout in the Russian River watershed. The Russian River watershed is 95% private land and creating a landowner directed restoration program could produce many more positive actions for the fish than a regulatory and punitive program. The Sotoyome RCD is a non-regulatory local agency that assists landowners with soil, water and resource conservation projects. RCDs were started in the 1930's during the Dust Bowl to provide assistance to landowners. The Board of Directors of an RCD is made up of landowners from the watershed. Although the Sotoyome RCD is taking the lead on this project, we work in coordination with the two other RCDs in the watershed - Mendocino RCD and Gold Ridge RCD.

The Fish Friendly Farming (FFF) program is a voluntary certification program for grapegrowers who implement land management practices that restore and sustain fish habitat on their property. The Fish Friendly Farming program is incentive based. This program will attempt to reward these fish friendly agricultural practices with an increase in the value of grapes. The wines made from these grapes will be labeled or advertised as environmentally friendly and may cost slightly more, allowing for a financial benefit to the certified grapegrower. This increased value would be achieved through marketing programs that focus on consumers' willingness to pay more for wines that carry this designation. There are opportunities to apply this concept to other agricultural interests and products as well.

A number of agencies have participating including the North Coast Regional Water Quality Control Board, the California Department of Fish and Game, the National Marine Fisheries Service, the Natural Resources Conservation Service and others. The SRCD is currently working with the National Marine Fisheries Service and the Regional Water Quality Control Board to develop a mechanism to receive regulatory approval for the program and its Beneficial Management Practices (BMPs) as consistent with the Russian River Basin Plan, the Clean Water Act and the Endangered Species Act.

This program uses a workbook for the landowner or manager to evaluate the property, the current practices, and create a farm conservation plan for the property focusing on resource concerns including fish habitat. The SRCD will be providing a series of workshops for farmers to help them complete the assessment, the farm plan, and implementation timeline. The farmer will keep the workbook and the farm conservation plan and use it and revise it as necessary. The workbook includes a format to allow for the farmer to use one notebook to include all of the information and maps. These methods recognize that improved land stewardship is best accomplished through a cooperative and positive working relationship with landowners and farmers. Landowners make numerous

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decisions regarding land management and will use improved methods, if encouraged, and technical and sometimes financial assistance is available.

The overall concept is that once the assessment and farm conservation plan are complete and the landowner will apply for certification, potentially including regulatory approvals. A certification team made up of resource agencies, technical experts, and farmers will evaluate the farm plan and perform a site visit. The certification will be based on the completeness and accuracy of the assessment and farm plan. The completeness and accuracy of the farm plan in documenting the current practices and uses of BMPs and the commitment to implement additional program BMPs as needed. The certification process is meant to provide assistance to the farmer and result in a collaborative effort to improve land stewardship. Continued monitoring will allow for the landowner to document their practices and fish friendly land stewardship. Re-certification will occur on a 3-5 year cycle for most sites. Vineyards located on steep slopes (in excess of 30% slope) and highly altered creeks will require more frequent re-certification, particularly for the first few years.

The following objectives were approved by the SRCD to guide the Fish Friendly Farming Certification Program:

- Cooperative efforts between landowners and interest groups in the watershed will increase the level and success of restoration and recovery efforts for salmon and steelhead.

- An incentive program that rewards grape growers for practicing beneficial management practices (BMPs) will protect fish habitat over the long term.

- Restoration and recovery of threatened fish populations is an immediate concern. The certification program, by providing incentives, will encourage rapid improvements. But some phasing of improvements needs to be built into the program to recognize the economic effects on the landowner.

- Beneficial management practices must be based on a credible scientific approach to watershed restoration and focus on the needs of the fish and its habitat. The certification and incentive program will incorporate these scientific principles.

- Recovery of the salmon and steelhead is a long-term endeavor. Changes to support and sustain these fish populations must be integrated into all land uses in the watershed. There are many problems not associated with agriculture which have had significant effects on the fish. This program focuses on one land use, grape growing, and recognizes that changes must be made in other activities and land uses as well if the fish are to recover.

- The program involves regulatory agencies, interest groups, farmers and landowners so that the program may be found in compliance with the Endangered Species Act and the farmers achieve relief from regulatory problems.

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- The program will include a marketing program that addresses increasing the value of wine grapes from growers who become certified and integrate economic issues with environmental issues.

- This program is entirely voluntary. Landowners chose to participate.

The FFF Program was funded through a grant from the State Water Resources Control Board, with funds from the Environmental Protection Agency. The program was carried out from May 1997 through June 1997. A Technical Advisory Committee (TAC) was formed to assist with the program development. The TAC adopted two goals for the project:

- "Farmers certified as Fish Friendly will use beneficial management practices to reduce erosion and sedimentation in order to maintain and improve water quality and water quantity

and

- Farmers certified as Fish Friendly will manage their agricultural lands for creek corridor integrity to ensure a sustainable, native fishery in the context of a productive farm."

Through a series of monthly meetings, the TAC discussed, reviewed and oversaw the preparation of the farm conservation plan workbook and all of the BMPs. In addition, the BMPs were sent out to TAC members who could not attend the meeting. Written comments on these draft documents were incorporated in this final workbook. The project manager, Laurel Marcus, gave over 25 presentations to agricultural groups, environmental groups, government agencies, and general interest groups, as well as having hundreds of meetings with TAC members and interested parties. The TAC field-tested the workbook and BMPs on the farm site of one of the TAC members and field certified the farm plan.

The SRCD Board of Directors in their regular public monthly meetings also discussed the progress of the program and invited additional public comment.

The workbook consists of three parts:

- A set of instructions, templates and BMPs to use in preparing a farm conservation plan under the FFF program. The BMPs are relatively detailed but individual analyses, calculations and designs are required to apply the BMPs to each farm.
- A set of Appendices of additional technical information related to the inventory/assessment methods and BMPs in the program. Also included is information from several other programs. Information on funding for implementing farm conservation plans in included as well.
- Fish Facts a publication chronicling the life cycle and habitat requirements of the salmon and steelhead trout ad how human actions can impact the watershed processes

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and fish habitats. Fish Facts sets out the needs and requirements of these endangered species. The FFF program encompasses the methods and BMPs to reduce impacts and restore habitat and sustainable watershed processes.

The potential benefits of the FFF program for the farmer include:

- ❑ improved land stewardship with soil and water conservation,
- ❑ better roads
- ❑ lower maintenance creek corridors
- ❑ increased income from special marketing
- ❑ regulatory approvals
- ❑ implementation funds for riparian corridor restoration
- ❑ road and erosion site repair
- ❑ public recognition as an environmentally conscious farmer
- ❑ personal satisfaction for assisting in the recovery of the salmon and steelhead trout for your children and grandchildren

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Sea Grant

Aquaculture
FACT SHEET
September 1991

Cornell Cooperative Extension • State University of New York

FOR-FEE POND FISHING: DECISION-MAKING FACTORS

Douglas H. Ververs
Cornell Cooperative Extension Agent

Under the right circumstances a for-fee fishing enterprise can be successful. Like other forms of agriculture or alternative recreation, fee fishing involves capital investment risks, adequate land and water resources, and daily attention. If you're considering fee fishing on your property, the following checklist can help you determine whether a fish-for-fee enterprise is feasible for your particular situation.

This checklist, of course, doesn't cover all situations or possibilities. The issues raised by these questions will take considerable knowledge and research to answer. Prior to entering this venture, you need to be committed to acquiring the knowledge and conducting the ongoing needed research. To have a good probability of success, most of your answers should be in the yes column.

Information on for-fee fishing is limited. A concise bibliography of information concerning fishing for fee is included in this fact sheet.

Economic Factors

Management	**Yes**	**No**
1. Do you already have suitable ponds or a site suitable for constructing ponds?	____	____
2. Do you have suitable facilities and road access?	____	____
3. Do you have the necessary financial resources?	____	____
4. Is the profit potential equal to or higher than that of other possible investments?	____	____
5. Will investment and operating costs permit a reasonable profit?	____	____
6. Will the expected profit be adequate compensation for your labor, management, and liability risk?	____	____
7. Is fee fishing the best economic alternative for the land you intend to use?	____	____
8. Can you afford to forego income until you develop a clientele?	____	____
9. Could you absorb a season of lost revenue?	____	____
10. Is this a stand-alone enterprise?	____	____
11. Are you able to devote the time and effort required?	____	____

Market		
1. Do you have angler acceptance for the species and size of your fish?	____	____
2. Is there a demand for fishing access at the time of year you can provide it?	____	____
3. Do you have suitable arrangements for replenishing your stocks with fish acceptable to clientele?	____	____
4. Can your for-fee enterprise accommodate your clientele's desire to harvest fish and gain some solitude or relaxation?	____	____
5. Do you have an alternative marketing strategy or target market to fall back on?	____	____
6. Will you offer "catch and release only" or "pay-by-the-pound harvesting"?	____	____
7. Can you achieve and maintain quality catches, high volume, and catch rates?	____	____

Environmental Factors

	Yes	No
1. Does the topography of the land lend itself to pond construction?	____	____
2. Are the soil types and groundwater level capable of maintaining pond water levels?	____	____
3. Can you obtain the necessary permits and licenses? (See page 3.)	____	____
4. Is your water of the proper quality for selected fish species' survival and growth?	____	____
5. Can adequate water temperatures and levels be maintained?	____	____
6. Is enough water available to fill the pond and replace losses?	____	____
7. Do compatible types and quantities of aquatic plants, algae, and fish species currently exist?	____	____
8. Is the pond area protected from flooding?	____	____
9. Can undesirable and exotic fish be prevented from entering the pond?	____	____
10. Is there year-round access to the pond for fishing, feeding, and maintenance?	____	____
11. Is there a cleared access area to the pond to allow efficient and safe angling by a variety of anglers, whose abilities and techniques may differ?	____	____
12. Is your residence close enough to the pond to allow frequent and timely observations and the necessary management adjustments?	____	____

Production Factors

1. Can you constantly evaluate the status (abundance and size) of the fish population?	____	____
2. Do you have a management plan for maintaining fish size and population densities?	____	____
3. Is a source of replacement fish stocks (fingerling or harvest size) available?	____	____
4. Can you raise your own replacement stock?	____	____
5. Are replacement size fish available at an affordable price?	____	____
6. Are dependable contracted services available for testing water, fish health, and population density?	____	____
7. Can you make or purchase aeration equipment?	____	____
8. Do you have facilities for storing feed and equipment?	____	____
9. Are good-quality feeds readily available at a competitive price?	____	____
10. Is dependable labor affordable and available?	____	____
11. Are you aware of the government agencies and aquaculture associations that can provide you educational and technical services?	____	____

Common Risks and Concerns

Are you equipped to handle the following issues:

1. Poor water quality?	____	____
2. Low water and oxygen depletion?	____	____
3. Disease and parasites?	____	____
4. Poachers and vandals?	____	____
5. Personal stress resulting from daily management?	____	____
6. Bird and wildlife predators?	____	____
7. Angler complaints and requests?	____	____

Conclusion

For-fee fishing can provide a unique opportunity for those individuals interested in working with a natural resource as a hobby to generate limited levels of income, or as a more substantial enterprise focusing on filling particular target or "niche" markets with planned returns on investments. There are numerous factors which control and impact the success or failure of this type of enterprise, including economic factors, environmental determinants, biological factors, production variables, and business planning decisions. Additional information is available from the New York State Aquaculture Association, the United States Fish and Wildlife Service, the United States Soil Conservation Service or the soil and water conservation district in your county, the New York State Department of Environmental Conservation, the New York Sea Grant Extension Program, and the Cornell Cooperative Extension program in your county.

A Bibliography of Information Concerning Fishing for Fee

Entrepreneurs considering for-fee fishing would be well advised to read and study some, if not all, of the following references prior to any large commitment of resources to fee fishing.

Beem, M. 1990. Fee Fishing. Oklahoma State University Extension Facts No. 9200. Oklahoma State Cooperative Extension Service. Oklahoma State University, Stillwater, OK. 4 pp.

Cichra, C. E. and L. T. Carpenter. 1989. Fee Fishing as an Economic Alternative for Small Farms. Southern Rural Development Center. Pub. No. 116. Mississippi State University, Mississippi State, MS. 72 pp.

Cremer, M. C., S. D. Mims, and G. M. Sullivan. 1984. Pay Lakes as a Marketing Alternative for Kentucky Fish Producers. Research Bulletin No. 8. Aquaculture & Natural Resources. Kentucky State University, Frankfort, KY. 19 pp.

Eipper, A. W., H. A. Regier, and D. M. Green. Revised 1988. Fish Management in New York Ponds. Information Bulletin No. 116. Cooperative Extension Publication, Cornell University, Ithaca, NY. 20 pp.

Garling, D. L. 1989. Fee Fishing Pond Management. Fisheries and Wildlife Cooperative Extension Program. Michigan State University, East Lansing, MI. 6 pp.

Helfrich, L. A., R. J. Sheehan and J. S. Odenkirk. 1986. Fishing for Sale: Fee-Fishing Opportunities in Virginia. Dept. of Fisheries and Wildlife Sciences. Virginia Cooperative Extension Service. Virginia Polytechnic Institute, Blacksburg, VA. 8 pp.

Higginbotham, B. 1987. Current Fee Fishing Trends and Techniques in Texas. Reprint No. A 1803. Reprinted from 1987 Texas Fish Farming Conference. Cooperative Extension Program. Prairie View A & M University, Prairie View, TX. 4 pp.

Higginbotham, B. 1988. Facility and Equipment Needs for Texas Fee Fishing Operations. Reprint No. A1804. Reprinted from 1988 Texas Fish Farming Conference. Cooperative Extension Program. Prairie View A & M University, Prairie View, TX. 2 pp.

Huffstodt, J. 1985. Fishing for a Fee. *Farm Pond Harvest.* Vol. No. 19, No. 4. Momence, IL. 2 pp.

Hutchins, B. W. and J. R. VanMeter. 1970. Guidelines for Developing a Fee Fishing Area. Bulletin No. GRPR-10. Office of Recreation and Park Resources. University of Illinois at Urbana-Champaign, Urbana, IL. 6 pp.

Kiely, J. 1989. Fee Fishing: Income Opportunities for Rural Areas. Reprinted from Resource Management Packet from 1st Eastern Conference on Rural Income Opportunities — April 1989. West Virginia University, Morgantown, WV. 4 pp.

United States Department of Agriculture. 1982. Ponds — Planning Design and Construction. Agriculture Workbook No. 590. Soil Conservation Service, Washington, DC. 51 pp.

New York State Department of Environmental Conservation — Permit Applications & Assistance

The following licenses and permits are required in New York State:

Application for Fishing Preserve License No. FW-171. Farm Fish Pond License No. FW-50 (must be upgraded to FW-171 prior to allowing fee fishing). Fish Tags Permit No. DEC 19 (tags must be attached to all fish prior to leaving property). Permits to Raise Fish for Breeding, Stocking or Resale: Private Bass Hatchery Permit No. DEC 11, and/or Permit to Raise and Sell Trout No. DFG-197. Permit, licensing, and technical assistance is available from the State Department of Environmental Conservation offices listed below.

Region 1 — Stony Brook
Building 40, SUNY
Stony Brook NY 11794
(516) 751–7900

Region 3 — New Paltz
21 South Putt Corners Rd.
New Paltz NY 12561
(914) 255–5453

Region 4 — Stamford
Route 10
Stamford NY 12167
(607) 652–7364

Region 5 — Ray Brook
Route 86
Ray Brook NY 12977
(518) 891–1370

Warrensburg Suboffice
Hudson St., Box 220
Warrensburg NY
12885–0220
(518) 623–3671

Region 6 — Watertown
State Office Building
317 Washington St.
Watertown NY 13601
(315) 785–2262

Utica Suboffice
207 Genesee St.
State Office Building
Utica NY 13501–2885
(315) 793–2554

Central Office — Albany
Bureau of Fisheries
Rm. 518
50 Wolf Rd.
Albany NY 12233–4753
(518) 457–5420

Region 7 — Cortland
P.O. Box 5170
Fisher Ave.
Cortland NY 13045
(607) 753–3095

Region 8 — Avon
6274 E. Avon-Lima Rd.
Avon NY 14414
(716) 226–2466

Region 9 — Olean
128 South St.
Olean NY 14760
(716) 372–8676

Additional sources of information and technical assistance

United States Fish and Wildlife Service
3815 Luker Rd.
Cortland NY 13045
(607) 753–9334

New York Sea Grant
Swetman Hall
SUNY College at Oswego
Oswego NY 13126–3599
(315) 341–3042

New York State Aquaculture Association
c/o New York State Department of Agriculture and Markets
Capital Plaza
1 Winners Circle
Albany NY 12235
(518) 457–4383

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Copies of this publication are available from:

New York Sea Grant
Swetman Hall
SUNY College at Oswego
Oswego NY 13126–3599

New York Sea Grant Extension is a state and federal program designed to help people solve coastal problems along New York's Great Lakes, St. Lawrence, Niagara, and Lower Hudson Rivers, the New York City waterfront, Long Island Sound, and the State's Atlantic Ocean coast. It is administered through the State University of New York and Cornell University. Sea Grant funds research projects and conducts educational programs on issues ranging from off-shore mining and erosion control to commercial fisheries, coastal tourism, and aquaculture.

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Sea Grant
New York

- NOAA, Department of Commerce
- Cornell University
- State University of New York

Coastal Recreation
FACT SHEET
May 1997

LAKE ONTARIO ANGLER SATISFACTION

by
Nancy A. Connelly
Research Specialist
Cornell University Department of Natural Resources

Diane Kuehn
Coastal Tourism Specialist
New York Sea Grant

and
Tommy L. Brown
Senior Research Associate
Cornell University Department of Natural Resources

INTRODUCTION

The ecosystem of Lake Ontario has changed greatly over the past two decades. A reduction of nearly 40% in total phosphorus in the lake in the 1980s (data from the Canadian Center of Inland Waters), followed by the introduction of the zebra mussel, led to a large decline in zooplankton density. This, in turn, led to substantial declines in smelt and alewife populations by 1991 (Lake Ontario Committee of the Great Lakes Fishery Commission, 1992). As a result, the New York State Department of Environmental Conservation (DEC) decided in 1992 to reduce predatory demand on the declining forage fish stock by 50% through a stepwise reduction in the stocking of salmonines, starting in 1993 (Brandt et al., 1996).The potential impacts of these ecosystem and stocking changes on catch rates and, consequently, angler satisfaction and activity are a concern of fishing-related businesses and tourism promotion agencies.

This study was implemented by Cornell University researchers with funding from the New York Sea Grant Institute in order to determine current levels of angler satisfaction and whether other fishing-related recreation opportunities could compensate for potential changes in catch rates.

METHODS

To target Lake Ontario anglers, a systematic sample of 1,500 names was drawn from 1993-1994 fishing licenses purchased in five New York counties bordering Lake Ontario (i.e., Oswego, Wayne, Monroe, Orleans, and Niagara). These counties, which had the highest percentages of license buyers fishing Lake Ontario in 1988 of all New York counties (Connelly, Brown & Knuth, 1990), provided the most efficient way to obtain a sample of Lake Ontario anglers. The sample included resident, nonresident, seasonal, and short-term fishing licenses.

A questionnaire was mailed to the sample in early September 1995. Respondents who had fished Lake Ontario or one of its tributaries in 1994 or 1995 were asked to recall specific information about their two most recent trips. Respondents were asked specific details about each trip, including the number, species, and size of fish caught, and if they were fishing from a charter boat. Respondents also rated, on a 10-point scale (1 = very dissatisfied to 10 = very satisfied), their satisfaction with nine different aspects of their fishing trip (Table 1) and their overall satisfaction with their trip. Respondents were then asked how their overall satisfaction would have changed if, in addition, they could have

taken advantage of three different fishing-related recreation opportunities (i.e., a booth for fishing information, a regional fishing museum, and a retail outlet store specializing in fishing equipment) during their last trip.

A statistical analysis (regression analysis) was used to identify which aspects or components of an angler's trip were the most important to his/her satisfaction. Each additional recreation opportunity was then examined to determine if it would compensate for a decreased satisfaction with catch and catch rate.

RESULTS AND DISCUSSION

Survey respondents

Of the 1,500 questionnaires mailed, 78 were undeliverable and 838 completed questionnaires were returned. This resulted in an adjusted response rate of 59%.

Approximately 56% of the sample of license buyers fished Lake Ontario or one of its tributaries in 1994 or 1995. Most of them (81%) fished for salmon or trout during that time; 40% fished for species other than salmon and trout.

In an effort to begin tracking the use of the internet by anglers, those who had fished Lake Ontario in 1994 or 1995 were asked if they had access to the internet either at work or at home. More than one-third (37%) of respondents indicated they had access in September 1995, when this study was conducted. Access did not differ for anglers fishing only for salmon and trout.

Angler satisfaction with fishing trips

The remainder of this fact sheet deals only with trips anglers took to Lake Ontario or its tributaries to fish primarily for salmon or trout. These results are based on 456 trips, 96 (21%) of which were charter boat fishing trips.

On a 10-point scale (1 = very dissatisfied, 5 = neutral, and 10 = very satisfied), the average overall trip satisfaction for anglers was 7.1. Although this means that the average angler was satisfied with his/her trip to Lake Ontario, individual responses ranged from 1 to 10 (very unsatisfied to very satisfied).

Survey respondents were also asked to rate their satisfaction with nine different aspects or components of their fishing trip (Table 1). While the average angler was satisfied with each of these components, individual responses once again ranged from 1 to 10. Anglers were the least satisfied with catching fish (the average rating was 5.4), and most satisfied with the companionship of family or friends (the average rating was 8.8).

The aspects or components of angler trips that were most important in explaining overall trip satisfaction were also identified (Figure 1). The numbers listed next to each component in Figure 1 identify the relative importance of the component to overall trip satisfaction. While "catching fish" and "being aware of the presence

Table 1. Trip-related components and average levels of angler satisfaction with each. Satisfaction was measured on a 10-point scale, where 1 = very dissatisfied and 10 = very satisfied.

Components of Trip	Average Angler Satisfaction
Enjoying the companionship of family or friend(s)	8.8
Relaxing; getting away from it all	8.3
Getting access to where you wanted to fish	8.0
Finding any retail services you needed	7.4
Practicing fishing and/or boating skills	7.3
Having enough room to fish; not being too crowded	7.2
Learning something new about fishing or the aquatic environment	7.0
Being aware of the presence of fish	6.9
Catching fish	5.4

Figure 1. A model developed to explain the major components that contribute to overall trip satisfaction for **all trips** to Lake Ontario or its tributaries, primarily for trout or salmon fishing. The numbers (standardized regression coefficients) indicate the relative importance of each component to overall trip satisfaction (i.e., the higher the number, the higher the importance of the component).

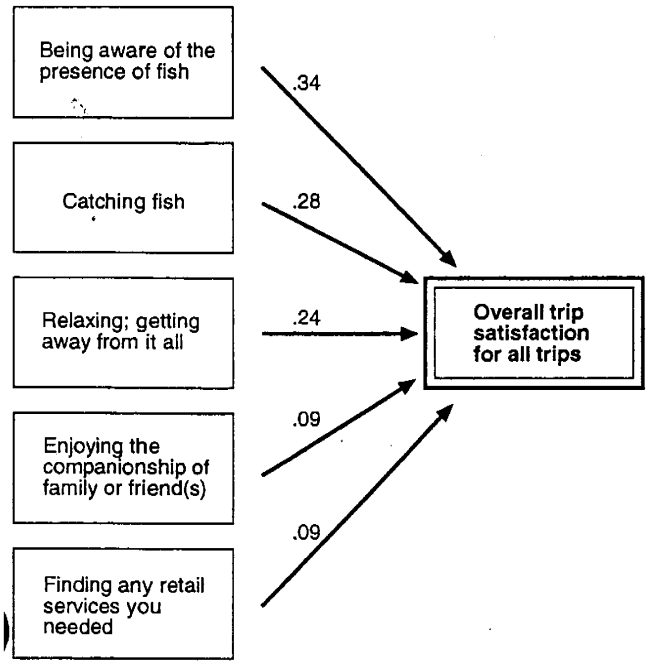
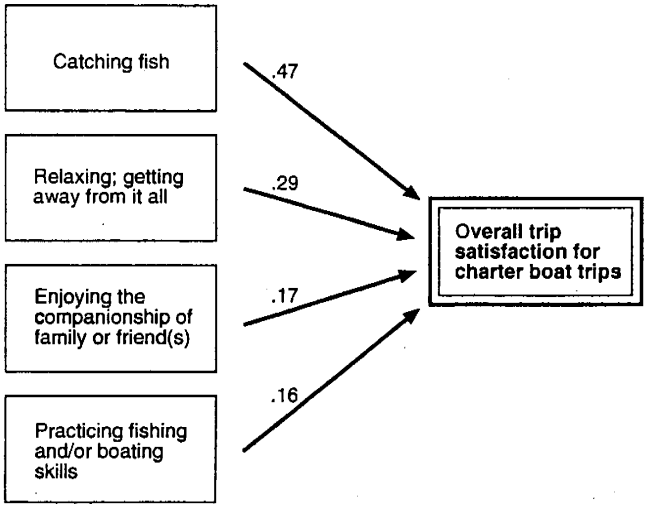


Figure 2. A model developed to explain the major components that contribute to overall trip satisfaction for **charter boat trips** to Lake Ontario or its tributaries, primarily for trout or salmon fishing. The numbers (standardized regression coefficients) indicate the relative importance of each component to overall charter boat trip satisfaction (i.e., the higher the number, the higher the importance of the component).



of fish" had two of the highest numbers (indicating they were among the most important factors), "relaxing; getting away from it all" was also important. "Finding any retail service you needed" and "enjoying the companionship of family and friends" had smaller numbers and thus were not as important as the other three components. Components of fishing trip satisfaction that were not statistically significant are not included in Figure 1.

Half of the anglers (51%) who fished for salmon or trout felt that the ban on snagging in Lake Ontario tributaries had no effect on their fishing satisfaction. One-third (32%) felt the ban had increased their fishing satisfaction, whereas 17% felt it had decreased their satisfaction. The majority of anglers (58%) who fished for salmon or trout supported the ban; 21% opposed it and 21% had no opinion.

For anglers reporting trips on charter boats, the key satisfaction components were similar to trips for all anglers (Figure 2). "Catching fish" was the most important component affecting overall satisfaction, while "relaxing and getting away from it all" was second; "enjoying the companionship of family or friends" and "practicing fishing skills" were somewhat less important.

Importance of catch to overall trip satisfaction

Results indicate that the size of the fish caught by anglers was more closely related to trip satisfaction than the number of fish caught. The average weight of the largest trout or salmon caught on each trip was 14 pounds. A decline of 6 pounds in this average weight would result in a slight decline in overall trip satisfaction. For anglers on charter boat trips (where catching fish was more important than for anglers on all trips), a decline in the size of the catch would result in only slightly more of a decline in satisfaction. On 28% of the trips, no trout or salmon were caught.

Importance of fishing-related options to satisfaction

Anglers were asked how their overall satisfaction would have changed if one of three fishing-related recreation options (i.e., a booth for fishing information, a regional fishing museum, or a retail outlet store specializing in fishing equipment; Table 2) was available. For 40% to 50% of trips, respondents felt these options would not increase their overall satisfaction. These respondents were more likely to have caught a fish on their trip and

Table 2. Potential fishing-related recreation options.

Option A	Visit a booth or kiosk and get free, updated information on the status of Lake Ontario's fisheries and the fishing outlook for the next month.
Option B	For a modest price visit a regional fishing museum that describes and illustrates the history of commercial fishing and sportfishing for that section of Lake Ontario, and how fishing has affected local culture, both historically and today.
Option C	Visit a major nationally-known retail outlet store that specializes in fishing equipment and outdoor clothing.

were generally more satisfied with their overall trip experience than anglers who felt the options would increase their satisfaction.

For 50% to 60% of the trips, anglers said they would experience an increase in satisfaction if one of the options was developed. On average, an increase in overall trip satisfaction of 2.2 to 2.3 points (on a scale of 1 to 10) was expected for each of the three options. For example, an angler having a trip satisfaction of 6.0 **without** the existence of any of the three options, would have a trip satisfaction of 8.2 to 8.3 **with** the existence of one of the options. For anglers on charter boat trips, overall trip satisfaction would increase on average by 2.6 points if they were visiting a regional fishing museum. For both overall trips and charter boat trips, the increase in satisfaction from implementing any of the three options may compensate for the loss in satisfaction resulting from realistic reductions in the average weight of trout and salmon caught. This does not mean that more anglers would come to Lake Ontario for fishing if these options were implemented, only that the trip satisfaction of anglers who did come could increase.

CONCLUSION

The average angler was generally satisfied with his/her Lake Ontario fishing experiences. While "catching fish" and "being aware of the presence of fish" were two of the most important factors for overall trip satisfaction, "relaxing; getting away from it all" was equally as important. "Catching fish" was more important to anglers on charter boat trips, indicating that the importance of catch varies by trip type.

Developing fishing-related recreation opportunities such as fishing museums and retail fishing equipment stores may help increase angler satisfaction. For most trips (50% to 60%), anglers said they would experience an increase in satisfaction if one of these options was developed. However, the results from this study do not indicate that more anglers will come to the Lake Ontario region to fish if these options were implemented, only that the trip satisfaction of anglers who did come would increase. The development of a regional fishing museum may be the best option to pursue to provide additional satisfaction to anglers, since results indicate that this option would increase trip satisfaction for anglers on all trips (including charter boat trips).

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LITERATURE CITED

Brandt, S., et al. 1996. *A review of the current status of Lake Ontario's pelagic fish community.* Report of the 1996 Lake Ontario Technical Panel. Great Lakes Research Review. 2(2):4-10.

Connelly, N. A., T. L. Brown, and B. A. Knuth. 1990. *New York statewide angler survey 1988.* NYSDEC: Albany, NY. 158 pp.

Lake Ontario Committee of the Great Lakes Fishery Commission. 1992. *Status of the Lake Ontario offshore pelagic fish community and related ecosystem in 1992.* NYSDEC: Albany, NY. 34 pp.

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Purrfecting the Catfish

by Tara Weaver-Missick,
Agricultural Research Service
Information Staff

Whether blackened or fried, baked or broiled, catfish is a favorite catch, particularly in the South. Now, eaters and producers alike should have no problems finding the "purrfect" fillet.

Research to develop meatier, tastier, and faster growing catfish is paying off. Agricultural Research Service scientists at the Catfish Genetics Research Unit (CGRU) in Stoneville, Mississippi, have bred a new catfish variety—USDA 103—scheduled to be made available to catfish producers in

February 2001. ARS will release the new catfish jointly from the Thad Cochran National Warmwater Aquaculture Center with the Mississippi State University Agricultural and Forestry Experiment Station, Mississippi State, Mississippi.

It's one of the few times genetic research has improved catfish since the industry started in the United States during the late 1950s. Since then, catfish has become one of the most successful aquacultural enterprises. Genetic research on channel catfishthe most commonly used species—began in the mid-1960s. But producers have been waiting for development of a new higher performing catfish variety. Since the industry's inception, genetic improvement has not had a significant effect on commercial production in the major catfish-producing states—Alabama, Arkansas, Louisiana, and Mississippi.

The release of USDA 103 should change that. "It usually takes catfish 18 to 24 months to go from birth to market. This new catfish variety grows 10 to 20 percent faster in the pond, and it's ready for market sooner than other varieties—an advantage for producers," says geneticist William R. Wolters, who heads the CGRU.

USDA 103 consumes 10 to 20 percent more feed than other catfish. But since the feed costs only 10 cents per pound, producers are gaining a return on their investment because they can often get 70 to 80 cents per pound for the fish.

"This new fish also has good reproductive characteristics," notes Wolters. "Some USDA 103 catfish can reach sexual maturity at 2 years of age—a year faster than current catfish. The new variety starts producing eggs sooner and produces more eggs than some fish now raised commercially."

"I think this new variety is great," says catfish farmer H. Austin Jones, who raises about 35 million catfish fingerlings (small fish) and 3 million food fish on 1,045 acres of water in Moorehead, Mississippi. "I only have one growing season to get my fish ready, so I'm excited about USDA 103 because it will mean I can get a larger fish to the market faster," Jones says.

This new fish is the cat's meow. In taste tests comparing it with other catfish lines, a quality panel selected cooked USDA 103 fillets as one of their favorites. Wolters says the quality of fresh, frozen, and cooked fillets is comparable to that of other popular catfish strains.

New Tools Spawn Better Fish

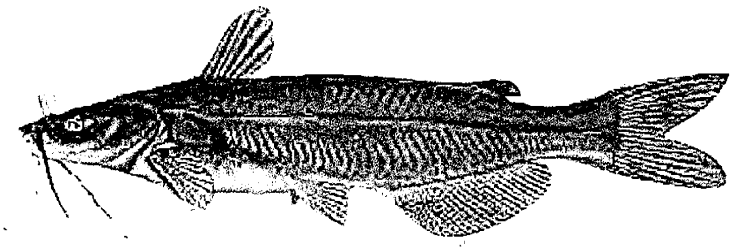
Aside from genetics, high-tech instruments are helping to boost catfish production. ARS geneticist Brian G. Bosworth is using ultrasound to see the internal anatomy of catfish. It's the same technology that allows an expectant mother to see her baby—and even possibly predict the child's health. Ultrasound uses reflected sound waves

to produce a gray-scale image of the catfish's internal anatomy. Different tissues have different reflective properties.

"Using an ultrasound machine, we can measure the size of the muscle," Bosworth says. "From that measurement we can estimate the fillet yield of a live catfish." Fillet yield is the meat from the whole fish. The cattle and swine industries use this technology to measure carcass traits, like backfat and loin area, but no one has ever used it to measure fish muscle mass.

"Ultrasound measurements are a good indication of which fish have higher fillet yield. Now we're breeding those fish to see if they produce offspring with higher fillet yields," Bosworth says.

Bosworth is adapting another procedure from human medicine to predict the fat content in catfish. Typically used to quantify lean muscle mass, total body moisture, and body fat,



bioimpedance measures resistance to a harmless, low-level electrical current passed through electrodes in live, tranquilized fish. Resistance is related to the amount of water and fat in the fish. The more fat, the more resistance. Using this method, Bosworth says he can measure fat levels in live fish and determine which fish would make the best genetic contribution to developing a low-fat catfish.

Another phase of the research involves evaluating fillet yield in different catfish families. "Members of a family have some genes in common, so by determining how similar the yield is in family members, we can get an idea of which fish have the best genes for increased fillet yield," Bosworth says. "Measuring and evaluating traits in families has been used in other livestock species, but we are just starting with this approach in catfish."

G. Crops / Horticulture

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A Small-Scale Agriculture Alternative

Blueberries

The blueberry is delicious as a fresh fruit snack or in a variety of foods such as blueberry pies or muffins. Although most large-scale commercial blueberry operations are in either Michigan or New Jersey, highbush blueberries can be cultivated throughout much of the United States—with careful site selection and proper cultural practices.

Highbush blueberries fit nicely into small-scale farming. In the Midwest, by selecting early or late varieties, harvesting can begin in early June and last into August. Local marketing by pick-your-own (PYO) customers, at farmer's markets, or ready-picked sales to nearby stores is particularly feasible for small-scale operators in close proximity to metropolitan areas. Blueberry sales can supplement income from primary sources.

Growing highbush blueberries is labor and management intensive. Most work can be performed by hand, but specialized equipment may be beneficial. Blueberry production requires a substantial investment in time and money. Plantings require 2 to 3 years to establish and are not harvested until the third or fourth growing season. Many things can go wrong during the first years and a knowledge of blueberry biology and pest management is essential.

Without good cultural practices—including insect, weed, and disease control—plantings may be doomed even before first harvest. Ideas on pest control practices should be available through the local Cooperative Extension Service (CES).

Per-acre returns can be high. A mature planting can gross $5,000 per acre and return $3,000 or more with correct marketing, management, and growing.

Site and Pre-Planting Considerations

Blueberries should ideally be planted on a gently rolling slope to provide good air and water drainage. Good air drainage reduces likelihood of blossom damage from late spring frosts. Blueberry roots are very sensitive to standing water so they need good surface and internal water drainage. Although a sandy soil is best for drainage, heavier soils may be used if internal drainage is adequate. This may require either planting on ridges or placing tiles to improve drainage.

In choosing a site, give consideration to a water source for irrigation. If the crop is to be harvested by PYO customers, the location should be easily accessible to parking nearby.

Blueberry plants are very sensitive to soil pH and require acidic soils for success. Optimum soil pH is 4.8 to 5.2, although levels as high as 5.5 are acceptable. The soil pH can gradually be reduced through use of acid-reaction fertilizers. Soils with pH levels of 5.5 to 6.0 can be used if the soil pH is lowered using an agricultural sulfur 1 year or more prior to planting. The sulfur required to lower soil pH varies with soil type. It may be economically unfeasible to adjust the pH of some soils. Therefore, prior to planting, another soil pH test should be conducted to learn whether the soil pH has attained a satisfactory acidic reaction.

Planning should begin at least 1 year prior to planting blueberries. This time schedule allows for adjusting soil pH (if needed), tiling, ditching, and digging a pond or drilling a well. During this time, it may be possible to control perennial weeds which may be difficult to stop with herbicides registered for use on blueberries after planting. A green manure crop of rye or wheat may be grown and then turned under to improve soil tilth. Any cultivated crop grown during this preparatory year may help reduce insect and weed problems. If herbicides are used to manage weeds during the preparation of the site for blueberry production, then be aware of the time limits for degradation of the herbicide residues in the soil.

Plant Selection

Cultivars (cultivated varieties) are the keys to success and are selected a year ahead. They should be booked with a reputable nursery. The CES (Extension agent) should have information on which cultivars are best adapted for local use. A potential grower may also learn about cultivar selection by visiting other growers and from nursery professionals. Most nurseries offer rooted cuttings, 2-year-old bare-rooted fieldgrown plants, and 2-year-old containerized nursery stock.

Many small-scale operations buy containerized planting stock because of the increased survival and earlier production they may offer. If containerized stock is used, it is wise to pick up the plants at the nursery and eliminate shipping expenses.

Field Layout

Blueberries benefit from cross pollination so growers should alternate cultivars with similar flowering seasons in alternating blocks of 2 to 4 rows. Rows ideally run north to south to allow for uniform sunlight. However, any orientation is acceptable. Blueberries are normally grown with wide row spacings, with the area between rows seeded down to a perennial cover crop such as Kentucky bluegrass or fescue.

Row spacings of 10 to 14 or more feet ensure that mowing and spraying can be done by tractor, although narrower spacings will allow for equipment use during the first few years of planting. However, without at least 10-foot spacing the plants will grow large enough that a tractor can no longer be driven between the rows. Spacing within the row is commonly 4′or 6′.

Planting for PYO operations should allow for customer convenience and handling. Rows should be interrupted with cross-walks or drive alleys about every 200′. It is also helpful to arrange cultivars with similar ripening seasons together so that harvest can progress in an orderly fashion.

Planting

Planting of containerized nursery stock may occur in either early fall or early spring. Bare root nursery stock is normally planted in the spring. Fall planting should occur between late September and early October. The roots of these fall-set plants will continue to grow until soil temperatures fall below 45 °F. Spring plantings are often delayed because of wet weather. Fall-set plants are already in place and have the advantage of early spring growth, which is often missed in spring plantings due to wet weather delays. Fall-planted blueberries must be mulched prior to winter in areas in danger of frost heaving. Spring planting should begin as soon as the danger of severe frost has passed.

Blueberries are shallow rooted so the planting hole needs to be wide. Holes may be dug by hand or with an oversized tractor-mounted posthole digger. Some growers prefer to plant in a plow furrow. After the hole is dug, the plants should be planted as deep as they were in the nursery. Usually about 1 pound of moist acidic sphagnum peat moss is used per plant during planting. It is mixed with soil during backfilling of the planting hole and should be thoroughly wet prior to using. Failure to wet the sphagnum peat moss can result in it drawing moisture out of the soil and causing the newly set plants to dry out.

After planting, bare-root plants should have 1/3 to 2/3 of the branches removed. This allows the plant root system to be in balance with the shoot system and increases survival by reducing transpirational demand. Planting containerized stock reduces the need for pruning branches at planting time. Flower buds should be rubbed off to ensure that plant energy is channeled into vegetative growth.

Mulch and Irrigation

In most regions where highbush blueberries can be grown, both mulch and irrigation are essential for successful production. Mulch goes on newly set plants soon after planting and irrigation should be ready before newly set plants dry out. Many materials are suitable for mulching blueberries, but sawdust is most common. Mulch keeps soil temperatures cooler during summer, reduces weeds, and maintains soil moisture more uniformly.

Although mulch helps save moisture, it does not eliminate the need for irrigation. Blueberries are very sensitive to drought and irrigation is essential in most areas. Trickle irrigation offers the advantage of being more efficient, but it does not allow for the frost protection that overhead systems can provide. In areas where late spring frosts are of little concern, trickle irrigation is normally chosen because of its increased efficiency. Irrigation then occurs without interrupting spraying or harvesting.

Crop Management

Bird depredation can be the biggest problem of small-scale producers, sometimes causing crop losses of over 70 percent. Scare devices and exclusion by netting are commonly used to reduce losses.

Insect and disease problems may be small in areas of few blueberry plantings. The CES can provide information on weed, insect, and disease control.

Marketing the Crop

The principal small-scale market may be consumers in local communities. A high percentage of blueberries are direct marketed locally. The potential trade area for blueberries tends to be larger than for strawberries. Blueberries also offer other advantages over strawberries for PYO operations. Blueberries require little stooping. Customers find them easy to freeze, requiring little preparation other than washing, and easy to use. PYO surverys have found a trend towards an increased average age of PYO consumers.

Sales of ready-picked blueberries at the farm or local markets bring higher prices to producers from consumers who desire farm fresh produce, but do not wish to PYO.

The blueberry crop is usually sold within 60 days, depending upon weather and varieties. Weekends are usually the busiest. Coordinating sales advertising and promotion with peak harvests challenges even experienced growers.

PYO growers must be market oriented, plan far ahead, seek alternative market possibilities, train employees, and develop successful advertising, especially a good farm logo. Before starting any small-scale enterprise, a farmer should study the potential markets, trade areas, competitors, and the advertising media.

About 450 PYO customers can harvest 1 acre of blueberries (6,000 pounds). PYO blueberries are usually sold by weight in pounds and/or ounces. The scales used for sales should be inspected by the Weights and Measures Division of the State Department of Agriculture or Commerce.

A direct market business requires time to develop. Blueberries lend themselves nicely to market development because they require 6 years or more to reach maximum yields. Careful attention to a business image, including the logo, quality of fruit, and how fields are maintained, is essential. A direct marketer should exceed customer expectations. Merely raising high-quality blueberries is not enough.

Often customers enjoy the recreational aspect of a trip to a country farm as much as obtaining high-quality produce at reasonable prices. They want well marked roads; adequate parking; and friendly courteous service.

Since accidents do occur, growers must have adequate insurance. A regular farm insurance policy may not cover liability to PYO customers.

For More Information

State university and county CES personnel can often provide information from local Ag Experiment Stations which is geared to local production and marketing. For example, the University of Illinois conducts an annual "Small Fruit School" and publishes a Proceedings, which includes information on blueberries as well as other small fruit. For information write to J.D. Kindhart, University of Illinois, Dixon Springs Agricultural Center, R-1, Box 256, Simpson, IL 62985. Similar extension schools are held in Michigan, New York, Wisconsin, Ohio, North Carolina, Pennsylvania, Missouri, and other States.

Other Information Sources

Highbush Blueberry Production Guide (200 pp, color), Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cooperative Extension, Cornell University, Ithaca, NY 14853.

Small Fruit Crop Management (608 pp), Prentice Hall. Mail Order Billing Dept.,200 Old Tappan Road, Old Tappan, NJ 07657.

Growing Blueberries in Missouri (26 pp), State Fruit Experiment Station of SMSU, Mountain Grove, MO 65711.

Hints on Growing Blueberries (8 pp), Bulletin Office, 10B Agriculture Hall, Michigan State University, East Lansing, MI 42824.

Fruit and Vegetable Clip Art for Direct Marketers University of Illinois, Department of Horticulture, Dixon Springs Agricultural Center, Simpson, IL 62985.

Small Fruit Production and Pest Management Guide (111 pp), Publications Distribution Center, 112 Agricultural Administration Building, The Pennsylvania State University, University Park, PA 16802.

The Highbush Blueberry and Its Management (270 pp), The Haworth Press Inc., 10 Alice Street, Binghamton, NY 13904.

By J.D. Kindhart, University of Illinois, and George B. Holcomb, Office of Communication, U.S. Department of Agriculture (USDA), for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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Brambles

ew crops are as well suited for small-scale griculture as the brambles—raspberries and lackberries. Significant production can be chieved on just a few acres and berries are in reat demand, not only for fresh eating but for esserts, jams and jellies, and wine.

Raspberries and blackberries are very high ı fiber, vitamin C, phosphorus, potassium, nd magnesium and have more calcium than ny other temperate fruit.

Exquisite flavor, high nutritive value, and an xotic image push brambleberry prices to $1 er half pint in rural areas and $5 in urban enters. With yields of about 5,000 lbs. per cre, a gross return of more than $13,000 per cre can be realized even with the lower price.

A wide variety of brambles includes ummer-bearing red raspberries (fruiting ccurs on second year canes), first to narket—usually in late June or early July. Next e black and then purple raspberries. ckberries (including Loganberries and oysenberries) and blackberry-raspberry ybrids (e.g., Tayberries) ripen from late July hrough August.

Finally, from late August through frost, red aspberries are again available from varieties hat produce on the tops of first year canes. A ew raspberry cultivars have yellow fruit.

In all but the most severe climates, a grower can select bramble types that continuously supply the market from late June hrough frost.

The challenges are many. Brambles need nuch labor. Canes must be annually pruned and trellised; this cannot be done well nechanically.

Fresh market fruit must be hand-harvested and sold soon after picking. Raspberries and blackberries have the shortest shelf life of any temperate fruit; only special care can maintain quality.

Few commercial growers have more than 5 acres in production; and even this requires excellent management.

Assess resources first

Potential growers should assess natural, capital, and human resources and likely rkets before considering brambles. Climate ely determines which types can be grown. old winters limit northern ranges; lack of adequate chilling during dormancy limits southern ranges. In general, blackberries are more adapted to southern and raspberries to northern climates.

The coastal Pacific Northwest offers an ideal climate—with winters and summers that are usually mild. Brambles can be severely injured when temperatures drop rapidly between late fall and early spring.

In most areas, special sites and cultivars are required. But the many cultivars will allow growers to produce at least one variety of bramble fruit. Local county cooperative extension agents can recommend varieties for a particular area.

Important for brambles is a well-drained soil. Many varieties are extremely susceptible to diseases in cool, wet soils. Artificial drainage is usually a sound investment.

Although raspberries and blackberries do not tolerate wet soils, neither do their relatively shallow root systems bear drought. Drip irrigation, with a good water source, is generally needed. See "Trickle Irrigation in the Eastern United States" ($3.25), NRAES-4, Northeast Region Agricultural Engineering Service, 152 Riley-Robb Hall, Cornell University, Ithaca, NY, 14853, and "The Basis of Trickle Irrigation," VC-23-82, Univ. of Illinois Cooperative Extension Service, Urbana, IL 61801.

The site should allow cold air to drain; in northern areas, northeast slopes minimize temperature fluctuations until spring.

Prior cropping history is important; weeds and vegetable crops can harbor verticillium wilt disease to which many brambles are susceptible. Growers should identify land for rotation before replanting old fields.

If the crop is to be marketed on a pick-your-own basis, parking space must be available nearby.

Regarding capital needs, it usually takes more than $6,000 an acre to establish brambles. Total investment may be recovered within 6 years, according to Mark Castaldi's "The Cost of Establishing and Producing Small Fruits for Pick-Your-Own and Commercial Harvest" ($3), Department of Fruit and Vegetable Science, Cornell University, Ithaca, NY 14853.

University of New Hampshire economists have developed a bramble crop budgeting template for Lotus software and a manual (NC5-30, $30), NRAES, 152 Riley-Robb Hall, Cornell University, Ithaca, NY 14853.

"Farming Alternatives: A Guide to Evaluating the Feasibility of New Farm-Based Enterprises" ($5.50), NRAE5-32, Riley-Robb Hall, Cornell University, Ithaca, NY 14853, a workbook, can help small-scale growers decide whether to invest.

Labor needs, very inconstant, are a major factor. In full production, each acre may need 10 pickers. State and Federal labor laws must be adhered to. See "Agricultural Employers Notebook," ($14) from Cornell Cooperative Extension, P.O. Box 217, Alton, NY 14413.

Market assessment

Fruit growers should explore potential markets before investing. Prices can vary considerably with supply, location, demographics, and time of year. Eastern prices are generally higher than those in the West; the large Washington-Oregon processing industry can depress prices. In the South, many consumers won't pay prices listed for exotic produce.

Dale Stokes, former president of the North American Bramble Growers Association, says **market identification is the most important component of success.**

Pick-your-own (PYO) is popular for marketing because it reduces harvest labor costs. Successful PYO operators link entertainment with harvest; many customers view picking as recreation.

Westmoreland Berry Farm, outside Washington, DC, markets blackberries both PYO and retail. The typical customer buys $18 to $20 worth of fruit. The farm is within 2 hours' drive of three marketing outlets--Washington, Richmond, and Baltimore, ideal for PYO. Owners Charles and Anne Geyer say their first 2 acres of blackberries grossed over $30,000 in their third year.

Supermarkets often buy fruit from a grower to bypass a warehouse. Such growers must pay much attention to quality and consistency, packing and cooling fruit soon after picking to extend shelf life.

Some restaurants pay top dollar for fresh raspberries and blackberries but each restaurant uses only a relatively small quantity and deliveries cost time and gasoline. Roadside stands can be popular but a diverse selection of items may be needed to justify a stand. Many growers sell to others' stands.

Besides fresh fruit, a small-scale grower can produce value-added jelly, juice, wine,

/rup, or candy. In St. Louis, Bissinger's, a nall candy store, chocolate-coats raspberries summer, hardly keeping up with demand at 32 a pound.

Sand Hill Berry Farm in Pennsylvania arkets a gourmet raspberry vinegar—aspberries, apple cider vinegar, and sugar. he Tomasello Winery in New Jersey finds its aspberry wine popular.

Liquor Store magazine reports raspberry ill be the next flavor rage. Raspberry-flavored roducts are leading sellers at many outlets. Vhistling Wing Farms in Maine sells raspberry roducts, such as jelly and syrup, all over the /orld by mail order. Its bakery does well elling raspberry pies, muffins, and turnovers.)pportunities are limited only by imagination.

ite preparation.

Vith adequate resources and an identified narket, a grower needs a year to prepare a lanting site. Certain changes are difficult if ot impossible to make once a planting is stablished.

irst comes an adequate drainage and rrigation system. USDA's Soil Conservation ervice (SCS) may help.

Second, perennial weeds should be liminated through repeated cultivation (as vith an organic-enhancing cover crop), erbicides, or soil sterilization.

Third, potential nematode populations ould be assessed and controlled. Nema-odes not only can damage plants directly but arry viruses that can decimate plantings. hey are more of a problem in warmer limates and in lighter soils.

Fourth, adjust the soil chemistry for dequate nutrients and a 6.5 pH--best for rambles. Soil testing varies among laborato-ies; each has its recommendations for hosphorus, potassium, magnesium, and alcium. Tests may point to peculiar soil onditions. Lime or sulfur can adjust the pH alue; a year or more may be required for mendments to effectively change soil hemistry.

Obtaining plants

In the early 1900's, viruses destroyed a thriving U.S. bramble industry in the East. Uninfected plant materials were unavailable for propaga-tion. But in the 1970's, nurseries, applying tissue-culture techniques, produced brambles without harmful viruses or exposure to diseases.

Nurseries offering tissue-cultured brambles include Ahren's Strawberry Nursery, RR 1, Huntingburg, IN 47542; Congdon & eller, Mile Block Rd., North Collins, NY 11; North Star Gardens, 19060 Manning ail North, Marine, MN 55047; Nourse Farms, Inc., Box 485 RFD, 5. Deerfield, MA 01373; and Champlain Isle Agro Associates, Isle La Motte, VT 05463.

Never propagate brambles from a neighbor's patch; infection with viruses from nearby wild brambles is likely.

The performance of cultivars varies considerably with location.

A high demand exists for yellow (golden) raspberries, but plants seem more susceptible to diseases than traditional red raspberries.

Cultural practices

The most complete reference is "Bramble Production Guide," $35, NRAE5-35, Riley-Robb Hall, Cornell University, Ithaca, NY 14853. It notes how each type must be treated differently.

Federal and State researchers recently have learned that:

- Plants propagated from tissue-culture, although vigorous and virus-indexed, are sensitive to herbicides normally applied at planting. A straw mulch during the planting year or planting through black plastic may be better than conventional herbicide weed control.

- Spreading fruiting canes apart in the row in a V-configuration significantly improves fruit yield and hastens drying within the plant canopy and makes spraying and harvesting easier.

- New trellising systems for mechanical harvesting include use of monofilament nylon wire as strong as metal but not conductive of lightning. (Amberg's Nursery, 3164 Whitney Road, Stanley, NY 14561, is a distributor.)

- Although raspberries are not widely grown in the South, displaced northerners will demand fresh fruit. Some recently developed southern blackberries include several erect types—no trellises needed—such as Arkansas' recently released thornless Navaho.

- A combination of first year cane suppression, plus mowing half the planting every other year, can bring yields equal to conventional annual intensive pruning and fruiting. This also reduces labor and spray costs—half the cost of planting fruits in any one year.

- Using a floating row cover in early spring over fall-bearing raspberries, such as Heritage, accelerates cane growth and yields. Covers in the north can minimize damage from frosts.

- Inoculating brambles at planting with new strains of particular soil fungi and bacteria may prevent subsequent harmful infection.

- A combination of rapid cooling after harvest, storage of fruit near 30 °F, and maintaining high humidity and carbon dioxide in the storage room prolongs shelf life.

Pests problems

Among pests, of most concern are viruses that can be transmitted by aphids, leafhopper nematodes, or even bees carrying pollen from wild brambles. See "Virus Diseases of Small Fruits " ($20), Ag Handbook #631, U.S. Government Printing Office, Washington, DC 20402.

Water or high humidity is essential for infection by most disease organisms, so proper pruning and trellising for good air drainage cuts disease pressure. Since most root diseases require standing water to complete their life cycle, good soil drainage minimizes these problems.

Several insects attack bramble canes, flowers, fruit, and leaves. Responsible growers scout plantings regularly, applying insecticides only when pests reach damaging levels. Avoiding locations near insect habitats helps.

The American Phytopathological Society has a "Compendium of Raspberry and Blackberry Diseases and Insects," describing with colored photographs many bramble problems—such as herbicide injury and nutritional deficiencies. ($25, APS, 3340 Pilot Knob Road, St. Paul, MN 55121)

Organizations and Newsletters

The North American Bramble Growers Association provides helpful information. Membership is $45 plus $5 per acre up to maximum of 7 acres. (Richard Fagan, Executive Secretary, Rt. 2 Box 539, Cumberland, MD 21502)

Other sources of newsletters on small fruit crops: Bernadine Strick, Department of Horticulture, Oregon State University, Corvallis, OR 97331; Paul Otten, 19060 Manning Trail North, Marine on St. Croix, MN 55047-9723; Fruit Extension Secretary, Department of Fruit and Vegetable Science, Cornell University, Ithaca, NY 14853.

Prepared by Marvin P. Pritts of the Department of Fruit and Vegetable Science, Cornell University, and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture (USDA), for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Program Director). OSSA's address: Cooperative State Research Service, USDA, Room 342-D, Aerospace Building, Washington, DC 20250-2200. (Telephone: 202-401-4640 or Fax: 202-401-5179)

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A Small-Scale Agriculture Alternative

Bees

More than 211,000 beekeepers maintain about 3.2 million honey bee colonies in the United States. Thousands of beekeepers are small-scale entrepreneurs. Aside from the pleasures of the hobby, they keep honey bees for the production of honey, pollen, beeswax, propolis, and royal jelly.

Only in the last century have people begun to recognize the value of bees as pollinators. Pollinators include not only honey bees, but also more than 3,500 species of pollen bees in North America. The contribution of bees as pollinators of cultivated crops far outweighs the value of hive products. Although most beekeepers specialize in honey bees, some raise pollen bees for their pollination services.

Beekeeping's profitability depends on many factors, and the decision to enter this occupation should be made carefully. Beekeepers should know about bee biology, flora, and management, and should also possess business ability. They should understand that beekeeping is subject to factors beyond their control — such as market prices that fluctuate and weather elements that range from drought to floods and temperature extremes.

Entrepreneurs intent on commercializing should decide whether to be migratory or nonmigratory and select locations that offer opportunities for pollination rentals; production of honey, beeswax, or pollen; and selling of packaged bees and queens.

Although some local governments restrict placement of beehives, many beekeepers can keep their honey bee colonies in almost any urban, suburban, or rural location. Beehives can be found on rooftops and balconies in many cities. Observation beehives are sometimes seen in homes, classrooms, offices, and museums. The Insect Zoo at the Smithsonian Natural History Museum in Washington, DC, features an observation beehive. Specific publications may help in selecting a location. (See "Beekeeping and Their Neighbors" by Dewey M. Caron, Eastern Apiculture Society of North America, Inc., and "Beekeeping" from the Beekeeping Education Service, Wicwas Press, Cheshire, CT 06410/$1.50 to nonmembers.)

A potential beekeeper may find helpful information in many places. Most States have county agents and Extension entomologists whose responsibilities include beekeeping. Some State universities even offer college credits for beekeepers either as residents or by correspondence. All 50 States and Puerto Rico have beekeeping organizations that meet regularly to exchange the latest information. Many groups also put on workshops for potential beekeepers. National and regional beekeepers' groups meet annually. "Who's Who in Apiculture," published yearly in the April issue of Bee Culture, (referenced below under "Beekeeping Publications"), lists organizations, dealers, and government information sources.

A would-be beekeeper should learn as much as possible about beekeeping before purchasing bees and bee equipment. Observing honey bees close up with an experienced beekeeper is an excellent way to learn about beekeeping.

Those First Honey Bees

A beekeeper can get started by:

- Purchasing an established beehive.
- Buying new bee equipment and packaged bees with queens from bee supply companies. (See "Who's Who in Apiculture.")
- Obtaining bee equipment and capturing a swarm.

Beekeepers can collect swarms by making their interest known to apiary inspectors, Extension agents, police departments, beekeepers, and others who might receive swarm calls.

Information on availability of bees and bee equipment also can be obtained from beekeeping groups and trade journals.

Honey Bee Management

Cardinal points to keep in mind when managing bees:

- Bees need food to survive: honey or sugar syrup as a carbohydrate source, pollen or pollen substitutes for protein, and water as the universal solvent.
- The bee colony will need lots of comb space for storing food and rearing brood. Lack of adequate space could lead to swarming, which could reduce honey production.
- For successful wintering, a colony should have a young queen, a large cluster of adult bees, 40 to 60 pounds of honey, and several combs of pollen. Each colony should have a two-story standard hive that includes a brood chamber and a honey super — the removable section where the bees store their honey.
- Starvation is a principal cause of colony losses. If bees are short of honey, they should be fed a syrup of two parts granulated sugar to one part water. Lack of pollen can be compensated for by purchasing pollen substitutes from bee supply dealers.

Insecticides

The occasional pesticide spraying of isolated plants or gardens may kill only a few bees; but when entire fields and orchards are sprayed or dusted, the resultant bee loss could be devastating. In such cases, beekeepers will usually see a large accumulation of dead and dying bees at hive entrances.

Beekeepers who place hives on growers' property should mark each beehive with their name, address, and telephone number so they can be notified in advance about spraying. Beekeepers who maintain bees on their own property need to communicate closely with neighboring agricultural operations where the bees are likely to be foraging. With a few days' warning, several things can be done to minimize the effects of a spray. First, decide whether the pesticides would harm honey bees. If so, here are some alternatives:

- The beehive may be moved to a temporary location at least 2 miles from the spray area.
- The hive entrance can be draped with damp burlap. This protects the beehive from effects of a direct "hit." The burlap cover should stay on only for the duration of the application.

The hive may be left in place and some loss of bees accepted.

The best way is to work with the farmer and the pesticide applicator in developing programs that safeguard pollinating insects. Some general guidelines are:

- Insecticides should not be applied to blossoms; honey bees visit not only blossoms on cultivated crops, but also those of orchard ground-cover and noncultivated plants.
- The safest time to apply insecticides is late afternoon after bees stop foraging. Early morning applications are also less dangerous to bees than those in mid-day.
- An insecticide may be selected that has the least impact on nontarget insects and animals.

Diseases and Pests

Bees, like all creatures, are subject to infectious diseases. To lessen the spread of disease and minimize harm, beekeepers should learn as much as possible about healthy, normal colonies so they can recognize signs of diseases.

The most common brood diseases of honey bees are American foulbrood, European foulbrood, and chalkbrood. Among adult bees, Nosema disease is one of the most serious. Two parasitic mites, *Acarapis woodi* and *Varroa jacobsoni*, recently replaced more traditional adult and brood diseases as the most serious ailments.

If disease is suspected, the county Extension agent, a more experienced beekeeper, or the State apiary inspector can help. "Who's Who in Apiculture" (mentioned above) lists State apiary inspectors.

Here are a few simple rules for avoiding diseases in honey bees:

- Do not feed honey from an unknown source; it may carry organisms that cause American foulbrood disease.
- Buy packaged bees and queens only from reputable dealers.
- Buy used bee equipment only after consulting with the State apiary inspector.
- Look for signs of diseases each time the beehive is opened. Early detection can avoid costly replacements.

Beekeepers also have been keeping an eye on the range expansion of Africanized honey bees. As of November 1994, Africanized honey bees are established in Texas, Arizona, New Mexico, Puerto Rico, and California. Subject of many scary media stories, these bees are more likely to sting in defense of their nests than are the domestic European honey bees. However, a chance encounter with an Africanized bee foraging on blossoms is no more likely to result in a sting than is an encounter with a domestic honey bee.

In 4 years, Texas has recorded only one fatality from stings of Africanized honey bees. All the stinging incidents attributed to Africanized honey bees originated from feral colonies — those not managed by a beekeeper. Destroying feral colonies of honey bees in areas where Africanized honey bees are known to exist appears to be a good strategy for reducing the impact of Africanized honey bees.

Keeping European honey bees by requeening is strongly recommended in areas where Africanized honey bees are known to exist. Only queens from non-Africanized areas or certified European queens should be used for requeening. Printed materials, slides, and videotapes on Africanized honey bees are available in many languages from State and Federal Extension agents.

Products of the Hive

Honey, the most popular beehive product, can be marketed in many ways. The simplest is merely to cut out pieces of the comb containing honey. This "cut comb" may be wrapped with plastic or enclosed in a plastic sandwich box. Liquid honey is extracted from combs by centrifugal force with specially built extractors. The equipment needs make extraction impractical for many beginners.

Pollen and propolis — the resinous substance bees use to fill holes and gaps — are additional sources of income. However, small-scale entrepreneurs should make sure they have a market. Beeswax is a useful byproduct, but not for beekeepers with just a few colonies. Production of royal jelly is labor-intensive, and markets are limited.

Beekeeping Publications

Beekeeping periodicals and books abound. Many county Extension agents or State universities have publications dealing with beekeeping and bee supply companies. See "Who's Who in Apiculture" (mentioned above) for State universities with beekeeping specialists.

U.S. periodicals with the largest circulation are:

- American Bee Journal, 51 South Second St., Hamilton, IL 62341/$16.20 a year.
- Bee Culture, 623 W. Liberty Street, Medina, OH 44258/$16.50 a year.
- The Speedy Bee, P.O. Box 998, Jesup, GA 31545-0998/$17.25 a year.

Because there are so many beekeeping books, a newcomer may want to borrow books from a library or another beekeeper before deciding which to buy. Two books in most beekeepers' libraries are:

- "ABC and XYZ of Bee Culture," A.I. Root Co., P.O. Box 706, Medina, OH 44258/$25.
- "The Hive and the Honey Bee," Dadant & Sons, 51 South Second St., Hamilton, IL 62341/$36.00.

Prepared by H. Shimanuki and S.W.T. Batra of the Bee Research Laboratory, Agricultural Research Service, for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, D.C. 20250-2244. Telephone 202-401-1805, Fax 202-401-1804.

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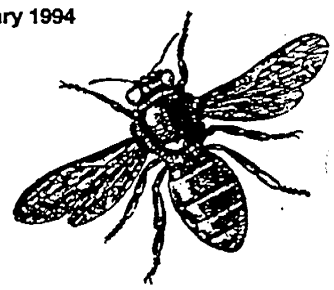
All uses of fungicides, pesticides, and herbicides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Fungicides, pesticides, and herbicides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife if they are not handled or applied properly. Use all products selectively and carefully. Follow recommended practices for the disposal of surplus products and their containers.

January 1994



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A Small-Scale Agriculture Alternative

American Ginseng

ıots of cultivated American ginseng (Panax inquefolium L.) sold for $40 to $43 per und in 1992, but this high-value crop is ficult to grow and requires a great deal of ıe, labor and money. Nearly a dozen fungi n attack the plants and roots, damaging or ping out an entire crop worth $75,000 per re, which may have taken 3 or 4 years to ach harvest maturity.

Meanwhile, China has been purchasing ed from American growers to produce ıinese-grown American ginseng. Insiders eculate that the combination could saturate ə future ginseng market.

Ginseng has become a significant cash ɔp export since the discovery of a wild riety nearly 280 years ago in Canada. A suit missionary, traveling with a group of ɔhawks north of Montreal, stumbled upon e plant in the early 1700's. Realizing its ɔtential trade value, the Canadian Jesuits arched for more. In 1718, a cargo of wild ıseng roots was shipped to southern China sold for $5 a pound. Today the price is een $150 to $280 a pound.

The China trade remained secret until nerican colonists learned of the herb's high ice. "Sang" hunters searched the forests of estern Pennsylvania, West Virginia, Kentucky ıd Tennessee. Ginseng quickly became a luable trade export to the Orient, until over- ırvesting threatened the native crops. Today, ıseng still grows wild, mainly in the cooler ɔpalachian Mountain areas, but over-har- sting causes serious scarcity.

Unlike the early 1900's, today's harvests e closely regulated through the Convention ı International Trade in Endangered Species Wild Fauna and Flora (CITES). Under the TES, import and export permits help prevent ternational trade from threatening survival of ld species. Some countries also levy ad ılorem import taxes.

Cultivated roots and underground rhizomes ɔ not need export permits in the United ates, but all shipments must have an "Artifi- ally Propagated Plant Certificate" issued by e U.S. Fish and Wildlife Service of the U.S. epartment of the Interior. Federal law quires States to issue regulations on the ırvesting and sale of ginseng, and to keep cords of exports. On Federal property, nseng hunters must apply for permits and only in designated areas.

OR PRODUCERS

ternationally, the United States produces the ost cultivated American ginseng, followed by Canada. There are nearly 1,300 growers in Wisconsin — the major growing state — 300 in Ontario and 100 in British Columbia. Growers are also scattered throughout New York, Kentucky, North Carolina, Tennessee, Oregon and Washington.

Wisconsin was actively involved in the harvest and export of wild ginseng in the mid nineteenth century. By the 1860's, the threat of extinction forced State governments to devise protective measures and Wisconsin growers began cultivating American ginseng under artificial shade. Today, these growers annually produce more than 1 million pounds, nearly 90 percent of the total cultivated U.S. crop.

In 1993, Wisconsin growers harvested nearly 1.7 million pounds of ginseng roots, valued at close to $70 million. Prices are based on market conditions and root quality, weight, size and color.

Currently, expanding Canadian production is reported to be nearing 1 million pounds annually. Ontario produces the largest percentage in fields formerly used to grow tobacco.

The "American Ginseng Trends" newsletter (Future Concepts, Inc., P.O. Box 1982, Wausau, WI 54402-1982) covers all aspects of the international industry, including harvest overviews, political issues, research updates and market reports.

HIGH-RISK INVESTMENT

According to Jennifer Parke, University of Wisconsin professor of plant pathology, the high risk comes mainly from disease. Parke coordinates disease studies at Wisconsin's Ginseng Research Gardens, which encompasses nearly 2 acres of plants ranging from seedlings to three-year-olds. Parke and her team focus on three main research areas: chemical controls for Phytophthora root rot, Alternaria leaf and stem blight and seedling diseases. In addition to publishing findings annually, the researchers offer summer tours of the Gardens and plan disease workshops for growers. (For more information, contact Jennifer Parke, Department of Pathology, University of Wisconsin, Madison, WI 53706; telephone 608-262-6531.)

James A. Duke, a botanist and author on herbs, and a long-time expert on medicinal plants at the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS), Beltsville, MD, suggests planting goldenseal, a bitter medicinal herb, among ginseng roots to reduce rodent damage.

New crops require a great deal of human labor. Even as growers are protecting their ginseng crops from disease, insects, and thieving field mice, they must also hand-weed continuously to kill weeds. The fall season is even busier when ripe berries are handpicked for new seeding from each mature plant.

Conservative estimates place monetary investments at as much as $200,000 during the 3 or 4 years before a real profit is earned. Duke warns would-be ginseng growers that starting ginseng from expensive seed can be frustrating. The seeds need 18 months to germinate and if they become too dry, they may never grow. Duke's article on ginseng in the 1978 "Yearbook of Agriculture" provides additional information for prospective growers. USDA published Farmers Bulletin No. 2201 on "Growing Ginseng" (1973) is out of print, but may be found in a few libraries around the country.

Growers must also deal with security and protect their fields from shovel-wielding thieves in the night. Some States have made it a felony to steal ginseng from another's property.

Occasionally, geographic location is a problem. Ginseng requires winter chilling to break dormancy of the overwintering bud produced at the peak of the rhizome at the beginning of each growing season. The most favorable temperature and soil moisture conditions are on north- or east-facing slopes. A sloped site helps provide needed drainage, while wet conditions cause root rot. Ideal soils are loams with much organic matter. As ginseng tolerates only short periods of exposure to sun, light intensity should be no more than 15-25 percent of full sunlight.

In the wild, deeply rooted deciduous trees are welcome neighbors; coniferous or shallow-rooted trees, like maple, offer serious competition for water. Depending on such factors, wild roots may need 7 to 20 years to reach a desirable size.

Secrets to successful ginseng production are protected carefully between growing regions or even growers, but conferences open up communication. One new gathering is the International Ginseng Conference, sponsored by the Simon Fraser University, Burnaby, British Columbia, Canada V5A 1F6; telephone: 604-291-4910. "The Challenges of the 21st Century" was chosen as the theme for the 1994 conference in Vancouver, B.C., July 17-20.

The Illinois Specialty Growers (ISGA) Convention and Trade Show is an annual event for growers of fruits, vegetables, ginseng and other herbs. (Contact ISGA at 309-5572107.)

Every August, Ginseng Day attracts growers, equipment manufacturers and other international industry members to Marathon

unty, WI. The trade show offers information, v products and demonstrations on the st technologies and equipment. (For information contact Jack Cramer, Rib River Ballin, 3237 Hwy. 29, Marathon County, WI 448; telephone 715-443-2060.)

NSENG VARIETIES

rieties of American ginseng fall into three egories. Cultivated ginseng requires the st human labor and disease and pest con-. Wild plants thrive solely with the help of ther Nature, while woods-grown categories somewhere in between.

W. Scott Persons, author of "American seng: Green Gold" (Bright Mountain Books, 3 Springside Road, Asheville, NC 28803), s "Woods-grown ginseng is for growers o want to avoid the costs, time estments, disease, and supplydemand tuations associated with cultivated gin-g. While woods-grown roots may reap a h reward, risks include theft and disease."

Woods-grown ginseng can be divided into ods-cultivated and wild-simulated. The mer is the more labor intensive, but can ng as much as 1,200 to 1,500 pounds an e. The woods-cultivated method may use v plantings of seedlings, seeds, or berries, ficial shade, mulching, drainage ditches, sticides, rodent-trapping and fertilizers. With wild- simulated methods, seeds or berries thinly scattered by hand in an undisturbed odland environment with favorable growing tions.

ild roots are darker in color than cultivat-ones, appear more gnarled, and usually ow more of the concentric annual growth gs that indicate age. Cultivated roots are nerally a light cream color, smooth, and ker. Generally, they taste about the same, are larger, heavier and more uniform in e than wild ginseng roots. Yet the latter sell a much higher price, often more than dou-the others.

Some Asians consider older, well-formed d roots of higher value because they resem-wild Oriental ginseng. They believe wild ts, which grow more slowly and are har-ted older (20 years or more) than cultivated es, absorb more nutrients from the soil. In 38, dried wild ginseng roots sold for as ch as $280 per pound, while quite a few wers of cultivated ginseng received less n $30 per pound.

UTHEAST ASIAN MARKET

1991, nearly 1.3 million pounds of American seng were consumed in China, mainly in southeast regions. Over the past several rs, Chinese consumption of American seng increased by 20 percent. Consump-n in other southeast Asian countries could and at this same pace.

seng has gained a strong following as people become concerned about pre-ive health measures and add supplements heir diets. For centuries, Southeast Asians have claimed ginseng as a source of good health. Due to its availability and lack of side effects, American ginseng is becoming increasingly popular in Asia. Its products are sold as dried root, powder, slices, extract, teas, and sodas. Ginseng is added as a food ingredient to many other products.

Buyers from as far away as Malaysia, Singapore, Hong Kong, and Taiwan travel to Wisconsin every October to compare roots and negotiate prices. If growers are not visited individually, they have the option of displaying their roots at area showrooms, including Ginseng USA, 315 South 4th, Wausau, WI 54401; the Ginseng Board of Wisconsin, 16H Menard Plaza, Wausau, WI 54401; and Marathon Feed, 409 Pine, Marathon, WI 54448.

Local businesses buy and export American ginseng year round through several major Wisconsin companies, including the Progenix Corporation, 1013 North Third Avenue, Wausau, WI, and Hsu's Ginseng Enterprises, T6819 Hwy. W, Wausau, WI. Roots from both firms are sold in bulk or processed into graded roots, powder, extracts, and capsules. They also are sold to U.S. retailers.

In his eight-page booklet "American Ginseng" (American Botanical Council, P.O. Box 201660, Austin, TX 70720, 512-331-8868), Steven Foster looks at the discovery, distribution history and research on American ginseng.

AMERICAN MARKET

Ginseng product sales are increasing in the United States as more American consumers become health conscious and look for "natural" foods and methods to supplement diets. American ginseng is among herbal supplements included on the GRAS (Generally Recognized As Safe) "list."

Health food stores and many Asian stores in the U.S. offer an array of ginseng products: capsules, extracts, teas, sodas and facial creams. "North American Cooking with Ginseng" (available from the Progenix Corporation) features ginseng in more than 150 traditional Western recipes.

Future American ginseng research by Western scientists encourages the American market. Some researchers link the active ingredient in American ginseng, a ginsenoside called Rh2, to reversal of some cancer-forming processes. If additional research confirms the medicinal value of ginseng, the market certainly would expand. According to some authors, global additional markets need to be identified if American ginseng is to remain a lucrative industry.

Ginseng is a member of the Araliaceae botanical family. American ginseng's scientific name, Panax, derives from the Greek words "pana" (meaning "all") and "axos" (for "cure"). The word ginseng (or Jen-shen) originally stemmed from two Chinese characters meaning man and body. The Chinese name is often translated in Western publications as "man-shaped root" or "manroot." However, Professor S.Y. Hu, a botanist at the Arnold Arboretum at Harvard University, prefers the term "man-essence." According to Hu, it was derived from "the fanciful resemblance of th root to the human body," and from "the bel that this root represents the essence or elixir of the earth crystallized in a human form" (Joseph Hou, 1978; S. A. Graham, 1966).

Asian species include Japanese ginseng (Panax japonicus), sanchi or tienchi ginseng (Panax notoginseng). While Siberian ginseng (Eleutherococcus senticosus) is a member of the Aralia family, it is not in the genus Panax. Folklore about Asian ginseng maintains that it has internal warming properties (Yang) while American ginseng is believed to be a cooling tonic (Yin).

Information Sources

Sources of information about ginseng can be found in some libraries, while the following books and articles either devote a chapter to ginseng or focus on it as their main topic:

"Facts About Ginseng: The Elixir of Life," Florence C. Lee. Copyright 1992, Korea Ginseng Research Institute. Available from Future Concepts, Inc., P.O. Box 1982, Wausau, WI 54402-1982.

"Ginseng: A Concise Handbook," James A. Duke. Copyright 1989, Reference Publication.

"Ginseng: the Magical Herb of the East," Stephen Fulder. Copyright 1988, Thorsons Publishers, Inc.

"An End To Ageing?" Stephen Fulder. Copyright 1983, Destiny Books.

"Ginseng, What It Is ... What It Can Do For You," Ben Charles Harris. Copyright 1978, Keats Publishing, Inc.

"Ginseng: The Myth & The Truth," Joseph P. Hou. Copyright 1978, Wilshire Book Company.

By Rebecca Zunker, Assistant Editor, "American Ginseng Trends" newsletter, and George B. Holcomb, Office of Communications, U.S. Department of Agriculture (USDA), for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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United States
Department of
Agriculture

Cooperative State
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Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Dessert Vines

Improvements in disease resistance of watermelons open up new possibilities for small-scale entrepreneurs who want to produce them for local markets. It could mean a comeback for watermelons, which were consumed at the rate of about 17.9 pounds per capita in the 1950's. The rate dropped to only 12.8 pounds in the 1970's.

Among those with more hardiness to disease are the miniatures—icebox size melons of 5 to 10 pounds. Meanwhile, hybrid triploid varieties are being produced without seeds. Some triploids average 15 pounds. Consequently, small and seedless melons may show up in many markets.

As to the minimelons, Lawrence A. Risse, a marketing specialist with the Agricultural Research Service (ARS) of the U.S. Department of Agriculture, says new varieties, Mickylee (averaging 10 pounds) and Minilee (weighing 7.5 pounds) could become big sellers here and abroad. Risse is with the ARS Export and Quality Improvement Research unit, Orlando, FL 32803. (Telephone: 407-897-7326)

Growers say that besides their resistance to the common diseases of anthracnose and Fusarium wilt, minimelons are firmer, crisper, and sweeter than other watermelons. Whether size gives them a marketing advantage over their 20- to 25-pound cousins is a question. Supermarket dealers can make more money per melon by selling slices of large melons. The small ones average more rind per pound than the big ones. But the new minimelons reportedly hold up well in shipping, even without refrigeration. They were developed in Florida under James M. Crall, University of Florida faculty member at the Central Florida Research and Education Center (CFREC) 5336 University Ave., Leesburg, FL 32748. (Telephone: 904-787-3423.)

Dr. Crall says that while small-scale entrepreneurs may not be able to compete with big commercial melon growers in supermarkets, they can retail direct at highway or shopping mall spaces or sell to smaller stores.

Yield of the smaller melon usually equals that of larger size melons—anywhere from 1 to 3 tons an acre, depending on available moisture and soil quality. They bear in about 82 days.

Mickylee and Minilee seeds are available at prices ranging from $2.50 to about $4 per ounce from some seed dealers. If not available locally, and while supplies last, they may be obtained by mailorder (with mailing costs varying from 50¢ to $1.25 per ounce) from seed retailers, including the Kilgore Seed Company, 1400 West First Street, Sanford, FL 32771 (telephone: 407-323-6630); H.G. Hastings Company, P.O. Box 115535, Atlanta, GA 30310 (telephone: 1-800-334-1771); Willhite Seed Company, P.O. Box 23, Poolville, TX 76076 (telephone: 817-599-8656), or Otis S. Twilley Seed Company, P.O. Box 65, Trevose, PA 19047 (Telephone for a minimum of $25 orders only: 1-800-622-7333 outside Pennsylvania or 1-800-232-7333 inside the State. For other calls, telephone 215-639-8800). Twilley also has a 65-day miniature with yellow flesh. Some dealers will give or sell a useful catalog to prospective customers.

Retailers not yet having these varieties may be able to get them from either Petoseed Company, Inc., 1905 Lirio Street, Saticoy, CA 93004, or Hollar and Company, Inc., of P.O. Box 106, Rocky Ford, CO 81067, the two major distributors handling the miniatures originating in Florida.

As for the seedless or hybrid triploid watermelons, the Twilley Seed Company handles two varieties called Fummy and Quality. They bear fruit in about 90 days. Seed cost is $49 per ounce—about 500 seeds—plus the needed pollinators. Seeds from non-seedless or diploid varieties have to be planted as pollinators with the triploid seeds in order to produce melons.

The Hastings Company has had one variety of seedless hybrid, Tri-X 313. Seed for this variety sells for $9.95 per ounce. One melon grower reportedly has bought rights to this product, and will market melons only on an exclusive basis.

The Petoseed company has developed three seedless varieties: Jack of Hearts, King of Hearts, and Queen of Hearts. One retail seed company handling the Jack of Hearts is Earl May Seed & Nursery Company, 208 N. Elm Street, Shenandoah, IA 51603. Only limited quantities are available at $1.75 per packet of 10 seeds.

Two Japanese seed companies are also reportedly offering seedless varieties. Takii & Company of Kyoto, Japan, has Jupiter (like the Sugar Baby) and Laurel (a Crimson Sweet type). Sakata Seed Company of Yokahama, Japan, has one named Nova.

Northrup King Seed Company of P.O. Box 1827, Gilroy, CA 95021 (telephone: 408 – 847-4242) may have a new variety of seedless available in 1989.

Some growers advise that for good germination, seeds from hybrids should not be stored outside a refrigerator for more than 3 months before planting.

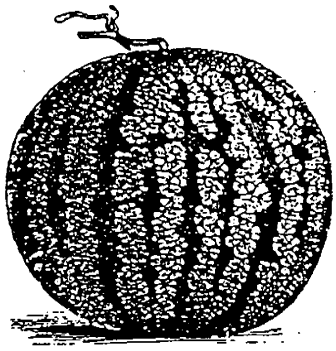
Germinating triploids requires special care. That's one reason, along with cultural and climatic factors, why companies may make no guarantee that fruit will be produced in a "seedless" condition. Unless a grower can find a local experienced person to consult, each grower may have to test out the varieties to learn which suits his or her conditions. County Extension agents often have useful knowledge to share.

Experts recommend that the triploids be started in pots or pellets of peat in greenhouses or with some other temperature control method. The pots or pellets should first be soaked in water thoroughly, then allowed to drain for 24 hours before planting. The seeds should first be treated with Captan to prevent their getting damping off disease and dying.

Two seeds should be planted ½ inch deep in each pellet or pot, with pointed ends toward the sky. Sometimes the seed coats hang tough around an emerging seedling; they should be removed from the cotyledon or seed leaf with care whenever spotted.

When about 10 percent of the seedlings have sprouted, the plastic covering should be removed, and they should be watered as needed to keep them moist. The greenhouse temperature should be lowered to 75 degrees.

Sprouts should be thinned by cutting off the weaker ones or possibly transplanting them to another pot or pellet. The plants should be ready for field culture in about 3 weeks or when they show two or three leaves. They should not be left inside the green-



house after three leaves appear. The cooler temperatures and good light of outdoors should keep them from becoming spindly; that is, elongated and weak. Even then, the early fruit of most triploids may have a tendency to form "hard" seeds, according to some advisers.

Some hybrids have a production period averaging 90 days, somewhat longer than many other varieties, but, according to experts, they can be grown anywhere in the United States so long as the temperature precautions described above are followed.

Both the miniatures and the diploids ship well; but the miniatures have a shorter growing period, usually about 82 days, and need somewhat less care.

Cantaloupe and Others

Another vine-producing dessert fruit is the cantaloupe, of which there are many varieties in various parts of the country. Hybrids are recommended for disease tolerance and quality. The nearest Extension agent is likely to be able to recommend good varieties for his or her area, and will give instructions on growing them. Production time varies from 70 to 90 days.

Three varieties of national worth that are cited by Gary W. Elmstrom, director of the Leesburg, Florida, center mentioned above are Mission, Magnum .45, and Easy Rider. Northrup King has a new variety that is sutureless; that is, it has no seams and thus is better shipping. Twilley also retails a sutureless variety called Ambrosia.

There are also hybrid Crenshaw and honeydew melons available. Dr. Elmstrom recommends a cross between the Crenshaw and the honeydew that originated in Central America. Called Mayan Sweet, its flesh is whitish rather than green.

Another melon worth investigating is MaryGold, a casaba developed by Dr. T.J. Ng of the University of Maryland (Department of Crop Physiology, MD 20742). With a canary yellow rind, it has white flesh and is described as having an excellent sweet taste. It is said to do well in Maryland and surrounding States, hence, it may have a broad range. Its shape is round to oval; the rind has no netting and is slightly wrinkled. It is not a hybrid; hence, it reproduces from its seeds. Seeds are available from Hollar and Company (mentioned above), and possibly other distributors.

County Extension agents may give tips on marketing, but they can't provide the extra labor that may be needed if a grower plants more than his family and available laborers can harvest, haul, and sell.

One way to help with the labor problem is to use plastic row covers and mulch systems so as to stagger planting dates, thus getting some melons developed and harvested ahead of the regular season. Spreading labor needs may also help in market competition. Booker T. Whatley's "How to Make $100,000 Farming 25 Acres," describes how. The book is sold by the Rodale Institute ($17.95, softcover; $24.05, hardcover), 222 Main Street, Emmaus, PA 18049.

Dr. Whatley also tells how producers can build their own buyers' club by selling memberships. He suggests this for combinations of crops, but it could be done solely with dessert vines. A producer might also build a delivery route. Participation in a club requires consumers to use leisure time; many people want to shop at one supermarket once a week.

Pleasant and harmonious customer relations may be the most important part of succeeding with dessert melons, as with any high-value crops. It may take as much time and energy selling as growing and harvesting combined.

Direct marketing, as Whatley recommends, means doing as well with people as with crops. "Socializing with customers" was a primary reason for direct marketing at farmers' markets, as given by more than 90 percent of 21,000 marketers in a study by USDA's Economic Research Service.

The question, "Is Your Farm Suited to Pick-Your-Own?," is taken up by J.W. "Bill" Courter in "Adapt 2," the publication growing out of Successful Farming magazine's 1987 conference on ag diversification at Kansas City, MO. The publication contains the proceedings of the two-day meeting and is available for $12.95, postpaid (at P.O. Box 10652, Des Moines, IA 50336).

An Extension specialist at the University of Illinois, Dixon Springs Agricultural Center, Simpson, IL 62985, Court suggests it may be better for the grower to harvest melons and display them at a stand, noting that customers may damage crops or cause excessive losses when not supervised.

Ranson Blakely, a marketing consultant (P.O. Box 449, Dryden NY 13053), has two companion reports in "Adapt 2" on "Direct and Roadside Marketing," noting 14 "cautions for direct marketers," and on "Farmers' Markets: Steps to Success." He emphasizes the need to keep track of competitors' prices and quality, and says that before doing any price cutting, a seller must advertise to be effective. He prefers the accent on serving quality-conscious shoppers rather than trying to catch fickle bargain hunters.

Also in "Adapt 2," Curtis Stutzman, economist and program developer for Rural Diversified Enterprise Center (Kirkwood College, P.O. Box 2068, Cedar Rapids, IA 52406), has recommendations in an article called "Determining Your 30-Mile Markets."

For those select producers at some distance away from big cities, but who want to wholesale through specialty marketers, much knowhow is required about packing and shipping requirements.

In response to such needs to know, the Export Services Branch of USDA's Office of Transportation (410 McGregor Building, Washington, DC 20250-4500. Telephone: 206-653-6317) has a "Tropical Products Transport Handbook" available at no charge. It discusses maintaining fruit and vegetable quality during transportation, especially emphasizing cooling practices needed. It provides growers, shippers, carriers, and receivers of fruits, vegetables, plants, and flowers facts about standards and ways to reduce postharvest losses. A Spanish version is called "Manual de Transporte de Productos Tropicales." A summary of recommendations is given for 120 fruits and vegetables. Import regulations are described briefly.

A warning about insurance needs is also found in "Adapt 2" in a chapter on "Insurance and the Diversified Farmer," by Don R. Cook, an Indiana insurance merchant. And Roy Ferguson, a farmer (10726 S. 68th East Avenue, Tulsa, OK 74133), describes "Developing a Multiyear Business Plan" and "Obtaining Lender/Investor Capital." The local USDA Farmers Home Administration office, found in most counties, can give information on whether there is a need for a USDA loan and if so, how to obtain a USDA loan to help get started in the melon business. Another source of information, supported by USDA as an aid to help farmers, Extension agents, and rural community developers, is the organization, Appropriate Technology Transfer for Rural Areas (ATTRA), Agricenter International, 7777 Walnut Grove Road, Box 17, Memphis, TN 38119 (Telephone: 1-800-346-9140).

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. Kerr, Jr., Program Director). The address is: OSSA, Cooperative State Research Service/~~Office of Agricultural Program Systems~~, Room 328, Aerospace Building, USDA, Washington, DC 20250-2200 (Telephone: Area Code 202-~~447-3640~~ 401-1805

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United States
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Agriculture

Cooperative State
Research Service

Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Exotic Fruits

Certain potentially high-demand tropical or other exotic fruits growing in Florida or California also have varieties that will bear fruit farther north. But potential small-scale northern enterprisers should not buy seeds or seedlings from anyone until checking them out carefully with a horticulturist at their county or State Extension office.

Even in Florida, which produces many kinds of exotic fruits, there are a few unscrupulous promoters who try to market unsuitable tropical fruit trees. "Enthusiastic amateurs," says Dr. Robert J. Knight, Jr., of a Florida branch of the Agricultural Research Service, U.S. Department of Agriculture (USDA), may unwittingly buy cultivars of fruits such as rambutan (*Nephelium lapaceum*), durian (*Durio zibethinus*), and others with no chances of success producing fruit commercially in that State.

The growing demand for specialty fruits in most large cities means skilled small-scale entrepreneurs may compete with strong competitors from New Zealand and Central and South America if they select varieties carefully and master their marketing homework. The fruits discussed here may come from many parts of the world. Most aren't commercially feasible in the United States other than parts of Florida, California, or Texas and sometimes in Hawaii and Puerto Rico.

However, there is a move along a southern belt of South Carolina and on west to risk planting some hardier varieties of fruits such as the kiwi. But the kiwi situation is "very iffy, commercially," according to L.D. Holmes, whose 16 acres may be the biggest kiwi orchard in the east that is north of Florida. He has at least $160,000 invested in trellises and irrigation equipment for the Hayward variety. So far, too many freezes have cost him too many crops to consider his acreage a success.

He markets through Seald Sweet Growers, Inc., with headquarters in Tampa, Florida. Kirk McCreary of Seald Sweet says marketing is not easy because the firm is not able to get enough volume to supply most chain stores. And the competition from California is formidable.

Dr. Judith Caldwell (Department of Horticulture, Clemson University, Clemson SC 29631) and Janice McGuinn, Extension agent in Charleston County, are still wary about recommending investments in kiwi vines in their State. They also note that prospects for controlled atmosphere storage are in the offing, which could make California producers even more competitive.

Frieda Caplan, U.S. pioneer in marketing the kiwifruit (also once known as Chinese gooseberry) in the early 1960's notes that kiwi was not an overnight success. Caplan, founder of the Los Angeles family specialty produce firm known as Frieda's Finest, said it took 14 years for her and other marketers and growers to acquaint food journalists and consumers with the fruit and another 6 years to reach the point where California kiwi growers have 11,000-plus acres.

Despite the fact that U.S. per capita fruit consumption has been rising, the experts caution any small-scale entrepreneur who might want to emulate kiwi success and launch some other little known fruit, such as the feijoa.

"For other specialties to develop like kiwi fruit has," Kaplan told a trade publication writer, "growers must know how to manage their crops so that they can achieve a reasonable profit even at lower prices."

While some fruits do well in one State and not in another, a few, like the feijoa, a native of South America, have also been adopted successfully by New Zealanders, Floridians, and Californians. With some protection, it too can be cultivated farther to the north; but according to latest reports it hasn't, possibly because damaging fruit flies love it so.

U.S. growers have an advantage over overseas producers in that many fresh fruits are barred from entry into the United States because of the fruit fly problem. Many fruits may be imported from some countries or the State of Hawaii only if frozen or processed, as in puree. If frozen, they are given an initial quick-freezing at subzero temperatures, with subsequent storage and transport at no higher than 20 degrees F.

Market experts emphasize that growers must understand how to harvest, pack, store, and transport their crop so the consumer will receive a product of high quality 7 to 10 days after harvest. Retailers must not experience excessive spoilage or moisture loss while displaying new items. All know customer satisfaction is the key to repeat sales.

Talk With Marketers

Potential growers of any fruit are advised to talk with retailers and intermediate marketers before starting to produce.

Entrepreneurs actually growing quality fruit can contact marketers such as the mail-order house known as Bear Creek Operations, Inc. (P.O. Box 9000, Medford, OR 97501); Caplan (P.O. Box 58488, Los Angeles, CA 90058), or Roland Chicas, Chicas and Associates (P.O. Box 788, New York, NY 10035), a New York specialty-produce distributor looking for a few good exotic fruit producers.

For other marketing ideas, growers might also check information from Dr. Booker T. Whatley, or Nancy Lee Bentley. Whatley produced the book, "How to Make $100,000 Farming 25 Acres." (Rodale Institute, 222 Main St., Emmaus, PA 18049. $17.95 softcover, $24.95 hardcover.) And Bentley authored "Windows of Opportunity: The Market for Specialties and Organics." (The Food Circle, P.O. Box 62, Cabery, IL 60919. $25.) A useful book, possibly found in some libraries, is "Handbook of Tropical and Subtropical Horticulture," published by the Department of State in 1970.

In selecting marketable fruits, potential producers should check with their local Extension agents on what to grow. Floridians, for example, will know that some Asian fruits with "no possibility of serious cultivation in Florida," as Knight noted, are breadfruit (*Artocarpus communis*), mangosteen (*Garcinia mangostana* L.), pulasan (*Nephelium mutabile*), and probably rambai (*Baccaurea dulcis*), duku, tampoi, and champedak (*Artocarpus interger*).

In Puerto Rico, on the other hand, breadfruit may well have great commercial potential, and mangosteen and rambutan can also thrive, according to Ismael Reyes Soto of the University of Puerto Rico. Other tropical fruits in order of potential in Puerto Rico, he says, are guanabana or soursop (*Annona muricata* L.); Jobo de la India (*Spondias dulcis*-Parkinson); quenepa, also known as quenep, kenep, mamon, mamoncillo, limoncillo, and, in English, Spanish lime (*Melicoccus bijugalus* - Jacq. or *Melicocca bijuga*, L.); nispero, also known as sapote, chicozapote, chicle, sapotillo, zapote colorado, and, in English, sapodilla, dilly, and naseberry (*Manilkara sapotilla* Gilly); and tamarindo. He also has a list of others

of possible potential importance.

To compete with big Florida and California growers now dominating tropical fruit production, growers elsewhere must study matters other than market potential. They may also have to form, or at least join, a marketing cooperative for the advantage of being able to market enough to interest chain stores, which buy in large lots.

Tropical Reference

Potentially saleable fruits of the tropics number in the hundreds. One major reference, the 247-page *Perennial Edible Fruits of the Tropics: An Inventory*, by Franklin W. Martin, Carl W. Campbell, and Ruth M. Ruberte, describes many. (The handbook, available at some libraries, may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, for $12 plus 94 cents for fourth class postage.)

Timely sources of information include the rare fruit councils. The Rare Fruit Council International, Inc., of Florida publishes an 8-page monthly newsletter from 13609 Old Cuttler Road, Miami, FL 33158.

The California Rare Fruit Growers, Inc., at Fullerton Arboretum, California State University, Fullerton CA 92634, has about a dozen chapters and 2,600 members.

Another data source is the specialty crop program of Claude Sweet of the Horticulture Department of MiraCosta College, One Barnard Drive, Oceanside, CA 92056. Sweet authored the 96-page *All About Citrus & Subtropical Fruits*, published in 1985 by Ortho Books, 6001 Bollinger Canyon Road, Bldg. TB120, San Ramon, CA 94583. (It costs $7.95, including postage, plus State tax if any.) It tells how to grow more than a dozen subtropical fruits, and includes a chapter on container plantings for northern growers.

Sweet also is building a national computer data base on plants, especially the tropicals. He has considerable data stored, and hopes to collect marketing data so growers can compare profit and risk potentials of various crops.

Exotics of Potential

Alphabetical according to scientific name so as to reduce confusion, below are tropical or 'exotic' fruits that certain distributors might handle.

Annona cherimola Mill. ("Cherimoya" in English; "anon" and "chirimoya" in Spanish.) A high-value crop, it demands great management skill to produce the uniformly shaped, high quality fruit the market demands. Grading and packing requires full attention. It must be handled gently and properly stored to reach the consumer in good shape. Production is likely to be confined to California.

Annona squamosa x A. cherimola. ("Atemoya" in English and Spanish.) Atemoya is a hybrid cross developed by Floridians as an alternative to the Cherimoya. Just coming into production in Florida, it may have good potential, according to Dr. Campbell, tropical fruits specialist for the Florida Extension Service with the University of Florida. It is one of few exotic fruits sold by mail order.

Annona squamosa. ("Sugar apple" or "sweetsop" in English; "anon," "rinon," or "anona blanca" in Spanish.) Sugar apple may have only local commercial production potential but may be useful for home gardens in hot tropical lowlands. It will survive a light frost.

Averrhoa carambola L. ("Carambola" in English and Spanish, and also "starfruit" in English.) Carambola acreage is growing in Florida, according to USDA Scientist Knight. A tree will bear fruit two or three times a year. Some see it as the next kiwi.

Calocarpum sapota Merr. ("Mamey sapote" in English or Spanish.) The Campbell book says this is one of the most notable and talked about fruits, with a rich and distinctive flavor. Its popularity grows in Florida.

Casimiroa edulis La Llav. et Lex. (White sapote" in English and "zapote, matasano, sapote blanco" in Spanish.) While very perishable, the taste and flavor of white sapote compares well with the cherimoya. It is more adaptable to California than to Florida, tolerates a variety of soil conditions, seasonal dry periods, and frost.

Feijoa sellowiana Berg. This pineapple guava, Caplan says, has potential "much smaller" than that of the kiwi.

Litchi chinensis Sonn. ("Lychee' or "litchi" in English and "lichi" in Spanish.) Although this fruit is very perishable, it can command a premium price. Domestic varieties bear irregularly in Florida; new ones brought from Australia and Hawaii by Miami researcher Ed Johnston of the Fairchild Tropical Garden's Tropical Fruit Program may be better.

Passiflora adulis Sims or *Pasiflora edulis Sims f. flavicarpa Deg.* (The first is "purple passion fruit" and the second is "yellow passion fruit." In Spanish, both are named "maracúya," "granadilla," or "parcha.") Demand rises; purple passion fruit promises much to California but not to Florida, where the mean temperature is too high. Disease-resistant varieties are needed.

Psidium guajava L. ("Guava" or "common guava" in English and "guayaba" in Spanish.) Guava is highly perishable. Growers need varieties that are tastier and can be marketed with proper promotion.

Tamarillo. Grown in a limited way in California, tamarillo does poorly in humid, hot areas like Florida. It merits consumer education.

Health, Labor Problems

All fruits, of course, require much work to keep vines or trees healthy. Then, there is the problem of harvesting hands. They are not easily found, but migrant labor can sometimes be available through a larger organization that a grower can join, such as a marketing cooperative.

To keep up with fruit prices, operators may want to check with USDA's Agricultural Marketing Service (AMS). Its Fruit and Vegetable Division has a Market News Branch, headed by W.H. Crocker, Room 2503-S, AMS, USDA, Washington, D.C. 20250. AMS may be able to provide a recent listing from Los Angeles, San Francisco, or New York of latest prices for certain fruits regularly supplied. To calculate what the farmer's price will be, deduct about 30 percent from the quoted price, Caplan advises.

USDA's National Agricultural Library (NAL, Beltsville, MD 20705) has a Reference Division that can provide a bibliography of information about fruits.

Another source for a bibliography is the Produce Marketing Association (PMA, 1500 Casho Mill Road, Newark, DE 19714-6036).

To help growers, shippers, carriers, and receivers learn the standards and to reduce postharvest losses and expand the markets for highly perishable, high-value fruits (and vegetables), the Export Services Branch of USDA's Office of Transportation (410 McGregor Building, Washington, DC 20250-4500) has a Tropical Products Transport Handbook available at no charge. A Spanish version also is available.

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. Kerr, Jr., Program Director). The address is: OSSA, Cooperative State Research Service/~~Office of Grants and Program Systems~~, Room 3428, Aerospace Building, USDA, Washington, DC 20250-2200. Telephone: Area Code 202 + ~~447-3640.~~ 401-1805

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Foliage Plants

Foliage plants come in all shapes—rounded, spread, upright, cascading or weeping, oval, and mounded. They can be maintained in dishes, terrariums, hanging baskets, totem poles, large individual pots, troughs, or boxes. They can range in height from a few inches to 20 feet or more in large patios or entries. They cover a wide color range and may or may not have flowers.

Ten States dominate sales in the highly competitive indoor foliage plant industry. Florida leads. Acreage in production in Illinois soared some 2,500 percent over 10 years. The other significant producing States are California, Texas, Ohio, Pennsylvania, Michigan, New York, New Jersey, and Massachusetts.

Acreages and values of foliage plants, generally tropical, have grown over recent decades. From 1970 to 1980, foliage sales increased 834 percent.

A small-scale entrepreneur who is a good marketer might make substantial profits every spring on a part-time basis by growing certain foliage plants in a 3,000-square-foot greenhouse, according to Dr. Davis S. Koranski, floriculture specialist at Iowa State University. The least costly greenhouse could be used, he said, and plant sales could gross from $9,000 to $18,000. Seeds or cuttings, labor, and other costs should not total more than 40 to 50 percent of gross, he said. His estimates apply to the northern tier of States; farther south, lower heating costs could boost returns.

An enterprising marketer could emphasize individualized personal service and fresh ideas. Talented growers sometimes branch out into interiorscaping, the newest service in the nursery business. Competitors include many large grower-firms, some of which do their own retailing with mail-order sales.

Key book sources of data on foliage plants include *Interior Plantscapes: Installation, Maintenance and Management,* by George H. Manaker, and the highly technical *Foliage Plant Production,* edited by Jasper N. Joiner. Both were published by Prentice-Hall, Inc., Englewood Cliffs, NJ 07632 in 1981.

Many Sources

Other sources of information on foliage plants, their production and marketing, include county Extension agents; wholesale florists; State nurserymen's associations; experts at State universities; U.S. Department of Agriculture's (USDA) National Agricultural Library (NAL) with its AGRICOLA computer data base (Horticulutre Information Center, NAL, Beltsville, MD 20705); the Society of American Florists (1601 Duke Street, Alexandria, VA 22314), which has a growers' division; the information center of the Producer Marketing Association (PMA); and major private commercial magazines, such as *GrowerTalks.* The latter's publisher is George J. Ball, Inc. (250 Town Road, West Chicago, IL 60185). A year's subscription costs $19. A colorful cyclopedia, *Tropica,* by Dr. Alfred Byrd Graff, sells for $125 at Roehrs Company (19 Prospect Terrace, P.O. Box 125, East Rutherford, NJ 07073). It has about 7,000 color photos.

PMA's information specialist, Julie E. Stewart (1500 Casho Mill Road, Newark, DE 19714-6036) can provide a bibliography on foliage plants at a minimum charge for nonmembers of $20 per search plus $10 for up to 10 printed pages and $1 per page for anything over 10 pages. Her latest foliage plant bibliography is 5 pages long. It includes items dealing with prices, consumer buying trends, shipping temperatures, and marketing ideas.

PMA also has a Floral Marketing Division which annually produces *Floral Marketing Directory & Buyer's Guide* ($20). Foliage plant producers are part of the floral industry. Besides listing floral growers and suppliers, the guide notes supermarkets that buy floral items and may provide consumer interest survey information. It also may describe the latest boxing or shipping standards and list floral holidays.

Other published information sources include the *Produce Marketing Almanac,* issued every year by PMA; the *Packer* newspaper; *Produce News; Florists' Review; Produce and Floral Retailing; Nursery Business-Retailer;* and *Florida Foliage.*

Many local libraries can supply addresses and sometimes copies of the above or other publications that discuss foliage plants. Local newspapers and general magazines often provide indications of trends in foliage plant decoration.

The NAL's Horticulture Information Center can provide potential entrepreneurs with a bibliography. It lists articles and books, such as *Practical Horticulture: A Guide to Growing Indoor and Outdoor Plants,* by L. W. Rice and R. P. Rice; and *The Greenhouses,* an annual.

Quarantine Laws

If plant growers make interstate shipments of plants and soil, they must remember State and Federal plant quarantine laws. Penalties apply to violators. Growers should seek information from their State plant regulatory official at the State department of agriculture or USDA officials with the Animal and Plant Health Inspection Service (APHIS, Plant Protection and Quarantine, Regulatory Services Staff, Federal Building, Hyattsville, MD 20782).

Marketing foliage and foliage plants is basic to success, as indicated by Koranski. If beginning entrepreneurs can find a large floral retailer or jobber with whom to become associated as a supplier of plants, they will have solved some marketing problems. Sometimes growers also can find retail florists who have a need for seasonal plants such as forsythia, forced peach blossoms, spirea, and pussywillows, to mention a few, as well as plants such as ferns that are used the year round.

A grower also might work out a sales arrangement with the owner of a local store with a large parking lot where plants can be displayed.

For those who would like 11 pages of ideas for use in marketing, Allen C. Bjergo, community development specialist with the Montana State University Cooperative Extension Service (1018 Burlington, Room 200, Missoula, MT 59801), has developed "Your Marketing Plan Outline," available free on request. (He also has "Earn

Extra Money From Your Farm or Ranch" and "Financing Your Ideas.")

Meanwhile, in Florida, where one grower said 95 percent of foliage plants are grown on speculation, some marketers are trying to beat the competition and interest new customers, either retailers or final consumers, by moving away from the "bread-and-butter mainstays" among foliage plants. These include *Schefflera Aboricolas* ("Hawaiian elf"), *Dracaenas marginata* and *D. fragrans massangeana* (corn plant), *Ficus benjamina,* (rubber trees), and *Chrysalidocarpus lutescens* (Areca or "butterfly" palms). Such growers look for harder-to-grow but attractive plants, or new ones. With fresh items, they also may avoid the problem of selling plants at 1970 prices.

A couple of the more colorful plants such growers are introducing are the hibiscus and the croton. Other, harder-to-grow varities include the *Dracaenas detrmensis* 'Janet Craig' and 'Warneckii.' A few producers are developing new cultivars.

Competition Stimulates

Pressured by competition, growers also look for other ways to save, by:

- Selling directly to the public as well as to retail sales outlets and interiorscapers.
- Doing interiorscaping in addition to growing.
- Establishing inventory control.
- Scheduling production on the basis of past sales.
- Maintaining low sales overhead.
- Mechanizing to reduce labor.

Some nurseries join others to combine marketing, billing, shipping, and retailing.

For those interested in doing direct marketing to consumers, a 32-page 1981 publication, *Direct Marketing by Farmers to Consumers: Some Legal Implications,* is an information source. It discusses employment regulations and marketing liabilities such as warranties in direct marketing. By D. L. Uchtmann and J. T. Archer, it was published by the University of Illinois and may be obtained for $1.50 from the Agricultural Publications Office (54 Mumford Hall, 1301 W. Gregory Drive, University of Illinois, Urbana, IL 61801).

2 Acres Enough

Foliage plant nurseries range in size from backyards to 60 or 70 acres. One successful Florida grower said "you could make money" with 2 acres, with properly controlled overhead.

A North Carolina grower, self-described as a nonworkaholic, is surviving on a full-time basis with 30,000 square feet and nine greenhouses, a prefabricated portable hut, and a coldframe. In the Deep South some growers shade plants and don't build greenhouses. In Northern States, however, sturdy, well-insulated greenhouses are essential for full-time foliage operations.

Insulation and heating methods change. Coverings that hold in infrared light for use as a heat source are recommended in certain areas. Solar energy also is often used as a heat source.

Joiner's book, *Foliage Plant Production,* illustrates how to achieve greenhouse efficiency and set up a systems approach that allows expansion. Many growers recommend movable benches to make best use of space.

Costs for several types of greenhouses range anywhere from $10 to $40 per square foot.

In his book, Joiner says, "Polyethylene houses or steel frame and fiberglass covered houses would make best use of investment funds where a 10 percent minimum return on an investment is required." He cautions that "availability of investment funds is usually a major problem."

Joiner's book also analyzes yield per square foot of greenhouse space for various foliage plants such as philodendrons, pileas, dieffenbachia, aglaonema, ferns, hoyas, and Norfolk Island pine.

Many Problems

Pest challenges facing foliage producers are those of any greenhouse manager. *'GrowerTalks'* in June 1987 profiled 10 of the worst greenhouse problems, namely: Among insects, whiteflies, thrips, spider mites, mealybugs, and leafminers; and among diseases, powdery mildew, *Xanthomonas, Rhizoctonia, Fusarium,* and *Phytophthora.* The biological-controls approach to pests is usually recommended by USDA and State Extension and university specialists when possible, and *'GrowerTalks'* also calls for its study, calling it the "technology of tomorrow."

A feature of Joiner's book is a 10-page table listing symptoms and possible causes of foliage plant problems, ranging from nutrient deficiency to inadequate light and humidity, chilling, plant spacing, air pollution from gas, and many pests.

Besides various botanic gardens around the country, another location where potential growers might see some useful foliage plants is the U.S. Botanic Garden, administered through the Office of the Architect of the Capitol, just west of the U.S. Capitol at Independence and First Streets, SW, Washington, DC 20024.

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Herbs

ıe term "herbs" has many meanings. The ost accepted one is "plants that are not used ılely as vegetables or ornaments." Herbs are ultiple-use plants useful for culinary, cosmet-, industrial, medicinal, landscaping, decora-ve, and fragrance purposes.

They include vegetables such as garlic, ıvoring items such as red peppers or mint, ecorative flowers such as roses, various lseed shrubs, ground-cover plants such as mon thyme or perennial chamomile, edible owers such as nasturtiums, trees such as the ıden or bay, and plants such as chrysanthe-ıums that may be intercropped and used as n alternative to pesticides.

Herbal processed products include fresh nd dried flowers; leaves, barks, roots, and eeds — dried, ground, or dissolved powders; ssential oils (as distinguished from petroleum ynthetic oils); and oleoresins, naturally ming mixtures of oil and resin. Some other oducts are condiments, spices, or food easonings; teas; dyes; cosmetic products; nd so-called health foods.

The competition is intense in producing nd marketing herbs, and producers range om giant corporations to small-scale entre-ıreneurs and hobbyists. Regardless, there are ıpportunities for new herb producers as the ıarket expands.

The world market is extremely volatile, with ıices ranging from less than $1 a pound for ome herbs to more than $100 a pound for ıthers. Political situations in third world coun-ries (where much of the world production is ound) causes shortages, and prices fluctuate idely. Increasing commercial herb production n the United States will help maintain some ıuilibrium in supplies and the stability of ellers' prices.

Consumer and producer interest in herbs is ncreasing. A decade ago it was difficult to find ooks on herbs. Today there are dozens of ooks published on all aspects of the subject. ncreasing consumer interest has created more ompetition in herb production by growers. ational and regional herb trade associa-s provide information and support to their nembers. The Herb Growing and Marketing Network (P.O. Box 245, Silver Spring, PA 17575; 717-393-3295) publishes *The Herbal Connection*, a bimonthly trade journal, and *The Herbal Green Pages*, an annual resource guide with more than 5,000 herb-related listings; the International Herb Association (1202 Allanson Rd., Mundelein, IL 60060; 708-949-4372) holds an annual conference in various parts of the United States, and the American Herbal Products Association (P.O. Box 2410, Austin, TX 78768; 512-320-8555) represents manufacturers of herbal health food and over-the-counter products.

Regional groups are represented by herb organizations in several States. Often these groups are organized by the State Departments of Agriculture. States that have existing support groups are: North Carolina (North Carolina Herb Association, c/o Jeanine Davis, 2016 Fanning Bridge Rd., Fletcher, NC 28732), Delaware (DHGMA, c/o Dr. Art Tucker, Delaware State Univ., Dept. of Ag & Natural Resources, Dover, DE 19901-2275), Pennsylvania (PHBN, c/o Barb Will, RD 7, Box I, Somerset, PA 15501), the Ozarks (OHGMA, c/o Pam Robinson, 3249 S. Erie, Tulsa, OK 74135), Texas (THGMA, c/o Deborah Cox, Rt. 8, Box 567, Brownsville, TX 87520), Illinois (IHA, c/o Lowell Lenschow, 1701 Towanda Ave., Bloomington, IN 61701), Michigan (MHBA, c/o Judy Larison, 135 E. 120th St., Grant, MI 49327), Kentucky (KHGMA, P.O. Box 123, Washington, KY 41096), West Virginia (WVHA, Rt. I, Box 263-SS, Weston, WV 26452), Virginia (VHGMA, P.O. Box 1176, Chesterfield, VA 23832), Hawaii (HHA, P.O. Box 62150, Honolulu, HI 96839), Montana and the surrounding region (Great Northern Botanicals Association, P.O. Box 362, Helena, MT 59624).

A number of groups serve specific interests within the industry: medicinal (American Botanical Council, P.O. Box 201660, Austin, TX 78720; Northeast Herbal Association, P.O. Box 146, Marshfield, VT 05658-0146; American Herbalists Guild, Box 1683, Soquel, CA 95073), and ornamental (Association of Specialty Cut Flower Growers, MPO 268, Oberlin, OH 44074).

For the small-scale entrepreneur, the best chance of competing may be in plant sales. With interest in gardening at an all-time high and no diminishing of interest in sight, gardeners are searching for a wide variety of herbs for cooking, landscaping, and alternative health needs. A prospective producer might consider starting a mail order business. Many home gardeners and others market herbs that way. Herb plant sales are increasing every year, and the enterprising grower who combines knowledge and service along with plant sales is doing well.

Fresh-Cut Herbs

Culinary herbs are well suited to small-scale production because of unique growing conditions and intensive labor needs. Production can be on small acreage, marginal land, and without heavy machinery or with modified equipment. Potential markets are in selling fresh-cut herbs to restaurants, at local farmers' markets, and through some specialty grocers. Much about pricing and marketing fresh-cut herbs can be learned from the Agricultural Marketing Service (AMS) of the U.S. Department of Agriculture (USDA).

AMS provides reports on prices and supplies of "miscellaneous herbs," which are fresh-cut and whose leaves are usually used for flavoring, such as arugula ("rocket salad"), basil, chives, cilantro (also known as coriander, parsley, and Spanish or Chinese parsley), chervil, dill, marjoram, mint, oregano, rosemary, sage, savory, sorrel, tarragon, thyme, lemon thyme, and watercress. Also listed as an herb is the confusingly named anise, which is a close relative of fennel, bulbous fennel, Florence fennel, or finocchio. Its bulbous lower section is generally boiled like a vegetable; its leaves are not used for flavoring, as is the case with anise hyssop, a kind of mint. (A third anise, sometimes classed as an umbelifera because of its relationship to dill, angelica, and celery, is Pimpinella anisum, a flavoring seed producer.) Some herbs used for their roots, such as ginger, are listed by AMS as oriental vegetables, but the horseradish (root) is sometimes listed as an herb. Herbs such as garlic, onions, parsley, and hot peppers also are priced but are listed as plain vegetables. The weekly National Wholesale Herb Market News Report is available from the Fruit and Vegetable Market News, Attn: Jacquelline Davis, Market Reporter for Herbs, USDA-AMS, 230 South Dearborn St., Rm. 512, Chicago, IL 60604;

312-353-0111. The annual price for the weekly report is $120, but a monthly update at $10 is also available. The report covers 18 terminal markets around the country and provides prices and shipment sizes of 20 or more different culinary herbs. Most of the commercial fresh-cut herbs in this country currently come from California, Texas, or Florida. Some items come from other States, and some are imported at very competitive prices.

A lack of knowledge of particular herb cultivation systems, difficulties with correct seed labeling, and lack of regulations concerning pesticides, herbicides, and fungicides are major production problems.

Seeds are another concern for herb growers. Although imported seeds and seeds supplied by bulk suppliers are the main sources for the industry, there is an urgent need for the production of high-quality, reliably identified seed sources.

Processed Herbs

Non-food herbs are another potential market. Outlets include pharmaceutical and industrial uses, the fragrance industry, and dried herbs/flowers for arrangements and craftwork. Marketing for the pharmaceutical/industrial segment is specialized, competitive, and can require a substantial investment. Considerable specialized knowledge of dehydrating, processing, and extracting, is often required, and specialized machinery may be needed. Keen foreign competition exists, as import prices are often low. Because of the instability of the world market, however, many companies are looking for reliable U.S. suppliers. Growers must establish close working relationships with buyers. Information on U.S. trade and the world situation for many processed products from herbs and spices may be obtained from circulars sold by USDA's Foreign Agricultural Service (FAS). For information on subscription prices, contact FAS, Information Division, Room 5074-S, Washington DC 20250-1000. Telephone 202-720-7115; Fax 202-720-3229. Dr. James A. (Jim) Duke, a botanist at USDA's Agricultural Research Service Germplasm Introduction and Evaluation Laboratory, Beltsville, MD 20705, suggests study of the *Chemical Marketing Reporter* (Schnell Publishing Company, 100 Church St., New York, NY 10007) for the latest continuing data on processed herb prices and dealers. Copies of the annual *Oil, Paint and Drug Chemical Buyers Directory*, which lists dealers, is also for sale from the publisher.

Varietal Selection

Among many challenges in the herb business is varietal selection. Some seeds do not produce the crop desired. For example, "oregano" seeds sold by some companies may not produce plants of culinary use quality. While many kinds of lavender may be grown from seeds, they will not produce quality oil. Dr. Duke and Thomas DeBaggio, an herb grower in Arlington, VA, and author of *Growing Herbs*, advise that many herbs should be started from cuttings.

Growing Methods

There is a limited amount of commercial growing information in print. The quarterly *Journal of Herbs, Spices & Medicinal Plants* emphasizes the latest research in production and quality control. Dr. Lyle E. Craker, a plant physiologist at the University of Massachusetts, is the editor. Individual annual subscriptions are $28 per volume ordered from The Haworth Press, Inc., 10 Alice St., Binghamton, NY 13904-1580. Other sources for information on production, marketing, and manufacturing are the proceedings from the National Herb Growing and Marketing Conferences. Copies of the proceedings from 1986-1988 are available from the Extension Office, Center for New Crops, 1165 Horticulture Building, Purdue University, West Lafayette, IN 47907. The 1989-1994 proceedings are available from the International Herb Association. Information on Purdue's International Training Program in Medicinal and Aromatic Plants is also available.

Although many herbs flourish outdoors, prospective producers should seriously consider a greenhouse for year-round production as well as early season propagation. Construction costs will vary depending on location and equipment. Seeking expert advice before construction is essential.

Other Information Sources

Other sources of herbal information include the Alternative Farming Systems Information Center at USDA's National Agricultural Library (NAL), Room 304, 10301 Baltimore Blvd., Beltsville, MD 20705-2351 (301-504-6559); the Cooperative Extension Service office in your county; and your State university horticulture specialists.

Persons wishing to view more than 100 varieties of living herbs should visit the USDA's National Arboretum at 3501 New York Avenue NE, Washington D.C. (202-245-2726). Janet Walker is curator of the Arboretum's National Herb Garden. It is one of the largest such formal gardens in the world and has been sponsored by the Herb Society of America's Potomack Unit since 1965.

There are hundreds of books on herbs, but most deal with growing herbs on a gardener's level. Selections that include more detailed material for both the growing and business aspects are: *Growing Herbs* by Thomas DeBaggio from Interweave Press; *Herbal Renaissance* by Steven Foster from Gibbs-Smith; *Park's Success with Herbs* by Gertrude Foster and Rosemary Louden from Park Seed Comp *Growing Your Herb Business* by Bertha R. t from Storey Communications; *Herbs for Sale* and *Profits from Your Backyard Herb Garden* by Lee Sturdivant from San Juan Naturals (Box 642S, Friday Harbor, WA 98250). Two trade journals that deal with commercial enterprises are *The Business of Herbs* (Rt. 2, Box 245, Shevlin, MN 56676) and The Herbal Connection.

By Maureen A. Rogers, P. O. Box 245, Silver Spring, PA 17575, for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr, Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone 202-401-1805; Fax 202-401-1804.

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Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Northern Nut Growing

Northern Nut Growing

It is not generally known that delicious nuts of many varieties may be grown in the most Northern areas of the United States. Butternut and hazel have always grown wild in Minnesota and Wisconsin. The exotic almond and northern pecan thrive in Michigan and New York. Northerners can be very successful with nut trees and this article will get you started in the right direction.

Buttemuts, hazels, heartnuts, and Korean and Siberian nut pines are some of the hardiest nut trees. Almond and sweet chestnut require the more favored sites in the Northern States.

Growers have had occasional disappointments transplanting nut trees due to the long tap root. All of the tap root must be secured to assure successful transplanting. Spring transplanting, rather than fall transplanting, usually gives the best results. However, heartnut, chestnut, and hazel are some of the best choices for fall transplanting. Most nut trees are suitable for a wide range of soils although chestnut and almond require sandy loans.

Good water drainage is essential for many nut trees. Areas with poor air drainage become frost pockets in both spring and fall and should be avoided. Sites prone to extreme drought should not be considered. The addition of peat moss may make all the difference in difficult instances.

Young trees are always easier to establish in the presence of nearby, but not overshadowing, windbreaks. Generally, nut trees require full sun. The Persian (Carpathian, English) walnut prefers north-facing slopes, whereas the northern pecan prefers a south-facing slope.

Although average planting is 20 feet apart, small bush types (hazel) are planted 10 feet apart. Full-sized trees (northern pecan) are often thinned to as much as 40 feet apart in their senior years. The optimum height for transplanting is 2-4 feet.

Contrary to popular belief, several trees (hazel and chestnut), may produce nuts in as few as 3 years from transplanting. They respond to fertilizing, irrigation and other good growing techniques. On favorable sites, the trees will reach ages of 50-200 years and will grow on rough lands unsuitable to annual crops.

Fortunately, many nut trees are substantially free of insects and diseases, and may not require chemical protectants.

Most nuts are harvested by allowing the crop to fall to the ground. Then they are collected, cleaned and dried to about 6 percent moisture for common storage of 1 to 2 years.

Nut tree plantings may be started from nursery stock or nuts may be seeded directly on the sites selected. Usually seed nuts are sown 2-3 inches deep in the fall. Specialty nurseries offer improved types of trees which are known as cultivars.

Sweet Chestnut

The "sweet" in the title is used to distinguish edible chestnuts from the ornamental horse chestnut (Aescalus hippocastanum), which produces similar appearing, but bitter, nuts unsafe for human consumption. The four sweet chestnut varieties are: the American chestnut (*Castanea dentata*); the European chestnut *(Castanea sativa)*; the Japanese chestnut (*Castanea crenata)*; and the Chinese chestnut (*Castanea mollissima*).

Among these four species there are some differences in nut size and leaf format. One of the most significant differences is blight resistance. The American is the most susceptible, while the Chinese is the most resistant.

Chestnuts have been a staple food in Europe and Asia for centuries. Now that blight resistant oriental types are available and have sufficient cold hardiness, chestnuts can be reintroduced into North America on a commercial scale. There is also ample opportunity to hybridize the four major sweet chestnuts to achieve combinations of size, consumption quality, and high production.

The general characteristics and requirements for the several sweet chestnuts are:

- A season length of 100-140 frost-free days, requiring 2500 plus heat units (base F) to fill the kernels. Winter hardiness may extend to -15°F to -30°F.
- Nut sizes range from 10-200 nuts to the pound. Kernel percentages range around 85 percent, unusually high compared to most northern nuts. Chestnuts are starchy rather than oily and the nuts are stored at 100 percent moisture until consumed. If allowed to dry, they may become moldy, hard, and inedible.
- Chestnuts prefer rich sandy loams, but may also do well on coarse sands. Near perfect drainage is necessary. They respond well to fertilizers, mulches, trickle irrigation and full sunlight. In areas troubled by chestnut weevil, worms will be present in the nuts. Check with your state agriculture department for acceptable control applications.
- Well sited chestnuts grow quickly and are healthy. A vigorous seedling may grow from seed to 20 feet in 10 years. Trees achieve mature size after 40-80 years and range from 30-90 feet tall, often with spreading crowns. Some may live to over 150 years.
- Chestnuts on marginal soils are susceptible to manganese deficiencies, apparent in excessively yellow leaves and slow, spindly growth. This problem is usually corrected with foliar sprays of manganese.
- Chestnuts generally bloom in July. In most years, this relatively late bloom season protects them from spring frosts. A minimum of 3-5 trees are required for good cross pollination. Both grafted and seedling chestnuts will bear nuts in the third year from planting. If 1 or 2 year old chestnut grafts develop nuts, they should be cut off as excessive early bearing weakens trees and makes them susceptible to winter damage.
- Protection should be provided from both deer browsing on young chestnuts and rodents girdling around the base of trees in winter.
- Harvest is from mid-September to early October and chestnuts may be used as lawn ornaments if the fall drop of burrs is not troublesome.
- Chestnut is one of the highest yielding of all nut trees bearing 1,000-4,000 pounds per acre or 50-100 pounds per tree. At current prices of up to $3 per pound (wholesale/retail), profits are possible.
- Cultivars of chestnut include many old favorites such as Orrin, Layeroka Paragon, Abundance, Colossal, and Nanking. Newer cultivars are available from specialty nurseries and have shorter season requirements and larger nuts. *(Greg Miller, Empire Chestnut Co., 3276 Empire Rd., SW, Carrollton, OH 44615)*

Eastern Black Walnut

Black walnut is grown commercially in the United States for timber and nuts. The rich, dark-grained wood is one of the most valuable in North America. The pungent tasty kernels are especially favored for baking. The trees are vigorous, fast growing and spread over large tracts from southern California to the Carolinas, and west of the Mississippi River in Iowa, Nebraska and Kansas.

The characteristics and requirements of black walnut include:

- A season length of 100-140 frost-free days. The trees require 2600 plus heat units (base 50 F) to fill the kernels. Winter hardiness may extend to -30 °F to -40 °F. Nut sizes range from 10-100 nuts per pound. Kernel percentage of nuts varies from 15-35 percent. Black walnut shells are very tough to crack.

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- Although black walnuts prefer open-textured bottom lands, they will grow on many upland locations and in clay loam. Medium to good water drainage will give best results. Usually 3-5 different cultivars or seedlings are required to provide adequate cross pollination. The trees require 4-8 years from planting to produce commercial crops. Harvest is from mid-September to late October.
- Black walnuts are slightly less attractive to deer and rodents than other trees, but they also require winter protection.
- If nothing else is grown nearby, black walnuts make a good lawn tree. It is a competitive species, requiring space and full sun.
- The trees respond well to special fertilizers, mulches and irrigation. They will probably do better than most trees when planted on a "wild" basis with very little seasonal care.

Some of the better cultivars for northern climates are Emma K, Sparrow, Ohio, Stabler, and Sparks 127. *(Archie Sparks, Box 98, Beaver, IA 50031)*

Persian Walnut

The Persian walnut (*Juglans regia*) is similar to and closely related to the eastern black walnut, with one very important difference: the shells are thin. The kernels are mild and delicious and easily extracted. Some of the notable characteristics of this valuable tree include:

- Nuts which ripen from mid-September through early October in the Northern States. Winter hardiness extends to -40° F. Caution: Winter frosts may be a serious problem.
  Nut sizes range from 20-60 nuts per pound. Kernel percentages are from 35-65 percent.
- Persian walnuts grow on a wide range of sites if the soil is reasonably rich, open-textured and well drained. A vigorous seedling may grow from a nut to a tree 25 feet high in 10 years. Mature trees reach 60-80 feet and may live for 150 years.
- The trees bloom in early May and are often at risk from spring frosts. Several trees of different types are needed for cross pollination. Grafted trees may bear nuts in as little as 3-5 years from planting.
- Persian walnuts must be protected from all rodents and predators.

Many growers in the North have worked with Persian walnuts, so a wide range of cultivars are available. They will produce nuts just like the ones purchased from a grocery store. *(Ernie Grimo, Grimo Nut Nursery, RR3, Lakeshore Rd., Niagara-on-the-Lake, Ontario LOS 1J0,* Canada)

Shagbark Hickory

Those who collect hickory nuts from the wild are aware that they have the most deliciously delicate flavors of all the nuts. Currently, only those who are familiar with collecting in the wild have access to these wonderful nuts as they are not available commercially. In spite of not being well known, hickories are widely grown in North America. Their crops ripen toward the end of September from southern Canada to the Carolinas and from Connecticut to Missouri. Some of their pertinent characteristics include:

- Winter hardiness may range as low as -40° F. The hickory is one of the few nuts which prefers clay soils, although occasionally they are found in sandy soils.
- Nut size varies from 50-150 per pound and the kernel percentage ranges from 30-50 percent.
- The trees are remarkable for their straight, central leader growing habits. The wood is strong, tough and hard. A hickory can be grown from seed to 25 feet high in 10 years. Mature trees may reach 90 feet high and live 200 or more years. First bearing may occur at 6-12 years from planting and several trees are needed for cross pollination.

Shagbark cultivars recommended for planting include: Yoder No. 1, Porter, Weschecke, Grainger, and Walters. The shellbark or kingnut hickory trees are closely related to the shagbarks, but are somewhat bigger and faster growing. Recommended shellbark cultivars are: Fayette, Henry, and Totten. *(Charlie Thatcher, 1267 Gill Hall Rd., Clairton, PA 15025)*

Filberts

The filbert *(Corylus avellana)* and the closely related hazels (*C. Americana and C. comuta*) are known as the little nuts which grow everywhere in North America. The familiar round nut is a favorite with all kernel eaters. It is also a nut of commerce in the United States and millions of pounds are produced every year. Some of its more salient points include:

- Winter hardiness may drop to -50 F. Some of the *C. comuta* grow within sight of the Artic Circle. The hazel or filbert will grow in a wide range of soils, even with imperfect drainage. Most hazel/filbert types grow in bush form. A notable exception is the Turkish tree hazel, which can grow higher than a 2 1/2 story house. Vigorous seedlings may grow from a seed to bushes 6-20 feet high in 10 years.
- The bushes are very precocious and start bearing nuts 3-4 years after planting. Nut size ranges from 100-200 to the pound.
- Kernel percentage varies from 20-55 percent. Hazel nuts are a favorite food of birds and rodents.
- Bush life may be limited to 30-40 years or even less where the filbert blight is a problem. Blight may be a limiting factor in growing the species and should be cut out of the bushes at the early stages of infection.
- Hazel/filberts bloom from December to April in North America, and they have a rather odd reproduction style. Several different types should be planted together to ensure cross pollination.

Cultivars proven for satisfactory nut production include: Barcelona, Duchilly, Reed, Potomac, Buchanan, Willamette, Casina, Winkler and Graham. *(Harry Lagerstedt, The Peace Place, 34151 Electric Rd., Corvallis, OR 97333)*

Northern Pecan

Pecans (*Carya illinoensis*) are generally regarded as a southern nut. However, wild native pecans have been growing along the banks of the Mississippi River as far north as the Illinois/Wisconsin border. Recent explorations in these areas have discovered a new line of nuts which can truly be called Northern pecans. They grow successfully in most of northern America and more favorable parts of southern Canada. The characteristics of the Northern pecan include:

- Winter hardiness may extend to -30° 40° F. A season of 130-150 frost-free days is required at 2900 plus heat units (base 50° F) to fill kernels. Nut size ranges from 60-200 nuts per pound. Kernel percentage of the nuts varies from 35-55 percent. Harvest is from mid-September to late October.
- Pecans prefer a deep, high organic soil, but may perform well in a wide range of soil types, including clay. A vigorous seedling may grow from a seed to 30 feet high in 10 years; achieve full size of 60-90 feet high by 30-50 feet wide after 60-80 years; and may live over 200 years.
- Northern pecans flower/pollinate in May/June and several trees are required for cross pollination. Grafted trees will bear in as little as 5 years from planting, whereas seedlings may require 7-12 years.
- The trees are healthy, vigorous, productive and have fewer pest problems than many of the other nut trees in the North. Wildlife may browse on young pecans, so some protection may be required. The trees need a high level of nutrients and may show zinc deficiency in more alkaline soils. Pecans which set many narrow, weak crotches should be given formative pruning. They make excellent shade/lawn trees, as well as orchard trees.

Some of the pecan cultivars grown throughout the South (Georgia-Texas) include: Stuart, Schley, Success, Desirable, Mahan and Wichita.

Cultivars for the middle latitudes (Kentucky-Missouri) include: Major, Colby, Peruque, Posey, Green River and Hirschi.

Some of the best choices for the most northern tier of American states and southern Canada include: Cornfield, Carlson #3, Snaps Early, Snag, Best's Early, Theresa Foster, and Lucas.

Many of the most Northern cultivars will be difficult to find outside of the cottage industry nurseries. The nut size of the northern pecan is about half that of the familiar southern pecan. However, the flavor of the true northern pecan is unbeatable. (Doug Campbell, Campberry Farm, RR1, Niagara-on-the-Lake, Ontario LOS 1JO, Canada)

Further nut tree information is available from the Northern Nut Growers Association (NNGA). Write: Tucker Hill, Secretary, 654 Beinhower Rd., Etters, PA 17319-9774. Telephone: 717-938-6090. Annual membership in NNGA is $15.00 and may be obtained through: Kenneth Bauman, Treasurer, NNGA, 9870 South Palmer Rd, New Carlisle, OH 45344.

Under the guidance of Doug Campbell, this publication was prepared for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-720-5245; Fax: 202-205-2448. Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the U. S. Department of Agriculture

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PEPPERS

Peppers (*Capsicum* sp.) exhibit a wide variety of shapes, sizes, colors, and tastes. These sweet and pungent peppers should not be confused with the "black pepper" (*Piper nigrum*) that is produced from the dried unripe fruit of a vine grown in India and Ceylon. Confusion over the term dates back to Christopher Columbus, who discovered *Capsicum* plants in the New World in 1493. The hot varieties that Columbus introduced to Europe were soon widely grown, dried, powdered, and used as a substitute for black pepper.

Peppers are an excellent source of vitamins A and C. Low in calories, peppers are used widely as both a vegetable and a spice. Peppers are also used as ornamental house plants. Mature pods can be dried and used in flower arrangements. Pungent pods have been used for medicinal purposes and in repellent sprays to deter dogs and people.

Pepper Classification

Peppers can be classified botanically or by pungency characteristics. The genus *apsicum* (family Solanaceae), which ncludes both sweet and pungent peppers, has approximately 20 separate species. The five domes ticated species include hundreds of cultivars. Four of the five species (*C. baccatum*, *C. frutescens*, *C. chinense*, and *C. pubescens*) were domesticated in South America, while *C. annuum* was primarily cultivated in Central America. The latter includes most of the common sweet and pungent peppers grown in the United States.

The pungency of a pepper depends on the amount of capsaicinoids it contains. The dominant and hottest capsaicinoids are capsaicin and dihydrocapsaicin. These alkaloids are produced primarily by glands in the placenta tissue along the pod wall. Seeds are not sourcesof heat, but can absorb the capsaicinoids during processing. Environmental factors that can affect pungency include water stress (increases pungency) and cool growing conditions (decreases pungency).

Pungency in peppers is generally measured with the Scoville Organoleptic Test. Developed by Wilber L. Scoville in 1912, this test uses a panel of five human heat samplers to taste and evaluate extracts of pungent peppers in alcohol and sugar ater. Pungency readings are recorded in ultiples of 100 "Scoville Units"; at least three tasters must agree on the ratings between 0 and 10. Recently, human tasters have been replaced by high-pressure liquid chromatography (HPLC). A spectrofluorometer is used to measure capsaicin levels (parts per million) in samples of powdered pepper combined with ethanol and sodium acetate.

Pungent peppers are generally called "chile," which refers to both plants and pods. Chile is a Spanish form of "chilli"—the Aztec word for these plants. The term " chili," on the other hand, is generally used to describe a prepared food, "chili con carne" (chili withmeat). Chile-based "salsas" have replaced ketchup as America's number-one condiment. The State of New Mexico is the leading producer of chile (34,500 acres in 1992).

Pepper Types And Uses

(Capsicum annuum var. *annuum)* Most commercial pepper cultivars—including sweet bell peppers and long, green chile cultivars—occur in this species of pepper. Although pungent peppers are predominant in Latin America, Asia, and the southwestern United States, sweet bell peppers are by far the most popular pepper in the United States. Sweetness is controlled by a single recessive gene that eliminates the capsaicin.

Sweet Peppers

Bell—Fruit 3"-4" wide, 4"-5" long; sweet, large, blocky-shaped; hollow with thick flesh and 3 or 4 lobes; normally harvested at mature, green stage, although some may turn yellow, red, or brown when mature; pungency rating #0; can be stuffed or used in salads, relishes, or cooked vegetable dishes; most popular pepper in temperate countries; popular varieties include Bell Boy, Gypsy Hybrid, and California Wonder.

Pimento—Fruit 2" wide, 3" long; sweet, slightly pointed, conical-shaped with thick walls; pungency rating #0; red when ripe; used as olive-stuffer, in fresh salads, pimento cheese, and sandwich spreads; popular varieties include Early Pimento, Pimento Select, and Perfection.

Sweet Wax—Fruit 1" wide, 2"-6" long; conical; yellow when immature, with waxy gloss, turning orange to red when mature; pungency rating #0 (may be more pungent); maybe pickled, made into relishes, or used fresh in salads; popular varieties include Sweet Banana and Hungarian Sweet Wax.

Cherry—Fruit 2" in diameter, produced on upright stems; cherry- or globe-shaped with three cells; orange to deep-red color; pungency rating #1 (may be more pungent); mature green or colored pods used as pickled garnish; also used as ornamental plant; popular varieties include Sweet Cherry, Red Cherry Small, and Red Cherry Large.

Pungent Peppers

New Mexican (previously called "Anaheim")—Long, green/red chile type; fruit 1"-2" wide, 4"-10" long; relatively thin flesh; harvested either in mature green stage or mature red stage, although some varieties may turn yellow, orange, or brown; pungency may range from sweet to hot; red pods can be ground into powder; both red and green pods can be used in sauces and salsas; green (peeled) may be eaten fresh or may be canned or frozen; used in all types of Mexican-style dishes from casseroles to candies; colored pods can also be used in "ristras" (ornamental strings of dried pods) or combined with dried flowers in harvest wreaths; popular varieties include NuMex R-Naky (pungency rating #1), N.M. 6-4 (pungency rating #2), NuMex Big Jim (pungency rating #2), Española Improved (pungency rating #3), and Sandia (pungency rating #4).

Ancho (wide)—Fruit 3"-4" wide, 3"-6" long; heart-shaped with marked depression at base of pod; immature dark-green pod turns red to almost black in mature dry stage; fresh green pods called Poblano (people); pungency rating #3; very popular in Mexico; fresh pod peeled and stuffed with meat or cheese (relleno) or used in casseroles; dried form used insalsas, sauces, and "moles" (special sauce mixed with other ingredients such as chocolate, garlic, and coconut); popular varieties include Ancho 101, Poblano, and Mulato.

Cayenne—Fruit 1/2"-1" wide, 5"-10" long; mature dry red pods become very wrinkled; very pungent (rating #8); grown mostly in India and Asia, although some is grown in Louisiana and New Mexico; dried pods ground into powder for use in hot sauces; fresh green and red pods used in salsas and salads; popular varieties include Hot Portugal, Ring of Fire, and Hades Hot.

Jalapeño—Fruit 1"-1½" wide, 3" long; conical with tapered blunt tips and thick flesh; immature dark green fruit turn red at

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turity; most varieties highly pungent ing #5); used fresh, in salsas, canned, ked, or on nacho (corn) chips; smoked t called "chipotle"; popular varieties ude Jalapeño, Jalapeño M, and TAM apeño (mild).

Serrano—Fruit ½" wide, 1"-4" long; erect (pendant); slightly curved or ical; immature dark-green fruit turn wn, yellow, or orange when mature; y pungent (rating #6-7); mostly grown in xico; fresh green pods used in various getable dishes and salsas; most popular S. variety is Hidalgo (multi-virus istance).

Pasilla (little raisin)—Fruit 1" wide, 6"-' long; cylindrical with undulating ape; immature dark-green fruit mature to k brown; pungency rating #3; very fla-ful; used in powdered forms in moles pecially chocolate mixtures) and uces.

de Arbol— Fruit 3/8" wide, 2"-3" long; ngate, pointed; mature pods dark red nslucent); pungency rating #7; grown stly in Mexico for soups, stews, sauces, le oils, and vinegars.

Chiltepin *(Capsicum annuum* var. *avic-ire)*—Fruit ¼"-½" in diameter; round, nerally pea-shaped; borne erect; (wild m); domesticated Piquin has somewhat ger fruit (bullet-shaped); pungency rat-g #8-9; not grown much commercially in ited States; used as spice for soups, as, lentils, beans, and stews; fresh fruit opped and used in salsas; popular mesticated variety is NuMex Bailey in; available from Enchanted Seed 233-3033).

Tabasco (Capsicum frutescens)—Fruit 3" wide, 1½" long; immature yellow pods n orange to red when mature; pungency ing #8; pods borne erect; most widely own for use in Louisiana Tabasco Sauce ods crushed, salted, fermented in casks 2 1/2 to 3 years, strained, and vinegar ded); fresh pods also used in salsas, ed pods used in stir-fry dishes (Sauce urce: McIlhenny Co., Dept. 94-4, Avery and, LA, 70513).

Habanero (Capsicum chinense)—uit 1"-2" wide, 1"-2½" long; sets 2 to 6 it per axil; oblong with undulating shape; me varieties pointed at end, while others e flattened; immature green pods turn d, orange, yellow, or white when mature; ange is preferred color; most pungent ile known (pungency rating #10); has a ique flavor; also called "Scotch Bonnet" "Scot's Bonnet"; used in salsas, bottled uces, and barbecue seasonings; one of e hottest known Habaneros is a red (Red avina) developed by Frank Garcia, Jr. of NS Spices in Walnut, California (909-4-9505).

Aji(Capsicum baccatum)—Fruit 3"-5" ng (great diversity of size and shape); gate; mature pod turns orange-red, w or brown; generally quite pungent ng #8); pod is erect when immature d becomes pendant with increased size d weight; pods become yellow at some stage in their development (common name is "aji amarillo"); grown mostly in South America; unique flavor; used in salsas and as spicing for potatoes, chicken, and fish.

Rocoto (Capsicum pubescens)—Fruit round, similar to cherry type; vary in size; mature color is yellow, orange, or red; seeds are black; pungency rating #8-9; difficult to grow in United States; used in salsas.

Paprika Peppers

Other peppers of importance include those grown for "paprika," which is not considered a variety of pepper (in United States), but a food product. Paprika is a sweet to mildly pungent red seasoning used primarily for red food coloring. Peppers developed for paprika are bred for dark red color, little to no pungency, and ease of dehydration. Peppers grown for paprika in the United States should not be confused with the more pungent Hungarian Rose paprika used in Hungarian cuisine.

Pepper Culture

Peppers are a warm-season crop and require growing conditions similar to tomato and eggplant. Because peppers are highly susceptible to frost, transplanting should be delayeduntil after the last frost in spring. Cool soil temperatures will delay emergence and retard growth, so direct seeding and transplanting peppers in the field should be delayed until soils warm.

Plant growth and fruit set are maximized when daytime temperatures range between 65 and 85 °F, with nighttime temperatures of 60-70 °F. Blossoms may not set if temperatures drop below 60 °F or rise above 90 °F. Under ideal conditions, mature green peppers will be ready for harvest 45 to 55 days after pollination. Cool weather will delay maturity.

Peppers prefer a well-drained loam or sandy loam soil with a pH of 7.0 to 8.5. Green manure crops such as winter rye, planted in the fall and soil-incorporated a month before planting peppers, will help increase the water-holding capacity and nutrient retention of sandy soils and the aeration and drainage of clay soils. The amount and types of fertilizer to apply for maximum pepper production should be based on a soil analysis and recommendations from your county Extension agent.

In colder climates, peppers are best established from transplants. Purchase stocky, healthy transplants for best results. Peppers grown in the greenhouse for transplanting require 6 to 8 weeks from seeding to transplanting size. Space plants in the field 8"-14" apart in rows 30"-36" wide. Transplanting is best done in the early evening to reduce shock. Water immediately after transplanting.

In warmer areas with longer growing seasons, peppers can be direct-seeded. Plant seeds 1" apart and ¼" deep. Plants can be thinned when seedlings have four or more true leaves. Planting technique and plant spacing will vary from region to region.

Especially in northern climates, peppers may benefit from the use of black plastic mulch to help warm the soil early in the season. The black plastic can be replaced with organic mulches when the weather warms. Organic mulches such as straw, dry grass clippings, and leaves help cool the soil during hot weather.

Use of floating row covers in the early spring can help get seedlings off to a strong start. Row covers allow light in while warming the atmosphere around the plants. To prevent damage from wind, support row covers with wire braces that arch over the plants. Outside edges can be anchored with soil. Although most modern row covers allow air circulation, it is best to remove the cover in warm weather. Row covers also help screenout many insect pests, such as the beet leafh-opper, which spreads curly top disease.

Harvest green bell peppers before they change color (except those harvested specially as colored peppers). Fruit should be fully developed, crisp, and firm when squeezed. Long, green, pungent varieties harvested for green chile should have a similar feel. Most pods can be broken off the plant easily if pods are mature. Chile peppers harvested for red color can be climates) or harvested when fully ripe and hung up by their stems to dry. In more humid areas, mechanical dehydration may be necessary.

Where To Learn More

Peppers are becoming more and more popular. If you want to learn more technical information about peppers, you may wish to attend either the International Pepper Conference or the Annual New Mexico Chile Conference (contact Javier Vargas, 505-525-6649). Or you can write to the Chile Institute (Box 30003, Dept. 3Q, NMSU, Las Cruces, NM 88003).Suggested reading on chile: *The Whole Chile Pepper Book* and *The Whole Chile Pepper* magazine (contact Dave DeWitt, P.O. Box 4278, Albuquerque, NM 87196).

Other seed sources for peppes include: Plants of the Southwest (800-788-SEED), Nichols Garden Nursery (503-928-9280), The Pepper Gal (305-537-5540), Twilley Seeds (800-622-SEED), Shepherds (408-335-6910), and Petoseed (805-647-1188).

By George W. Dickerson, Extension Horticulture Specialist, New Mexico Cooperative Extension Service, New Mexico State University, for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr., Program Director, Ag Box 2244, Washington, DC 20250-2244. Telephone 202-720-5245; Fax 202-205-2448.

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United States
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Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Pumpkins

The pumpkin reigns as king of the vegetables. The pumpkin was already a staple in the American diet long before the first Thanksgiving feast at Plymouth Rock, Massachusetts, in 1621. Pumpkins were cultivated by native American tribes long before Europeans ever set foot on American shores. Archaeologists have found pieces of pumpkin stems, seeds, and rind in the ancient ruins of the cliff dwellers in the Southwestern United States. For native Americans, pumpkins were a vital part of an existing multiple cropping system of corn, beans, and squash. Those seeds were usually planted together in the same hill, sometimes accompanied with a fish for fertilizer. The combination of these vegetables was the staple of many of the native diets and still is today in certain areas of Latin America. Pumpkins were eaten roasted, boiled, and stewed by native American tribes. Not only was the pumpkin grown for its food and feed value, but also served as a living mulch, helped keep maize fields free of weeds, and discouraged raccoons from eating the corn.

Since that first Thanksgiving feast, pumpkins have become a tradition on American Thanksgiving tables, served primarily in the form of pumpkin pie. The native Americans showed the Pilgrims how to dry pumpkin meat and grind it into meal for year-round use. Colonists used this new vegetable, not only for pie, but as feed for animals (roasted seeds) and as a prime ingredient in other foods. For example, stewed pumpkin was mixed with corn meal for bread, and a simple pumpkin pudding was made by slicing off the top of the pumpkin, scooping out the seed and fibers, and filling the cavity with milk. The whole pumpkin was then baked until the milk was absorbed. The pumpkin and its relative, the winter squash, were very easy to store for winter use.

The irony is that today the American pumpkin is not known for its nutritional value, but as a decorative jack-o-lantern synonymous with Halloween. One can only speculate that the first jack-o-lantern was created as a result of efforts to prepare pumpkin pudding.

Washington Irving wrote about the pumpkin in "The Legend of Sleepy Hollow," and more recently, Charles Schultz has rekindled American folklore with the Great Pumpkin in "It's the Great Pumpkin, Charlie Brown."

The medieval French name "pampion" means sun-baked squash and is derived from the Greek word "pepon," or a large melon. The English modified "pampion" to "pompkin," which was finally changed to "pumpkin" by the American colonists.

The pumpkin's scientific names are Cucurbita maxima, represented by such varieties as "Atlantic Giant," "Big Max," "Mammoth," and "Boston Marrow," and *Cucurbita pepo*, represented by "Connecticut Field," "Howden's," and similar varieties.

NUTRITIONAL VALUE

The pumpkin is very high in fiber and vitamin A and contains plenty of beta carotene, which has recently received credit for cancer-preventing qualities. Also, high-fiber diets may prevent overeating, a great concern in American diets. One cup of mashed pumpkin contains approximately 50 calories, yet it ranks among the most nutritious of domestic produce. It contains over 2,500 units of vitamin A, considerable quantities of B complex and C vitamins, along with generous amounts of phosphorus, potassium, calcium, and iron. The smaller pie-sized pumpkins, including "Connecticut Field," can be substituted in virtually any recipe calling for winter squash.

PLANTING CONSIDERATIONS

To grow healthy pumpkins, the soil should be well drained with a pH of 6.0 to 6.5. It is best to get a soil test done first. Check with your local Extension Service office. Otherwise, if commercial fertilizers are used, broadcast 500 to 1,000 pounds of 5-10-10 per acre before planting. This equates to approximately 5 quarts per 100 feet of row, spread out 3 feet wide over the row. Sidedress at 3 and 6 weeks after seeding with 20 to 30 pounds of nitrogen and 60 to 100 pounds of potassium (approximately 1 pint of 13-0-44 per 100 feet of row). Sidedress fertilizer 6 to 8 inches from the plants on both sides of the row. Equivalent nutrients can also be provided from organic materials.

Pumpkins require ample amounts of potassium for good dry-matter production. If misshaped pumpkins develop, check the boron level or add 1 pound of actual boron (5 pounds of Solubor) per acre to your fertility program. Boron deficiency is likely to occur on sandy soils.

According to Robert J. Rouse, Wye Research and Education Center, University of Maryland, Queenstown, pumpkins can be seeded too early if one is not careful. Pumpkins should not be seeded in the mid-Atlantic region in May. They will make it, but will need to be sprayed over a longer period of time. June is more appropriate. During summer, the days to maturity can vary from 90 to 120, depending on the variety of pumpkins planted and the temperature. According to your marketing strategy, 90-day pumpkins can be planted as late as the first week in July and still make a crop by October. However, pumpkins planted late in the season are more subject to disease and do not yield as well as those planted earlier. Mid-June is the normal planting time. Spacing pumpkins depends on varieties and vine size. If you are planting on a hill system — the easiest for organic growers since the compost and animal manure only needs to be worked into the hills — plant three to four seeds per hill and then thin to one plant per hill. For larger acreages, 2 to 3 pounds of seed per acre should be sufficient for achieving 3,000 to 4,000 plants per acre. Higher rates of up to 4 to 5 pounds/acre may be required for bush varieties. Plants should be spaced 3 feet apart and at least 6 feet between rows.

Cover crops can really help, particularly hairy vetch. Kill the cover crop and then seed or plant in the residue. By killing or mowing the vetch before it forms seeds, which is the end of May in the mid-Atlantic region, in June one can then use no-till seed or, on a small scale, transplant through the mulch by using a bulb planter or spade. Vetch mulch gives a nice carpet and minimizes soil contact on fruit.

Variations to this monocrop planting system are used by some growers. Ed and Kathy Schaefer, who operate Bellevue Berry and Pumpkin Ranch near Omaha, Nebraska, utilize oats or rye as a cover crop in the spring, and then plant 2 pounds of pumpkin seed per acre in the grain with some ornamental corn. Some

heir 35 acres of pumpkins are planted ough 4-foot-wide plastic mulch with 10- -wide strips of rye or oats in-between the ic. This is done because the same fields e been continuously cropped in pumpkins the last 10 years. Care needs to be taken t to plant a row of pumpkins in the same ation each year. A combination of sorghum d sudangrass is strip-cropped for frost tection, especially in those fields in which mpkins are cut and left for pick-your-own rvesting in late October.

To reduce disease problems, most search data suggests rotational cropping, if ssible, by planting pumpkins once every 3 7 years. For those growers who do not ve this amount of acreage flexibility, it is portant to clean the field thoroughly after rvest and to fall plow as deeply as possi- e. If this is done, choose land that is not ghly erosive and, weather permitting, plant winter or early spring cover crop to protect e soil and help minimize crop pest build-up oblems. Growers must be aware that cer- in crops can carry over diseases (e.g., ppers are subject to phytophthora and so e pumpkins), so they should not be planted the rotations. Nor should other cucurbits ich as watermelon, cantaloupes, cucum- ers, and squash. Pollinating bees are also tical for successful pumpkin production. In crops, the recommendations are one to honey bee colonies per acre.

Popular pumpkin varieties include: Small zes: "Munchkin," "Jack-Be-Little," "Sugar ie," "Spookie," and "Oz." Medium sizes: Spirit Hybrid," "Jack O'Lantern," "Autumn old," and "Happy Jack." Large sizes: Aspen," "Connecticut Field," "Pankow," Howden," "Jackpot Hybrid," "Wizard," and Big Autumn." Very large sizes: "Prize Winner," Atlantic Giant," "Big Moon," and "Big Max."

ARKETING STRATEGY

marketing strategy is critical for those con- mplating growing pumpkins so they can sell hat they sow. One needs to assess whether o wholesale pumpkins or direct market them. arm location, zoning, insurance, labor supply, nd willingness to work with the public are just few of the factors that should be considered. or those who want to market direct to con- umers, one can choose from roadside mar- ets, farmer's markets, on-farm markets, J-pick activities, and community-sponsored gricultural farms. In addition, there is a grow- ng practice to couple some of the market ctivities with entertainment agriculture, which ompasses hayrides, harvest festivals, and p farm tours.

A farm that markets direct to the consumer needs to project a positive and safe farm image (including overall farm neatness); offer a variety of quality pumpkins; and have adequate equipment, signing, advertising, and access roads. Customers will also require restroom facilities and adequate parking.

Bellevue Berry and Pumpkin Ranch customers enjoy free hayrides to the pumpkin fields, western cookouts, a Haunted Barn, and a kids' "How the West Was Fun" play area. Other pumpkin growers throughout the United States have various marketing strategies, including fall festivals, food-fests and other farm-focus themes. Some growers, like Skip Jackson at the Iron Kettle Farm in upstate New York, construct elaborate pumpkin scarecrow exhibits and sell pumpkins next to their farm market. Butler's Orchards, located in the Maryland suburbs near Washington, DC, allows customers to drive their cars to the pumpkin fields and offers a festival environment in the center of the farm with decorated pumpkin figures, apple butter preparation, food provided by local churches, and live entertainment. The most successful retail farm marketers are innovators. Farmers who build entertainment into their pumpkin sales can draw customers to their farm markets. Some farms, like the Berry Farm in Mathews, Virginia, focus almost exclusively on educational farm experiences for school groups. During their visits, students learn about farm animals, how pumpkins grow, and other crops. Doug Carrigan of Carrigan Farms in Mooresville, North Carolina, offers fall school tours focusing on either pumpkins or apples.

ORGANIZATIONS AND NEWSLETTERS

According to several vegetable and fruit specialists, there are no national organizations or associations focusing specifically on pumpkin growing. Pumpkin work at the University of Maryland, Wye Research and Education Center, is highlighted in "Agent Update" by Robert J. Rouse, WREC, P.O. Box 169, Queenstown, MD 21658. Much of the information on mid-Atlantic pumpkin work is also featured annually in the Proceedings of the Mid-Atlantic Vegetable Workers Conference.

Farmers contemplating growing and marketing their own pumpkins should check with their local Extension Service offices. An annual pumpkin meeting is hosted by Ray Samulis, Burlington County Cooperative Extension Agent, 49 Rancocas Road, Mt. Holly, NJ 08060-1317 (telephone 609-265-5050). Most States have fruit and vegetable grower associations, which may also have important grower information. The North American Farmers' Direct Marketing Association hosts an annual conference. In 1995, it will be held in Knoxville, Tennessee. Audiotapes of presentations are sold, and in past years there have been presentations on pumpkins and entertainment farming. For more information, contact Richa Reese, Audio Productions, 8806 South Lake Stevens Road, Everett, WA 98205 (telephone 1-800-356-2834).

Prepared by Ed and Kathy Schaefer, Bellevue Berry and Pumpkin Ranch, South 48th & Cornhusker Road, Omaha, NE 68133, and George B. Holcomb (Retired), Office of Communications, U. S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr Jr., Program Director. OSSA's address: Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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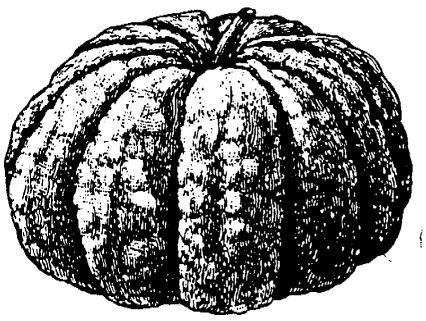

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A Small-Scale Agriculture Alternative

Specialty Corns

Five hundred years ago, Columbus was one of the first Europeans to set eyes on maize—foundation of most great Western Hemisphere civilizations, including those of the Incas, Mayans, and Aztecs. In the April 1992 Organic Gardening magazine, Shepherd Ogden says, "sweet corn is the most American of vegetables." His article has tips for growers.

In 1540, Coronado noted maize or corn growing under irrigation among Native Americans of the southwestern part of what is now the United States. Corn largely kept the Pilgrims alive during the harsh winter of 1620 on the East Coast. The oldest known remains of corn cobs may be in Tehuacan, Mexico, dating back 7,000 years. Most corn historians consider a wild grass called Teosinte one of modern corn's primary ancestors.

Corn is one of the most diverse grain crops. Nature by itself and man working with it have produced many types of corn. Corn is generally classed as to kernel endosperm characteristics. Endosperm refers to a seed's nutritive tissue, surrounding and absorbed by the embryo. The six most common corn types include flint, flour, dent, pop, waxy, and sweet. A seventh is called pod or tunicate corn, which may have endosperms like the other six. Pod corns differ from the others in that each individual kernel is enclosed in a glume or husk.

Popcorns are basically small-kerneled flint types. Waxy corn carries a gene which results in the production of 100 percent amylopectin, i.e., starchy pectin.

Sweet Corn

Standard sweet corn at the immature, milky stage contains about 10 percent sucrose, while field corn in the same stage has about 4 percent. After harvest or if left on the stalk too long, sucrose in standard sweet corn is rapidly converted to starch.

Unlike dent corn, sweet corn is not grown for feed or flour, although USDA researchers have developed a technique to produce a high-fiber, no-calorie flour from pericarps that surround kernels, holding them on the cob.

Sweet corn kernels often have a wrinkled, glassy appearance resulting from a sugary gene which retards the normal conversion of sugar to starch during endosperm development. Kernel colors vary, sometimes being mixed both white and yellow.

William "Bill" Watson, president and owner of the Liberty Seed Company (P.O. Box 806, New Philadelphia, Ohio 44663; 1-800-541-6022 or 216-364-1611), is doing a write-up of the many sweetcorn developments of the past decade. He says there has been more change in the past decade than in the preceding 25 years.

To compete and find a nearby niche (like a restaurant or roadside stand) for their sweet corn, entrepreneurs should explore the potentials for moving high-sugar varieties of corn to consumers within a day after harvest. The need for speed is because kernels at room temperature can lose as much as 50 percent of their sucrose by 24 hours after harvest.

Development of sweeter varieties of standard sweet corn was done by selections within homozygous "SU1" genotypes. One selection—Silver Queen—became the standard against which other standard sweet corn varieties were compared. Later supersweet SH2 varieties, i.e., "sugary enhanced (SE)" or supersweet "shrunken (SH2)," have 2 to 3 times as much sucrose as standard sweet corn at harvest! What's more, sucrose levels stay relatively high 48 hours after harvest.

Growers of the SH2 gene sweet corn must be careful not to plant it within 250 feet or more—depending on prevailing winds—of any other kinds of corn because pollen may be picked up from neighboring corn, which will dilute the sweetness, making kernels undesirably tough and starchy.

One exception to the distant planting rule is Kandy Korn, whose sugar-enhanced SE gene produces a variety for farmers that, like other SE varieties, requires no isolation. (Abbott and Cobb, Inc.; 1-800-345-SEED. Asgrow; 616-323-4000)

Growers for the roadside trade usually sell high-sugar corn of the SE variety because it's easier to grow; those who ship to the more distant markets lean toward the supersweet varieties to meet the competition.

The seed count is about 2,500 to 3,500 a pound for regular sweet corn. The count of the shrunken gene types is considerably higher.

Andy and Tannie Daniels are successful sweet corn growers at Route 4, Box 73, Columbus, NE 68601. Their story is reported in the Successful Farming magazine's publication, ADAPT 3, 1991. (P.O. Box 10652, Des Moines, IA 50309-3023, at $12.50. 515-284-2852)

The Daniels note that roadside stand work is hard, the season is not long, and the returns may grow slowly. To pick corn at the peak time, they usually pay high schoolers or others the minimum wage.

Roadside prices for sweet corn vary widely. Discounts for quantity are urged. The freshness increases the value (price) over grocery store pricing. Don't undercut grocery stores. The Daniels also advise adding other vegetables, such as tomatoes and cantaloup, after establishing a customer base.

They recommend SE varieties over the others for reasons noted above, plus disease control. The sweeter the variety, the more susceptible it is to disease, usually. The Daniels say plant early, with not too many varieties so as to avoid confusing customers.

Growers should check with the county agriculture Extension agent to learn the best planting dates, varieties recommended locally, and disease and pest control methods that reduce or eliminate chemicals.

The supersweets are just as good for freezing as the others. There are many varieties. Every catalog will have some.

Other marketing details have been emphasized in previous factsheets and are in the ADAPT books and not repeated here. It needs repeating, however, that entrepreneurs not wishing to waste money should determine an exact and committed market before they buy or plant any seed.

Popcorn

Popcorns are generally either pearl or rice types. Pearls have smooth, rounded crowns, while rice types are pointed. Color varies. Heating the kernel turns the moisture inside the soft starch in the center into explosive steam that can turn the kernel inside out. The greater the expansion, the higher the quality. Moisture content should be 13.5 to 14 percent for best results. Varieties differ as to quality, which also includes flavor, tenderness, absence of hulls, color, and shape.

Shape can vary from mushroom-spherical to butterfly. The confection industry usually prefers the spherical—easier to coat with flavors or syrups. The butterfly-shaped popcorn has a better "mouth feel" and is preferred for on-premises sales, as in theaters.

For more information, contact the Popcorn Institute, 401 N. Michigan Ave., Chicago, IL 60611. (312-644-6610)

Hi-Lysine Corn

Corn is a major staple in many underdeveloped countries. As dent corn is a relatively poor source of protein, many consumers have to supplement their diets with other protein sources like beans.

Most of the protein in corn is zein, which cannot be efficiently digested by humans and other nonruminant (single stomached) animals like pigs and chickens. Zein exists at the expense of lysine and tryptophan, which tend to be very low in dent corn. Lysine and tryptophan, two of eight essential amino acids that nonruminants can't synthesize on their own, must be obtained from food they eat.

In 1963, scientists at Purdue University found that the corn strains containing opaque-2 (O2) genes contained lesser amounts of zein and greater amounts of lysine and tryptophan in their endosperms than dent corn. Opaque-2 kernels, however, appear dull and tend to have soft textures and very little hard endosperm. It makes them difficult to harvest and subject to attack by various pests. Opaque-2 varieties also tend to have lower yields and must be isolated from other corns to retain protein quality. For more information, contact Crow's Hybrid Corn Co., P.O. Box 306, Milford, IL 60953. (815-889-4151)

High-Oil Corn

The highly polyunsaturated and high linoleic acid content of corn oil makes it an excellent energy and essential fatty acid source for both humans and livestock. Livestock feeders may be interested in varieties with greater oil contents. Such varieties have more calories, bringing greater gains per feed unit.

Most hybrid dent corns will average between 3.5 and 6.0 percent oil. Varieties with oil contents greater than 6.0 percent tend to have lower yields.

Oil quality is dependent on the amounts of unsaturated and saturated fatty acids it contains. Oils high in linoleic acid and low in oleic, palmitic, and stearic acids are preferred for human diets. For information on breeding high-oil corn, contact John Dudley, Agronomy Department, S-112 Turner Hall, 1102 South Goodwin Avenue, University of Illinois, Urbana, IL 61801. (217-333-9640)

Waxy Endosperm Corns

Waxy endosperm hybrids contain 100 percent amylopectin starch; the normal dent corn ratio is 72 percent amylopectin and 28 percent amylose. The waxy (wx) mutant was found in China in 1909 but was not fully developed until 1936 when researchers from Iowa State University noted its unique properties and started developing hybrids.

Steers make better gains when fed waxy endosperm corn rather than dent corn. The stability and clarity of amylopectin starch make it highly suitable as a food thickener. For more information on food processing aspects, contact Edith Munro, Corn Refiners Association, 1100 Connecticut Avenue NW., Suite 1120, Washington, DC 20036. (202-331-1634)

Blue Corn

Atole, tortillas, corn chips, and other corn products have been the backbone of most traditional and present-day Native American and Mexican American cuisines. Blue corn and other flour corns historically represented the major kernel type of corn ground into "harinas" (flour and meals) in the American Southwest. But dent corns, both white and yellow, now dominate the market. However, the blue corns are finding new market outlets.

Although Pueblo tribes have historically grown many different colored corns, blue corn is one of the most important, both as food and for religious purposes.

Unlike most commercial yellow hybrid dent corns that can yield 8,000 to 10,000 pounds of grain per acre, blue corn is open-pollinated and characterized by relatively low yields of 1,000 to 4,000 pounds per acre. It also tends to lodge, making machine harvest somewhat difficult.

Blue corn has a coarser, sweeter, and nuttier taste than other corns grown for flour or meal. Its grainier consistency results in a somewhat denser tortilla than those made from white or yellow corn flour.

Research of the New Mexico Cooperative Extension Service found blue corn, like Opaque-2 corn, higher in lysine than either white or yellow dent corn varieties used in tortillas. Most blue corn varieties were also found to be high in iron and zinc.

Blue corn flours and meals have traditionally been used in making tortillas and corn chips. Native American products less well known include piki or paper bread, chaqueque (similar to corn meal mush), atole (corn meal drink), and nixtamal or lime hominy used in making stews.

Newer products include pancake and muffin mixes and corn flakes. For more information, contact George Dickerson, New Mexico Cooperative Extension Service, address below. (505-275-2576) Seed source: Rose Seed Company, San Jon, NM 88434. (505-576-2241)

Corn Cob Corns

Although most corn grown in the United States is for grain or silage, at least one hybrid variety is grown for making corn cob pipes. Cobs should be at best 1 1/2 inch in diameter and long enough to make at least two bowls (2 inches each). The diameter of the cob should be relatively uniform.

Cobs should be woody and sufficiently hard to keep smoking tobacco from burning through the bowl. For more information, contact Harry Minor, the Agronomy Department, Extension Service, Waters Hall, University of Missouri, Columbia, MO 65211. (314-882-2001)

Prepared by George Dickerson, Extension Horticulture Specialist, New Mexico Cooperative Extension Service, 9301 Indian School Rd. NE, Suite 201, Albuquerque, NM 87112, and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Cooperative State Research Service, USDA, Room 328-A, Aerospace Building, Washington, DC 20250-2200. Telephone: 202-401-1805; Fax: 202-401-1804

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United States
Department of
Agriculture

Cooperative State
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Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Specialty Flowers

Flowers provide an allure that has been used by man to transcend the seasons and evoke emotion. Dried or fresh, certain specialty flowers can stimulate not only the eyes but also the sense of taste or smell, empowering new marketing opportunities for small-scale enterprisers.

Such flowers can be marketed fresh, dried, sugarcoated, in bulk, as singles, or by the pound, ounce, or sometimes gram. This exciting market, although subject to whims of designers, chefs, or fashion, continues to grow to meet demands.

For small-scale operators, recognizing unique marketing opportunities provides an entry into this competitive marketplace. Once there, an ability to provide consistent, dependable service with high-quality products can provide sustainable income. Growers of specialty flowers service specific needs in the floral industry. These spinoffs include rare cut flowers, edible flowers for garnishes or salads, potpourri mixes, and medicinals.

All must meet consumer expectations that are often reflected in production, packaging, and presentation. Examples of new products can be suggested by articles in national magazines such as *Gourmet*, *Bon Appetit*, or *Food and Wine*. Small-scale entrepreneurs should become acquainted with members of the local chefs' association or state restaurant association.

Read Trade Journals

One management tool taught at the Small-Scale Agriculture Program at the University of Maryland Eastern Shore (Princess Anne, MD 21853) is that the grower must become aware of the customers' competitive environment. Products may be anticipated by reading the customers' trade journals. Specialty products, such as flower garnishes, mixes, or specialty packaging, focus attention on customers' operations and expand and strengthen a market base. Stan and Susan Devoto of Sebastopol, California, learned at a local farmers' market how specialty flowers could be a marketing aid. In *The Furrow* (John Deere, 1400 13th Street, East Moline, IL 61244-1493), they explain how 15 different varieties of edible flowers were mixed in ready-to-eat salads. "You need something different to get noticed," Susan said.

Susan used the edible flowers to catch eyes and open the way for their other produce at the local farmers' market.

Gourmet Chefs Pay Heed

The many flowers that can be packaged for gourmet chefs and discerning grocery shoppers include old favorites like calendula, chrysanthemum, dianthus, dandelion, geranium, hibiscus, lily, nasturtium, pansy, rose, and blue violets. Others include certain herb flowers like mint, sage, basil, and bergamot and even vegetable flowers such as pumpkin, okra, and squash. Many are outlined in Claire Clifton's "Edible Flowers," 1984. (McGraw-Hill Publishing Co., P.O. Box 400, Highstown, NJ 08520/$10.95) Flowers are harvested early in the day and kept moist at refrigeration temperatures.

Wholesale packs of pansy blossoms protected with shrink-wrap plastics retailed for $17 per hundred at the 1988 Mid-Atlantic Food Exhibition. Other presentations are discussed in "Specialty Food Packaging Design," Association for the Specialty Food Trade, 1989. (PBC International Inc., 1 School St., Glen Cove, NY 11542/$59)

Production techniques found in James Crockett's "Crockett's Flower Garden," 1981 (out of print but may be found in some libraries), are restricted to organic practices, without pesticides. Production and variety selection are affected by planting schedules, species selection, and chefs' tastes.

Farmer David Aydelotte of Salisbury, Maryland, explains, "Chefs using my field-grown mint flowers and herb flowers are constantly looking for new garnishes. That is the real challenge, to keep them interested in what I'm producing.

"Many chefs are looking for a social event, a story that goes with the food," Aydelotte says. "Sequence plantings every two to four weeks are used to maintain production of annual flowers. Many are affected by day length and temperature but growers use fertilization and watering to lengthen the flowering periods."

Presentations can be developed from books such as:

- "Cooking with Flowers," by Jenny Leggatt, 1987. (Out of print; consult your local library.)
- "Cooking from the Garden," by Rosalind Creasy, 1988. (Sierra Club Books, 730 Polk St., San Francisco, CA 94109/$35)
- "The Forgotten Art of Flower Cookery," by Leona Smith, 1985. (Pelican Publishing Co., Inc., 1101 Monroe St., Gretna, LA 70053/$14.95)
- "Gourmet Bouquet," by Julia Weinberg, 1977. (New Win Publishing, Inc., P.O. Box 5159, Clinton, NJ 08809/$10.95)

Candied Flowers

Reviving the Victorian technique of candying flowers generated a marketing opportunity for Jo and Rob Pendergraph of Midlothian, Virginia. As Jo explained in the *Delmarva Farmer* newspaper, each petal is painted with egg white and sprinkled with granulated sugar. After the sugar has crystalized, flowers are stored in air-tight containers. The candied flowers sell for $45 per hundred at a major department store in New York City.

Edible flowers to brighten up custom salad mixes include chives, nasturtiums, pansies, and bergamot. "Most chefs are

paying $9 per dozen for edible flowers flown in from California," Pendergraph adds.

Competition Fierce

The competition is even fiercer in the dried flower market. This is where volume growers can stockpile quantities and provide a stiff marketing challenge. Producers listed in the "1990 Organic Wholesalers Directory/ Yearbook," published by California Action Network (P.O. Box 464, Davis, CA 95617; $25), can often suggest trends for your area.

Carol Kopolow, reference librarian at the U.S. Department of Agriculture's National Agricultural Library (NAL), has prepared listings of journal articles, books, and associations providing information on "Marketing of Floricultural Products in the United States," "Agri-Topics on Dried Flowers," and "Agri-Topics on Cut Flowers: Production and Marketing."
To request copies, write to USDA/NAL, Reference Branch, Room 111, Beltsville, MD 20705 and enclose a self-addressed gummed label.

Current production practices of both wild-gathered and commercially grown flowers are discussed in the 207-page proceedings of the "Commercial Field Production of Cut and Dried Flowers Symposium," hosted by the American Society for Horticultural Science and the Center for Alternative Crops and Products. Presentations covered marketing, economics, production, and handling of dried and fresh cut flowers and decorative plants. (The book costs $20 per copy, from Nancy Breneman, Extension Special Programs, 405 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, MN 55108.)

In *The Business of Herbs,* Paula Oliver (Ed.) focuses on the potpourri market blends and supplies. Including both herbs and flowers, this publication provides classified ads for both buyers and sellers. (Northwind Farm Publications, Route 2, Box 246, Shevlin, MN 56676/ six issues per year/$20)
Sample ingredients are outlined in Clarence Meyer's "Potpourri and Incense Recipes," 1986. (Meyerbooks, P.O. Box 427, Glenwood, IL 60425/ $3.95)

Information on producing dried flowers can be found in Hiller, Malcolm, and Hilton's "The Complete Book of Dried Flowers," 1987 (Simon and Schuster, Inc., 200 Old Tappan Road, Old Tappan, NJ 07675/$22.95 plus State sales tax); and similar books found in regional libraries.

"Spend about a year doing research. I think that is very important for anyone getting into any type of business, including specialty cut flowers and bedding plants," grower Brian McCreight explained at a Delaware horticultural exposition. "Experimentation is part of the learning process, and we usually try 10 to 15 new varieties of flowers every year.There are two 'musts' if you grow flowers outdoors. Facilities for cooling are essential, and so is irrigation."

The Association of Specialty Cut Flower Growers (ASCFG, 155 Elm St., Oberlin, OH 44074; annual membership: $55) was recently established by growers and educators across the country to improve the industry through conferences, information, research, and education. Judy Laushman, executive director, distributes "Gatherings-The Cut Flower Quarterly," the association's newsletter. Regional directors, such as Leonard Perry for the Northeast Region (University of Vermont, Plant And Soil Science Department, Hills Building, Burlington, VT 05405-0082), help coordinate Extension and research information.

Another Major Problem

One major problem domestic growers face is importation of floral products. Despite such intense competition, some established growers, such as Kitayama Brothers (Watsonville, California), have not only survived but thrived. Kitayama Brothers expanded over 50 percent with new production greenhouses from 1986 to 1989.

Demand is good for mainstream cut-flower species such as snapdragons, lilies, alstroemeria, irises, and delphiniums. But any new production volume can depress prices.

In *The Furrow* magazine (June 1989), Kee Kitayama adds, "A few acres of any cut-flower crop can flood the market. We try to grow not only ones that we hope will be in short supply but ones that also will be profitable."

Recognizing trends and gaining production experience become necessary tools in this industry. Information appears in marketing publications, such as:

- "Floral Marketing Directory and Buyer's Guide," Floral Marketing Division, Produce Marketing Association, P.O. Box 6036, Newark, DE 19714-6036 ($25 a copy for members, $50 for nonmembers).
- *Florist* (12 issues a year/$24), *Trends* (once a year/$7.50), and "Florist Buyer's Directory" ($4 a copy), Florist Transworld Delivery Association, P.O. Box 2227, Southfield, MI 48037."
- *Flowers &,* Teleflora Inc, Teleflora Plaza, Suite 260, 12233 West Olympic Blvd., Los Angeles, CA 90064 (12 issues per year/ $28).

Growing expertise, innovative technologies, and production supplies can be found in industry publications such as:

- *The Flower Market,* going to 20,000 floral-related businesses (growers, grocery chains, wholesalers, retailers, and trade suppliers), 780 North Fourth St., San Jose, CA 95112 (12 issues a year/$15).
- *Nursery Manager* or *Greenhouse Manager,* Branch-Smith Publishing, 120 St. Louis Avenue, Fort Worth, TX 76104 (each: 12 issues per year/$24).
- *Greenhouse Grower,* Meister Publishing Co., 37733 Euclid Ave., Willoughby, OH 44094 (14 issues per year/$25).

Other information sources can also be found in the "Directory of Small-Scale Agriculture." (Order No. 001-000-04539-3, Superintendent of Documents, United States Government Printing Office, Washington, DC 20402/$5.50 per copy)

Prepared by Thomas S. Handwerker, Small Farms Research Leader at the University of Maryland-Eastern Shore, and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is Office for Small-Scale Agriculture, Cooperative State Research Service, Room 342-D, Aerospace Building, USDA, Washington, DC 20250-2200. (Telephone: 202-447-3640 or Fax: 202-475-3179)

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Specialty Mushrooms

If you enjoy cultivating the unusual, specialty mushrooms offer many possibilities. The term "specialty" refers to any mushroom, except the white button mushroom commonly found in supermarkets. Specialty mushrooms include shiitake, oyster, enoki, wine cap, maitake, and pompom among many others. Selling large quantities of any of these mushrooms may be a challenge unless you are near a large ethnic population (e.g., Asian American) that has enjoyed these delicacies for centuries. Smaller quantities can be sold locally in farmer's markets as part of a pick-your-own fruit and vegetable operation, to gourmet restaurants, to health food stores and to local grocery stores. While production of the common button mushroom is a possibility, it is already widely available in grocery stores, and new growers will be competing with large-scale producers in established markets. However, small-scale cultivation of specialty mushrooms could be a profitable addition to a farming enterprise.

About Mushrooms

A mushroom is neither a plant nor an animal, but has properties of each. Modern taxonomists give the fungi, including all mushrooms, a kingdom all their own. Most mushrooms have a "common" name and a "scientific" name. The latter identifies the genus, species, and sometimes the variety of mushroom for the experts. This eliminates confusion since one common name can apply to several different species. Scientific names usually appear in italics with the genus capitalized.

Like plants, mushrooms begin with a "seed," which is actually a microscopic spore. The gills or pores beneath the cap of a parent mushroom produce spores and a single mushroom produces thousands. The wind can easily transport a spore until it comes to rest in a suitable environment and then germinates and grows into a mat of root-like filaments called hyphae. The mat of hyphae is called the mushroom's mycelia. Unlike plants, this outgrowth of a single spore cannot produce a mushroom. Instead, like animals, a sexual union is necessary. In mushrooms, that union occurs when a hyphae from one spore contacts a hyphae of a compatible spore. After joining, the mycelia is capable of producing mushrooms, the fruit of the fungi.

Mushroom cultivators typically use already-growing mycelia called spawn, rather than growing their mushrooms from spores. The spawn can be purchased from several sources or produced in-house on grain. When the spawn is ready to use, each grain kernel has enough living mycelia to begin mushroom growth when introduced to the growing medium or "substrate."

Environmental conditions are the key to cultivating mushrooms. The hyphae may not grow if the substrate is not correct. If nutrients are not sufficient or the weather is not appropriate, healthy mycelia may not bear fruit. Some mushrooms will produce fruit under a wide range of conditions while others are very specific in their needs. Some even require a symbiotic relationship with specific tree species before they will fruit. Mushroom cultivators must understand the requirements of the species they want to grow. After identifying environmental needs, the grower determines whether to grow a particular species outdoors or in a controlled environment. Typically, investments in climate- controlled rooms will be much greater than investments in outdoor growing space. Mycologists are regularly discovering ways to cultivate new species. Let's look at the attributes of a few specialty mushrooms and their requirements.

Shiitake *(Lentinula edodes)*

Shiitake mushrooms are very popular in Japan. American production of shiitake has increased faster than any other specialty mushroom. Until recently, worldwide production of shiitake was second only to the common button mushroom. Shiitake grow best with certain hardwood species, especially ironwood and oak. Other substrates with a corncob or straw base and several additives can produce shiitake, but have not proven as good a substrate as the hardwood species. Depending upon the climate, shiitake may grow on logs outdoors. Indoor growers typically use a substrate composed of sawdust and several additives. Current wholesale market prices for shiitake range from $3.50 to $8 per pound, depending upon quality and size. Growers typically get from $4 to $6 per pound for their best mushrooms.

Oyster *(Pleuratus spp.)*

There are several species of oyster mushrooms that are widely cultivated internationally. Major production increases in China recently moved the oyster mushroom to second place in terms of worldwide production. Some of the more common species include the Indian oyster, tree oyster, golden oyster, pink oyster, and the abalone mushroom.

Unlike the shiitake mushroom, oyster mushrooms grow prolifically on a variety of substrates including most hardwoods, paper, cereal straws, coffee grounds, corncobs and sugarcane bagasse, among many others. If you have an agricultural or wood waste product in your area, you can probably find a variety of oyster mushrooms that will grow on it.

Oysters are most commonly grown indoors in specially constructed growing rooms, which sustain the necessary climatic conditions. They need high humidity and warm, not hot, temperatures. Many growers convert existing barns, stables or sheds, or buy an inexpensive greenhouse that can be insulated. Humidity is provided via misters or commercial-scale humidifiers. Heating comes from whatever inexpensive source is readily available. Most mushrooms, including oysters, require light during their life cycle and daylight fluorescent bulbs seem to work well.

Other mushrooms require a sterilized substrate. A boiler and an autoclave large enough to sterilize commercial quantities of substrate are quite expensive. Oyster mushrooms are so prolific that the mycelia outgrows most contaminants. Thus, pasteurization is generally sufficient. For a chopped straw substrate, pasteurization can be accomplished in a hot (160o F) water bath for a couple of hours. After cooling, the spawn is mixed with

aw. One technique for growing oysters lastic bags from a roll of tubing usually 8 ıches in diameter. The grower cuts a of tubing, ties a knot in one end and he inoculated straw into the bag. When s nearly full, a knot is tied in the other d the bag is hung in the growing room. are punched in the bag to allow the a to breathe and to provide a place for ıshrooms to pop out.

ster mushrooms have several advan- and only a few drawbacks. They are easy v using agricultural waste as a substrate. v is used as a substrate, the remaining ɔsted material can be used as a feed for ɔr hogs or as a soil amendment after the ooms are harvested. On the cautionary ıysters produce numerous spores which allergies in many people. Usually a ıtor is required for lengthy stays in the ıg room. Marketing opportunities may be l since oysters have a relatively short fe of approximately 1 week. Finally, they : mushroom gnats more than most other ɜs. Current wholesale prices range from $4 per pound.

Stropharia or Wine Cap
ıharia rugoso-annulata)

ıushroom is good for outdoor growing. It asily cultivated in a shady bed of d chips and/or straw. Some garden- e beds in cold frames to produce crops summer to fall. These mushrooms grow ɔrmous size, weighing 5 pounds or more. tunately, these huge specimens are y filled with fly larvae and unsuitable for n consumption. However, the larvae- ed mushrooms do make great fishfood! ıusly, the younger mushrooms are the ɜd edible for people.

ıce these mushrooms have not been / commercialized, there is no established ɜt. However, there is the opportunity to ine stropharia with other products of a farm for sale at a farmer's market or able stand. Expect prices in the $5 per d range. They also have the advantage of ıg your waste woodchips or sawdust into compost while providing mushrooms for al years.

gy Mane *(Coprinus comatus)*

haggy mane is not typically produced on ımercial basis as it becomes an undesir- ɜs of black ink within a few hours of g if it is not cooked immediately. Inclusion in a pick-your-own operation may be profitable if customers are carefully taught how to handle this species.

The main advantage is that it is easy to grow and you may already have some growing wild on your farm. It even shows up as a contaminant for growers of other mushrooms, like the oysters. To encourage its growth, you need only inoculate a bed made up of a soil/sawdust, manure/sawdust, or straw/manure mixture and keep it wet. Research from China indicates that this mushroom may suppress the growth of certain types of cancers.

Maitake *(Grifola frondosa)*

The maitake—or hen-of-the-wood—is different. It comes from a group called the polypores. Rather than distinct individuals, this mushroom produces a large clump of interwoven "leaves." It grows wild on dead or dying hardwood trees or stumps in the Northeastern and Mid-Atlantic States. Growth can be induced by inoculating a suitable log or stump with its mycelia. An advantage is that the Maitake can recycle old stumps into forest soil. The major disadvantage is the 3 years it may take to produce any fruit.

More Information

This factsheet only hints at the possibilities of growing specialty mushrooms. You may already have delicious species, like some of those mentioned above or common meadow mushrooms or even giant horse mushrooms, already growing on your farm. The details needed for cultivation have not previously been well understood or easily available to the public. Continuing experimentation has led to more accessible information. In addition to the publications that specifically address shiitake cultivation, as noted in the factsheet entitled Shiitake Mushrooms from the Office for Small-Scale Agriculture (OSSA), the following selections may be helpful:

For a quick overview of several species:
Organic Gardening Magazine - November 1993

For a more detailed discussion on growing many mushroom species outdoors:
"Mushrooms in the Garden" by Hellmut Steineck. A 152-page book published by Mad River Press. ISBN: 3-8001-6122-2.

For details on both outdoor and indoor cultivation:
"The Mushroom Cultivator - A Practical Guide to Growing Mushrooms at Home," by Paul Stamets and J.S. Chilton. A 415-page book published by Agarikon Press. ISBN: 0-9610798-0-0.

For more details on more species:
"Growing Gourmet and Medicinal Mushrooms," by Paul Stamets. A 552-page book published by Ten Speed Press. ISBN: 089815-608-4.

For a comprehensive mushroom guide with over 1,000 color photographs:
"Mushrooms of North America," by Roger Phillips. A 319-page book published by Little, Brown and Company. ISBN: 0-316-70612-4.

For a monthly update on prices, marketing information, and production techniques:
The Mushroom Growers' Newsletter
P.O. Box 5065
Klamath Falls, OR 97601

Published monthly, 6 - 8 pages, $24 annually.

By Jerry Haugen, P.O. Box 5065, Klamath Falls, OR 97601; George B. Holcomb (Retired), Office of Communications, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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Specialty Potatoes

e potato, one of the most important food ps, came under cultivation by South erican "Indians" more than 2,000 years). Potatoes, of which there are hundreds of ieties in every shape, size, and color, were ried to Europe around 1500. From Europe y were introduced into the British Colonies North America.

In 1992, the potato is one of several food ps featured in the Smithsonian Institution's tional Museum of Natural History's nibition "Seeds of Change," commemorat- the 500th anniversary of Columbus' first yage. For many years, the potato had its n Potato Museum, in Washington, D.C. so see *The Incredible Potato*, *National ographic Magazine*, May 1982.)

Interest is increasing in the yellow-fleshed d other uncommon varieties—specialty tatoes. Yellow-fleshed potatoes are the rule her than the exception in most countries. e specialty potatoes available in the d States for many years were long sidered of little commercial value. Now, wever, with increased consumer demand, mestic potato breeders have begun to ease some excellent yellow-fleshed rieties.

In Washington State, nearly 200 specialty tato varieties and clones have been tested; me varieties appear with pink or purple flesh d skin colors ranging from buff to red. Many ve given yields greater than 'Russet rbank.' Erik J. Sorensen, Washington State niversity Cooperative Extension, Franklin unty Courthouse, Pasco WA 99301, has sults from test trials.

With per capita fresh potato consumption atic or declining, the variety offered by ecialty potatoes can add to sales. Despite rdles, they have a bright future but will never mpletely replace the traditional white- shed, russet type.

imate, Soils, and Water

though classified as a cool-season crop, mmercial acreage can be found in all 50 ates, with Idaho, Washington, Oregon, aine, Wisconsin, California, and North akota leading. Soil temperatures should be tween 45 and 70 degrees F at planting time. ting into cold soils delays emergence and ases the risk of seed piece decay. Although rainfall often suffices, irrigation ay produce highest yields. Potatoes need 18 30 inches of water to mature. Potatoes are shallow rooted, with most roots being in the upper foot of soil.

Potatoes are sensitive to water stress. Well-drained, light textured soils, such as sandy loams or loamy sands, generally produce the highest quality potatoes.

Good-Quality Seed

Potatoes are vunerable to several diseases, including blackleg, bacterial ring rot, and viruses, which can be transmitted in infected seed. To avoid such problems, certified potato seed is recommended. Not guaranteed to be disease free, potatoes certified by State agencies have shown no more than an allowable tolerance level for disease symptoms. For certain diseases, such as ring rot, the tolerance level is zero. To be certified, seed lots must be inspected in the field during the growing season AND in storage or at shipment.

Addresses of State and Provincial certification offices which list certified growers may be obtained from the publisher of this factsheet.

A number of mail order companies also offer limited quantities of specialty potato seed. Among these are some run by innovative potato growers: Will Bonsall, Scatterseed Project, Box 1167, Farmington, ME 04938; David Ronninger, Ronninger's Seed Potatoes, Star Route 1, Moyie Springs, ID 83845 (both curators for Seed Savers).

Planting and Cultivation

In much of this country, potato seed pieces are planted 3 to 4 inches deep. But where soil moisture may be limited, seed pieces are planted an inch deeper. The amount of seed required varies according to seed piece size and plant spacing. A spacing of 9 to 12 inches between plants is common. Wider spacings often result in oversized tubers.

Cut seed is widely used, but whole seed is less sensitive to tuber decay. Cut seed pieces should be 2 to 2 1/2 ounces in weight, firm, and with at least one eye.

After planting, potatoes may be cultivated to help control weeds and to reshape beds. It is common to hill potato plants when they are 8 to 12 inches tall: Soil is mounded to a height of 2 to 3 inches around the plant base. Some varieties, such as 'Yukon Gold,' set tubers high in the bed. Hilling helps maintain suitable soil cover to prevent greening or sunburning of tubers.

Pest Control

The potato is vulnerable to pests. In addition to using certified seed, growers need many strategies to minimize insect and disease problems. Strategies include proper soil fertility and water management, crop rotation, sanitation, and the use of resistant varieties.

Harvesting and Storage

Time of harvest varies according to variety and intended market. Potatoes may be harvested with vines still green and tubers comparatively immature. Such potatoes are generally intended for immediate use as "new potatoes." Most potatoes, however, are harvested at full maturity. Indicators of maturity are tuber size, skin set, and death of the vine. Mature tubers store better than immature tubers and resist bruising better.

Many varieties of specialty potatoes, such as `Michigold,' `Donna,' and `Yukon Gold,' produce a high percentage of A-size tubers—generally the most desirable size.

`Yellow Finn,' however, is an exception. The market prefers smaller sized tubers of this particular variety. With red-skinned varieties, the small C size demands the highest price. Many restaurants also prefer small potatoes.

Potatoes store best at 40 to 50 degrees F, with adequate ventilation and relative humidity at 90 percent. It is important to exclude light to prevent greening. Only sound potatoes should be put into storage.

Varieties

The dark-yellow flesh of 'Yellow Finn' has become something of a standard. By comparison, 'Yukon Gold' flesh is relatively light-yellow. Many European varieties also have light-yellow flesh.

'All Blue' is oblong with purple skin and purple flesh. Sometimes called 'Purple Marker,' its striking appearance led to its use as a marker for the ends of potato plots. It can be baked or boiled and retains the purple flesh color even after cooking. 'Purple Viking' has purple skin with red stripes.

Varieties with commercial potential: Yellow-fleshed with buff or yellow skin: 'Delta Gold,' 'Donna,' 'Michigold,' and 'Saginaw Gold.' Yellow-fleshed with red or pink skin: 'Desiree,' 'Iditared,' 'Red Gold,' and 'Rose Gold.' Yellow-fleshed with purple skin: 'Brigus.' And small-sized or fingerling potatoes: 'Banana' and 'Ruby Crescent.'

od descriptions of potato varieties are in
it-of-print books often found in
ity libraries: **"Description of and Key
rican Potato Varieties,"** C.F. Clark
M. Lombard, USDA Circular No. 741,
April 1946 (Revised November 1951)
lorth American Potato Varieties," H.M.
j, 1959 Potato Handbook, Potato
es Issue, Potato Association of America

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ls and the popular press. Supermarket
have featured yellow- fleshed potatoes.
ry's Supermarket in Seattle, a 4th of July
tion featured red, white, and blue
es. Without such efforts it is difficult to
specialty items beyond local markets
to the produce mainstream.
ality is of paramount importance to
t acceptance. For the fresh market,
rance strongly influences sales. Color,
hape, and defects shape consumers'
pression of quality. Texture, flavor, and
value are less obvious, but still
t quality components, affecting first
le but greatly influencing subsequent

ny restaurants feature specialty
es. Often customers who first tried
n a restaurant purchased them later in
narkets. Some brokers and others who
nd ship fresh produce concentrate on
lty potatoes.
rketing specialty potatoes is compli-
by the fact that most potatoes are not
y variety name. Some specialty
es have characteristics that lend
elves to product differentiation. 'Yellow
as a characteristic flattened shape and
eyes. 'Yukon Gold' is distinguished by
k coloration around its eyes. Packaging
so be important to market success.
hat display the variety name along with
g or nutritional information are useful.
llow-fleshed varieties have already been
hat can be used for either fresh market
cessing. 'Saginaw Gold' produces a
ith good color and taste. Purple or pink
chips and yellow french fries are among
ilities for processed specialty potatoes.
g beyond local markets, specialty
es and potato products may also have
ial for export.
market for specialty potatoes is limited
production is a real danger. Growers
ed to develop a market before trying
ops--and then only on a limited
e.

Cooking Quality and Nutrition

Fresh potatoes contain about 80 percent water. Solids, or dry matter, is highly correlated with texture. A mealy texture is associated with high solids, a waxy texture with low solids. Although individual tastes vary, varieties such as 'Michigold' have a mealy texture usually considered best for baking or french-frying. Varieties such as 'Red Gold,' with a waxy texture, are more often used for boiling or in salads.

Potatoes are an excellent source of carbohydrates and contain valuable amounts of protein, minerals, and vitamins. Nutrient levels vary not only by variety but also according to the maturity of the crop and storage time. Nutritive content can be used to market specialty potatoes. It appears that the darker the yellow flesh color, the higher the level of vitamin A.

For More Information

In addition to the U.S. Department of Agriculture, State universities and county Cooperative Extension personnel can provide useful information on local production methods and marketing practices. PAA (Dr. David Curwen, Secretary, University of Wisconsin, Hancock Ag Research Station, Hancock WI 54943) publishes a Potato Extension Specialists Directory that lists University faculty members in 46 States and the District of Columbia. PAA also has an annual meeting and publishes "The American Potato Journal," a monthly. (Contact Linda Best, Membership Secretary, PAA, 8 Holmes Hall, University of Maine, Orono ME 04469-0163.)

Many potato production educational programs are sponsored by the Cooperative Extension System. In Washington, the Washington State Potato Conference and Trade Fair is held each year. Similar programs exist in Idaho, Maine, Michigan, Nebraska, and Oregon. Potatoes are included in numerous other conferences.

Other Information Sources

There are many excellent publications:

- *"Delta Golds...Consumer Response to Yellow Fleshed Potatoes*, Applied Market Research Report #2." Agriculture and Resource Economics, 206 Winslow Hall, Univerisity of Maine, Orono, ME 04469.
- *"Potato Handbook."* Agricultural Communications Center, 111 Ag Sciences Building, University of Idaho, Moscow, ID 83843.
- *"Potato Growers Handbook."* Washington State Potato Commission, 108 East Interlake Road, Moses Lake, WA 98823.
- *"Potato Varieties - An introduction to variety characteristics, management and performance in the Klamath Basin.".* University of California Tulelake Field Station, P.O. Box 447, Tulelake, CA 96134.
- *"North American Potato Varieties."* Potato Association of America, 8 Holmes Hall, University of Maine, Orono, ME 04469-0132.
- *"Selecting Potato Varieties for Michigan."* Michigan State University, Bulletin Office, P.O. Box 231, East Lansing, MI 48823-0231.
- *"Integrated Pest Management for Potatoes in the Western United States,"* Publication 3316. Agricultural Sciences Publications, Division of Agricultural Sciences, University of California, Berkeley, CA 94720.
- *"Compendium of Potato Diseases,"* American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121.
- *"A Guide to Monitoring Potato Pests in New York State, 102 IPM 107."* Cornell Cooperative Extension, Research Center, 7 Business and Technology Park, Ithaca, NY 14850.
- *"Potato Diseases, Agriculture Handbook No. 474,"* Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

A computer software program, *Potato Crop Management*, is available from the University of Wisconsin, WISPLAN Computing, 302 Hiram Smith Hall, 1545 Observatory Drive, Madison, WI 53706.

Prepared by Erik J. Sorensen of the Washington State University Cooperative Extension and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address:

Cooperative State Research Service, USDA,
Room 342-D, Aerospace Building,
Washington, DC 20250-2200.
Telephone: 202-401-4640
Fax: 202-401-5179

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Specialty Vegetables

There is a growing demand for Latin and other 'ethnic' vegetables in most of the larger cities such as Chicago, Miami, and New York. To supply customers' needs for such specialty items, many major chain stores across the country are turning to specialist marketers, many of whose suppliers are small-scale growers.

Specialty vegetables being introduced or reintroduced by immigrants from the Pacific Basin, Africa, Latin America, the Caribbean, and even Europe include amaranth, arrowroot (Chinese potato), cipolines, daikon, donqua, elephant garlic, fava bean, fiddlehead green, gil choy, Japanese eggplant, jicama, manzano banana, moqua, napa, taro root, tomatillo, and yuca (also known as sweet cassava). Even the native watercress is enjoying newfound popularity. Many such vegetables are described in a book, *Windows of Opportunity: The Market for Specialties and Organics*, ($25), by Nancy Lee Bentley, marketing consultant at The Food Circle, P.O. Box 62, Cabery, IL 60919. (One fresh produce item likely to capture consumers' fancy is the miniature watermelon, to be discussed in more detail in a fact sheet on fruits.)

Things to Consider

Above all, a small-scale entrepreneur interested in growing specialty vegetables must be cautious, advises Frieda Caplan. She is an ace California-based national-chain marketer of specialty produce for nearly 30 years. Her successes include Jerusalem artichokes (marketed under the name she coined, "sunchokes") and many other specialty vegetables. She gets as many as 50 phone calls a week from potential vegetable or fruit growers asking how to get started.

Frieda, as she is known in the trade, tells callers first to check with an expert, such as a Cooperative Extension Agent or Soil Conservation Service soil specialist with the U.S. Department of Agriculture (USDA), to learn what vegetables their soil can grow best. Next, from a seed company, "find out what's new and available." Then she suggests they contact her to learn whether she can market what they plan to grow. (Her address: Frieda's Finest Produce Specialties, Inc., P.O. Box 58488, Los Angeles, CA 90058).

Chances are, if an item is really new, she will advise them to grow only a few rows, just to try it out. She cautions growers about making certain before contracting that they have packing and shipping arrangements worked out. "It's up to the grower to arrange transportation," she points out.

Vegetables have to be packed according to standards; and growers must have arrangements to precool the vegetables for shipment. Failure to have all the links in the chain from soil to market can doom an enterprise.

To help growers, shippers, carriers, and receivers learn the standards and to reduce postharvest losses and expand the markets for highly perishable, high-value vegetables (and fruits), the Export Services Branch of USDA's Office of Transportation (410 McGregor Building, Washington, DC 20250-4500) has a *Tropical Products Transport Handbook* available at no charge. A Spanish version also will be available in 1988. It discusses maintaining quality of fruits, vegetables, plants, and flowers during transportation.

The booklet emphasizes proper planning, grading, packaging, and precooling practices as particularly important for crops shipped long distances from areas with tropical and subtropical climates. The information is presented in a brief manner with many illustrations. The handbook also discusses the choice of mode of transportation, checking the transport equipment before loading, loading practices, and recommended intransit and storage procedures. A summary of recommendations is given for 120 fruits and vegetables, most being tropical in origin. (Telephone 202-653-6317.)

One key need both before and just after harvesting is adequate labor to gather and pack crops quickly for market when they are ready. Most specialty crops can't be harvested by machine. A U-pick operation would solve the labor problem; but not all areas support pick-your-own operations. Each producer must evaluate his or her prospects for U-pick carefully.

Lawrence Rinkenberger, Indiana farmer who spoke at the 1986 "ADAPT 100" conference (sponsored by Meredith Corporation's *Successful Farming* magazine), said his pick-your-own acreage has been declining since 1981, despite his fast checkout lanes and a recreational atmosphere. Fewer customers are finding time for picking, and supermarkets have become more competitive with higher quality and lower prices.

The text of Rinkenberger's talk (along with discussions of many other alternative farming ideas) is in the book, *ADAPT 100*, available for $12.95 from *Successful Farming* at P.O. Box 10652, Des Moines, IA 50336.

Miniatures in Demand

In deciding what to produce, entrepreneurs may pinpoint demand. In some markets and gourmet restaurants, demand is often high for miniature or "baby" sizes of conventional vegetables, such as squashes.

Some varieties of vegetables have been especially developed to grow small, or miniature size. Others are simply picked at an immature stage; it is important to know which ones. Many minivegetables are being grown in California, Florida, Texas, and Mexico year round. With good soil, they can be grown in many States in summer, or they can be grown in greenhouses. Growing and marketing minivegetables is tricky. Besides being produced from appropriate varieties, they must be harvested precisely when they are at a sweet rather than bitter stage. Not all immature vegetables qualify.

Some Market Outlets

Any vegetable can be labeled "gourmet" if marketed at peak condition, according to David Miskell, a speaker at the 1986 "ADAPT 100" conference.

For information, Miskell noted seed companies and market outlets such as Frieda Caplan's; "Fresh and Healthy" of Lehigh Valley Organic Growers, Inc. (125 West Seventh Street, Wind Gap, PA 18091); Green Leaf Produce (1980 Jerrold Avenue, San Francisco, CA 94124); and Flying Foods International (43-43 Ninth Street, Long Island City, NY 11101). Both Sibella Kraus, Green Leaf planner, and Walter Martin, founder and managing director of Flying Foods, say

their companies are always interested in hearing from growers with plans for novel produce—such as colorful lettuces.

Miskell mentioned some of the gourmet lettuces being marketed, including Merveille de Quatre Saisons, Rouge d'Hiver, Red Sails, Red Romaine, Red Salad Bowl, Oak Leaf, and Boston type. Miskell may be contacted at Shelburne, VT 05482, where he produces organic vegetables on 3 acres with four greenhouses.

The produce market—gourmet or otherwise—is extremely competitive. The specialists emphasize that when too many people begin growing a vegetable crop, it is no longer a specialty that commands a premium price. Above all, the experts emphasize that people should NOT plant first and try to sell later.

One way to beat the competition as well as take advantage of the U-pick solution to labor shortages, is described in Dr. Booker T. Whatley's book, *How To Make $100,000 Farming 25 Acres,* ($17.95, softcover; $24.95, hardcover, from Rodale Institute, 222 Main St., Emmaus, PA 18049). He explains how clever growers can build a 'guaranteed' or contract market by organizing a clientele membership club. Members buy rights to pick vegetables and/or fruits at rates adjusted regularly to be below supermarket prices. This kind of club, of course, takes as much servicing as any organization.

Price Information

To help make decisions, operators can seek price data from many sources. One is USDA's Agricultural Marketing Service (AMS). Its Fruit and Vegetable Division has a Market News Branch (headed by W. H. Crocker, Room 2503-S, AMS, USDA, Washington, D.C. 20250). AMS reports daily on prices and shipment sizes at 20 of the Nation's biggest metropolitan centers. AMS will send inquirers data on subscription fees for reports from various cities.

While all major markets detail wholesale prices on the most common produce, not all report gourmet vegetable prices. However, AMS reports from New York and San Francisco often have lists of vegetables or herbs designated "oriental" or "miscellaneous." Some sell by the pound, others by the dozen (bunches) or by the carton or lug.

Caplan says the farmer's price can be estimated by deducting 30 percent from the price that AMS shows for any particular item.

For data on local prices and competition, the best source of data is the produce manager of the nearest large gourmet grocery store. If there is no gourmet store, the owner of a gourmet restaurant might discuss prices and supplies.

Production Ideas

Many sources of vegetable production information include county offices of the Cooperative Extension Service (CES), supported by the States, State universities, and USDA. Most counties have CES offices.

The Produce Marketing Association (PMA, 1500 Casho Mill Road, Newark, DE 19714-6036) can provide a list of articles on specialty vegetables to nonmembers of PMA for $20 (the search cost) plus $10 for a set of computer page printouts of up to 10 pages plus $1 per additional page.

A recent PMA bibliographic printout on "exotic produce" (which includes fruits as well as vegetables) covered about 18 pages. Two other pages were on Hispanic produce operations and two on Oriental produce and marketing.

Typical articles are two in *Restaurant Business,* "Oriental market poised for explosive chain growth" and "Oriental: Fast food of the next generation," and one in *Supermarket Business,* "Oriental items can be bonanza for produce section." Items on the Hispanic list include: "Tips on capturing a piece of Hispanic grocery market," in *Packer* newspaper; "The emerging Hispanic market," in *Produce and Floral Retailing* magazine; and "Ethnic perishables bring Denver Hispanics to TJs," in the *Supermarket News* newspaper.

USDA, Purdue University, and the CES (at West Lafayette, IN 47907) have a publication (HO-194) available at no charge: *Guide to Production Information for Commercial Vegetable Growers.* It is aimed mainly at readers in Indiana and the Midwest, and it lists publications of wider use, such as *The Basics of Trickle Irrigation,* from the University of Illinois.

Purdue also has published the 70-page *Indiana Vegetable Production Guide for Commercial Growers.* Numbered ID-56, it is available from the Publications Mailing Room, 301 South Second Street, Lafayette, IN 47905-1092, at $4. It summarizes recommended varieties of common vegetables, seeding rates, fertilizer rates, insect and disease control measures, and safe use of agricultural chemicals. The guide, updated every 2 years, has supplements alternate years.

The Purdue list names several vegetable books issued by private publishers and the 1977 USDA publication, *Growing Your Own Vegetables,* Ag. Info. Bulletin No. 409. No longer available from the government, this 244-page "how to" book may be found in some libraries. Because of its age, readers will want to update its pesticide information through their Extension agents.

Purdue's list also notes many periodicals on vegetables. While many emphasize the chemical control of pests, some are oriented toward organic methods—using biological instead of chemical approaches to control pests.

Another useful USDA publication, *Growing Vegetables in the Home Garden,* 49 pages, is available from the Superintendent of Documents, Government Printing Office (GPO), for $2.25. Ask for HG 202, Stock No. SN 001-000-004454-1. USDA's 1977 Agricultural Yearbook was the 392-page *Gardening for Food and Fun,* available from GPO for $12. Its Stock No. is SN 001-000-036789-3.

USDA's National Agricultural Library (NAL, Room 111, Beltsville, MD 20705) also has a bibliography listing publications on vegetable gardening and another on marketing of horticultural crops.

* * *

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is: Office for Small-Scale Agriculture, Cooperative State Research Service/Office of Grants and Program Systems, Room 635, Hamilton Building, Washington, DC 20250.

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Strawberries

Nearly everyone loves home-grown strawberries and many people will go out of their way to buy or pick fresh berries—often the first "taste of spring." Strawberries are the most widely grown small fruit in most States. The leading States in commercial production are California, Oregon, and Florida. However, strawberries can be grown in many soil types almost any place in the United States.

A strawberry crop can fit nicely into small-scale operations. The average farm in most States grows less than 10 acres. The strawberry harvest begins in spring or early summer and generates income when few other crops are available. Local marketing by pick-your-own (PYO) customers, at farmers' markets, or ready-pick sales to nearby stores is feasible for small farms. The income from strawberries can supplement farm income from other, primary sources.

Strawberry growing is labor and management intensive. Although much work can be performed by hand, growers soon learn that specialized equipment and crop knowledge go a long way toward ensuring success. Growing strawberries on any scale requires a significant investment in money and time. Knowledge about strawberry crop pests and proper timing is essential. Because weeds are often a pitfall, beginners must know about herbicides and weed control.

A job well done can gross $4,000 or more per acre. Strawberries can net $2,000 or more per acre with the right marketing, management, and growing conditions.

Planting Considerations

Strawberry plants are shallow rooted, low growing, and very sensitive to environmental conditions. Poor field and soil conditions cannot be overcome after the crop is planted. Select sites with enough slope to provide adequate air and water drainage, above lower land into which the cold air can drain, and well away from wooded areas and other frost pockets. Such a site allows for good air drainage. Cold air, which is heavier than warm air, flows down to lower elevations, thus increasing chances of frost damage during blossoming. The soil must also be well drained; strawberries will not survive "wet feet."

Irrigation is necessary for commercial production—at planting time, for frost protection of blossoms, at renovation, and in dry spells during the growing season or at harvest.

The preparation of strawberry fields should begin at least a year before planting. Fields previously in sod should be cultivated for 2 or more years. Starting then allows for soil testing and amending, as well as for eliminating perennial weeds. In addition, pre-planting preparation provides time to grow a cultivated crop for improved insect and weed control, or to grow one or two green manure crops for increased organic matter, nutrient availability, and improved soil texture. Green manure crops can smother out weeds and, when plowed under, augment their destruction. All efforts should be directed toward reducing weeds: Weeds should not be permitted to produce seeds during this time.

Strawberries should not be planted after eggplant, peppers, potatoes, or tomatoes because of common susceptibility to the Verticillium wilt fungus, which can infect and damage strawberries. Strawberries should not be planted in fields treated with high rates of herbicides (such as atrazine) that could carry over to injure strawberry roots.

The success of a strawberry planting, in large part, depends on the health and vigor of planting stock. A new planting should not be started with plants from an old strawberry bed because almost all established plantings are disease infested. In the long run it is far better and cheaper to obtain virus-free plants from a dependable nursery than to risk using plants of doubtful value.

Choose the Best Varieties

Strawberry growers should plant the varieties best suited to their growing sites, cultural methods, and eventual markets. Even the best cultural practices cannot overcome the handicap imposed by poor varieties. Risks involved in variety selection can be spread out by planting three or four different varieties. Such planting enables a grower to lengthen the harvest season and give customers a choice of fruit qualities. Since most fields are harvested for only 3 or 4 years, changing varieties to meet future demands is relatively easy. Names of the varieties recommended for commercial and trial plantings are available from your local universities and extension service.

The Junebearer is the most widely grown type of strawberry outside of California and Florida. One or more of these varieties will likely grow well in most areas. The plants are set in early spring to form matted rows, the flower buds are initiated in the fall, and the crop is harvested the following spring. The field will be renovated after harvest and picked again for 2 to 4 years or longer.

Leading varieties include Totem, Benton, Shuksan, Redcoat, Glooscap, Earliglow, Redchief, Honeoye, Cardinal, Kent, Bounty, and Allstar.

Everbearers, widely grown but rarely commercially, tend to cycle up and down in crop production, and yields during summer and fall seldom approach those of Junebearers in berry size, amount, or quality. Most everbearers have limited potential other than for home use. Examples of varieties are Ozark Beauty, Quinalt, Ft. Laramie, and OurOwn.

New Types of Strawberries

New dayneutral and short-day strawberry varieties produce both flowers and fruit at the same time during most of the growing season. Production exhibits some "peaks and valleys," depending on the climate where grown. The berries produced during midsummer heat in the Midwest lack some desirable characteristics needed for commercial harvest. They need optimum management in weed and runner control, water and nutritional maintenance, and harvesting. Given ideal conditions, these varieties do offer the potential for expanding the marketing season in many locations, especially where nights are relatively cool. Among leading varieties are Douglas, Chandler, Pajaro, Selva, and Irvine, grown primarily in California and Florida. Tribute and Tristar are new disease-resistant varieties well adapted to other areas.

New Production Systems

Research on growing dayneutral and other varieties under highly intensive cultural [redacted] has been on-going in recent years in [redacted]rk, North Carolina, and Iowa. These systems utilize techniques (fumigation, plastic mulch, trickle irrigation, hill planting) similar to those practiced in California and Florida. Costs and potential returns, as well as risks, are much higher than for conventional production. Reports on costs, yield potential, and cultural techniques are available from (1) "Dayneutral Strawberry Production Guide," Information Bulletin 215, for $2.30 (including postage), from Distribution Center, 7 Research Park, Cornell University, Ithaca, NY 14850; (2) Dr. E.B. Poling, Annual Hill System Strawberry Research, Department of Horticultural Science, North Carolina State University, Raleigh, NC 27695-7609; or (3) Dr. Gail Nonneke, Department of Horticulture, Iowa State University, Ames, IA 50011.

Marketing the Crop

The principal market for strawberries is formed by consumers in local communities surrounding the producing farm. A high percentage of all strawberries grown in the Midwest and Northeast are harvested "pick-your-own" (PYO). The PYO market is competitive and in some areas saturated. The trend, now, is [redacted] more ready-picked berries, and growers find more sales when they have workers for picking.

Word-of-mouth is the primary method by which local consumers learn about PYO strawberries. Thus, marketing begins with choosing the best cultivars, growing top quality berries, and having clean, weed-free fields and courteous, friendly personnel on hand to supervise PYO customers.

The strawberry crop is usually sold within 30 days, depending upon weather and varieties. Weekends are usually the biggest picking days. Coordinating sales advertising and promotion with peak harvest is a challenge even for experienced growers.

PYO growers must be market oriented. They must plan far ahead, seek alternative market possibilities, train help, make a suitable farm logo, and develop an advertising program, as well as make contingency plans in case of rain, cold or hot weather, or increasing PYO competition and California berries in local supermarkets. California berries have improved in recent years, making it difficult to attract [redacted]mers to PYO farms.

Before starting a PYO strawberry enterprise, each farm should study its potential trade area. What is the market opportunity and where are advertising media? There must be a large customer base within 20 miles of the farm. A farm with 10 acres of strawberries requires a nearby population of about 30,000, with no other competition, to provide a suitable PYO market. Information on how to determine a PYO-customer trade area is available from the Department of Horticulture, University of Illinois, 1005 Plant Sciences Lab, 1201 South Dorner, Urbana, IL 61801. Ask for Fact Sheet HM-6.

PYO strawberries are usually sold by weight in pounds and/or ounces, in single-quart or 4-quart baskets. The scales are usually inspected by the Weights and Measures Division of a State department of agriculture or commerce.

A business that markets directly to the consumer, either by PYO or ready-pick, does not develop completely in a single season. The farm image—neatness, cleanliness, the logo, signs, personnel, quality of fruit, printed material, and access roads—is extremely important. City customers especially enjoy the farm outing and recreational aspects. However, they may be critical of muddy or dusty roads, inadequate parking, poor sign directions, weedy fields, or rude personnel.

Since accidents may occur when crowds come to the farm, the grower must be sure to obtain adequate insurance coverage. The normal farm insurance policy most likely will not cover accident liability or even the buildings used in the business.

Many PYO strawberry enterprises are successful because the entire family works in the operation. Often, one spouse hires, trains, and supervises the help, handles the money and keeps records, helps in planning the advertising, and meets customers on a daily basis, while the other spouse and other members of the family are involved in field operations. By meeting or exceeding customer expectations, the local marketing of strawberries can be a successful enterprise.

For More Information

State universities and county Cooperative Extension personnel can often provide helpful tips geared to local production methods and marketing information. For example, the University of Illinois conducts an annual "Strawberry School" and publishes a Proceedings, which also includes other small fruits. For information, write to Dr. J.W. Courter, University of Illinois, Dixon Springs Agricultural Center, Simpson, IL 62985. Similar extension schools are held in Wisconsin, Ohio, North Carolina, Michigan, New York, Pennsylvania, Missouri, and New England States.

At the national level, the North American Strawberry Growers Association (NASGA) offers newsletters, annual conventions, proceedings, research reports in their journal, "Advances in Strawberry Production," marketing information, and legislative support, and also makes financial contributions to research projects. The benefits from joining NASGA are invaluable for the professional grower. Contact Dr. Richard and Shirley Funt, Executive Secretaries, NASGA, P.O. Box 20268, Columbus, OH 43220.

Other Information Sources

For cost information and availability on one or more of the following useful publications, potential growers should write to the address given:

- *Compendium of Strawberry Diseases,* 138 pp, color. The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121.
- *Strawberry Deformities*, 13 pp, color, Bulletin 683. University of Vermont, Agricultural Experiment Station, Burlington, VT 05401.
- *Strawberry Deficiency Symptoms: A Visual and Plant Analysis Guide to Fertilization,* 60 pp, color, Publication No. 4098. University of California, ANR Publications, 6701 San Pablo Avenue, Oakland CA 94608-1239.
- *Insect Pests of Strawberries in Ohio,* 19 pp, color, Extension Bul. 667. Ohio State University, Ohio Cooperative Extension Service, Kottman Hall, Coffey Road, Columbus,OH 43210.
- *Ohio Strawberry Manual*, 43 pp, color. Ohio State University, Ohio Cooperative Extension Service, Kottman Hall, Coffey Road, Columbus, OH 43210.
- *Fruit and Vegetable Clip Art for Direct Marketers,* Series 52. University of Illinois, Department of Horticulture, Dixon Springs Agricultural Center, Simpson, IL 62985.
- *The Strawberry Enterprise*, 5 pp, FR-10. University of Illinois, Department of Horticulture, 1005 Plant Sciences Lab, 1201 South Dorner Drive, Urbana, IL 61801.
- *Small Fruit Crop Management,* 608 pp. Prentice Hall. Mail Order Billing Department, 200 Old Tappan Road, Old Tappan, NJ 07657.

Prepared by J.W. Courter of the University of Illinois and George B. Holcomb of the Office of Integovernmental Affairs, U.S. Department of Agriculture (USDA), for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is OSSA, Cooperative State Research Service, Room 224 D, Aerospace Building,USDA, Washington, DC 20250-2200 (Telephone: 202-401-4640 or Fax: 202-401-5179)

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Wildflowers

The wildflower business may bloom as never before in coming years. Federal legislation adopted in September 1987 requires that 25 cents of every $100 in Federal highway landscaping funds be used to plant wildflowers. With few exceptions wildflowers are now part of any landscaping project on the Federal-aid highway system. Most States already have some sort of native plant growth program involving highways, following the lead of Texas, which began its highway beautification with wildflowers in 1927.

A resurgence of interest in the landscaping of the last century, with its emphasis on native plants, also is noted by Dr. E. "Pat" Carpenter, professor of plant science at the University of Connecticut. Houseowners who want to get the most yard beauty from the least work, he says, are turning to "naturalistic landscaping."

Reduced maintenance costs also are part of the benefits from wildflowers along roads. Many native plants are highly resistant to drought. Texas reported saving millions of dollars by substituting flowers for roadside weeds.

Texas activities helped inspire the National Council of State Garden Clubs, which launched its Operation Wildflower project in 1973. Under Mrs. La Verne R. Collard of Massachusetts, it has a national newsletter (*The Columbine,* P.O. Box 860, Pocasset, MA 02559) and encourages work with the U.S. Department of Transportation's Federal Highway Commission and State highway agencies to promote road plantings.

Such projects may not only open up new markets for producers of wildflower seed but also stimulate greater demand for wildflower plants around homes.

Wildflower Families

"Wildflowers" is the nickname for herbaceous flowering plants native to an area. They come in many shapes, sizes, and colors and grow everywhere.

Most are annuals, but many are biennials or perennials. Those along highways are usually perennials from the meadows, but they also are found in alpine, aquatic, bog, and timber settings.

Major wildflower families include legume (including the bluebonnet, State flower of Texas, and the locoweed), rose, violet, heath (such as crimson snowplant), phlox, snapdragon, mint, sunflower, lilly, arum (including the Jack-in-the-pulpit and the skunk cabbage), and orchid—including the lady's slipper. Others not commonly thought of as wildflowers are cat-tails, poppies, capers, mustards, geraniums, callas, amaranths, cacti, and even Spanish moss.

Although wildflowers grow in all States, most are extremely sensitive as to the locale in which they can be grown. Wild plants have adapted by nature to environmental factors such as climate, rainfall, altitude, exposure to sun or shade, and the predominant soil's pH (balance of acidity to alkalinity). Any attempt to reestablish wildflowers must begin by recognizing those field factors. Relatively few natives are like the perennial columbines (*Aquilegia canadensis,* etc.) of the buttercup family that thrive from border to border. Therefore, before anything else, potential entrepreneurs need to learn which flowers are native to their areas.

Some species of wildflowers have even become extinct. Conservationists actively campaign against wild collection except at a commercialized site where bulldozers already are wiping out plants. They urge consumers to buy plants or seeds from growers.

Propagation

Some wildflowers are propagated best from seeds, although seeds sometimes must be frozen to get them started. Other ways of starting flowers are from divisions, or stem or root cuttings. Some can be started from bulbs, corns, rhizomes, stolons, or tubers.

But many plants are difficult to propagate, says Dr. Henry M. Cathey, director of the National Arboretum of the Agricultural Research Service (ARS), U.S. Department of Agriculture (in Washington, DC 20002). Wildflowers brought into landscaping are in "strange" territory that works against their reproduction, Cathey says. Also, the nursery industry needs tough plants that survive transplanting, shipping, and other environmental changes. At the same time, the industry needs plants that can be produced on a commercial scale.

Although out of print at USDA, Cathey's ARS booklet, *Growing Flowering Perennials,* Home and Garden Bulletin No. 114, may be of interest to wildflower growers. Some libraries still have it.

Other publications about growing wildflowers are:

1. *Wild Flowers of the United States* by Harold William Rickett (multivolumed encyclopedia with colorful photographs).
2. *Growing and Propagating Wild Flowers* by Harry Phillips (University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC.27514, $16.45 pamphlet, $26.45 hard cover).
3. *American Nurseryman Magazine.*
4. *Directory to Resources on Wildflowers' Propagation.* (National Council of State Garden Clubs, 4401 Magnolia Ave., St. Louis, MO 63110.)

A source of bibliographic information on wildflowers is USDA's National Agricultural Library, 10301 Baltimore Blvd., Room 111, Beltsville, MD 20705.

An information source on nursery industry research involving native plants is Dr. Richard E. Bir, Extension horticulture specialist at North Carolina State University. His address is Mountain Horticultural Crops Research Station, 2016 Fanning Bridge Road, Fletcher, NC 28732-9628.

Research Center

The National Wildflower Research Center (NWRC) in Texas is the heart of research and information about U.S. wildflowers. This nonprofit organization, financed entirely by contributions, has a membership of more than 8,000. It publishes a quarterly newsletter, *Wildflowers,* for members. NWRC's address is 2600 FM 973 North, Austin, TX 78725.

"There is a phenomenal public interest in wildflowers for ecological, esthetic, and economic reasons," according to Dr. David Northington, executive director. The Center receives thousands of inquiries annually, from every State.

Members for $25 a year receive the newsletter, priority mail handling, and free fact sheets. Nonmembers wishing information should include a legal-sized envelope with 56 cents' postage.

The Center has cooperative projects with several facilities, such as

Farmingdale University and Clark Garden in New York, Atlanta Botanic Gardens and Callaway Gardens in Georgia, Denver Botanic Gardens in Colorado, and the University of North Dakota.

Specialists at NWRC and some State Universities are always looking for easier ways to grow wildflowers. Some county Cooperative Extension Service (CES) agents have information.

USDA Assistance

A Plant Materials Program, which includes other conservation plants besides wildflowers, is conducted by the U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS).

This program is handled through 25 plant materials centers in 22 States. Wildflowers are among the cultivars (cultivated varieties) that the program has developed to improve erosion control on cropland, along highways and shorelines, and at minespoils. The program also aims to boost forage yields and the protein diets of grazing livestock.

The SCS program includes help to wildflower seed growers. Much labor is involved in harvesting and packaging seed. And there is a scarcity of equipment. However, in Oregon and Washington, some commercial seed growers use grain harvesting equipment adapted to gathering seed.

Any local SCS county office can handle inquiries. Experts there will have advice and can speed getting seed from a plant materials center.

SCS's publication, *Improved Plant Materials Cooperatively Released by SCS Through December 1986,* lists many useful conservation cultivars of plants, including wildflowers. Also known as forbs (herbaceous plants other than grasses that are common in meadows), all may be grown from field-planted seed. With their cultivar name inside quotation marks, they include:

'Golden Jubilee,' a black-eyed Susan (*Rudbeckia hirta*);

'Sabine,' an Illinois bundleflower (*Desmanthus illinoensis*);

'Eldorado,' an Engelmann daisy (*Engelmannia pinnatifida*);

'Midas,' a rough oxeye (*Heliopsis helianthoides*);

'Eureka,' a thickspike gayfeather (*Liatris pycnostachya*);

'Appar,' a Lewis flax (*Linum lewisii*);

'Bandera,' a Rocky Mountain penstemon (*Penstemon strictus*);

'Kaneb,' a purple prairieclover (*Petalostemon purpureum*);

'Sunglow,' a grayhead prairie-coneflower (*Ratibida pinnata*);

'Nekan,' a pitcher sage (*Salvia azurea va. grandiflora*);

'Aztec,' of the Maximilian sunflower (*Helianthus maximiliani*); and

'Prairie Gold,' of the same species.

The SCS publication notes States in which each plant grows best and which plant materials centers grow them for seed. The booklet is available at no charge from W. Curtis Sharp, SCS national plant materials specialist, P.O. Box 2890, Washington, DC 20013. He also has a list of the centers, which may be visited.

Accessing Markets

A 17-page report, "Accessing the Market," is available from Pat Carpenter at the Department of Plant Sciences, University of Connecticut, Storrs, CT 06268. Carpenter discusses groups of plant buyers and how to reach them through paid or free promotions. He also lists 20 State native plant associations and the regional New England Wild Flower Society, Inc., Garden in the Woods, 180 Hemenway Road, Framingham, MA 01701.

Gardeners are one potential market. Garden clubs often have garden sales at meetings. Don Shadow, owner of Shadow Nursery, Inc. (Route 1, Box 37-A, Winchester, TE 37398), suggests growers also hunt for local markets at

(1) retail garden centers,

(2) organizations with botanic gardens, and

(3) larger established nurseries, which may use additional plants.

Other markets might include landscapers and interiorscapers or interior decorators for civic or other public areas, colleges, other institutions, and private apartments.

Another way to reach consumers is by displaying potted perennials at grocery stores or florist shops or from a temporary greenhouse in a shopping center parking lot or along a highway with ample parking space.

For seed sales, growers may wish to contact groups of wildlife and bird conservationists, some of whose members may have farmland lying fallow much of the year. They welcome ideas about wildflowers bearing seeds or fruit that stays on branches up above the usual snowfall. They might be reached through want ads in professional magazines.

Marketing Cautions

When selling seeds, conscientious marketers should label seed packets carefully. Garden club groups point out that some seed mixes are not labeled accurately and may contain unmentioned noxious weeds, such as loosestrife. They urge purchase only of carefully controlled seed mixes that contain high percentages of indigenous species. An entrepreneur should buy seeds only for one species at a time.

Also, shippers must be aware of State and Federal plant quarantine laws designed to prevent movement of diseases or other pests across State lines. Growers should seek information either from their State plant regulatory official at the State Department of Agriculture or officials with USDA's Animal and Plant Health Inspection Service (APHIS, Plant Protection and Quarantine, Regulatory Services Staff, Federal Building, Hyattsville, MD 20782).

When entrepreneurs are making plans, they might want to note that net income may be about a fifth of gross sales. Without a high gross, an entrepreneur should not expect to make more than a supplemental income even with skilled, hard work and a coldframe or two, according to Dr. Sam Jones, professor of botany at the University of Georgia, Athens.

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Programs Director). The address is: Office for Small-Scale Agriculture, Cooperative State Research Service/Office of Grants and Program Systems, Room 635, Hamilton Building, Washington, DC 20250.

December 1987

United States
Department of
Agriculture

Cooperative State
Research Service

Office for
Small-Scale Agriculture

A Small-Scale Agriculture Alternative

Shiitake Mushrooms

Shiitake (pronounced "shee-tah-kay" and spelled the same whether singular or plural) are said to be the favorite mushroom in Japan. Worldwide production is second only to the common white button mushroom found in most grocery stores in the United States. Besides Japan, other large producers include China, Taiwan and Korea.

Since 1972, when the U. S. Department of Agriculture (USDA) first allowed shiitake spawn into the United States, production here has grown steadily. During the 1991-92 season, USDA's National Agricultural Statistics Service (NASS) estimated that over 2.7 million pounds of shiitake were grown in the United States. This compares to an estimated 738.8 million pounds of the common button mushroom. The current NASS statistics (published each August) can be purchased from ERS-NASS, P.O. Box 1608, Rockville, MD 20849-1608 for $6.

Jerry Larson, the International Trade Manager for the Oregon Department of Agriculture (121 SW Salmon St., Suite 240, Portland, OR 97204-2987) believes that the market potential for U.S.-grown shiitake has hardly been touched. He reports that the United States imports 14,000 metric tons of dried shiitake from Japan, Taiwan and Korea each year. If these were fresh mushrooms, this would amount to 126,000 metric tons (nearly 100 times the current U.S. fresh production level).

Growing Shiitake

Shiitake can be grown either on natural logs or on artificial logs made of a special combination of oak sawdust, bran, millet and other additives. Most small-scale farmers will want to start with natural logs because they require less environmental control. Further information on sawdust culture can be obtained from Professor Dan J. Royse, at Pennsylvania State University (211 Buckout Laboratory, Penn State University, University Park, PA 16802).

There are five basic steps in cultivating shiitake on logs:

•Ordering good-quality culture, which is called spawn or inoculum, so that it will be on hand when needed. The mushroom that will grow from the log is the fruiting body of the whole fungus. Most of the fungus is a mat of white strands (mycelia) that grow through the log to collect the nutrients necessary for fruiting. The spawn that you will purchase is nothing more than a pure strain of living mycelia, growing either in sawdust or in hardwood dowels. Contact your county extension agent for help in locating a spawn supplier near you.

•Obtaining suitable hardwood logs. Usually oak, maple, beech, ironwood, chestnut, or alder are used. The logs are cut green during the winter when the sap is down and are cut to 3- or 4-foot lengths for easy handling. Diameters from 2 to 6 inches seem to work well. Be careful to avoid damaging the bark. Torn bark can allow other organisms to enter the log and compete with the shiitake for nutrients.

•Inoculating the logs. Inoculate the logs with the spawn between 1 and 3 weeks after cutting to ensure optimal moisture content. Inoculate the log by drilling holes partway into the log. Then carefully pack these holes with the spawn and seal them with wax to retain moisture and keep out competing organisms.

•Allowing shiitake to colonize the wood. Once the mushroom has been introduced to the log via inoculation, it takes 4-9 months, depending upon climate, for the mycelia to spread throughout the log. During this "spawn run" period the logs are stacked and shaded to avoid moisture loss.

•Inducing fruiting. To induce fruiting the logs are soaked then shaded to keep the moisture level up until fruiting begins. Yields are quite variable. In some cases the spawn will not run through the log and no mushrooms will be produced. The highest yields are only attainable when all conditions are near ideal. The logs can be refruited several times without additional inoculation and can produce mushrooms for several years, depending upon how often they are fruited.

There are several additional steps that must be pursued by an entrepreneur to bring the shiitake crop to the market and ultimate sale. Crop harvesting, packaging, storing, transporting, and marketing are some of the vital and important steps that are necessary. However, there are a host of different procedures practiced because factors such as the grower's location, time limitations, financial considerations, etc. necessarily dictate the technique pursued.

Information Sources

Several books are available that can provide additional details on growing shiitake. Among them are:

- *Growing Shiitake Commercially*, by Bob Harris
- *The Mushroom Cultivator*, by Paul Stamets and J.S. Chilton
- *Growing Shiitake Mushrooms in a Continental Climate*, by M.E. Kozak and J. Krawcyzk
- *Shiitake Grower's Handbook: The Art and Science of Mushroom Cultivation*, by Paul Przybylowicz and John Donoghue

A 13 ¼ minute video on "Growing Shiitake Mushrooms" is available for $10 from the Cooperative Extension Programs of Georgia's Fort Valley State College and North Carolina A&T State University. It is part of a video library they produced on money-making ideas for small-scale farmers. (Checks should be payable to NC A&T University CEP and sent to Director, Extension/Research Communications, NC A&T University, P.O. Box 21928, Greensboro, NC 27420.)

Economics

The costs of producing the mushrooms vary considerably. Major items to consider are the cost of the wood, the cost of the spawn, and the cost of labor. Typically, labor will be the largest consideration.

Returns are also quite variable and depend heavily upon your growing climate. The Forest Resource Center reported results of field trials in the March 1992 edition of its newsletter, Shiitake News. Depending upon the species of log and the strain of shiitake used, it reports yields of 0.4% to 12.6% of the green weight of the logs. With a cord of oak which weighs 2,200-pounds and contains 300 logs and an average yield of 7%, one could expect to grow 154 pounds of shiitake over 3 growing seasons. At $4 per pound, this cord would gross $616 over 3 years. These are conservative estimates based upon the Minnesota experience. Higher yields, on the order of 20% of the weight of the logs, can be produced in warmer, more humid climates and with the proper choice of logs and spawn.

Production Scales

Kenneth F. Konsis of the Vermilion County Conservation District in Westville, IL, reported to the 1990 Illinois Specialty Growers Convention that for large profits a 3,000 log operation is needed. However, he also recommends starting in the 100-to 500-log range and adding more as desired. This advice is echoed by Ron Snyder, Coordinator for the Geode Resource Conservation and Development (RC&D) office in southeast Iowa.

NASS does not attempt to track production from growers with fewer than 200 logs. The agency reported 458,000 logs under production and 172 growers in the United States during the 1991-92 season. The average grower is thus using around 2,700 logs.

Market Prices

Wholesale market prices for fresh shiitake vary seasonally and according to the market serviced. During the fall and spring when most outdoor growers are picking their mushrooms, prices tend to be lower (say $4 per pound). In the winter and summer, prices tend to be higher (as high as $7.50 per pound) since only those with climate-controlled growing facilities will be producing the mushrooms.

The 1991-92 NASS report mentioned above showed the average price nationwide for shiitake at $4.11 per pound.

Jim Gwynn of the USDA's Agricultural Marketing Service's Fruit and Vegetable Division (Market News Branch, Room 2503-S, P.O. Box 96456, Washington, DC 20090-6456) reports that AMS has employees in most major markets obtaining market prices daily. Daily reports can be obtained by subscription at $15 per month per market city. Weekly reports are $8 per month. Markets currently reporting shiitake sales include San Francisco, New York, Chicago, Atlanta, Boston, and Los Angeles. The lack of reports from other markets indicates potential opportunities for growers in those areas.

Pluses for Small-Scale Farmers

Kenneth F. Konsis, in the report mentioned above, states that shiitake growing might fit well with other goals of small-scale farmers. He suggests thinnings from commercial woodlots can be used for shiitake logs. He also notes that in many cases trees can be cut at the 6- to 8-foot height and will resprout at that height without damage by animals. The trees can then be used as living fence posts and provide a continuous supply of shiitake logs.

The Forest Products Lab of the USDA Forest Service (One Gifford Pinchot Drive, Madison, WI 53705-2398) has a shiitake factsheet in its free *Techline-Microbial and Biochemical Technology* series. FPL suggests that smaller diameter hardwood trees and limbs and tops of larger trees are one of the most underutilized forest materials currently available and that shiitake growing is a viable use of those materials. The factsheet notes that shiitake cultivation is expected to be an excellent growth industry over the next several years.

Marketing Points

Shiitake have some strong selling points. Fresh, the caps, 2 to 5 inches in diameter, have a chewy texture and a full-bodied aromatic flavor. They are low in calories (125 per fresh pound) and low in fat.

Reports indicate that tree-grown mushrooms, like shiitake, have about twice the fiber content of the common white button mushroom (*agaricus bisporus*). The particular type of fiber found in these mushrooms feeds the beneficial bacteria in the colon and enhances colon health.

According to Dr. Shu-Ting Chang, Professor of Biology, Chinese University of Hong Kong, and Dr. Phillip G. Miles, Professor of Biology at the State University of New York in Buffalo (in their 1990 book *Edible Mushrooms and Their Cultivation)*, shiitake contain all of the 9 essential amino acids of protein required in the human diet.

More Information

The American Mushroom Institute (907 East Baltimore Pike, Kennett Square, PA 19348) publishes *Mushroom News* and *Mushroom News Flash* for their members on a monthly basis. Associate memberships are $300 per year and grower memberships start at $350 per year.

Successful Farming Magazine has published two articles on shiitake in its ADAPT series. One describes the initial experience of the Geode RC&D's shiitake project. The second shares the experience of a Virginia shiitake farm. Copies of these articles can be obtained from Betsy Freese at Successful Farming (ADAPT), 1716 Locust Street, Des Moines, IA 50309-3023.

Shiitake News is published three times a year by the nonprofit Forest Resource Center at Rt. 2, Box 156A, Lanesboro, MN 55949. The 16-page newsletter costs $25 for an initial subscription, which also includes three back issues. Renewals are $15 per year.

The Mushroom Growers' Newsletter (P.O. Box 5065, Klamath Falls, OR 97601) is published monthly and includes production and marketing information (including prices) on other cultivated mushrooms as well as shiitake in its 6 pages. The current issue is $3.50, back issues are $3 each and subscriptions are $24 per year.

By Jerry Haugen, P.O. Box 5065, Klamath Falls, OR 97601 and George B. Holcomb of the Office of Public Affairs, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA), Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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June 1993

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A Small-Scale Agriculture Alternative

Mushrooms

Shiitake (pronounced "shee-tah-kee" and spelled the same whether singular or plural) are said to be the favorite mushroom in Japan. As many as 200,000 Japanese cultivate these forest fungi as a seasonal cash crop from logs of the shii tree, closely related to the oak. Other Asian countries are following suit; the brownish shiitake are also called black Chinese or black forest mushrooms and are grown in increasing amounts in Taiwan, China, and Korea.

The number of U.S. shiitake farmers is rising, though most of them operate on a small scale. Still, some U.S. growers already use more than 10,000 3- or 4-foot-long hardwood logs (2 to 8 inches in diameter) to produce shiitake. Some even plan to expand to more than 100,000 logs—the size of some growers in Japan.

U.S. shiitake production soared from nearly zero in 1980 to a possible 3 million pounds in 1987. Leading States in production are Pennsylvania, California, Michigan, and Minnesota.

Shiitake could mean new jobs for at least 20,000 U.S. farmers, according to Dr. Gary F. Leatham, a U.S. Department of Agriculture (USDA) research chemist with the Forest Service in Wisconsin. But that idea depends on an annual consumption rate in this country of a pound per person. In comparison, our current annual average per capita consumption of ordinary white (*Agaricus bisporus, A. bitorquis,* or *A. brunnescens*) mushrooms is about 2-½ pounds. However, that's an increase of a pound in only 8 years. U.S. production of all mushrooms increased to about 615.4 million pounds in 1986-87.

The prospective producer must decide in connection with any product how much the market can handle and what prices will be competitive. If the demand can be generated, domestic producers can compete with foreign producers in local markets, according to Dr. Michael P. Levi, Extension specialist at North Carolina State University (Department of Forest Resources, Raleigh, NC 27650). Few if any fresh shiitake are being imported.

As with any product that has a small-market niche, care must be taken not to produce more than the market can absorb at a profitable price.

Andy Hankins, alternative agriculture specialist at Virginia State University (Petersburg, VA 23803), suggests a small-scale entrepreneur start off with 1,000 log chunks, 3 to 4 feet long and 2 to 6 inches in diameter, as a winter project. If all goes well, he said, 1,000 logs can produce 1,000 pounds of shiitake over a year's time. That could bring about $5,000 at a market. He estimates Virginia alone has about 180 small-scale growers using 500 to 5,000 producing logs apiece. One grower has approximately half a million logs.

Regional prospects for using forests to produce shiitake were discussed in a 1985 paper, "An Evaluation of the Potential for Shiitake (*Lentinus edodes*) Mushroom Cultivation in Appalachia," by Dr. James P. San Antonio, an Agricultural Research Servicer (ARS) scientist at the Agricultural Research Center, U.S. Department of Agriculture (USDA), Beltsville, MD, and Dr. Fred B. Abeles, a scientist with West Virginia University and the ARS Appalachian Fruit Research Station at Kearneysville, WV. Appalachia has an abundance of underutilized second-growth hardwoods, they noted, with climate and topography conducive to shiitake cultivation.

But before beginning shiitake production, a prospective entrepreneur needs to check many information sources, such as the Economics and Marketing Reference Branch of USDA's National Agricultural Library (NAL). NAL's Jerry Rafats, himself a shiitake grower, has developed a bibliography of information listing 65 sources which NAL will mail on request (from Beltsville, MD 20705). Also, prospective entrepreneurs may contact county Extension agents to learn whether their State universities have mushroom specialists. Hankins urges potential growers to consider joining a marketing cooperative.

Shiitake Selling Points

Shiitake have some strong selling points. Fresh, the caps, 2 to 5 inches in diameter, have a chewy texture and a full-bodied aromatic flavor. They are low in calories (125 per fresh pound) and low in fat. Possibly because they grow on wood, shiitake have more fiber than the commonly marketed white button mushroom, according to Dr. Bela Szepesi, a USDA research chemist with the ARS Human Nutrition Research Center in Beltsville. Unlike fruits, mushrooms do not have "small" carbohydrates, such as sucrose, he notes. They can be a source of B vitamins and minerals. Drying with sunshine or ultraviolet light increases their vitamin D content but they usually are eaten fresh. Protein content is in the range of typical vegetables, mycologists indicate.

Drying Advantage

Drying gives shiitake a shelf life of years when stored in sealed containers at room temperature. Most domestic growers prefer to market them fresh.

Fresh shiitake have a shelf life of 12 days, compared with about 8 days for the common whites, and they are more resistant to bruising and spoilage. They may be refrigerated up to 14 days. They should not be washed or peeled to market them. (Their umbrella tops can be cleaned with a soft cloth or paper towel.)

Some U.S. producers market by mail order, but most sell shiitake locally. Gourmet restaurants, farmers' markets, and supermarkets provide opportunities. Allen C. Bjergo, community development specialist with the Montana State University Cooperative Extension Service (1018 Burlington, Room 200, Missoula, MT 59715), has developed a booklet called "Your Marketing Plan Outline" which can provide added ideas about marketing. He also has booklets on "Financing Your Ideas" and "Earn Extra Money From Your Farm or Ranch."

Marketing Prices

Prices vary considerably. In Ohio, fresh shiitake are bringing $4 to $6.50 a pound wholesale, according to Steve Bratkovich of the Forestry Department at Ohio State University, Columbus.

Current mushroom prices and markets may be obtained regularly from USDA, through its Agricultural Marketing Service (AMS). The AMS Fruit and Vegetable Division's Market News Branch provides daily reports on major sales of mushrooms, listing prices and shipment sizes from major metropolitan areas. In early 1987, while many cities reported sales of "domestic whites," only a few reported sales of shiitake.

In San Francisco, shiitake were bringing $6.50 to $8 a pound. That

market also reported sales of "sponge" morels from Canada, at $12.50 a pound; chantrelles from Oregon, $9 a pound; angel trumpets from Idaho, $8.50 a pound; and pleurettes from Italy, $27.50 per 8-pound carton.

The scarcity of sales reports on shiitake may suggest undeveloped markets at several major cities. (Write to W.H. "Bill" Crocker, Room 2503- S, AMS, USDA, Washington, DC 20250, to obtain subscription prices and cities from which prices are reported. The cost generally is about $12 a month per city.)

Ohio Study

In 1985, Bratkovitch and Constance A. Jones of the Ohio Cooperative Extension Service, at Ohio State, in cooperation with the Ohio Department of Agriculture Cooperative Extension specialist in forestry, began testing several strains from commercial U.S. suppliers to see if shiitake could be produced economically in Ohio. They can. With certain shiitake spawn the researchers were able to get as many as 338 pounds of shiitake per cord of wood over a 20-month period. They used oak logs soaked twice and carefully stacked to maximize air circulation. This procedure is a must to prevent weed fungi contamination.

Bratkovitch (at 017 Standpipe Road, Jackson, OH 45640) can provide a report describing the Ohio Shiitake Project. His report was also published by the *Shiitake News,* which covers growing as well as marketing topics. The *Shiitake News* is produced every March, August, and November. First subscription costs $25 a year including back issues, and annual renewal is $15. Editor is Joe Deden, director of the Forest Resource Center (private, nonprofit educational organization at Route 2, Box 156 A, Lanesboro, MN 55949).

Deden estimates that a cord of wood (roughly 150 4-foot logs) can usually produce 150 pounds of shiitake a year. At $4 to $6.50 a pound, that's a gross of $600 to $975 a cord. He calculates production costs at about $500 a cord.

The 1983 book, *How to Grow Forest Mushrooms (Shiitake),* by Daniel D. Kuo and Mau H. Kuo (Mushroom Technology Corporation, P.O. Box 2612, Naperville, IL 60565), estimates production more conservatively. Their book (originally selling for $8.95) provides details on production and harvesting methods.

Iowa Conference

Ric Zarwell, former coordinator of the Geode Wonderland Resource Conservation and Development Office (3002 A Winegard Drive, Burlington, IA 52601), provided details on shiitake in *Successful Farming* magazine's publication, *ADAPT100,* (100 ideas for farmers). This publication grew out of the magazine's 1986 Iowa conference on diversification in farming. It sells for $12.95, including postage, at P.O. Box 10652, Des Moines, IA 50336.

Costs and related data on results of a 4-year shiitake project using hardwood logs indoors and outdoors at the University of Minnesota are scheduled for release by 1988. A report on the project may be obtained from Kraig Kiger (1851 E. Highway 169, Grand Rapids, MN 55744).

Culture

There are six basic steps in cultivating shiitake:

- Ordering good-quality culture, which is called spawn or inoculum, 3 months prior to cutting logs;
- Obtaining suitable hardwood logs such as oak;
- Inoculating the logs between 1 to 3 weeks after cutting to ensure maximum moisture content;
- Allowing shiitake to colonize the wood through incubation (the spawn run);
- "Fruiting," and
- Crop harvesting, packaging, storing, transporting, and marketing.

Stable temperatures and high humidity are required. Besides logs, sawdust is available for use in some areas. Some information on sawdust culture may be obtained from Dr. Paul Wuest, mushroom Extension specialist, or Dr. Dan J. Royse, associate professor at Pennsylvania State University (211 Buckout Laboratory, Penn State University, University Park, PA 16802).

Other Information Sources

A reprint of Leatham's "Cultivation of shiitake, the Japanese forest mushroom, on logs: A potential industry for the United States," published in the *Forest Products Journal,* August 1982, as well as lists of spawn suppliers and consultants, U.S. research groups, and references, may be obtained by writing to the Forest Products Lab, P.O. Box 5130, Madison, WI 53705.

Another information source is the American Mushroom Institute (907 East Baltimore Pike, Kennett Square, PA 19348), national trade association for mushroom growers and marketers. The Institute publishes the monthly *Mushroom News* of 30 pages or more and occasionally devotes most of an issue to a major problem.

The Produce Marketing Association (1500 Casho Mill Road, Newark, DE 19714-6036) also can provide a bibliography on mushrooms to nonmembers of PMA for $20 (the search fee) plus $10 for computer-page printouts of up to 10 pages, plus $1 per page additional.

Those wishing to grow mushrooms faster and perhaps easier than shiitake may note the May-June, 1987, issue of *The Furrow,* a publication issued by Deere and Co. (John Deere Road, Moline, IL 61265.) It reports that Louisiana farmer John Meek produces oyster mushrooms in pasteurized bermudagrass bales. He harvests 5 to 6 pounds of mushrooms per bale weekly for 6 to 8 weeks, growing this species in a converted barn.

For those entrepreneurs able to produce the morel mushrooms commercially, the Neogen Corporation (620 Lesher Place, Lansing, MI 48912) has been granted a patent and will award licenses to experienced growers or companies to produce morels in recommended facilities. The research on morels was led by Dr. Gary Mills (Department of Natural Science and Agriculture and Natural Resources, Michigan State University, East Lansing, MI 48824).

Prepared by George B. Holcomb of the Office of Information, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (Howard W. "Bud" Kerr, Jr., Program Director). The address is: Office for Small-Scale Agriculture, Cooperative State Research Service/Office of Grants and Program Systems, Room 635, Hamilton Building, Washington, DC 20250.

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A Small-Scale Agriculture Alternative

Asparagus

Easy to plant and care for, asparagus comes back every year—with minimal labor except for harvesting. Its high value brings early income to direct marketers before harvest of other vegetables or—as a good complementary crop—strawberries.

Asparagus, native of temperate regions, succeeds best where either low temperatures or drought stops plant growth for a 'rest.' Asparagus should not be considered for commercial production where warm conditions result in the plant's growth all year.

Asparagus grows and yields best in deep, well-drained sandy loam soil. However, it tolerates heavier soils as long as the water table does not come within 4 feet of the surface. The soil should be free of perennial weeds.

Planting Techniques

Planting can be done anytime in the spring after the soil warms to 50° F. Asparagus should not be planted in cold, wet soils which can harbor *Fusarium* crown rot disease.

To open furrows, a lister plow or middle-buster throws soil in opposite directions. Only a 6-inch deep trench is needed, and no deeper. The deeper the plant, the lower the yield.

Rows should be at least 5 feet apart. This permits good air circulation and helps stop onset of foliar fungal diseases.

Asparagus is generally planted using 1-year-old crowns. A crown is a root system of a year-old plant grown from seed.

At planting, 200 lbs. of 0-20-0 or 0-46-0 fertilizer per acre goes in the furrow. The crowns are tossed atop the fertilizer. They won't burn. If not added at first, phosphorous won't reach roots later.

Crowns go 1 to 1-1/2 feet apart in a row. This takes between 5,800 and 8,700 crowns per acre. Costs run about $130 per 1,000 crowns or from $780 to $1,170 per acre. Including fertilizer and lime (if needed), soil preparation, etc., total cost should be about $1,500 per acre.

Crowns placed in the trench should have the crown buds facing up with the root system spread out as much as possible. Cover the trench with soil up to the original soil level. However, do not compact the soil over the row, or spear growth will be seriously delayed. With good soil moisture, new spears emerge in about a week.

Harvesting Techniques

Asparagus is generally harvested by snapping versus cutting. Snapping has the advantage of harvesting an "all usable" product. The spear snaps at the point where fiber starts to develop. Cutting spears below the soil with a knife adds more weight to the spear but the lower 1/3 of the spear is tough and fibrous and has to be discarded. Also, cutting below the soil injures other potential buds that will send up new spears on the crown. A new spear comes up from another bud on the crown. Snapped asparagus should command a higher price than cut asparagus.

In California and certain other States, commercial asparagus growers still cut below the soil with a knife because the fibrous butt end of the spear helps to slow water loss in the tip of the spear so it can survive several days of transit.

Asparagus spears are harvested when they reach a height of between 5 to 9 inches, with a diameter of at least 3/8 inches or larger. The first harvest year is actually the year after crown planting. Harvesting lasts 2-4 weeks, depending on how long the mature fern stays green. In subsequent years, the harvest season can be extended for 6-8 weeks.

Contact a State Extension specialist to find out how long the harvest can last. In the east, in the cool spring, asparagus grows very slowly, and a 9-inch spear can be harvested with the spear tip being tight. When temperatures rise, a 5-inch spear may have to be harvested before the tip opens up or starts to "fern out." Spears allowed to fern out must be snapped and destroyed to deny insects a site to lay eggs and to prevent the delay of new emerging spears. Stop harvesting when 3/4 of the spear's diameter reaches less than 3/8 inch.

Fiber development (toughness) of the spear is related to the tightness of the spear tip. The tighter the tip, the more tender the spear is. Spear diameter has no bearing on toughness.

Asparagus can be harvested by hand into buckets. It is tiring work. Or a person can harvest an acre of asparagus in 2 hours riding a harvest-aid—easily home-made to straddle the rows—traveling between 1/2 to 3/4 mph.

Asparagus is very perishable and must be put into an ice water bath immediately after harvest. It can then be drained and placed in plastic bags, and stored under refrigeration between 32 and 40° F for 2 weeks without an appreciable loss of quality.

However, the grower shouldn't store for more than 2 days, thus giving the consumer the longest storage time possible. Wholesale growers will pack the spears into 30 lb. pyramid wood or corrugated cardboard containers.

Marketing Techniques

Many growers sell asparagus by direct marketing (roadside market, pick-your-own, or farmer's market). Many growers who have a roadside stand located on a well-traveled road do well. Others advertise through newspapers, telling the people to come to their farm to pick it themselves or to buy it already picked.

Pick-your-own marketing involves considerable consumer education on how and when to pick.

Wholesale marketing of asparagus for the small grower is not profitable due to the added production costs. Wholesale buyers usually want the asparagus packed in a certain container, or require the asparagus to be hydrocooled, using equipment in a packing-house that showers ice cold water on top of the packed asparagus to remove the field heat. They will buy huge quantities of asparagus (tractor-trailer loads) over a certain period of time.

Also, when growers analyze the cost of packaging, cooling, transportation, etc., the price per pound they receive is usually very low compared with the price received by those growers who retail direct to consumers.

Wholesale marketers are forced to take whatever price is offered for their product, regardless of the quality.

Another way to wholesale asparagus, besides selling to produce wholesalers, chain stores, etc., is to sell to area hospitals, nursing homes, schools, etc. A small-scale grower may be able to receive a satisfactory price, and be able to "unload" some unanticipated asparagus during heavy growth.

Another sales option is to become familiar with chefs of fine restaurants in your area. Take them some asparagus and let them try it.

Other growers practice "value added"—changing the product and selling it in a different way other than in the raw product stage. For example, getting the necessary license to preserve green or white asparagus by pickling it and packing it in glass jars enables a grower to command a premium price and will bring off-season income if sold during the winter. Mail-order can be done.

White Asparagus

White (blanched) asparagus is traditionally grown in Europe by mounding up the adjacent soil over the asparagus rows in the spring before the spears emerge to a height of 10 to 12 inches. Once the tip of the spear emerges through the mounded soil, it is cut off at the base by digging into the mound. This is very

labor intensive but the product can bring a price of about $3 to $5 per pound.

[redacted]asier way to grow white asparagus is t[redacted]nd black plastic over wire hoops, bent o[redacted]d spaced 5 to 6 feet apart over the row. One side of the plastic is weighted down with soil and the other is anchored by placing 2 X 4's on the edge of the plastic. When the spears emerge, the 2 X 4's are put to one side and the edge of the plastic is lifted to snap the white spears.

The black plastic has to be at least 4 mils thick to block out the sunlight. Otherwise, the spears turn green.

Varieties

The old Mary and Martha Washington varieties are **dioecious**, meaning they produce male and female flowers on separate plants. Female plants produce seed which fall to the ground, germinate, and become an asparagus seedling weed problem. They also have to expend more energy to produce seed, so spear yield is less.

All-male hybrids have been developed by Rutgers University in New Jersey to have superior high-yielding characteristics with no seeds produced. Some of these popular all-male varieties include **Jersey Giant, Jersey Knight, Jersey Prince, and Jersey King. Jersey Centennial** is a variety consisting of 50 percent male and 50 percent female plants.

The all-male hybrids yield 3 to 4 times more than the older, open-pollinated varieties. G[redacted] following good cultural practices s[redacted]e able to expect the following yields:

- [redacted]bs. per acre the first year *after* planting
- 1,000-1,500 lbs. per acre the second year
- 2,000 lbs. per acre the third year
- 3,000 lbs. per acre the fourth year
- 4,000 lbs. per acre the fifth year

Other dioecious varieties for warmer climates include hybrids developed at the University of California. These include the F1 and F2 hybrids of UC 157, Ida Lea, and Apollo. They produce a high-quality 7- to 9-inch spear when daytime temperatures are warm. Yields are still less than those of New Jersey hybrids in warm climates.

Diseases and Disorders

Spears can be damaged by frost. If a frost is predicted, go out and harvest everything above ground. Spears should be mowed off at ground level after frost, being worthless.

Fungus diseases of importance include **asparagus rust**, *Phoma sp.*, and *Fusarium* **crown and root rot. Rust** will infect asparagus by attacking the fern growth. Orange rust pustules form on the fern and cause it to die back. *Phoma* forms elliptical (football shaped) spots on the fern stalks and also causes fern dieback. Approved fungicides must be applied after harvest when ferns reach 4 feet tall and th[redacted]plied every 14 days throughout the se[redacted]ntil late fall. *Fusarium* attacks the roots and the crown of the plant. It is present in the soil and plants will take it up through the root system when they are under stress.

Stresses can come from improper soil Ph; low fertility; excessive harvesting; and insect, disease, and weed infestations. Failure in any of these areas can lead to asparagus decline. The soil Ph should be between 6.5 and 7.5. Add limestone if soil Ph is below 6.0.

Insects

The **cutworm** feeds at night below the soil on one side of the spear tip. Spears are then unmarketable. Cutworms can be controlled using an approved insecticide.

Asparagus beetles lay eggs on spears, making them unmarketable. During fern growth after harvest, they chew on stalks, stripping off the green material, causing fern dieback. Asparagus beetles are controlled with an approved insecticide.

European asparagus aphids feed on fern growth, injecting a toxin. This results in dead crowns the following spring. So far, infestations have been sporadic throughout the Midwest.

Weed Control

Weeds are controlled mostly by hand hoeing and cultivation since no preemergence herbicides are labeled for use in asparagus during the planting year. The better the weed control during the planting year, the more fern growth for the next year's crop.

The following spring, about 3 weeks before asparagus emerges, mow dead ferns with a mower or bush hog. Delaying fern mowing until then will keep the soil temperature about 5 degrees colder than bare soil and discourage spears from emerging in an early warm spring.

Approved, preemergence herbicides may be applied right over the shredded fern because asparagus is a no-till crop. Cultivation will bury unwanted seeds from the female plants and run the risk of damaging crowns.

Asparagus Crown Sources

Jersey Asparagus Farms, Inc., RD 5,
Box 572 Newfield, NJ 08344.
Telephone: 609-358-2548; (NJ hybrids).

Daisy Farms,
91098 60th Street, Decatur, MI 49045.
Telephone: 616-782-7131; (NJ hybrids).

Nourse Farms, Inc.,
Box 485 RFD, South Deerfield, MA 01373.
Telephone: 413-665-2658; (NJ hybrids).

Cherokee Asparagus Farms,
1112 Valley Acre Lane, Tahlequah, OK 74464.
Telephone: 918-456-1993; (F2 of UC 157).

California Asparagus Seed and Transplants,
Inc., 2815 Anza Avenue, Davis, CA 95616.
Telephone: 916-753-2437; (F2 of UC 157, Atlas, Grande, and Apollo).

This list is intended only as a reference and does not imply endorsement; there undoubtedly are other suitable sources of crowns.

Information Source

For an illustrated publication on "Asparagus Production, Management, and Marketing," send $6 to Ohio State University, Piketon Research and Extension Center, 1864 Shyville Road, Piketon, OH 45661. Telephone: 614-289-2071.

By Carl J. Cantaluppi, Research and Extension Horticulturist, The Ohio State University, Piketon Research and Extension Center; and George B. Holcomb of the Office of Communication, U.S. Department of Agriculture, for USDA's Office for Small-Scale Agriculture (OSSA); Howard W. "Bud" Kerr, Jr., Program Director. OSSA's address: Ag Box 2244, Washington, DC 20250-2244. Telephone: 202-401-1805; Fax: 202-401-1804.

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All uses of fungicides, pesticides, and herbicides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Fungicides, pesticides, and herbicides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife if they are not handled or applied properly. Use all products selectively and carefully. Follow recommended practices for the disposal of surplus products and their containers.

February 1994

We're Gonna Be Rich!

Growing Specialty Cut Flowers for Market

by Frank and Pamela Arnosky

Cover photo by Robb Kendrick

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"We're Gonna Be Rich" contains articles previously published in ***Growing for Market,*** the monthly magazine for direct-market farmers. For information about subscriptions and other books about market farming, call toll-free: 1-800-307-8949.

Introduction

by Lynn Byczynski
editor and publisher, *Growing for Market*

Pamela and Frank Arnosky began writing the flower columns for *Growing for Market* in January 1995 and, so far, they have never missed a month. Here's the story of how they got the job: I met Pamela at an Association of Specialty Cut Flower Growers conference in 1994, and soon thereafter began to receive faxed letters from her telling me all about their 30-acre flower farm in the picturesque Hill Country south of Austin, Texas. The letters were packed with practical know-how, but they were also very funny. They had a wonderful conversational tone that made me feel like I had known the Arnoskys, and their flowers, and the great state of Texas, for years. In my mind, I thought of Pam and Frank as the Molly Ivins and Jim Hightower of the flower world. I knew I had spotted a talent, so I called them up and proposed that they write for *Growing for Market.* Pamela told me the letters were intended only as a lure to get me to come down and do a story about them. But they agreed to try their hand at writing regularly, and so they have.

With great enthusiasm and a wry sense of humor, they have regaled *Growing for Market* readers with advice, opinions, and anecdotes about flower farming. The title of this book, "We're Gonna Be Rich," is Frank's favorite refrain whenever success comes their way. Fortunately, Frank and Pam are often successful. They are out there on the cutting edge of the cut flower business. Every year, they search out the unusual - even the unheard of - and conduct their own research to learn all they can about every flower they grow. They are constantly tinkering with their farm, adding new plants, varying schedules, erecting more greenhouses, experimenting with different post-harvest treatments and so on. Every single month they say something *new* about growing cut flowers.

Growing for Market's readers have benefitted enormously from the

Arnoskys' generosity. With no effort to protect their "trade secrets", they have boldly told the flower-growing universe about the varieties they grow, where they get them, how they grow them, and where they sell them. They have undoubtedly given a leg up to some of the other growers selling in their markets, but Pamela and Frank have preferred not to think of other farmers as competition. Instead, they tell what they know, and sincerely encourage others to consider flower growing as a way to make a living on a small farm.

They come to flower growing from strong botany backgrounds, both having attended graduate school in plant-related fields. When they bought their farm in 1990, they started out growing poinsettias and bedding plants in a greenhouse. They differentiated themselves in that market by growing their plants organically. Within a year, they did a small planting of field-grown cut flowers, and were amazed at how well-received their flowers were by florists in Austin. Then came an upscale new supermarket that was looking for bouquets, and the Arnoskys decided to expand to fill the demand. Since then, the bedding plant part of the business has almost disappeared, with just a spring crop of vegetable transplants to help cash flow and only one greenhouse of poinsettias. The cut flowers, though, just keep expanding. As of this writing, they have 10 acres of field production and six greenhouses for winter production.

The columns in this book were written from 1995 to 1998. They are arranged loosely by season, with the January columns from each of the four years followed by all the February columns, then all the March columns and so on. As you read through the columns, you get a good sense of the issues facing the cut flower grower in each season.

The columns are also indexed in the back of the book, so you can look for specific topics as questions arise. Sources mentioned throughout the book are collected alphabetically in Appendix 1.

Whether you sit down and read these columns all at once, or peruse them in small bits and pieces, you're sure to learn a great deal about cut flowers. You'll probably get a few laughs, too, and feel as though you've made some new friends.

Then, we hope you'll join the Arnoskys every month by subscribing to *Growing for Market*. Call us toll-free at 800-307-8949 to order.

- August 1999

The New Farmers' Market

Farm-Fresh Ideas for Producers, Managers & Communities

Vance Corum, Marcie Rosenzweig and Eric Gibson

New World Publishing
Auburn, California

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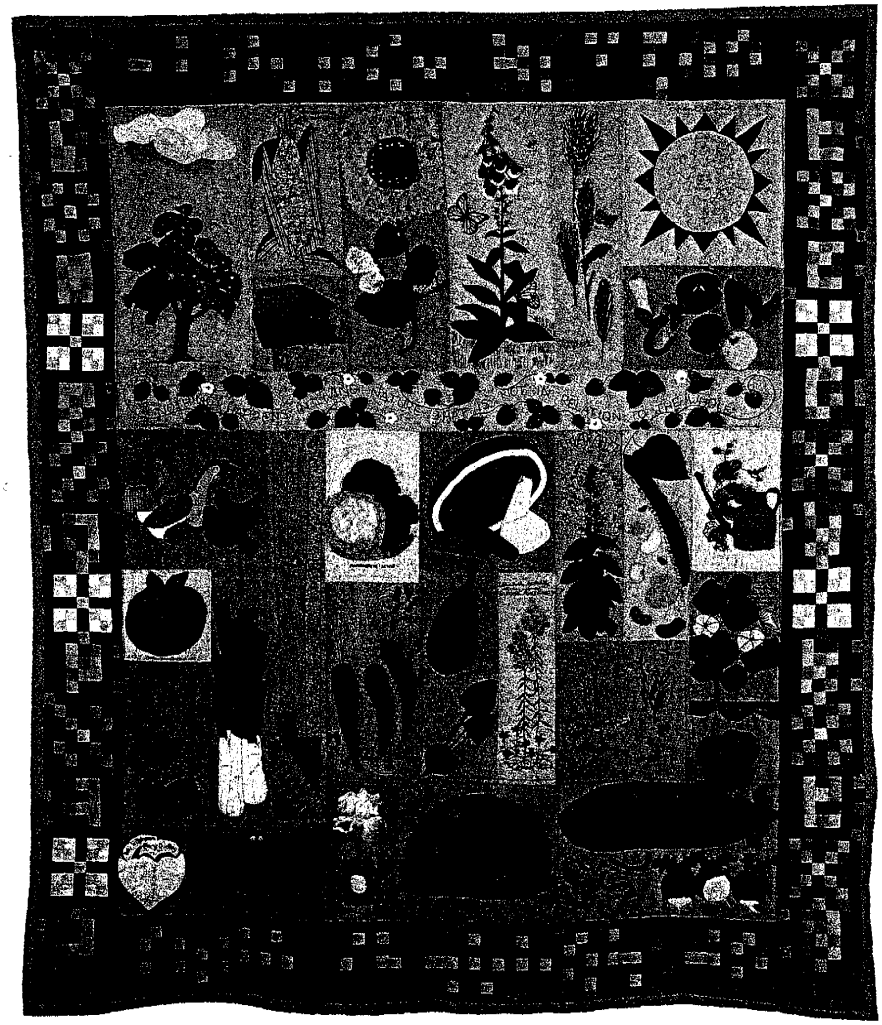

A GROW BIOINTENSIVE® Publication

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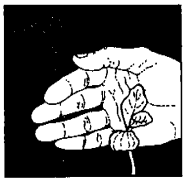

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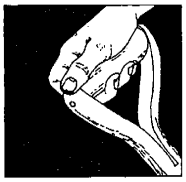

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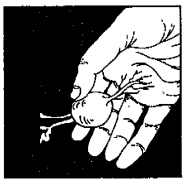

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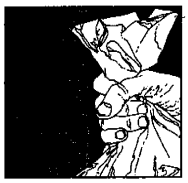

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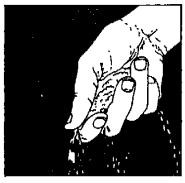

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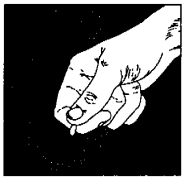

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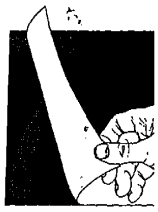

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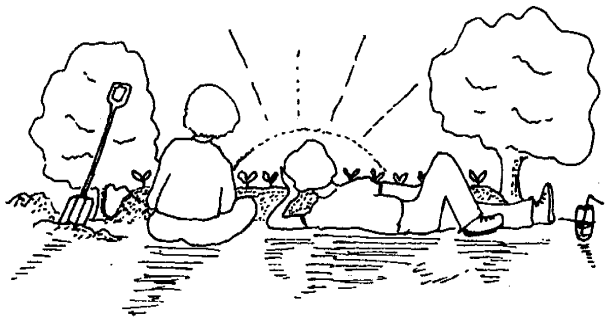
How to Grow Made Simple

The table of contents has special notations to make this book especially easy to use for the beginning gardener. One of the advantages of *How to Grow More Vegetables* is that *it describes a complete general approach to gardening.* As you learn the basics of soil preparation, the simple joys of gardening will gain depth. Bed preparation, fertilization, composting, seed propagation, transplanting, watering, and weeding are performed essentially the same way for *all* crops. Only the seedling flat and growing bed spacings are different from one crop to another (these are given in columns H, L1, and M2 of each section of the Master Charts beginning on page 87). *So, once you know how to grow lettuce, you know most of the basics for growing onions, tomatoes, wheat, apple trees, and even cotton!*

Remember to enjoy gardening while you are working—experience the warmth of the sun, the touch of a breeze, the scent of a flower, the smell of freshly turned soil, a bird's song, and the beauty of it all. Above all, have fun!

One way to harvest your fullest enjoyment is to garden with your family or friends. Light conversation makes the time pass quickly during even the most difficult tasks. Consider having a barbecue or picnic after double-digging, holding a neighborhood compost building party, or inviting your children to join in the harvesting! And preserving the year's harvest through drying, freezing, or canning vegetables and fruits is always a social occasion. Gardening together is half the fun of this practical experience of learning and sharing.

If you are a *beginning gardener or mini-farmer* reading *How to Grow More Vegetables,* you may want to skip most of the tables except for column H in the Master Charts for planning on pages 87–115, which lists plant spacings. You will probably start by growing vegetables and a few flowers and herbs, and many of these crops can be bought as seedlings from a local



nursery. Starting your own seedlings is a higher skill level that you may not want to try until your second or third year.

If you are an *intermediate gardener,* you will begin to use more of the tables and charts and to grow some compost crops, grains, and fruit trees. The bibliography (beginning on page 165) is a source of additional information on topics of interest that you may like to pursue as your skill as a mini-farmer grows.

Ten years in the garden will produce a *fully experienced food grower.* You can now draw on all of the information provided in this book as you work on growing most or all of your family's food, at home, plant a mini-orchard in the front yard, begin an economic mini-farm, or teach others the skills you have already mastered.

As you begin to grow GROW BIOINTENSIVEly, be sure to grow *sustainable soil fertility crops*—which we are calling carbon-and-calorie crops (see pages 27–29)—as part of your garden. We need to grow crops that *feed the soil* as well as ourselves. There are many such soil fertility crops. Examples are corn, millet, wheat, oats, barley, cereal rye, and amaranth. These crops grow a lot of carbonaceous material for the compost pile, which in turn feeds the soil with humus, as well as provides a great deal of *nutritious food to eat.* Be sure to try a few soil fertility crops in your garden or mini-farm this year. Information about these *dual-purpose crops,* which provide both dietary calories *and* compost materials, is included in the Master Charts section beginning on page 87 of this book and in the compost crop sections of Ecology Action's Self-Teaching Mini-Series Booklets 10, 14, 15, 25, and 26.

It is important to grow calorie crops in your garden or mini-farm. About 90% of your diet-growing area should eventually be planted in these nutritious crops. There are two kinds—crops that are *area-efficient* in the production of calories, and crops that are *weight-efficient* for calories.

Area-efficient crops produce *a large number of calories in a given area* because of their high yields per unit of area. Examples of these farming-efficient crops are potatoes, sweet potatoes, garlic, parsnips, burdock, and salsify.

Weight-efficient crops contain *a large number of calories per pound of food,* but have lower yields per unit of area. Examples of these kitchen-efficient crops are wheat, millet, oats, cereal rye, barley, and corn. Each garden or mini-farm should optimally contain some of both kinds of these calorie crops.

For more information about these concepts, also see *One Circle,* published by Ecology Action, and *The Sustainable Vegetable Garden,* published by Ten Speed Press. Important information about calorie crops is included in the Master Charts as well as in Ecology Action's Self-Teaching Mini-Series Booklets 14, 15, 25, 26, and 28.

How to Grow More Vegetables provides you with everything you need to create a garden symphony—from the basic techniques to advanced planning skills for a beautifully planted backyard homestead. But the real excitement is that each of us will never know everything! Alan Chadwick, after he had been gardening for 50 years, said, "I am still learning!" And so are we all. We have a lifetime of growing before us, and the opportunity to continually improve our understanding of the living canvas we are painting.

More Gardening Books from Ten Speed Press

THE SUSTAINABLE VEGETABLE GARDEN

A Backyard Guide to Healthy Soil and Higher Yields

by John Jeavons and Carol Cox

This quick-and-dirty introduction to Ecology Action's gardening methods shows how easy it is to grow healthy, organic fruits and vegetables in almost any plot of land.

128 pages, $11.95, ISBN 1-58008-016-2

THE GARDENER'S TABLE

A Guide to Natural Vegetable Growing and Cooking

by Richard Merrill and Joe Ortiz

Noted horticulturist Richard Merrill and award-winning cookbook author Joe Ortiz team up to deliver the ultimate no-nonsense guide to cultivating and cooking from a kitchen garden, including 50 creative, healthful recipes.

464 pages, $24.95, ISBN 0-89815-876-1

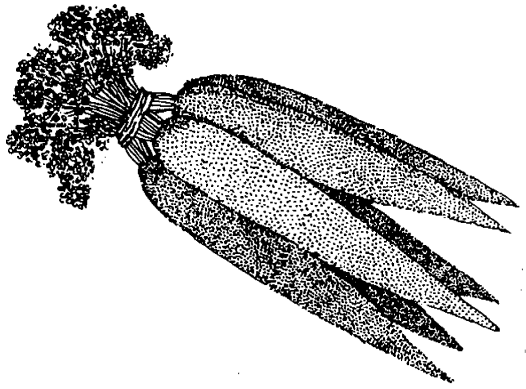
ALLERGY-FREE GARDENING

The Revolutionary Guide to Healthy Landscaping

by Thomas L. Ogren

After researching the role that urban landscaping plays in the allergy health crisis, horticulturist Tom Ogren compiled this extensive reference that will help gardeners and landscapers make landscaping choices to drastically reduce exposure to harmful allergens.

288 pages, $19.95, ISBN 1-58008-166-5



And, after you grow those vegetables . . .

ECO-CUISINE

An Ecological Approach to Vegan and Vegetarian Cooking

by Ron Pickarski

Using his flair for fresh ingredients, lovingly prepared and beautifully presented, Ron Pickarski, author of *Friendly Foods,* advocates healthful, nutritious food based on the simplest components and flavored with the juices of fruits and vegetables.

288 pages, $19.95, ISBN 0-89815-635-1

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Unique recipes to help you make the most of your garden's bounty.

176 pages, $11.95, ISBN 1-89815-540-1

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NEWS RELEASE

Contact: Rich Pirog, (515) 294-1854, or

Laura Miller , (515) 294-5272

FOR RELEASE AFTER April 17, 2000

LEOPOLD CENTER OFFERS NEW LOOK AT GRAPES, AN OLD IOWA CROP

AMES, Iowa – Once upon a time, Iowa farmers grew grapes that were prized for their quality and shipped to neighboring states. Today those vineyards have disappeared, and most of the fresh grapes sold or processed in Iowa come from California and Chile.

But the story doesn't have to end here. A report issued by the Leopold Center for Sustainable Agriculture at Iowa State University shows that grapes could be a promising value-added crop for Iowa farmers looking for specialty markets or agri-tourism opportunities.

The Leopold Center report coincides with formation of the Iowa Wine and Grape Advisory Council by Iowa Secretary of Agriculture Patty Judge, and announcement of a new Iowa Food Policy Council by Governor Tom Vilsack. The 30-page paper explores the sources of grapes, wine and juices available in Iowa grocery stores, and suggests ways to help redevelop the industry from a local food systems perspective.

"It's important to take an historical and current look at the system that supplies grapes for Iowa when you consider the potential to rebuild the state's grape industry," said Rich Pirog, the Leopold Center's education coordinator, author of the report. "Iowa has a history of grape production that dates to before the Civil War in the Council Bluffs area. Later, this area supported an active grape growers association representing owners of 400 acres of vineyards."

Pirog found that Iowa was sixth in grape production in the United States in 1919. By 1929, Iowa's production of grapes peaked with a yield of 15.8 million pounds. During that period, Iowa grapes had a reputation for good quality and were shipped to Colorado, Nebraska and South Dakota. Iowa-grown grapes brought association members 30 percent more revenue per ton than the national average, Pirog noted.

However, interest in grape production sagged in the 1930s and 1940s with the focus on corn and soybean production. Widespread use of the corn herbicide 2, 4-D resulted in chemical drift, which damaged vineyards throughout the Midwest. Many vineyards were not replaced and grape production dropped to only 56,000 pounds in 1997.

Interest in agricultural diversification and locally-grown produce are prompting state officials to take another look at Iowa's grape industry. Pirog estimated that Iowa would need an additional 330 acres of vineyards to supply five percent of the wine and table grapes, and one percent of the grape juice consumed in the state. Two of the state's largest wineries have indicated they also want to process more locally-grown grapes, rather than using imported varieties.

"Many of Iowa's neighboring states have developed grape and wine promotion programs to renew their grape industries," Pirog added. "In Missouri, for example, a program has helped increase the market share of wine produced and sold within the state, and built on the state's tourism industry."

For a copy of the report, contact the Center at (515) 294-3711, or download it from the Center's web site

800-346-9140

ATTRA
Appropriate Technology Transfer for Rural Areas

LAVENDER AS AN ALTERNATIVE FARMING ENTERPRISE

CURRENT TOPIC

ATTRA is the national sustainable agriculture information center funded by the USDA's Rural Business -- Cooperative Service.

By Katherine L. Adam
ATTRA Program Specialist
February 2001

Introduction

The lavender oil industry in the U.S. is located in the Dungeness River Valley of the state of Washington, where lavender can be grown perennially. It is marketed through agri-tourism and direct farm-to-market sales of products. Lavender may be grown as an annual in many parts of the U.S. for various niche markets.

In the appropriate climate lavender (*Lavandula* spp.) is a long-lived perennial with a typical productive life of about 10 years (for English lavender *L. angustifolia*). Since all types of lavender require a mean temperature range between 45°F and 75°F, it is not possible to raise lavender as a perennial field crop in most of the U.S. Lavender will not survive freezing. The Dungeness River Valley, near Sequim [skwim, rhymes with *swim*], WA, is the only part of the U.S where medium- to large-scale lavender oil production has proved economically feasible. In the box to the right is some basic information about growing lavender as a perennial for its essential oil (1).

The essential oil is used in some parts of the world in food manufacturing to flavor beverages, ice cream, candy, baked goods, and chewing gum. Non-food products manufactured with lavender oil include soaps, colognes, and other cosmetics. Very high quality essential oil of lavender is required for use in the alternative health practice of aromatherapy.

Lavender is most commonly grown in the U.S. as an **annual**—primarily as a bedding plant, herb specimen, tea plant, bee forage, or source of fragrance in landscaping designs. The greenhouse industry finds it a popular plant for home gardeners, and lavenders can fill some short-term public landscaping needs.

Lavender and Agri-tourism

Sequim, WA, has recently been proclaimed the "lavender capital" of the U.S. Sequim has a favorable geographic location for lavender, which grows best in a Mediterranean type of climate, with warm summers and cool, dry winters. Sequim (pop. 4,400), in the "rain shadow" of the Olympic Mountains—protected by the mountains from rain sweeping in from both east and west—draws thousands of visitors to view the purple haze of lavender fields during its annual mid-July "Celebrate Lavender Festival," which coincides with the lavender harvest season. Sequim also has a thriving bedding plants industry, which sponsors an herb festival each May. In fact, Sequim is a

- Lavender is best grown from cuttings from clones of standard types. For information on suppliers of lavender plugs, please request the ATTRA publication *Suppliers of Plugs for Medicinal Herb Crops.*
- Cultivars with erect flower stalks facilitate mechanical harvesting.
- An acre of true lavender (*L. angustifolia)* produces from 300 to 1800 pounds of dried flowers (12 to 15 pounds of essential oil—about 2 gal.)
- An acre of one of the lavandin cultivars (*L. x intermedia*) yields 3500 to 4500 pounds of dried flowers per acre (53 to 67 pounds of essential oil).
- More than 30 different types of lavender oils and blends are traded on world markets.

may be sold under deceptively similar names. For example, 'Hidcote' is *L. angustifolia*, while 'Giant Hidcote' is *L. x intermedia*. Cultivars used for landscaping usually differ from those appropriate for industrial applications. Many of the companies listed in ATTRA's *Suppliers of Plugs for Medicinal Herb Crops* specialize in lavender. (This publication may be viewed on the ATTRA website **www.attra.org**.)

For more complete information on the cultivars of lavender and lavandin, see Arthur Tucker's article in the scientific journal *Bailleya* (3).

More on essential oil production

Production of lavender for its essential oil ranges from large- to very small-scale. A distillery (still) that fits into a barn can be purchased for $2000 (4), producing a gal. of pure essential oil per batch. Larger-scale distilleries are typically located where they can conveniently process the output from a number of neighboring farms. There are many distilleries located in the Pacific Northwest, where until recently they were used to process the mint oil crop. Such a manufacturing plant costs upward of $500,000 to build (4). A few are located in the upper Midwest.

In manufactured lavender oil products the pure oil of lavender may be cut with cheap imported sweet almond oil because "customers find it pleasing" as a fragrance (4). Oil of lavandin (*L. x intermedia*) is used for inexpensive soaps & toiletries.

When 50% of the lavender buds have opened, the flowering tops are cut with a swather, then dried in a well-ventilated space with subdued light. Sometimes they are windrowed in the field, then thrown into a specially constructed wagon (a "buggy") with tubes that connect into pipes at the distillery to be hot water processed during the first run. The farmer retains ownership of the resulting essential oil and must have a marketing plan for it. The farmer is responsible for cost of processing the crop into essential oil of a quality standard and quantity acceptable to the fragrance industry (or his own clientele). The amount of oil distilled per acre can vary greatly. Quality depends on a wide range of variables—including stage of blossoming, harvesting at the right time of day, weather conditions, and methods of harvest and storage. Since the specific gravity of lavender oil is less than 1.0, there is no need for solvent extraction, as the oil will float on top and can be decanted easily. A schematic diagram of the steam distillation process used in France for lavender oil production is provided on p. 18 of Lavabre's *Aromatherapy Workbook*.

Essential oils crops may be grown "on contract" for manufacturers in the fragrance and flavoring sector, but it is not easy for a beginner to secure such a contract. More typically, the large farms that produce lavender as a raw material for the fragrance industry are vertically integrated (owned by the manufacturing corporation and run by a manager). There is no lavender oil industry in the U.S. at present, comparable to the export industries in France, New Zealand, and Australia's island of Tasmania.

I have talked to several people who make and sell very high-quality essential oils through mail-order for a private clientele. It is possible to distill essential oils using a device as small as a home pressure cooker, but only a few drops of oil are produced at a time.

The fact that there is a crucial difference between growing an alternative crop for bulk sales and doing on-farm value-added has been noted by herb consultant Richard A. Miller (5):

> Too many farmers, seeking to save their farms, tried to change over to the "hot" crops. In doing so, most missed the whole idea of this form of marketing. Those who made a finished product (like Frozen Pesto) found it easier to survive the financial demands of this [the herb] industry. Those who sought to grow raw materials found a more difficult row to hoe. (p. 43)

References: (cont.)

8) Hartung, Tammi. 2000. Growing 101 Herbs That Heal. Storey Books, Pownal, VT. 250 pages.

9) Grudens-Schuck, Nancy and Judy Green. 1991. Farming Alternatives: A Guide to Evaluating the Feasibility of New Farm-Based Enterprises. Northeast Regional Agricultural Engineering Service, Cornell University, Ithaca, NY. 88 p.

Further Reading:

Calvo, Maria Carmen and J. Segura. 1989. *In vitro* propagation of lavender [*Lavandula latifolia*]. HortScience. Vol. 24, No. 2. p. 375-376.

DeBaggio, T. 1989. Hardy lavenders. The Herb Companion. April-May. p. 10-15.

Lavabre, Marcel F. 1990. Aromatherapy Workbook. Healing Arts Press, Rochester, VT. 164 p.

Miller, R.A. 1985. The Potential of Herbs as a Cash Crop. Acres U.S.A., Metairie, LA. p. 51, 77, 111, 131, 148, 167. [Information on processing dried lavender.]

Miller, R.A. 1993. Cultivation and harvest of lavender. Herb Market Report. January. p. 4–8.

Sturdivant, Lee and Tim Blakley. 1999. Medicinal Herbs in Garden, Field, and Marketplace. San Juan Naturals, Friday Harbor, WA. p. 210–211.

Tucker, A.O. 1985. Lavender, spike, and lavandin. The Herbarist. No. 51. p. 44–50.

Tucker, A.O. and T. DeBaggio. 1984. 'Irene Doyle' lavender. HortScience. Vol. 19, No. 4. p. 595.

Tucker, A.O. and B.M. Lawrence. 1987. Botanical nomenclature of commercial sources of essential oils, concretes, and absolutes. p. 183–220. In: L.E. Craker and J.E. Simon (ed.). Herbs, Spices and Medicinal Plants: Recent Advance in Botany, Horticulture and Pharmacology. Oryx Press, Phoenix, AZ.

Verlet, N. 1988. History, production and marketing of lavender in France. p. 146–54. In: J.E. Simon and L.Z. Clavio (ed.). Proceedings: Third National Herb Growing Conference. Purdue Research Foundation, West Lafayette, IN.

Electronic Resources:

Frontier Herb Information on essential oils standards may be viewed at http://www.frontierherb.com

Celebrate Lavender Festival growing information **Seattlepi.nwsource.com/nwgardens/wins06.shtml.**

Statford Park Lavender. 2000. Lavender on-line: Oil distillation. www.lavender.au.com/distillation.htm.

The Herb growing and Marketing Network is on the Internet at http://www.herbnet.com.

Horizon Herbs
P.O. Box 69
Williams, OR, 97544
(541)846-6704
(541)846-6233 FAX
e-mail: herbseed@chatlink.com
URL:http://www.chatlink.com/~herbseed
Mediterranean herbs ($3.00)

Additional electronic resources and a bibliography icinal herbs are listed in ATTRA's *Herb Overview,* at: http:/www.attra.org/attra-pub/herb.html.

Katherine L. Adam
ATTRA Program Specialist
February 2001

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Pine Straw: Money Growing on Trees

by Regina G. Burgess

Landscapers around the country are discovering that pine straw makes excellent landscaping material. Besides being colorful, it interlocks and doesn't wash away like bark or other ground covers. Since it is a natural mulch, it adds nutrients back to the soil as it decomposes. Landscapers also like it because it gives a raised bed look that adds qualities that other materials don't. Pine straw also protects from the effects of sun, wind, and temperature extremes.

Pine straw can also cut down on the need for mowing since contoured pine straw islands look attractive and can replace large areas of high maintenance lawn. With just a few plants or trees, these islands can transform an otherwise drab landscape into a work of art. Pine straw also cuts down on the amount of water needed by the plants. Three to five inches of pine straw mulch will conserve moisture and reduce watering requirements. Also, pine straw is a weed deterrent so plant beds don't require as much weeding.

Georgia State Senator Tommie Williams began Georgia Pine Straw fifteen years ago. "I was teaching high school and harvesting pine straw in the afternoon to supplement my teacher's salary," Williams says. The business grew enough during the first year to allow him to pursue it full time. At first, most of Georgia Pine Straw's customers were in Georgia and South Carolina. Currently, ninety percent of their market is in the southeast, but they sell all over the United States and Canada to golf courses, commercial landscaping companies, mass merchandisers, homeowners' associations, and small nurseries.

One of the benefits of pine straw harvesting is that it allows the producer to start out small. According to Lynn Hooven, Chief of Forestry management at the Georgia Forestry Commission, all one needs to harvest pine straw is, "a pick-up truck, a rake, a pitchfork, and a couple hundred dollars to build a box baler and you can generate a little income," he says. A box baler is about

y inches square and three feet long. The baler lays ng in the bottom, packs in the straw, and then hand-ties the bales. "All that's required to harvest pine straw is to rake the straw, clean it, and bale it," says Hooven. "Pine straw can be retailed door to door to homeowners," he says. Pine straw harvesting can be part-time weekend work or a full-time business.

The main requirement for harvesting pine straw is finding the trees. Williams leases about 15,000 acres that he manages, mows, sprays, and fertilizes. He brokers another 40,000 acres where other people produce the pine straw and he sells it for them. "Our pine straw bales are 28 to 30 inches by 14 inches square and weigh about twenty pounds," Williams says. One bale will cover fifty square feet at a depth of three inches. There is no current standard for bale size, however, but this will probably

Types of Pine Straw

- Longleaf (needles twelve-plus inches long)
- Slash (needles eight inches long)
- Loblolly (needles six inches long)

hange according to consumer demands. The most popular types of pine w are longleaf (needles twelve-plus inches long), slash (needles eight inches long), and loblolly (needles six inches long). Longleaf straw is premium straw since it keeps its color the longest, and is followed by slash and loblolly. Pine needles stay on trees for two years providing food for the tree through photosynthesis. After two years, the needles turn brown and fall off. The greatest needle fall is from September through November, so the best time to rake needles is during the winter.

When trees are ten years old, a pine stand will yield between 125 to 200 bales per acre. The maximum yield is around age 15 when yields are about 200 to 300 bales per acre. Yields decrease slightly after age 15 to about 200 bales per acre. Pine trees can be harvested from the time they are ten years old until they are about twenty years old when the trees provide a final income in the form of timber. The needles can be harvested from the time they fall off the tree until about ten months later and still retain their value.

Resources:

University of Florida
School of Forest Resources and Conservation
Gainesville, FL 32611
http://www.sfrc.ufl.edu/Extension/pubtxt/cir831.html

North Carolina State University
Cooperative Extension Service
http://www.ces.ncsu.edu/nreos/forest/woodland/won-18.html

University of Georgia
Warnell School of Forest Resources
http://www.forestry.uga.edu/warnell/research/html/forestry/pinestraw.html

Benefits of Pine Straw

- High in nitrogen
- Great fertilizer
- Attractive appearance
- Deters weeds
- Insect and rodent free
- Will not wash away during heavy rain
- Easy to work with
- Prevents some melons and vegetables from forming mildew or mold
- When pine straw loses its color, just add fresh on top

has sales of up to $10 million annually. Williams estimates that the pine straw industry in the southeast area of the U.S. is a $250 million wholesale industry. "The market's pretty saturated now," admits Williams. "You have to be very service and quality oriented to keep your business. Be aware of quality and service and treat people like you want to be treated," he advises. He says that pine straw harvesting is "as profitable as long as you can manage your overhead."

H. Food Safety

H. Food Safety

I. APIARY

J. Non-Farm/Farm Residents

K. Education

University of California
Sustainable Agriculture
Research and Education Program

Market Cooking for Kids: Facilitating Field Trips to Sustainable Agriculture Farms

Final Report - July 1998

Principal Investigators:
Sibella Kraus
Karin Rosman
Contact Sibella Kraus
1417 Josephine Street
Berkeley, CA 94703
Phone: (510) 526-1793
Fax: (510) 524-7153
E-mail: sibella@igc.org

A FARMER'S GUIDE TO HOSTING FARM VISITS FOR CHILDREN

by

Market Cooking for Kids

A project of the Center for Urban Education about Sustainable Agriculture (CUESA)

WHY A FARM FIELD TRIP GUIDE?

"What people do not understand, they do not value, what they do not value, they will not protect, and what they do not protect, they will lose. "-- Charles Jordan

In the San Francisco Bay Area, as in other urban areas, most children know little about where their food comes from and the relationship between their own health, healthy food, healthy regional agriculture, and an overall healthy environment. For many young people, farmers and farming have an almost mythical quality, people and places imagined but not directly experienced. Urban children still read books that include farm animals and sing about old MacDonald, but most have never been to a farm or met a farmer. If future generations are going to care about farms and farming they must be directly exposed to the people and places that produce their food.

Many farmers already host educational trips. The goals of this guide are to share the good educational ideas that are already in practice on farms and to encourage and facilitate farm field trips by providing workable, effective ideas for planning and hosting educationally powerful visits. We have focused suggested activities on elementary school students, though many activities are adaptable for other age groups. This guide can also serve as a resource and starting place for teachers who want to plan farm field trips.

LEARNING ON THE FARM

Hands-on experiences

Farm visits provide a perfect opportunity for students to use all of their senses to learn: the more they can touch, smell, and taste the things they are learning about, the more deeply they will understand and remember what they learn. Even the simplest aspects of farm work are worthwhile for students to experience. While harvesting produce or helping to milk cows or goats are time-honored activities, weeding, turning compost, digging, gleaning, and other tasks can be equally as engaging.

It is easiest to allow ample hands-on time to students when the size of the group is manageable. We recommend dividing a class into smaller groups (5-10, ideally) for many of the activities. Group size should be determined by how many adults are available to help lead and supervise activities, and the age and energy level of the group.

Offering students an explanation of what they are doing during hands-on activities, and how it fits into the "big picture," is essential. If students understand that digging prepares a bed to be planted, or that weeding by hand helps reduce the need for pesticides, they are able to see the purpose behind the work.

It is important to realize that hands-on experiences on the farm won't always equate to "getting the work done." The focus should be on the experience: process rather than end product. If some good work gets done along the way, so much the better. For guidance on specific hands-on activities, see the General Activities section.

Observing the seasons

Just as seasons influence the work of the farm, the specific work and crops that accompany each season can help organize a successful farm field trip.

Building lessons around the concept of seasonality is particularly meaningful for urban children whose direct experience of fresh fruits and vegetables is often limited. Canned, frozen and processed foods and the ready availability of imported produce in most supermarkets have lessened children's awareness of when crops are in season.

The simplest way to incorporate the concept of seasonality is to talk about what is happening during the current season, what happened before it, and what will be happening in the next season. Talking students through the whole cycle of the seasons and involving them in a hands-on way in the activities of the current season, is a useful lesson in the reality of food production.

PLANNING

When hosting a farm field trip, it is crucial to have a thorough conversation with the teacher who is bringing the group. Make certain teachers understand that you can act as host and teacher at the farm only if they (and the adult chaperones) take responsibility for the conduct of the group. Have the discussion well in advance of the visit so that both you and the teacher can prepare as necessary. It is useful to discuss the following issues:

When to Call

Teachers are hard to reach by phone (as hard to reach as many farmers!). When you call the school, find out what time teachers have lunch, when the school day ends, and if the teacher has a "prep period." These are the best times to call. Ask the teacher for a home phone number so that you can reach her during the evenings.

Number of students visiting

Determine the number of students your farm can accommodate. Teachers often want to visit with more than one classroom to share the expenses of a bus. You should decide how many classes (typically 16-30

students each) your farm can accommodate. Let teachers know clearly what your limits are. Ask if there are any students with special needs that should be discussed.

Age of students

In order to prepare appropriate activities, you need to know the age or grade level of the students. In order to determine what age levels you can best accommodate, think about what you want to teach and share at your farm and discuss this with the teacher. In general, shorter, simpler activities are best for younger students. Even a simple task like weeding can be adapted for different age levels -- one farmer noted that young children were great at clearing away big weeds in the orchard, whereas weeding in beds was more appropriate for older children.

Number of adult chaperones and teachers

If you want a minimum or maximum number of adults to accompany the students, let the teacher know. If you plan to divide the visitors into groups, it is a good idea to have one adult per small group. For example, if you have 24 students and plan on dividing them into three groups, you might tell the teacher they should bring at least three and no more than six adults.

Role of adult chaperones

Parents and other adult volunteers who accompany students on field trips do so to be helpful, and should be given a clear role or responsibility. If adult support is needed to manage the group, the teacher should make this expectation clear to all volunteers, prior to the group's arrival and again upon arrival.

Size of groups

Small groups of 5-10 students allow for more hands-on time, stay focused better, and are easier to move around the farm. Most teachers are familiar with working with students in smaller groups and will welcome this approach. If possible, try to involve several members of the farm staff in the visit.

Travel time and directions

Discuss the length of the visit and how long it will take to get from the school to your farm. Provide clear directions to be passed along to the bus driver, including where the bus can turn around and park. Make clear your time limitations and learn what those of the teacher are. Clarify what the group's needs are for lunch and snacks, and schedule breaks accordingly.

Lunch and snacks

clarify what the group's needs are for lunch and snacks, and schedule breaks accordingly. For an additional cost, or as part of your fees, you might offer snacks of fresh produce or farm products.

Special interests

Find out what the visiting group's specific interests are, and what they hope to get out of the visit. If possible, work with the teacher to synthesize those interests into a theme for the day. A theme can be a concept or questions that bring together the different experiences of the day. For example, you may wish to focus on "life cycles," including a discussion of plants, animals, soil, and compost. Themes can be very basic, such as "where do food and fiber come from," learning about farm animals, raising food crops, the medicinal and culinary value of flowers and herbs, or what happens in each season on the farm.

Preparation and follow-up activities

It is useful for you to know how students will prepare for their visit to your farm, and how they will follow-up on the experience. You may recommend that the group prepare questions to ask you when they visit. Or, students might read a book about a farm before visiting and discuss what they think they'll see and do. You may also want to suggest that the group observe things on their way from the school to the farm. What changes did they notice in the smells, sounds, and landscape? Will the students be completing

a writing or other activity after their visit? If you know what infonnation they are gathering for follow-up assignments, you can help provide access to what they need. The more students are asked to think about the visit before and after they go, the more they will learn and remember.

Costs for a visit

Most farms around the San Francisco Bay Area charge between $1 -5 per student for day visits. Some farms run occasional visits for schools at no cost, but farms that charge a small amount are typically able to host trips more often because the fee helps to cover time lost from other work or other expenses incurred in hosting the trip. Teachers need time to arrange the funding for a trip (either through school funds or student fundraisers), so it is a good idea to discuss this early.

GUIDELINES FOR GENERAL ACTIVITIES

Don't over plan

Dru Rivers of Full Belly Farm says that the biggest mistake she made in her first years of hosting educational visits was to plan each minute of the day. Inevitably things wouldn't go according to plan and the day could seem rushed or hectic. She also points out that kids need some unstructured time to "just play." It's a good idea to leave enough flexibility in your schedule to spend more time on activities that students really like and cut short activities that are less engaging.

Give Equal time

Those who are familiar with elementary school children will attest to fairness being a "big deal" at this age. Avoid hassles by ensuring that all students get a chance to participate in activities equally. If this is not possible, try rotating who gets a chance to do things, letting students know that over the course of the day, they'll each get to participate in something special. If students are engaged in an activity that requires tools and you don't have enough for each student to have one, make sure that one or more adults supervise the activity so each student gets a turn to work with the implement.

Set clear ground rules for children and adults

A visit will be much more successful for you and the group if everyone has a clear understanding of the rules. Specify any rules that are needed to make the visit safe for all, and comfortable for you and your staff. For example:

- The farm is a home where people live and should be respected as such.
- Certain places are off limits. You will need to define these clearly.
- When walking from place to place, the group must stay behind the farmer because you know where you are going and they don't.
- Garden beds and rows are fragile. Show where it is OK to walk and where it isn't.
- Students must keep any trash they create in their backpacks.
- Animals should be treated with respect. If you will be visiting animals, specify appropriate behavior for interacting with animals, such as not yelling, being gentle, not feeding animals anything except what you give them to eat.

Make it clear to parents and teachers that you need them to help supervise the children's learning throughout the day, and that you'll be asking them for help at certain points. They should concentrate on helping the group stay focused.

Meeting people who work on the farm

Sometimes this happens along the way as other activities happen. It can be a nice change of pace for you and your staff to talk to kids, answer their questions, and ask them some yourselves. If you have staff members who speak another language (Spanish, for example), many bilingual students will especially

welcome a chance to talk with them.

SUGGESTIONS FOR HANDS-ON ACTIVITIES

Planting /transplanting from seedling to pot
Ideal Group Size: Small groups. *Equipment:* Seeds, starts, or bulbs; plastic cups; trowels. *Adults Needed:* One per small group.
You can poke holes in the bottom of recyclable plastic cups and use these for students to plant a seed or seedling to take home, or to their classrooms or school garden. Most students don't realize that many plants are started in a greenhouse and later transplanted. It can be a great lesson to show students how transplanting is conducted. If students are very young they may not plant or transplant things as successfully as you would, so it's best to plant things with supervision. If they are planting/transplanting on the farm, you should choose a space where it won't be a problem if the plants don't germinate. If the students take seedlings back, tell them what kind of care to provide.

Harvesting
Ideal Group Size: Whole group. *Equipment:* Harvesting implements, if needed. (If implements are sharp they can be passed out to adults only.) Baskets or boxes to hold harvest. Adults Needed: One to each 5-10 students if you want roving adults to help oversee a careful harvest or supervise sharp harvesting tools. This is often the best loved activity for kids, in part because it may involve another great activity -- eating! Be cautious when taking students into production areas. Make sure students and chaperones clearly understand where to walk, so beds don't get trampled, and specify how much of a crop they can harvest. Have adults oversee the harvesting if you only want to harvest a small amount. For example, if you are harvesting flowers with kids, have them each stand near the one flower they want to harvest and have the adults come around with shears allowing each student to harvest her flower. It is preferable to have each student partake in harvesting rather than having a few students do so on behalf of everyone.

When harvesting a large quantity, James Cohea of the Our Farm CSA project reports that they've found it useful to identify which students are fastest at harvesting and put them in the front of a row to have them set the pace. This is a good way to make a game of things and make a work experience more productive.

Tasting
Ideal Group Size: Whole group. *Equipment:* Water to rinse produce or fruit; hose for kids to rinse their hands; a knife if needed; serving container. *Adults Needed:* None.
There is no better hands-on experience. Kids enjoy tasting crops even more when they've harvested them. This can be a great way to get kids to try things that they might not try at home. If the group is staying for a meal, try to incorporate farm produce. Making a salad, preparing fruit, or making herbal tea for a meal is educational and fun for students. If you grow several varieties of a crop, consider letting the kids taste and compare them.

Composting, Soil Exploration
Ideal Group Size: Whole group. *Equipment:* Digging implements. *Adults Needed:* None. With the increase in school gardens, some students may be familiar with small scale composting. It is great to have students see different stages of compost, help turn a heap, or turn compost into a bed. Have students feel the soil and notice the different textures and smells. Talk about decomposition. If you have a coat hanger or metal rod to insert in a pile so that kids can feel the heat of a hot pile, this is always very impressive. Many kids enjoy digging so having kids turn or sift soil can be very satisfying.

Petting animals, feeding animals
Ideal Group Size: Small groups. *Equipment:* Feed. *Adults Needed:* One per small group. Contact with animals is without question the favorite farm activity of most kids. "While it's great to talk to kids about

concepts like organics and sustainability, at a young age they take so much in through their senses, and animals provide so much sensory input," says Dru Rivers of Full Belly Farm. Having kids participate in the normal chores and care of animals is an excellent learning experience. Be sure to provide a handwashing station so the kids can clean their hands after handling animals.

Gleaning

Ideal Group Size: Whole group. *Equipment:* Harvesting tools, boxes for produce. *Adults Needed:* None, though they can help and motivate.

Gleaning can be an extremely rewarding service-learning project for young students, junior high and high school students, and civic and religious groups or workplace volunteers. Even very young students can glean a remarkable amount in a short time. Salvaged food can be donated to a local food bank or soup kitchen or be sent home to feed the volunteer group. While young students can sometimes find a big project daunting, there is a great sense of accomplishment in completing a big task. Moreover, harvesting or gleaning food gives students an appreciation of the "countless labors" that go into bringing their food to the store and dinner table.

Other Ideas

Following are additional suggestions from farmers for children's activities which you may wish to adapt for your farm.

- Pickle & salsa making
- Canning and preserving
- Music in barn
- Dried flower arrangements
- Backyard composting; construct a worm composting unit for the classroom
- Counting, care for fish
- Hands-on instruction in spinning, weaving
- Instruction in how apples are grown; pruning, thinning, harvesting, cider making
- Observing a bee hive
- Climb on farm tractors
- Sort beans
- Milking goats, cows
- Learning about beneficial insects
- Learning about cover crops
- Tree care and identification; nursery tour
- Teaching station where produce is prepared for market or visiting packing sheds (allows students to see behind the scenes of the farm)
- Hay ride around the farm to see what's there before a tour
- Discussing the interaction of wildlife and farmlife

Activities that can tie in to school subjects

Here are some ways to connect a farm visit to classroom learning:

- Math: measuring and counting activities
- Science: understanding pH, life cycles, water and sun cycles
- Language arts: writing activities about being on a farm, new vocabulary
- Art: drawing, sketching, collage making
- Social sciences: questions about the history of the farm; interview the farmer; learn where produce is sold; learn about environmental practices on farm; mapping activities

GROUP MANAGEMENT AND SAFETY CONSIDERATIONS

It should be made clear to teachers that management of the group's behavior during a visit is the responsibility of the teacher and adult chaperones. Farm staff who are involved showing students the farm and teaching them about it can only succeed if others are managing the group.

Students are usually so engaged by what they see and do on farms that while they may be energetic, they are interested and well-behaved. To ensure that visits run smoothly, host farms should:

- Greet students when they arrive and explain to them what they are going to do during the day. Let kids know where the bathrooms are, when they will eat lunch, and answer questions before getting started.
- Notice when students seem engaged in activities and adjust the schedule if possible to spend more time on the activities that hold their attention and move more quickly through activities where they seem less focused.

Staffing a visit

The farm must have at least one person who is responsible for planning for and hosting the group. Some farms recruit interns who have a background working with young people, to more easily host trips. If the classes include bilingual students, a staff person who speaks another language can be a wonderful host.

Insurance considerations

Ask the teacher to provide you with a letter from the school or school board saying that the liability insurance that covers students during school also covers them on a field trip. You should also contact your insurance agent and let them know that you are planning to host field trips. Explain that the group will have its own coverage and inquire whether you need additional coverage. If so, ask the school to cover this cost.

Safety considerations

As a precaution, make sure that the teacher or adult chaperones bring any medications a student may need. If any student is known to be allergic to bee stings, have that student put in a group with the teacher, who should have their medication. Make sure the group has a first aid kit. Think through where you' 11 be taking the group and remove hazards.

Bus companies

Bus companies require adequate space to safely drop off the group and to park the bus. A bus company may call you with specific direction questions.

Bathrooms

If possible, make a couple of bathrooms available to the group. If you are thinking of hosting multiple farm visits, consider renting a port-a-potty on either a one-time or on-going basis. This expense can be included in the cost charged to a group for visiting. If bathroom facilities are limited, suggest to the teacher a place the group can stop shortly before and after visiting the farm to use restrooms (e.g., a nearby park or rest stop). It is important to have at least one bathroom available for "emergency use" during the visit.

Food and water

Groups should bring their own food for lunch and snacks. Ask the teacher to bring large garbage bags, so you won't have to dispose of extra waste (though students can be encouraged to contribute their food waste to your compost!). Be sure to provide a handwashing station. If you have drinking water available, let the teacher know. If not, it is important to tell the teacher that students must bring their own water in a water bottle.

Weather

Make sure the teacher knows what kind of weather to expect, so that s/he can make sure the students are prepared with hats, sunscreen, sweaters, raingear, etc. It is also important to have a clear "rain policy" with the teacher. Does rain cancel the trip? It is a good idea to arrange to call the teacher the night before if you need to cancel due to rain so that he can make alternate arrangements and cancel the bus.

Considerations for hosting very young children

Even children between two-and-a-half and five years old benefit from visiting farms. A visit with this age group may be less of a teaching experience and more of an opportunity for young children to develop comfort and familiarity being outdoors or around animals. The suggestions in this guide can be simplified to plan a shorter program for younger children. With this age group it is best to be flexible and keep the visit moving at a pace that seems comfortable for the group.

Considerations for hosting older children

With older kids (junior high and high school), adapt the activities as appropriate and give a more sophisticated explanation to accompany them. Older students often value the sense that they are being given "real world" or adult responsibility. As a result, many young people welcome the chance to do physical work when they visit a farm. Gleaning is an excellent practice for young adults. Their labor is needed, and they can have the sense that they are helping to make a difference.

Overnight visits

Some farms make space available to groups for overnight visits. A group that is planning on spending the night must have an adequate number of adults along to supervise and organize the group. Overnight farm visits are a great way to extend learning opportunities. You can acquaint groups with the chores that happen at night and in the morning, and let them further explore the farm. Give teachers a precise sense of what you can provide in terms of space and accommodations, and what you expect the group to bring.

Items to give away or sell

Many farms provide items such as produce or plant starts for children to take home or to the school garden or cafeteria. It is wonderful for children to be able to take something back with them to share with family or classmates. Some farms provide these items and other products from the farm for sale. If you plan to sell anything on the farm, let the teacher know this in advance, so s/he can give parents and students the option to bring money.

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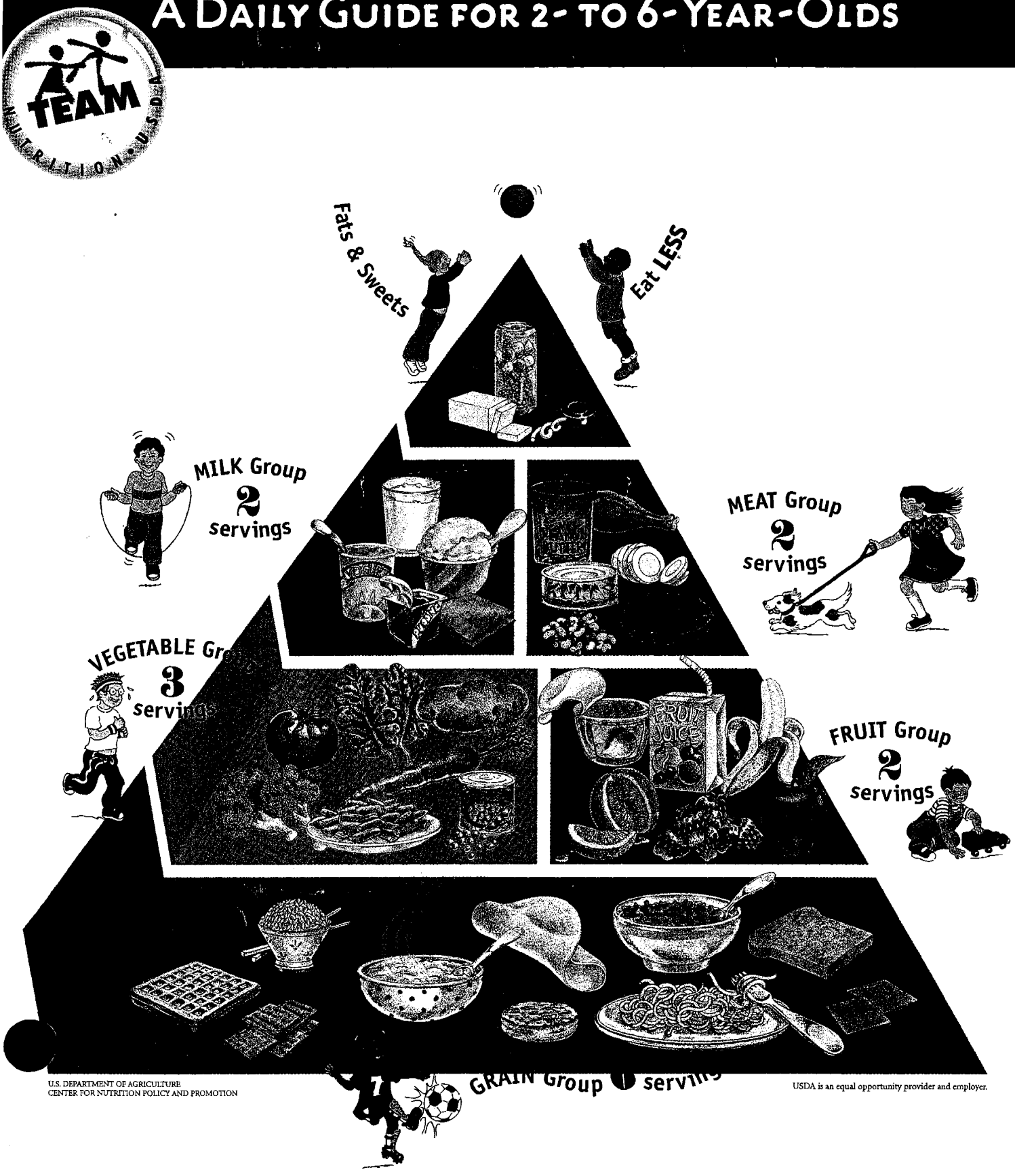
Food Guide Pyramid for Young Children

A Daily Guide for 2- to 6-Year-Olds



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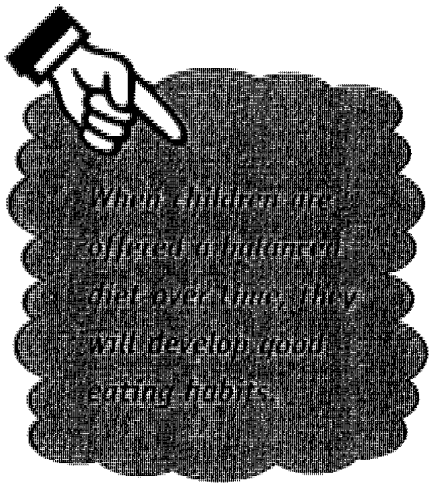
HEALTHY EATING TIPS...

Encouraging Food Choices for a Healthy Diet



BE PATIENT. Young children may not be interested in trying new foods. Offer a new food more than once. Show your child how the rest of the family enjoys it. The food may be accepted when it becomes more familiar to your child.

BE A PLANNER. Most young children need a snack or two in addition to three regular daily meals.

- ☞ Offer foods from three or more of the five major food groups for breakfast and lunch.
- ☞ Offer foods from four or more of the five major food groups for the "main meal."
- ☞ Plan snacks so they are not served too close to mealtime, and offer foods from two or more of the five major food groups.

BE A GOOD ROLE MODEL. What you do can mean more than what you say. Your child learns from you about how and what to eat.

- ☞ Eat meals with your children whenever possible.
- ☞ Try new foods and new ways of preparing them with your children. Both you and your children can be healthier by eating more dark-green leafy vegetables, deep-yellow vegetables, fruits, and whole grain products.
- ☞ Walk, run, and play with your children, don't just sit on the sidelines. A family that is physically active together has lots of fun!

BE ADVENTUROUS. At the store ask your young child to choose a new vegetable or fruit, from two or three choices, for a weekly "family try-a-new-food" night. At home your child can help you wash and prepare the food.

BE CREATIVE. Encourage your child to invent a new snack or sandwich from three or four healthful ingredients you provide. Try a new bread or whole grain cracker. Talk about what food groups the new snack includes and why it tastes good. Is the snack smooth, crunchy, sweet, juicy, chewy, or colorful?

United States Department of Agriculture
Food and Nutrition Service
August 2000

The Most Populous Realm

The average person can detect as many as 30,000 odors. That leaves a lot of room for personal preference; for some people, gardenia is great, but primordial is powerful. The customers of Demeter Fragrances have made Dirt cologne a best seller among the company's regular collection of 120 scents.

The secret to Dirt was unearthed when Demeter chemists analyzed a handful of soil from a company executive's farm to isolate the molecules responsible for specific scents.

But many secrets of soil remain buried. It's the most populous realm on the planet, and an astonishing one-third of the more than 1 billion organisms in a teaspoon of soil is unknown. "The abundance of life in soil is higher than anyplace else, and at least as diverse," notes botanist Greg Mueller, Ph.D., of The Field Museum of Chicago. 'Soil' is composed of organic, decaying material, inorganic material [rock, minerals, elements] and organisms that together form a living system. 'Dirt' is what kids get on their knees," he says.

More than 1 billion organisms live in one teaspoon of soil.

Among the mysterious denizens of this domain are bacteria and other microorganisms, worms, mites, insects and fungi. Even the 1 millimeter of soil veneer covering Antarctica's permafrost hosts some forms of hardy life. Midwestern U.S. prairie topsoil can measure more than 12 feet — deep space to an earth scientist. Mueller emphasizes that we are as ignorant of their diversity as we are of their existence.

Last year, The Field Museum opened a $10 million exhibit called *Underground Adventure*, a busy subterranean neighborhood that proved to be challenging to depict. "Because so little is known about much of this world," Mueller explains, "we weren't sure what some things should look like. The filaments of fungi, for example — what's their density in soil? How are they connected to roots?"

Some things *are* clear: Every 10 years earthworms turn over the equivalent of all the soil on the planet to a depth of 1 inch; without hungry organisms in the soil, deciduous forests would drown in their own litter; it takes thousands of years to reclaim topsoil after severe erosion, over-farming or development.

The mission of *Underground Adventure* is to engender an appreciation that residents of Earth are utterly dependent on earth. Mueller points out that we wear blue jeans made from cotton that grows in soil, that we eradicate infections with penicillin made from a fungus that lives in soil, that we drink from aluminum cans made from bauxite, a soil-borne mineral ore. "Today, we can manufacture many of the environments necessary for making raw material, but we couldn't initially, and we take for granted the soil from which they came," Mueller says. "We need to consider what other things of utility there are in soil that we don't even know about."

Like cologne.

Of all the constituents of soil, only a group of microbes called actinomycetes imparts its characteristic smell. Other dirt dwellers carry signature odors, but to the human olfactory sense, surmises Demeter Fragrances, only one teeny bacterium jump-starts the hard-wiring of interpersonal attraction.

Back to nature, indeed.

—Ellen Alperstein

AVAILABLE NOW!

Food System Education Resources from Penn State

IN TODAY'S FAST-FOOD SOCIETY, MANY PEOPLE—adults and youth—don't understand the complexity of the food system and what it takes to sustain a local agricultural sector. They know little about the foods they consume. At the same time, opportunities to have firsthand experiences growing and preparing food are decreasing.

These resources from Penn State offer strategies for becoming more involved in the local food system and creating opportunities for dialogue about food system issues.

The Food System: Building Youth Awareness through Involvement is a guidebook for parents and educators of youth in grades 4 through 12 who are enrolled in 4-H clubs or other youth programs.

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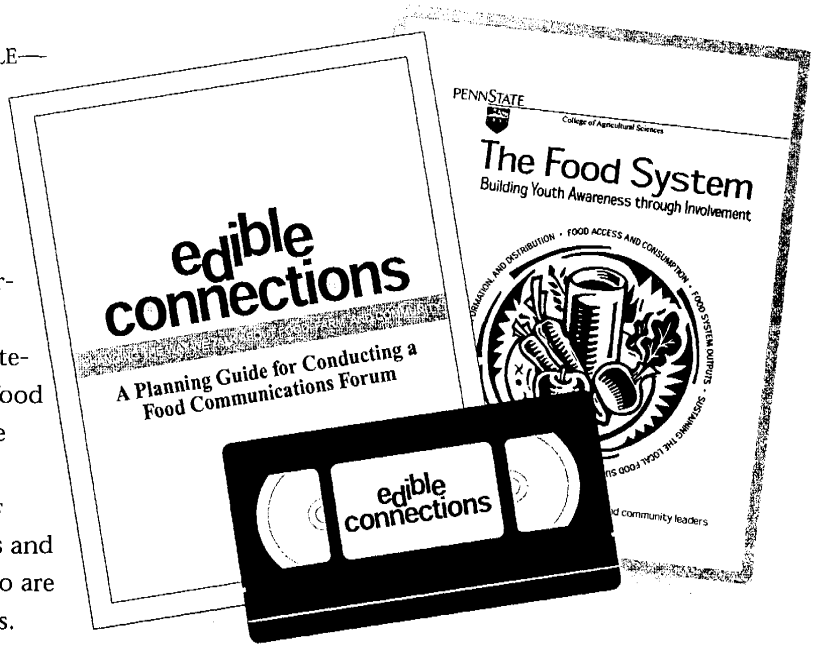

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Order Form

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Number of copies ____ at $15 each

Edible Connections: Changing the Way We Talk About Farm, Food, and Community (Publication and Video Package) (MISC-15)
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continued from front page

The 142-page guidebook introduces educators and youth to the concept of the food system, emphasizing interactive learning, skill building, and using the community as a classroom. Topics covered include food system inputs and outputs; food production, transformation, and distribution; food access and consumption; and sustaining the local food supply.

The guidebook also provides background information, curricula recommendations, activity ideas, thought-provoking questions, and resources for more information. Activities in the book can be used in the classroom, in club or group settings, or by families at home. Many of the activities also are appropriate for adult groups.

An **Edible Connections** food communications forum brings together people who are involved in local and regional food systems. *Edible Connections: A Planning Guide for Conducting a Food Communications Forum* can help you organize and conduct such a forum in your community. An **Edible Connections** forum aims to improve understanding, build connections, and promote communication about issues associated with food, farm, and community—those edible connections among us.

The guide discusses defining objectives, choosing a site, identifying supporters and generating resources, setting an agenda, marketing the forum, booking speakers and panelists, and evaluating impact. Discussion questions and planning tips are included, along with a planning timeline and budget worksheet.

Accompanying the guide is a video illustrating the six elements of an **Edible Connections** forum: Setting the Table, Food as Lifestyle, Food as Livelihood, Food as Connection, Town Meeting, and Celebration of Regional Foods. The video features scenes from previous forums and interviews planners and participants.

This publication is available in alternative media on request.

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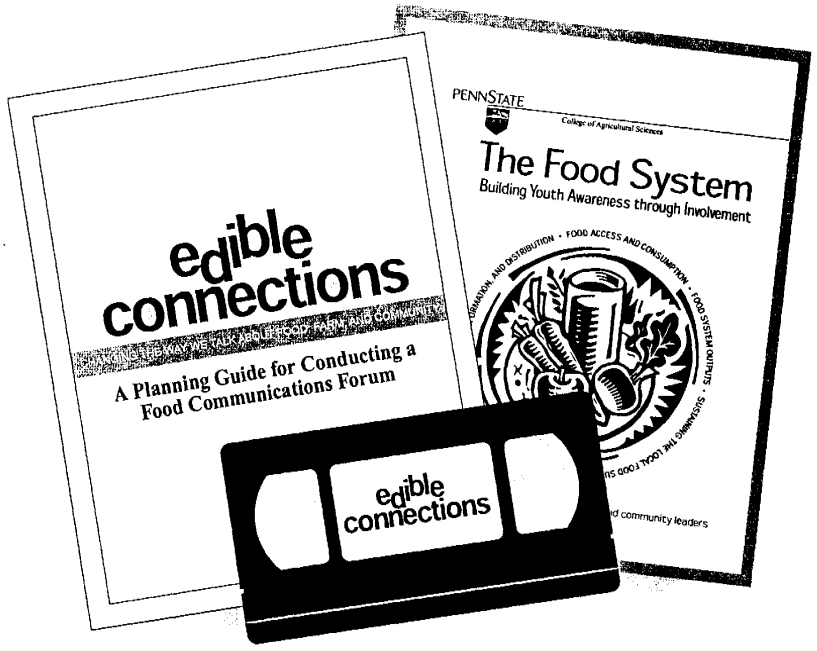


You Learn What You Eat

COGNITION MEETS NUTRITION IN BERKELEY SCHOOLS

by David Sobel

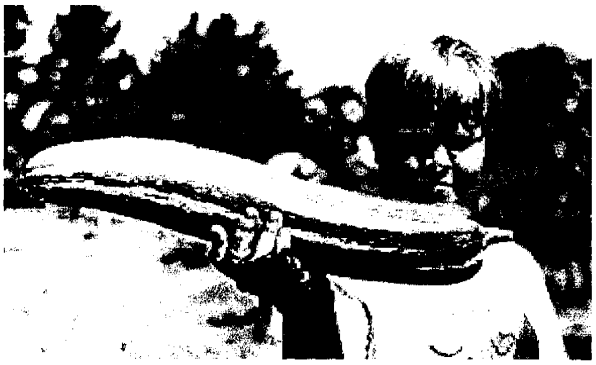
Summer 2001 | E-mail this Article to a Friend

I GOT MY FIRST SENSE of the disconnect between children and food when I was a kindergarten and first grade teacher in a lost-in-the-hills school in southern New Hampshire, multiple decades ago. Intent on a healthy curriculum, I had the students prepare their own snack every day, preferably from scratch. But after weeks of popcorn, apple sauce, and celery sticks with peanut butter, I was itching to explore new horizons. What new thing could we make that the kids would really like to eat, I pondered. French fries? Not terribly healthy, but certainly a fun food that would allow us to take part in the transformation from raw vegetable to tasty snack.

I gathered my group in the kitchen. Their eyes lit up when I announced our task. "So what do we need to make French fries?" No response, as a bit of glint left their eyes. Rephrase and concretize...I tried again: "When you make French fries, what's the first thing you do?" "Well," courageous Steve recollected, "you go to the icebox, open the freezer, and take out the plastic bag with the crinkly things inside." Not one of the children knew that French fries were potatoes. And when we made tomato soup with tomatoes picked fresh from the garden, I was

disheartened when Angela said, "This soup is OK, but I like real tomato soup better, the kind that comes in the can."

Most of the $4 billion spent on school lunches in the United States every year reinforces this severing of the conceptual food chain. When was the last time you walked into a school and enjoyed the fragrance of fresh-baked bread wafting from the school kitchen? These days, food appears from somewhere/nowhere out of the back of a truck. There are no smiling grandmothers with splatters of sauce on their aprons ladling up love with the freshly mashed potatoes; today's food service ladies just heat and serve. But in Berkeley, California, carrots are coming straight from the school's garden, food preparation is an integral part of the curriculum, local restaurateurs are selling organic tacos in the schoolyard, and the whole community is recognizing the links between cognition and nutrition.



A killer zucchini from the Edible Schoolyard.

IN THE BEGINNING was the seed. Well, actually, a handful of seeds. The Berkeley community had a long history of community gardening when Alice Waters, founder of the acclaimed Chez Panisse restaurant, had the vision of a school garden. Neil Smith, principal of the Martin Luther King Middle School, had a parallel vision of empowering teachers and students to enrich the curriculum and the schoolyard through real-world learning. A 1995 conversation between Smith and Waters helped them realize that they both wanted to hoe the same row. A couple of science teachers, Phoebe Tanner and Beth Sonnenberg, got intrigued, but were still a bit overwhelmed. Smith recalls, "Alice's vision was so far-reaching, so 'out there' compared to where we were. She was talking about students serving other students lunches that they had grown in the garden, and we were looking at an asphalt, urban lot. We needed to start with the garden before we could talk about the cafeteria and redoing the lunch program."

Fritjof Capra and Zenobia Barlow at the Center for Ecoliteracy recognized the asphalt-breaking potential in these seeds. Compelled by the center's mission to "support educational organizations and nurture communities in schools that teach and embody ecologically sustainable ways of life," they saw an opportunity to recreate a miniature food system on the school grounds. Philosophical and financial support from the center helped to weave together many strands of already existing support for community gardening, and so it was that the Edible Schoolyard was born.

First came the garden, then a student-designed and -built toolshed, followed by a kitchen classroom and specialized food preparation teaching staff to help students turn fresh produce into healthy snacks. The garden became an integral part of the math, language arts, and social studies curricula, and an emotional climate of warmth, mutual support, and trust flourished in the school. Esther Cook, manager of the kitchen classroom, reports that students have enthusiastically made and enjoyed such things as Jerusalem artichoke fritters, pumpkin and kale soup, cucumber sushi, and sweet potato biscuits. Cook saw much learning potential in the cooking activities: "Students have learned the origins of staple ingredients by grinding their own wheat and corn into flour and making butter from scratch. They have appreciated the inherent bounty of the garden by counting the seeds in a cherry tomato. And they were struck by the ability of one tiny tomato to hold the potential for 100 plants. 'Enough for everyone on my block!' exclaimed a student."

One garden on one schoolyard is a beginning, but not a significant challenge to Del Monte. Yet if a schoolyard garden can foster learning and community at Martin Luther King Middle School, why not have a garden on every schoolyard in Berkeley, or every schoolyard in California? And since you can't realistically feed all the children in any one school with just one garden, why not create connections between local farmers and the school district? Instead of freeze-dried burritos trucked in from the Midwest, how about burritos with organic beans and cheese grown and produced by area farmers, farmers whose fields are threatened by suburban sprawl? The educators, systems theorists, ecologists, and writers at the Center for Ecoliteracy saw the Edible Schoolyard as the first step in a profound shift toward more sustainable and equitable communities. They decided to aim high—convert the Berkeley School District's entire lunch program to all organic and locally grown.

The new school lunches are popular!

Exploring the wonder of chard is part of the curriculum

The center staff found conceptual support for their goals in the USDA's Community Food Security grant program, whose goals include: meeting the needs of low-income people by increasing their access to fresher, more nutritious food supplies; increasing the self-reliance of communities in providing for their own food needs; promoting comprehensive responses to local food, farm, and nutrition issues; and developing innovative linkages between the for-profit and nonprofit food sectors.

Janet Brown, program officer for the Food Systems Project at the Center for Ecoliteracy, sees the project as a model for the USDA's goal of linking farms and schools. "In just five years, the Center's Food Systems Project has grown from the funding of a school garden at an individual school site to the complete reinvention of Child Nutrition Services throughout the 10,000-student Berkeley Unified School District. By using food as an organizing principle for systemic change, the program addresses the root causes of poor academic performance, psychosocial behavior disorders, and escalating children's health issues such as obesity, asthma and diabetes. At the same time, the program connects the loss of farmland and farming as a way of life in our region and the social problems facing school communities to children's health."

There's a direct connection, Janet contends, between agribusiness that supports the high-fat, fast-food industry and recent research finding that one quarter of California adolescents are at risk of being overweight. But by creating dedicated markets for local organic farmers, school districts can help to nurture healthier students, minimize the use of toxic herbicides and pesticides, and build community through supporting local business and cross-generational food preparation experiences.

When the Berkeley Unified School District adopted its new Food Policy in August, 1999, it unpaved the way for breaking down both the conceptual mindset and infrastructure of the current food programs. Since the kitchens at most of the schools have devolved to just providing heat-and-serve meals, the school board

proposed and 83 percent of the voters approved a $10 million bond issue to renovate all of its elementary school kitchens and build a new cafeteria and kitchen facilities at the largest junior high school. Good facilities are a start, but kitchens need inspired staff, so additional grant funding will support a district-wide nutrition training program for food service workers. To facilitate the shift from USDA surplus food to fresh, locally prepared food, further grant funding supports hiring an organic-savvy chef to create whole new menus and new kitchen designs. Finally, to assure that school meal programs can serve delicious, nutritiously complete meals with ingredients from local farms while remaining economically viable, a $300,000 grant from the California Endowment supports the development of a strategic business plan.

And where's all that food going to come from? The project will be hiring a "forager" who serves as an envoy between the school district and local sustainable agriculture practitioners. When project coordinator Jared Lawson did some investigative foraging he found that Sebastapol orchards consistently lost money on small apples that had to be thrown away or sold at a loss because they were outside the standard pack regulations of the California Department of Agriculture. He saw that these apples were perfect for school snacks or for making organic cider for kids. Healthy snacks for students while creating a dedicated market for an unutilizable product for growers—it's a classic example of feeding two birds with one hand!

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Since implementing salad bars in some schools over the last year, the school district has purchased more than $100,000 of fresh produce from local farmers. This figure will increase exponentially as the district uses its buying power to provide locally grown food for the primary meal program. Further, negotiations are currently underway with Newman's Own and Amy's to explore whether volume purchasing can bring down the cost of providing organic, prepackaged snack foods like dried fruits and healthy cookies. Following Berkeley's lead, San Francisco, Oakland, West Contra Costa, and Marin unified school districts have all requested assistance in exploring similar acquisition programs. Joint purchasing for close to a million schoolchildren might catch the Green Giant's attention.

THE BIGGEST QUESTION, of course, is will the kids eat the stuff? Can McDonald's and licorice whips be replaced by kale and kiwis? Not leaving anything to chance, the Food Systems people have devised ingenious ways to both assess what students want and educate students and their parents about what's possible. The new breakfast program at Oxford Elementary School, consisting primarily of whole-grain oatmeal, is a test of the willingness of children to try something new. Extensive local and organic, seasonal condiments such as berries, yogurt, nuts, seeds, and fresh fruit are provided. Initial assessments indicate that more children are eating breakfast at school and that 59 percent are choosing the whole-grain breakfast over the usual fare of French toast, pancakes, and sugar cereal.

To assess the impact of this program, Dr. Michael Murphy of the Harvard School of Medicine is researching the effects of a nutritionally adequate breakfast on academic achievement, psychosocial behavior, physical health, and school attendance.

The other major change has been the salad bars. Four are in place at the elementary and middle schools and the project aspires to having eight in full swing by the end of the school year. Though salad bars present a certain number

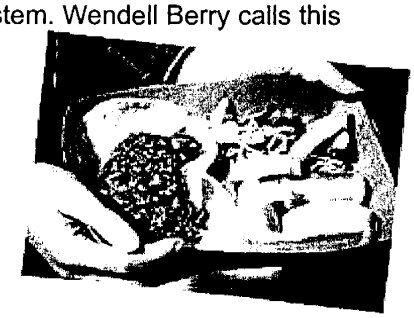
of logistical challenges, popularity among students is not one of them. It turns out that if students have grown cherry tomatoes in the school garden, they're more likely to choose them when they see them at the salad bar. So school gardens help to increase the repertoire of students' culinary choices.

The problems have more to do with time—one salad bar won't process students quickly enough, and making lunch longer affects the length of the school day, which impacts the bus schedule, and conflicts with union contractual arrangements. It's a systems problem; Muir's notion that everything is hitched to everything else applies to schools as well. Janet Brown reflects ironically that, "If our goal was to inexpensively create as many eating disorders as possible, then what we would do is shrink the amount of time for lunch." So the solution is not to shoehorn salad bars into a dysfunctional time frame, but rather explore how to adjust the whole system so that lunch can provide both nutrition and the opportunity for productive social engagement.

The initiative at the high school has taken a different tack. In response to the tasteless, unappealing food served at the high school cafeteria, more and more Berkeley High School students have started to hit the fast-food places downtown. Merchants then started to complain about the adolescent influx. Child Nutritional Services suggested that the solution to the problem was to bring fast food onto campus, but the Food Systems Project saw it differently. They went to a variety of local restaurateurs and said, "Here's a captive audience of 3,300 hungry consumers. Do you want to work with us to create organic food choices on campus?" The outcome is an on-campus food court, designed after surveying students about how they like to be served. In exchange for being willing to make organic substitutions in their menus, vendors get access to a dedicated market. Stroll into the food court this week and you can enjoy hormone-free chicken thighs and legs from Poulet, sandwiches on organic bread from the E-Z Stop Deli, and pizzas made with organic herbs and Marin County cheese. The Good Food Cafe, a campus kitchen for students studying the culinary arts, offers an organic smoothie. "Any high school in the country would kill for this," commented Principal Frank Lynch.

Student response ranges from thrilled to tolerant. Senior class president Jamie Lee said, "It's great we have a healthy option to the greasy stuff they used to serve in the snack shack. But lots of students just want the food to be affordable and tasty. If it's good for them, then that's all the better." When students complained that the costs were too high the first week, negotiations with vendors led to lowered prices, which was a good opportunity to demonstrate to students that feedback loops in ecological systems tend to move the system toward sustainability.

THE BERKELEY FOOD SYSTEMS PROJECT is problem-solving that explores connections between seemingly disconnected parts of a system. Wendell Berry calls this "solving for pattern," in which "good solutions promote the well-being of all parts of the system." The health of the soil, of plants and animals, of farm and farmer, of schools and schoolchildren are sustained by connecting the pattern.



Zenobia Barlow points out that, "schools have become a business opportunity for fast food vendors and global food producers.... Our tax dollars are buying a high-fat, high-salt, high-octane caffeine, fast food diet for school children that in turn produces a multi-million-dollar public health problem." This diet also reduces academic performance and contributes to the demise of family farms eradicated by urban sprawl. Instead, the Center for Ecoliteracy and

the Berkeley School District are devising a pattern of healthy food, improved academic performance, and sustainable agriculture.

The students, teachers, community gardeners, and ecologists in the Bay Area are on the doorstep of a significant food invention. Think, for a moment, of that food item that beckons to all of our taste buds. With enough innovative thinking, Berkeley students will be able to reinvent that holy grail of American foods—pesticide-free, locally grown, low-fat, and sea-salted French fries that will taste good and be good for us too. Maybe the next time I cook with students, I won't need to feel so guilty.

David Sobel *is director of Teacher Certification Programs in the Education Department and co-director of the Center for Environmental Education at Antioch New England Graduate School in Keene, New Hampshire.*

Photos: Second from top, Barlow/Center for Ecoliteracy. All others, Tyler/Center for Ecoliteracy.

The Center For Ecoliteracy, 2522 San Pablo Avenue, Berkeley, CA 94702, 510/845-4595, info@ecoliteracy.org, www.ecoliteracy.org.

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IX. Success Stories

Chapter IX:

Success Stories

Chapter IX: Success Stories

Success Stories--Agritourism, Direct Marketing, Education, Conservation and Agritainment
USDA/NRCS
This website contains links to interviews with 17 owners of successful alternative enterprises and agritourism businesses.
Available in Resource Manual or at:
http://www.nrcs.usda.gov/technical/RESS/altenterprise/success.html

Natural Resource Protection
SARE
This publication is a report on an interdisciplinary study showing that what's good for the wetland and the birds can also be good for a farmer's financial bottom line. The report focuses on farmers that are already using the wetlands program to achieve this goal. It is in the "Ten Years of SARE" publication under the Natural Resources Protection section.
Available online at: www.sare.org
Hardcopies available from: (301) 504-6245.

The New American Farmer
Published by SARE
This publication contains interviews with 48 farmers and ranchers describing their sustainable farm operations.
Available at: http://www.sare.org/newfarmer/
Hardcopies ($10) and CD-ROMs ($5) available from:
210 Hills Building
University of Vermont
Burlington, VT 05405-0082
Ph: (802) 656-0484
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Adding Value for Profit
Northwest Farm Credit Services
This article in the annual report issue features four producers that diversified to add value to their operations. These entrepreneurs are: customer focused, profit motivated, innovative and responsive, comfortable with change, strategic planners and effective communicators. See Chapter 8 for table of contents.
Available at www.farm-credit.com and going to the customer button where there are hyperlinks to their web sites. For copies contact
Ben Alexander
Sonoran Institute
201 S. Wallace Street
Bozeman, MT 59715
Ph: 406-587-7331

Greenbook 2003: Caring for the Land
Minnesota Department of Agriculture
This publication, updated annually, provides information on how farmers are adopting energy and sustainable agriculture alternative enterprises. The publication includes stories about how people are applying alternative sustainable enterprises. See Chapter 3 for table of contents.
Available online at: http://www.mda.state.mn.us/ESAP/Greenbook2003/default.htm
Hardcopies available from:
Ph: (651) 215-0367
Email: Alison.Fish@state.mn.us

USDA Small Farmer Success Story Bulletins
Available online at: http://www.ams.usda.gov/tmd/mta/publications.htm
Hardcopies are available from Dan Schofer at:
Ph: (202) 690-1170
Email: dan.schofer@usda.gov

Renewing the Countryside: Minnesota
Senior writers: Beth Waterhouse and Tim King
Institute for Agricultural and Trade Policy and the Great Plains Institute for Sustainable Development and the Northeast Minnesota Sustainable Development Partnership, University of Minnesota, 2001
This publication contains interviews with successful farmers, some of which have started their own alternative enterprises.
Available by calling 612-870-3472 or
www.mncountryside.org

Analyzing and Developing Marketing Strategies for Tennessee's Value-Added Agriculture: Using Case Studies to Enhance Success
Released by the Federal State Marketing Improvement Program
This study looks at various case studies of alternative agriculture businesses in Tennessee, with the purpose of providing farmers with information that will aid them in making decisions related to alternative agriculture.
Available at: http://www.utextension.utk.edu/publications/pbfiles/PB1699.pdf

The New Frontier of Ranching: Business Diversification and Land Stewardship
Sonoran Institute; June 2000
By Ben Alexander
This is an informational publication that discusses the benefits and methods of applying business diversification and land stewardship to ranching. Case studies are used to present the diversification possibilities. See Chapter 8 for table of contents.
This publication is available from:

Sonoran Institute
7650 E. Broadway Blvd., Suite 203
Tucson, AZ 85710
Ph: (520) 290-0828
www.sonoran.org

Sustainable Agriculture
NRCS Watershed Science Institute.
This publication contains four success stories that address sustainable agriculture and the productivity, environmental quality, socioeconomic viability of sustainable agriculture.
Available online at www.wsi.nrcs.usda.gov/products/sustainable-agriculture.html or call
Ph: (402) 437-5178 ext. 43
Email: saschmann@unl.serve.unl.edu

Sustainable Agriculture...Continuing to Grow: Proceedings of the "Farming and Ranching for Profit, Stewardship and Community Conference, March 7-9, 2000"
Western SARE
This publication contains the profiles of the speakers at a conference that addressed sustainable farms, disease, pests and weeds, sustainable ranches, marketing in a sustainable economy and sustaining agriculture. Farmers and ranchers made several presentations on how they are sustaining themselves through alternative enterprises. This gives the reader an understanding of what the speakers do and how they The profiles and overview of the speakers are available online at: http://wsare.usu.edu/ by clicking on the "publications" link. Or, hardcopies available at: (435) 797-2257 or wsare@mendel.usu.edu

Meeting the Diverse Needs of Limited-Resource Producers
Prepared by SARE.
This guide is intended to inspire agricultural educators to improve their outreach to limited-resource groups. The bulleting showcases nine successful examples across the nation, then points to more detailed resources on the subject.
Available online at www.sare.org/bulletin/limited-resource
Ph: 301-504-5230.

SARE 2003: Sustainable Agriculture Research and Education Program
This publication highlights 15 years of SARE activities by presenting the profiles of 12 projects that illustrate crop, livestock and marketing innovation tested by producers on and around their farms and ranches.
Available online
www.sare.org/highlight/2003 or
Ph: 301-504-5236

The Real Dirt: Farmers Tell about Organic and Low-Input Practices in the Northeast
Prepared by the Northeast Organic and Sustainable Farmers Network
Published by Sustainable Agriculture Research and Education (SARE)-SAN

This book is based on interviews with more than 60 farmers in eight states. It summarizes practical methods for ecological soil, pest, disease, crop, greenhouse, and livestock management. Available online at www.sare.org and click on publications. Or order at a cost of $13.95 (plus shipping and handling).
Available from:
Sustainable Agriculture Publications
Hills Building, Room 210
University of Vermont
Burlington, VT 05405-0082
Ph: (802) 656-0484

The North Central Initiative for Farm Profitability- Case Studies Website
This website has links to a few of their case studies.
http://www.farmprofitability.org/case.htm

Horticultural Innovators: Case Studies of Seven Entrepreneurial Growers in New York
Published by Farming Alternatives
Copies are free and may be ordered from Farming Alternatives:
17 Warren Hall
Cornell University
Ithaca, NY 14850
Ph: (607) 255-9832
Email: jmp32@cornell.edu

Pastured Poultry.
This publication describes the experiences of 35 southern limited resource farmers who from 1996-99 participated in a project to produce and market pastured poultry. The publication includes information on pen-building, brooding, feeding, processing, marketing, legal matters, economics, and several other topics.
Available online at: http://www.attra.org/attra-pub/pasturedpoultry.html
Hardcopies are available by calling, 1-800-346-9140

Grass Farmers
By Allan Nation
This book contains 37 success stories that provide insight into how people are running their livestock operations.
Cost: $23.50
Stockman Grass Farmer
PO Box 2300
Ridgeland, MS 39158-2300
Ph: 1-800-748-9608 or (601) 853-1861
Fax: (601) 853-8087

Community Forests: A Collection of Case Studies of Community Forestry
This publication was compiled by the Forest Community Research for the Seventh American Forest Congress Communities Committee
Available at: http://fcresearch.org/cfbooktoc.html

Stories Across America: Opportunities for Rural Tourism
Prepared by the National Trust for Historic Preservation
Published in 2001
See Chapter V for copy of abstract and table of contents. Available online at: http://www.nal.usda.gov/ric/ricpubs/stories.htm or
calling USDA/NRCS at 202-720-2307.

Scenic Byways, Trails, and Corridors and Their Impacts
This publication is a fact sheet produced by the Great Lakes Sea Grant Network, Coastal Land Use Committee. It contains case studies of scenic byways, scenic trail systems, river and canal corridors, and special touring events.
Available online at: http://www.msue.msu.edu/msue/imp/modtd/33520714.html
Hardcopies available from Cornell University at a cost of $0.50
Sharon Mullen, NY Sea Grant
SUNY Oswego,
Oswego, NY 13126

Developing Trails and Tourism on Private Lands in Texas: Case Studies on Existing Enterprises
Department of Recreation, Park and Tourism Sciences, Texas A&M
This publication discusses the use of trails and sponsoring of biking events as an income opportunity for ranchers. For more information, contact Scott Shafer 979-845-3837 or Email: Sshafer@rpts.tamu.edu.
You can also order the publication online at:
http://texaserc.tamu.edu/catalog/topics/Recreation_and_Tourism.html

Share Your Heritage: Cultural Heritage Tourism Success Stories
Prepared by the National Trust for Historic Preservation
See Chapter VII for abstract and a copy of table of contents.
Cost: $25
To order:
Ph: (202) 588-6296
Website: www.nthp.org.

Developing Trails and Tourism on Private Lands in Texas: Case Studies on Existing Enterprises
By C. Scott Shafer and Virginia Dilworth. The demand for outdoor recreational opportunities is growing rapidly. Texas landowners are discovering that developing trail-type tourism activities can be both profitable and rewarding. This publication features details about seven such enterprises, including tips for getting started, creating a desirable

product, and developing partnerships to make such ventures more economical. (40 pp., 22 photos).
Department of Recreation, Park and Tourism Sciences. Texas A&M
Email: Sshafer@rpts.tamu.edu or at
http://texaserc.tamu.edu/catalog/topics/Recreation_and_Tourism.html

Evaluating Marketing Strategies for Small Farms in Mid-Atlantic Region
This is a 4-year collaborative effort among public and private organization to improve the viability of small fams in the Mid-Atlantic region. Study is looking at successes and challenges of "producer only" farmers' markets and CSA including a survey of shareholders. Check the web site for status of study and success stories.
www.smallfarmssuccess.info

Marketing Strategies for Farmers and Ranchers
SARE, USDA, CSREES.
This publication provides information about alternative value-added marketing strategies, case studies, and a list of resources that include websites, books and periodicals. The publication offers insight into marketing through farmers' markets, community-supported agriculture, and new cooperatives.
Available online at: http://www.sare.org/market99/index.htm
Hardcopies available by calling, (202) 720-5203

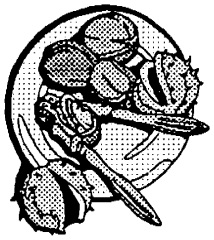
Small Farm Success Project
A coalition of land grant universities, USDA, and nonprofit organizations in the Mid-Atlantic region is dedicated to helping small and emerging farmers improve their financial success. With funding from the USDA's IFAFS (Initiative for Future Agricultural Food Systems) program, the coalition developed this initiative.
Available online at
www.smallfarmsuccess.info

Success Stories

Agritourism, Direct Marketing, Education, Conservation, Agritainment

Natural Resources Conservation Service, USDA

- Family Fun and Education, Pick-Your-Own, and Community-Supported Agriculture —Mark and Kate Zurschmeide
- 221 Melsted Place— Victorian Bed & Breakfast, Dinners, and Tea's--Neil and Lonnette Kelley
- Family Education and Entertainment on the Farm—Steve and Dorothy Enger
- Diversified Value-Added Products—Kim Tait
- 'Agritainment,' Weddings, Reunions, and Organic Dairy Products—Tony and Carol Azevedo



- Organic "Farm-to-Table" Herbs, Berries and Vegetables—Beverly Morton-Billand
- Horse-Drawn Wagon Rides—Larry Edmonds
- Cool's Pond—Fee Fishing, Farm Stand, and Crafts—Sam and Barbara Cool

- Catering, Picnics, Weddings, and Meeting Facilities—Randy Nixon
- Sylvanus Farms--Farm Stays, Hunting Leases, Fishing, Conservation, Education—Paul and Becky Kelley
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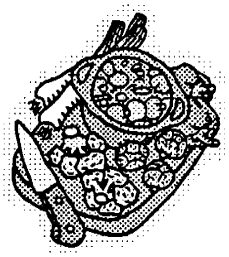

- Fruits and Vegetables/Farmers' Markets—Francisco Resendiz
- Direct Marketing of Dairy Products—Bill Lesher
- Greenhouse Bedding Plants, Welded Sculptures, Wetland Restoration, Hunting and Beef Cattle—Jeff and Lisa Weber
- Cherry Tree Farms—Grass-Fed Beef, Goats, Sheep, Chickens and Honey—Doyle Freeman
- Penn's Corner Farmer's Alliance—Farmer to Chef, Food Stores, Food Bank Marketing—Doyle Freeman

USDA NRCS
United States Department of Agriculture

Natural Resources Conservation Service

Resource Economics and Social Sciences Division

June 2001

Alternative Farm Enterprises – Agritourism Success Stories

Family Fun and Education, Pick-Your-Own, and Community-Supported Agriculture,

Interview with Kate Zurschmeide, Great Country Farms, 18780 Foggy Bottom Road, Bluemont, Virginia 20135, 540-554-2073, farmer@greatcountryfarms.com, www.greatcountryfarms.com

What is the history of your farm and farming experience?

Mark, my husband, grew up on a farm in Loudoun County, Virginia. His parents owned and leased land for the pick-your-own and fresh pumpkin market and a pick-your-own strawberry enterprise for over 25 years. They also marketed their products at their own farm market in nearby Leesburg. They were the largest pumpkin producer in the state in the 1980's. I did not get involved in agriculture until 1987 when I married Mark. He was farming by leasing land and growing pumpkins and strawberries in the mid-1980's. Then, we purchased our current farm of 187 acres, of which 50 acres is wooded, 100 acres are planted into vegetables, berries, vine and tree crops. The remainder is farmyard, ponds, agritourism fun areas, parking, and areas to keep the petting farm animals.

Describe the alternative enterprises in which you are presently engaged?

We currently operate a pick-your-own strawberry, blueberry, raspberry, black raspberry, pumpkins, flowers, herbs and vegetable garden enterprises. We are not a certified organic farm, even though most of our produce and berries are grown without the use of pesticides or herbicides. We also have an on farm market retail store. Our orchard crops are just starting to produce and include apricot, peach, plum, cherry and apple trees.

We operate a 200-member Community-Supported Agriculture (CSA) where the produce is delivered for 22 weeks up to 60 miles away. Additionally, CSA members may come and pick a pre-determined amount of the "pick-your-own" crops each week as part of their membership fee. Agritourism is also a major enterprise on our farm during the whole season but becomes most popular in the fall. We focus on education and fun for the family and school children. Some activities are: 60 foot in-hill-tunnel slide, tunnels, mazes, fishing pond, petting farm (pigs, chickens, ducks, goats, goats, rabbits, llamas, a donkey, cows, sheep, and turkeys), pig races, pony rides, three picnic areas for birthdays, business picnics and family reunions, education stations for dairy and chickens, hayrides, and a composting educational area.

We also turn our "vegetable bedding plant starter" greenhouse into a workshop for school groups in spring and summer, as part of our education program is to teach young children, kindergarten to fourth grade, about how their food is produced. This is also done through the "Farm Animal Barnyard," "ABC Garden," "Goat Tree House" and the "Kid Corral" play area.

In 2001, we added a 22,000 square foot greenhouse to grow bedding plants and hanging baskets for the contract wholesale market.

What made you decide to go into the present alternative enterprises? Goal? Vision?
Mark always knew he wanted to farm. Our goal and vision was to have a self-sustaining farm that would support our family. For about 4 years, Mark farmed and worked a full time job as a financial planner and accountant. Pumpkins and strawberries were the main crops until Great Country Farms was purchased. We found that we were always too busy to enjoy life when working two jobs. In 1993, Mark started farming full time when we purchased our farm. I continued to work for Verizon. I would leave for the office on Monday and not return until Friday as my work resulted in long days and frequent travel. We both knew there was "no office politics" on the farm!! It was time for a change.

How did you make the transition?
We knew that leasing of land did not have a future. Loudoun County was developing into a Washington, D.C. suburb so land prices were raising. We found this farm in the western part of the county that had been on the market for several years. We went to the owners, the Mormon Church, with a 45-member CSA agreement and earnest money. They agreed to finance the remainder. So, we became owners in late 1993, and began our CSA in 1994. We also knew from the beginning that agritourism would be one of the enterprises because of the success relatives were having in Indiana. We started our agritourism enterprise with local day care schools in 1994 until we developed the farm, play and learning activities. It was a learning curve for us too.

The farm has several old buildings and several natural springs. These barns and buildings really give the look and feel of a farm that "Grandpa" had. Our major natural spring provides an adequate water supply that keeps a 2-acre pond filled to a depth of 10 feet. This is our irrigation water source for the garden to insure produce for our CSA members, and water for our animals. We also stock the pond and use it as part of our agritourism enterprise.

A chronological listing of our activities will show how we managed our growth at Great Country Farms.

1992—started PYO pumpkins on leased land

1993—purchased the farm and PYO pumpkins

1994—operated a 45 member CSA, pick-your-own strawberries and pumpkins and started our agritourism and agrieducation enterprise

1995—expanded CSA to 900 members (A big mistake for us).

1996—reduced CSA to 100 members and grew the school tour business.

1997—started to regrow the CSA by adding 25 shares/year, started the Fall Harvest Festival, planted first apple orchards, built chicken coop, pig house, added a dual purpose shed that is used for equipment storage in the off season and a birthday party area otherwise, trained goats to walk up the 10-inch wide board ladder and develop fun activities for the education and agritourism enterprise.

1998—started to build our own house on the farm.

1999—added first greenhouse for CSA and group tours, and expanded the educational programs to the summer and Kate joined the farm full time.

2000—Added maze, pig races and tunnels to play area, built a "Little Farmer Barnyard" (allows the smaller children to play without getting bowled over by the big kids), built a dual purpose machine shed that stores equipment in the off season and is a third picnic area, otherwise, dug another pond by "springs" for tree crop irrigation, and added Haunted Hayride (abandoned it after the first year to re-design.)

2001—Added large slide, and educational signage, built the pig racing barn and the goat tree house, and Fall Festival barn, which serves as retail farm market, CSA processing shed and large party barn, and completed planting of orchards and vineyards.

2002—Added wholesale greenhouse business, and enhanced 200-member CSA delivery by using a delivery company.

What is your business planning and decision making process?
Mark, being a financial planner/accountant, developed a business plan for the farm. We determined the enterprise sizes that were needed to make it a profitable venture. We also develop a business and marketing plan for every enterprise that we have added to the farm. If it does not show a profit, we don't do it. However, this does not keep us from testing new ideas and keep us from being creative. We just don't invest a lot of money until we have tested it.

We also made some very substantial family financial decisions that allowed us to make this move. We traded a larger home and two cars for a happier and more healthier life. I continued to work at Verzion until 1999, when our third child, Jake, was born. Now, I am a full time working partner in the business rather than just on weekends.

What went wrong? and Why? How did you correct it?
The first year of the CSA was so successful that Mark's father and brothers decided to join us. We increased our 45 member CSA up to 900 members in 1995. This explosive growth caused several problems. We found ourselves being a delivery company rather than a farm with some drivers leaving at 6:00 a.m. and not returning till 12:00 midnight, while other drivers would return with a truckload of produce because they did not want to make the deliveries. We had delivery trucks on the road four days a week. Trucks would break down and the long hours were disheartening. It just got out of control! So, in the third year, 1996, we reduced to 100 CSA members and have had controlled growth. We now have 200 members. We are trying a new venture with delivery. One CSA member owns a delivery company and they are going to take one route on a trial bases. We are very cautious as Mark, a relative, or an experienced employee, made all of the deliveries since 1996.

What went right? Why? How are you building on this success?
Our agrieducation program is focused on young school children. We found the local teachers and schools to be very receptive. Today, we make mailings to teachers by class—from Day Care to the fourth grade. Each education program is developed and presented for that age group. We try new ideas and ways of teaching the children in the outdoor classroom at Great Country Farms. We listen to what the teachers and children want to learn about or type of fun they want when they come to the farm. We are now researching and determining if the farm visit and education program would work for intermediate schools. Teachers and students are traveling over 60 miles to come to our farm.

How do you price your products?
We receive some information from the Virginia Department of Agriculture on the pricing of pick-your-own. We look very close at the competition around us and try to remain competitive. The CSA "share "price is $645 for a 4-5 member family and $495 for a one-half share which is developed based upon the costs from the bottom up, including delivery.

Our agritourism and agrieducation prices change by season. School children are charged $4.00 in the spring and receive a "planting kit" and U-pick item and $4.50 in the fall and receive a pumpkin, apple cider and an apple" in the fall. The hayride, feed for the petting farm animals are included in the spring and fall. Other visitors are charged a $2.50 fee or $10.00 per car between May 1 and September 15, and for the Fall Festival $5.00 per person, or $20.00 per car on weekends from September 15 to October 31. Pony rides are $2.00, and non-group visitors purchase the feed fed to the animals.

How do you acquire your information?
CSA surveys are our biggest source of information. We listen very carefully to what our customers are saying they like or dislike. We attended a seminar on CSA sponsored by the Loudoun County Economic Development Council and grew our CSA business from there. We do an extensive amount of reading about our products and businesses.

How do you market or promote your enterprises?
We have brochures describing our business. We send mailers to the schools for spring and fall visits. I have a weekly CSA newsletter that describes what is happening on the farm and what crops are available that week. It also contains recipes on how to use the produce they receive that week. I place an ad in the local "Convention, Visitor's Bureau" publication for the county, plus, ads in the local and Washington Post newspapers during the Fall Harvest days of September and October.

How do you handle your liability concern?
North American Farmers Direct Marketing Association provided our coverage until this year when they reduced their coverage. We are looking for companies that provide higher umbrella policies. We have so many activities for children that adequate coverage is a must.

What would be the most important advice you would give other farmers considering an alternative enterprise?
- Do extensive research on marketing. You are an entrepreneur and must understand your market if you are to be successful.
- Listen very carefully to your customer as they can see things you don't about your business.
- Don't be afraid to try new ideas or new ways of doing something. Test it and see if it works for you and your customers.
- Customers are special and require special treatment. They can make or break you. They are the best advertisement you can buy. Invest time in them and grow them.
- Use signage to lead people around your farm as they have no clue about what is right or wrong on the farm. They need information on what to pick or not to pick, where to step, how to pick crops, and what not to touch or climb.

What would you have done differently?
We would have controlled our growth at the beginning. It really hurt us financially and emotionally. We still talk about it at least once a week. Our best advice is to start small and grow as you learn. I would also have researched the pricing of products better in all areas of our business. An entrepreneur must have price knowledge; alternative marketing plans, and understands the competition and the customer. We jumped in and planted 400 fruit trees and lost almost all of them to the deer in one season. We dug up the few that did make it and planted them in our "Memorial Apple Orchard" near one of our party venues. We are now replanting and using a number of deer controls including electric fence and dogs.

Where do you plan to go from here?
Our next step is to expand the school program to include children who are in middle school. We need to determine their needs and develop a program to meet it. As our new fruit trees and berry bushes begin to mature, we are going to start a bakery and make fruit pies and other baked goods.

What do you like and dislike the most?
We like making our own decisions and setting our own directions. It doesn't feel like work. We are really enjoying our lifestyle. We feel like we are participating in the world as we grow food and fun and share it with our customers. We love training our animals to do tricks for the children. Our customers have become an extended family. It was unbelievable the amount of assistance we received when our fourth child, Carly, was born in July 2001. They brought us meals and many even brought baby gifts. I receive a special joy from people relating to the farm, open space, and sharing our hopes and dreams. They are so supportive. The

dislike! "The work is never done." There is always something to repair or build on this farm.

Would you start this alternative enterprise business today after learning what is involved?
We would definitely do it again!! We do not feel like operating this farm for growing food and fun is work. It is fun!

What groups/organizations/activities have you joined or become involved in because of alternative enterprises?
We belong to the North American Farmers Direct Marketing Association, Loudoun County Convention and Visitors Association, of which Kate is now a board member, and Loudoun Valley Homegrown Farmers Marketing Association.

What do your customers like the most about your product(s) or enterprise(s)?
Visitors and customers enjoy the "real working farm" and the open space. Our customers also feel a sense of ownership that is shown by their support. They are as excited about our growth and value as we are. They feel like they are part of the farm. Two freezes of 2001 hit our strawberry production and we could not provide the quantity of strawberries that we had in the past. The members accepted this once they found out they received all of our strawberries. They would not accept any rebate. The CSA customers now understand how they are sharing our risk. If we have a crop failure, they would not receive the produce or berries. This builds the feeling of ownership and support. We also write into our CSA agreement that we do not deliver the fourth week of July, as this is family vacation time. We have never had one unsatisfactory word about this policy. We receive only wishes to have a great vacation!

We believe our CSA customer relationship is very strong. We work on building and keeping this relationship. We measure this success by the fact that 75 percent of our members return every year and by the beginning of the season we have about 50 people on a waiting list. This makes it very easy to build to capacity the following year. Also, we do not advertise our CSA. It has grown by word of mouth.

Would it be ok for people to contact you?
Yes

Do you want additional information?
For more success stories and other information, see:
http://www.nrcs.usda.gov/technical/RESS/altenterprise.

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June 2001

Alternative Farm Enterprises – Agritourism Success Stories

221 Melsted Place— Victorian Bed & Breakfast, Dinners, and Tea's

Interview with Neil and Lonnette Kelley, P.O. Box 221, Mountain, ND 58262, 701-993-8257, info@melstedplace.com, www.melstedplace.com

What is the history of your farm and farming experience?

Two twenty-one Melsted Place takes its name from the original owner. Sigurdur Magnusson Melsted from Iceland built this 12-room mansion in 1910 for his wife, her parents, and their 10 children. The house had indoor plumbing, running water, gas lighting, hardwood floors, a magnificent stairway, and elegant craftsmanship. This was the largest farm in Pembina County.

Lonnette grew up on a farm in Minnesota and is an LPN nurse. Neil grew up in the city and was a commercial construction contractor. We wanted to return to a rural area with a little land for a garden and horse. We purchased this property the day after we first saw it.

Describe the alternative enterprises in which you are presently engaged.

We have several income-producing activities based in the home and farmyard. We started with the B&B and afternoon teas and added special-request lunches the second year and dinners the third year. We now serve traditional festive holiday dinners and are doing some catering for community receptions and dinners. The community came at first out of curiosity about the place, especially the house. We had to become ingenious in developing continued community interest. We have slowly grown to the point that we now have a major event every month to ensure a steady cash flow.

What made you decide to go into the present alternative enterprises?

We purchased this to be our rural home on this 2-acre site in 1995. The beautiful Victorian house was a bonus. We wanted to be somewhat self-sufficient through gardening, and we saw the potential of the yard with its rich black soil. We began to fix up the house and outbuildings, which had been vacant for a year and a half. The house had been extremely well preserved. In January 1997, we needed a source of income other than part-time nursing for Lonnette and contracting and helping neighbors with farm work for Neil. Several neighbors suggested a B&B. Our main reservation was our location; we wondered if we'd be able to attract people to such a rural place. But it works great.

How did you make the transition?

We sat down as a family (Lonnette, Neil, and daughter Michele), in January 1997. This had to be a family decision because it impacts the whole family and really complicates life. We decided to start with the B&B and tea parties in June 1997.

Describe your decisionmaking process.

We first developed a business plan. Our goal was to provide a high-quality product and the best in hospitality. Lonnette met with community members to get their approval and also got the Melsted family's approval to use their name. She studied books on B&Bs and contacted state offices about licenses and other permits.

How did you obtain financing?

We developed a cost plan as part of the business plan. We knew every item we needed to buy. We

used our own resources as much as we could, including using a credit card to purchase bed linens, dishes, and supplies.

How do you market your B&B and other activities?
We cannot afford a marketing budget. Our biggest job was to develop a brochure explaining why 221 Melsted Place is an important place to visit or stay. We still have limited funds, so we rely mostly on word of mouth advertising. We have been very successful with that approach.

We are located approximately 15 miles from all the 15 communities surrounding us, so advertising would be expensive. We have placed brochures at Interstate visitor centers, but they don't let us know when they run out and time does not allow us to travel those distances. Today, we have a Web site, which is being used more and more by our national and international travelers. Also, we are working cooperatively with other businesses. For the future, we would like to find a representative in each of the 15 communities who would support and promote us. In turn, we would work together for the betterment of their community and provide the representative a dinner or stay at Melsted Place. Our focus is on serving the local area.

How do you price your products?
This is very difficult. It depends upon your community and what it is accustomed to in terms of quality and service. We have searched the 'net to check prices and amenities. Our rooms range from $80 to $120.

What went wrong? And Why? How did you correct the situation?
1997 was the year of the Red River Valley flood. Grand Forks was under water, and there were no motels where the Red Cross staff could stay. So we opened early for them. Also, we had to go to Minneapolis to get the brochure printed due to the flood. Then, in July we got 9 inches of rain in 2 hours, which flooded our attic and basement and laundry facilities. One needs to be adaptive and flexible in all cases and to have thought about alternative plans such as going to a laundromat until your basement dries out. Also, living in a historic home is great, but that also means everything does not work the way it should.

What went right? And Why? How did you build on your success?
We recognized at the beginning that our business had to be versatile and continually changing. It could not just be a B&B and tea room because we needed a monthly cash flow. So, we diversified into several different activities or entities at 221 Melsted Place. We try new ideas and discard the not-so-good ones. This has worked well for us.

The service business is constantly changing. For example, newlyweds who stay their first night with us make up 80 percent of our B&B business. We bought a limousine to pick them up after the dance and return them the next day to open gifts before they begin their honeymoon. We have also had weddings on the grounds and in the house. We have added a screened outdoor spa with a gas fireplace and a one-day a month massage therapist, by appointment.

What would you have done differently?
We would schedule more time for ourselves to get away. The burnout rate is high for a B&B, so that you are considered a master innkeeper after only 5 years in the business. We are now in our fifth year, and we do find that if we don't schedule time for our personal lives it does not happen.

Where do you plan to go from here?
We want to stabilize the business so the monthly cash flow and business expenses are reliable. We don't want to get too big because then you have employee problems to address. We are implementing ideas. First, we had an artist/welder build us a Victorian carriage. We plan to use the carriage as an attraction at 221 Melsted Place and at community events for publicity and as a source

A Typical Year at 221 Melsted Place

January: Christmas carryover
Lonnette decorates 15 trees and keeps them up until February. By request only, we serve dinners, luncheons, and tea parties to give people the opportunity to have that holiday party they could not squeeze in during December. We charge $20 for dinner, $15 for lunch and $10 for tea.

February: Valentine's Day and chocolate
Lonnette still keeps a few of the trees up and decorates them with valentines. A week before Valentine's Day, we hold a large open house at $10 per person. We have all types of chocolate candies, desserts, and breads—anything made of chocolate. We also added fruits and other foods, too. This has been working very well since 1998.

March: Rest, catch up, taxes, special cleaning, maintenance
Business has been extremely busy in 2001, to the extent that we needed to hire an accountant.

April: Mother/daughter May Day luncheon
Sometimes this includes a style show. This event is festive with flowers and frills at a cost of $15. The year 2001 is also our first year to cater the historical society reception.

May–early September: B&B
The B&B includes four rooms and a vacation trailer. A number of family reunions are planned with us—including sleeping, luncheons or dinners. In May 2001, we catered a dinner to a small theater for the first time. This dinner-theater ambience provides a very exciting experience to a small rural town of 1,100.

Late September–October 31: Halloween Granary
We converted a granary into a licensed kitchen and haunted eatery restaurant. We serve children, families, school groups, organizations, and fun-loving adults. Guests are encouraged to wear costumes. The prices ranges from $10 to $15 per person, depending on the type of party selected. Guests arrive at dusk, and we build a bonfire. Then, we walk by torchlight to the granary giving people time to let their minds go scary. The parlor of the granary holds a banquet table loaded with goodies. Then, we proceed into the more frightening second room for dinner. Dinners are served in a very "unusual" way for a very fun experience. It is a night of laughter and fun.

November 15–December 31: Holiday dinners
The home is elegantly decorated inside and outside. We serve dinners Thursday through Saturday. The cost is $20 for a 5- to 6-course meal served over 2 to 3 hours. We also obtained a wine license which has added an additional flair to the dinner. After dinner, Lonnette plays medley tunes and gives a mini-concert on the piano.

of income by giving rides. We may consider nationwide marketing of this carriage. Second, Lonnette's favorite dream is having a week-long camp for girls ages 6–12: tea parties, dress up, bonfires, games, and how to act as ladies. Third, people have been asking for a cookbook that would contain individualized historic

stories, associated recipes, and some of Lonnette's published poems.

What would be the most important advice you would give other farmers considering a B&B alternative enterprise?

1. Anything in your home complicates life. The family must recognize this and agree how the enterprise will affect family life. There must be ground rules as to how you act when guests are present (your professional hat) and when only family members are at home (your private hat). This is very difficult to achieve at times.
2. B&B is an all-consuming occupation when it is in your home.
3. Your must build your business up. There will be good days and not-so-good days.
4. You must be flexible and adaptable. A secondary plan is necessary from every standpoint to be ready for the unexpected.
5. It is a high-stress job, but the joy exceeds the stress.
6. Package your product for your area. Think about your community—who they are, what they do, where they go, their likes and dislikes. Keep thinking and adapting and planning.

How did you handle the liability concern?
We have an agent who has no problem with all our "entities"—except no horses. Our basic insurance plan costs about $2,000 per year for full coverage with a $1 million umbrella policy, Each of our other entities is an additional cost.

What do you dislike the most and like the most?
We dislike the all-consuming aspect of the service business. One must always say yes to a request for service. We miss family and community activities because we have no backup. Our records show we spend one hour for every guest that we serve. We have a number of dinners where we serve 25 people.

We like the guests the most. Guests are wonderful, and we receive so much joy from them. We had the opportunity to be host and hostess to President Olafur Grimsson of Iceland. President Grimsson, the brides and grooms, and others are special in their own way.

Would you start this alternative enterprise business today after learning what is involved?
Yes. The business is challenging and rewarding. It takes a lot of work, and being younger would be a great advantage. One needs to plan for backup staff that can fill in if you're sick and provide for vacations.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
We belong to the North Dakota B&B Association and the American Historic Inns, and Lonnette is a member of Quick Response, our community Emergency Medical Team.

What conservation and education activities do you have?
We have no conservation activities on the two flat acres, but people's experiences here are educational. Lonnette has been asked to teach cooking classes. And the camp for girls would be educational.

What do your customers like the most about your enterprises?
Our guests sign a journal and comment on their stay. They frequently note the peacefulness of the rural area, and many comment favorably on our hospitality. This tells us that we've reached our major goal and provided a total experience.

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to http://www.nrcs.usda.gov/technical/RESS/altenterprise

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May 2002

Alternative Farm Enterprises – Agritourism Success Stories

Family Education and Entertainment on the Farm

Interview with Steve and Dorothy Enger, RR 2, Box 68A, Hatton, North Dakota 58240, 701-543-3955, sdenger@polarcomm.com, www.engerfarm.com

What is the history of your farm and farming experience?

Both of us grew up on farms in North Dakota. After college, Steve was an agricultural credit officer and did home construction/remodeling. Dorothy taught elementary school. In 1978, we rented land near Hatton and purchased this farm in 1987; home construction was also part of the business. We are wheat, barley, pinto beans and soybean producers on our 1,450 acres. In 1993-94, we tried producing "high value" crops such as cucumbers, tomatoes, pumpkins and carrots, but lost money on the cucumbers and tomatoes. Today, we raise 130 acres of carrots and 10 acres of pumpkins for the wholesale market. We sell 25 percent of the pumpkins at the farm.

Describe the alternative enterprise(s) in which you are presently engaged.

We have developed "Fall Family Fun on the Farm" that provides entertainment and education for the whole family—from toddlers to seniors. We want to give people something they can go back home and talk about. Education is a major part of what we do. We have developed nine different activities to accomplish this—Corn Maze, Face Painting, Haunted House, Enterprise Golf, Tunnel of Doom, Rat Racers, Pumpkin Patch, Straw Maze and Tess the Cow. All of these activities tell a story about life with the focus being on agriculture and how food is grown and processed.

Education, the center of our alternative enterprise, is designed in a way that everyone has fun while learning about food and agriculture.

What made you decide to go into the present alternative enterprise(s)? Goal, Vision.

In 1997, our church became involved in Heifer Project International. They wanted to raise $5,000 and challenged the rest of the churches in our "conference" to do the same. The fund raising idea was to have a Halloween party on our farm. Our family converted our old granary into a haunted house, built a straw bale maze, and used another building for indoor games and the garage area for food and other goodies. It was so much work we decided that we would open early to the public (by placing hand made flyers in neighborhood businesses) and then have our Church's Halloween Party on October 31st. That night we had a blizzard, but the people still came! About 100 people came to the farm that year other than for the church fundraiser.

Our guests told us how much fun they had and asked us to do it again.

We have never set any definite goals. We treat this enterprise the same as the others on the farm. We know that living in a sparsely populated area like North Dakota, an entrepreneur must have new ideas, activities and attractions each year to get the customer to return. Our farm is not located near a city of any size. We are 35 miles from Grand

Forks, with a population of 50,000 and 75 miles from Fargo, with 75,000 people.

How did you make the transition?
We started our Fall Family Fun on the Farm in 1997 by having a haunted house, straw bale maze and pumpkin patch. We served hot cider to our guests. This was the time for us to learn this new business of agritainment. We grew the business slowly. It is too much to comprehend at one time. Some of the things you try don't work as planned and you need time to correct them. It is a step-by-step and area-by-area process to grow your business. It is a time commitment and the mind and body need to adjust and adapt to all the different activities. We grew the agritainment business as follows:

1998—We accepted the challenge of designing something new every year to keep the people coming back. Our daughter, Jennie, 14, developed the theme for the haunted house "Who Murdered Dad?" She wrote the story about how the haunted house was a B&B and some one allegedly murdered Dad. These are guided tours through the haunted house, but actors have been place strategically to increase the anticipation of the guest as well as the tour guide adding suspense. That year, we planted six tenths of an acre of our yard into a football field size corn maze and coordinated its design with the murder theme and the solving of the mystery. We also had the straw bale maze.

1999—We added the miniature golf course. It is said to be one of the most difficult in the region. It is agricultural based with each "hole" based upon a crop or livestock enterprise in North Dakota. Obstacles are parts from machinery associated with the crop or livestock "featured" at the hole. The fairways and paths from one hole to the other features the design of farm equipment such as a John Deere-A tractor pulling a dairy wagon.

The golf course is very focused on educating the player about farming in ND. Also, we added the "Tunnel of Doom" which is an optical illusion pathway in the dark that gives an effect of fast motion. This was used to create more interest to bring people back again. Teachers tell us this is a real "brain enhancer" which is used to stimulate the thought process of children who have learning disabilities. We knew we were in the therapy/education family fun business, but not in the treatment of learning disabilities! The five-acre corn maze was about North Dakota, its road system and location of the 53 county seats. The haunted house was filled with scary stories. This was the year we started the school tours and added "Face Painting." Face Painting was done on children, teenagers and adults.

2000—We added the "Rat Racer" which is eight feet in diameter and four feet wide. It runs along a 150-foot track with rails and bumpers next to the golf course. This location of this attraction was to encourage guests to try the golf activity. This "rat racer" activity is really a challenge because the faster it moves, the faster you have to go. It is fun to watch children get themselves into a very fast mode. The 7.5-acre corn maze was about the United States. The continental 48 states were outlined and trivia about each state was presented. One entered and exited through the "International Peace Gardens." The haunted house theme was about a girl who inherited the family home. The pumpkin patch and straw bale maze continued to be part of the Fall Family Fun farm visit.

2001—We added "Tess," the Holstein cow. It was amazing that many of our school children in the rural state of North Dakota did not know that cheese was made from milk produced by cows. Children had great fun hand milking Tess. The older people who milked cows growing up said they would just as soon forget those bad memories. We really enjoyed teaching the children about agriculture, farming and a farmer's family work and life style. The haunted house theme was the journey of a young girl one stormy night. The eight-acre corn maze was of the human body. It was three-quarters of a mile around the body (skin). Everything was done in proportion so children had a real feel of where the lungs, heart, blood vessels, arms, legs and etc. were in relation to the whole body. It was a real educational reward to see the children respond to information about the body, health, and environment. The pumpkin patch

continued to grow and the straw bale maze was continued.

2002—We are building a "Pumpkin House" this year. It is 12 feet high and shaped like a pumpkin with a stem on top. It will be used as a classroom inside to teach children how agricultural crops are grown and story time about animals, birds, and nature. It will also have shelves to display pumpkins for sale. We are making several improvements in landscaping around the buildings and display areas by using trellis and other structures. We are also planting other agricultural crops such as grapes. The haunted house theme this year is in the planning stages. The 10-acre corn maze this year is "the world." It will be 750 feet in diameter and will show latitude, longitude, airline routes to major cities and crops will be planted between continents. Since the sun moves 15 degrees each hour, time zones will be represented. We will still have Tess, the Pumpkin Patch, Straw Bale Maze, Face Painting, Golf, Rat Racer and The Tunnel of Doom.

Destination—We have grown to be a destination. Families will come from different cities in North Dakota, South Dakota and Minnesota to meet and spend a day at the farm. We have areas to relax, eat and enjoy the outdoors. Some families travel 300 miles to visit our farm. It is not unusual to have visitors travel 200 miles for a day visit and return home for work the next day.

What is your decision making process?
We really don't have a decision making process. We ask our customers what they like for Halloween entertainment. We design and build around agricultural or other educational themes. We also check with other people in this business to see what worked and what people wanted. We look at this as a challenge. We like to be creative and innovative—to add something new to the business every year. The designing and building everything ourselves is our goal. If we cannot build it, we don't add it to our set of activities. We try to provide most of the labor. Dorothy handles all the school tours and education. This is becoming difficult as schools are now sending all their elementary classes at the same time and help is needed. During the busy weekends, we employ eight people.

What is your business planning process?
We treat this enterprise the same as the others on our farm. We finance it from the income of the previous year. It has to pay for itself. Steve's background in construction and as an agricultural loan officer helps in planning and costing out our activities. Dorothy's background as an elementary school teacher helps in the design, layout and development of educational materials for everyone from toddlers to seniors. We look at how can we add something new that will benefit the customer. This year we are looking into developing a handicap/wheelchair access to our hay wagon rides. This will permit the disabled customer to ride around the corn maze and other sites on the farm. This should attract the senior centers and other hospital rehabilitation facilities. We know we need to develop the business to attract the local population. There is not a huge population base so we need to design activities to fit the needs of many from young to old. Both of us are inclined to be very imaginative. We are always looking at how "what we see and hear can be adapted to work on our farm."

How did you acquire your information?
We do a lot of research and reading. The Internet is a great tool. We joined the North American Farmers Direct Marketing Association and have attended their trade shows since 1998. We listen to and meet people doing the same type of agritourism at conferences and trade shows. We discuss our ideas with the friends we have made across the country. We have also attended entertainment trade shows to look at ideas, talk to vendors and other entrepreneurs. We picked up the "Tunnel of Doom" idea at the Chicago Halloween Trade Show . Steve came home and designed and built it.

How do you price your products?
Pricing has been a real challenge. Do we charge a general admission or by the type of activity? First, we did not charge at all because we thought people would come—have fun and buy some pumpkins.

That did not work. So, we charged $1.00 per person admission. We charged by the activities they did. As our farm events grew, our admission increased to $2.00 per person, and some activities became free. We have found people in ND feel that having fun on the farm should be free or cost very little. Yet, they think nothing of going to a pro football, baseball or Disney and spend hundreds of dollars. We are in the process of restructuring our pricing policy. Most of the industry is now charging a general admission because it minimizes confusion, labor needs and people trying to obtain entrance to activities without paying. We are planning to make this change this year.

What are your marketing techniques?
Marketing can be very expensive and we have taken the low cost route. Our unique attractions and family fun on the farm have attracted the television and newspaper media. Five television stations have visited our farm and all the major newspapers in ND have carried stories on our agritainment enterprise. We have done several 30-minute radio interviews within our state, Minnesota, and Canada. We put flyers in the local communities around us, we mail special information to the schools, and we take pictures of the school children and put them on our web site. We make extensive use of discount coupons that we distribute at fairs, festivals, and parades beginning as early as Memorial Day. We also send a discount coupon home with every school child and teacher. We support our local blood bank drive by providing free pumpkins to people who give blood. We also support a near-by university by providing a family with a pass to our farm when they are doing a fund drive. We have done some marketing with bus tour companies. Our web site has really helped market the Fall Family Fun on the Farm, but word of mouth has been the best.

What went wrong? and Why? How did you correct the situation?
We have not had any big problems. Steve built the golf course in 1999 and we could not determine why people were not using it as much as we expected. We found out people had not allowed sufficient time, but more importantly, they did not see it. So, we added signage and landscaped it with native flowers, bushes, and trellis vines. We also noted on our flyers to save time for golf! Activity picked up very fast after the landscape was completed.

Our pumpkins were not selling as well as we expected. By talking to our customers, we found out it was difficult for them to pick 2 or 3 pumpkins and carry them to the car. So, we built pumpkin carts for this purpose. We are also going to promote the pumpkins better through our flyers and the new Pumpkin House.

A real education problem exists among the residents in rural areas, cities and towns. They think all activity exists in town and the city! It is enjoyable for them to go to a farm for a picnic or to play miniature golf. We are now promoting this by being open on July 4th and throughout the summer to play golf. It is just going to take time to change how people think.

What went right? and Why? How did you build on your success?
The haunted house has been a real leader for us. People come back every year to participate in the "new scary theme." People are beginning to enjoy the education aspects of everything we do. The seniors are especially interested in the crops and livestock of ND and say, " I learned a few new things today." Everybody has something to go home and talk about.

Our school education and fun program has really developed very nicely. Whole elementary schools are coming for the fun and education. We work with the teachers to help them prepare the children about what they will see and learn about at the farm. Some schools have been driving over 100 miles, which we consider a real success. We also invite church groups, scouts, 4-H, FFA and other groups to the farm.

Our daughter, Jennie, has gained a tremendous amount of education from the agritainment enterprise. She has been totally responsible for the haunted house theme, decoration and operation. It has made her a very good manager.

What would you have done differently?
We had to change our hours of operation. We have extended our season by one weekend. There is a need for natural resource diversity to attract customers. We are located on the prairie with only a shelterbelt around the farm. We should have added the natural resource side of our education program earlier. We are just developing it now.

Where do you plan to go from here?
We are going to build up the natural resources and develop a nature-based tourism enterprise. We are adding birdhouses, birdwatching, nature trails, signage, and working with conservation and wildlife groups. We are adding equipment to attract the disabled, and promote the sale of pumpkins on the farm. We are going to market to day care centers during the summer and develop educational programs for them. We are seriously looking into farm stays where people pay to help do the farm work. Of course the biggest challenge is developing, designing and building the new attractions. We are also looking into value-added products such as milling and selling our wheat as flour. This would have a very strong education component too.

What would be the most important pieces of advice you would give other farmers considering an alternative enterprise?
We cover 13 points in our presentations at conferences. The most important are:

- One must be willing to give the time, yard, home, buildings and land base for the agritainment enterprise to develop the material and educate the public about agriculture.
- You need to be able to design, develop and build the activities for an agritainment enterprise to keep your cost down.
- You must be willing to meet the public and entertain them with a variety of activities for all ages.
- You need to create memories for your customers and educate them while they are having fun.
- You need to develop a set of peers that is in your business to discuss your experiences and challenges because you don't know how your business will operate until you open your doors. Each area of the country is different. Ours is being located in a sparsely populated area.
- Most people don't give themselves enough credit for their capabilities. Thus, people are afraid to try and fear failure. Start small and let the business evolve. "Dream it and do it!"
- It takes about 5 years to build your business so be ready for the long hall. Don't give up your other job.
- In our location, we now have about 5,000 + customers a year. We need to work harder to get customers than someone in a densely populated area. You can do it by being innovative.

How did you handle the liability concern?
North American Farmers Direct Marketing Association had a very good program that we participated in but it has ended. Now, Steve needs to look for a new vendor. We generally carry a one million-dollar umbrella policy.

Do you mind sharing your promotional material?
Our major materials are business cards, flyers, discount coupons and the web site.

What do you dislike the most and like the most?
Dorothy dislikes the constant pressure to be looking for new entertainment ideas and activities along with being tied to the farm when community activities are happening. Steve dislikes that some people are never satisfied because the more you do the more they expect. Dorothy enjoys meeting people and learning about their professions. Steve enjoys the challenge of designing and building new attractions. They both like seeing children, parents and seniors having fun and learning about agricultural, sharing with others, and reading the "thank you for the great time" notes. The greatest joy is touching someone's life forever, such as the ten-year-old Tennessee girl that visited the farm in 2001 but died six months later from leukemia. One of her last wishes was to have her uncle in ND

come and tell us about all the fun she had on our farm!

Would you start this alternative enterprise business today after learning what is involved?
Yes. The time required to manage an agritourism business along with a farm has resulted in some very long hours. Farmers and others in agriculture need to spend more time educating the public about how their food is produced. People are eager to learn about this, especially if they can learn it while they are having fun.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
We joined the North American Farmers Direct Marketing Association. We are becoming involved in conservation groups, wildlife associations and organizations to grow our nature-based tourism business.

What conservation and education activities do you have?
We are just beginning the conservation aspects of our agritainment business. We want to share the importance of caring for our land. If we take care of our land, the land will take care of us. We strive to preserve the soil and nature in all our farming practices. Education, by having fun on the farm, is really our agritainment/ agrieducation enterprise. Dorothy's experience as an elementary teacher has resulted in the development of our education part of the business. We have an outdoor classroom to enhance indoor learning. This technique is applied in designing our corn mazes and other activities. All nine activities we have today have the education component. Since we are a family farm, the education focuses on food, agriculture, farm family lifestyle, health and the natural resources environment.

What did your customers like the most about your product(s) or enterprise(s)?
Customers have thanked us for the cleanliness of our farm, wholesome entertainment for the whole family, and the variety of activities for all ages to enjoy.

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Natural Resources Conservation Service

Resource Economics and Social Sciences Division

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Alternative Farm Enterprises – Agritourism Success Stories

Diversified Value-Added Products

Interview with Kim Tait, RR 1, Box 329, Centre Hall. PA 16828, 814-466-2386, e-mail taitfood@vicon.net, www.taitfarmfoods.com

What is the history of your farm and farming experience?
Marian and Elton Tait purchased the 130-acre farm in 1950. Both were State Extension agents at Pennsylvania State University in State College. The farm is 7 miles east of State College on U.S. Rt. 322. It was the Taits' home and hobby farm for more than 25 years. They raised a daughter (Sandy) and two sons (David and John) as well as 4-H animals, a few Basset hounds, and cut-your-own Christmas trees.

Describe the alternative enterprise(s) in which you are presently engaged.
Tait Farm Foods produces high-quality fruits and vegetables using organic methods; manufactures more than 35 specialty food products; and sells farm-made and local foods and plants and gifts for the kitchen, garden, and home. Our specialty food line consists of Fruit Shrubs (a colonial fruit drink concentrate), international cooking sauces, fresh herbal olive oils, raspberry vinegar, preserves, chuntneys, and scone and pancake mixes. Our year-round Harvest Shop specializes in local and regional products, including produce, food products, gift collections, pottery, baskets, herb plants, bedding plants, heirloom roses, seasonal gifts, and kitchen and garden items. The Harvest Shop also offers cooking, gardening, and craft classes and events throughout the year. The farm business also has a 110-family Community Supported Agriculture project known as Community Harvest. Tait Farm Foods is really seven businesses in one:

- growing fruits and vegetables,
- manufacturing value-added foods,
- selling specialty food products via a retail catalog and Internet site (taitfarmfoods.com),
- selling food products and produce wholesale to restaurants, historical sites, and retail stores,
- operating a retail farm store,
- operating a CSA venture, and
- offering educational classes, workshops, and events throughout the year.

What made you decide to go into the present alternative enterprise(s)?
The Taits' two sons returned to the family farm around 1980. Their vision was to make it a profitable family farm by selling pick-your-own organic/ sustainable perennial fruits and vegetables (asparagus, raspberries, apples), as well as cut-your-own Christmas trees. They knew they had to grow high-value crops at direct marketing prices to the consumer to be successful. I came to the farm in 1989 and joined the existing enterprise and married David Tait a few years later. Between 1980 and today, the farm has made many transitions:

1980–82: Christmas trees and disease-resistant apple cultivars developed at Cornell University were planted. Five acres of apples were planted with the goal of a low-spray program. Two acres of asparagus were

planted along with several acres of raspberries. Trial plantings of blueberries (1/2 acre) were added later. A considerable amount of time was spent learning how to grow and manage the crops.

1981–82: A large vegetable garden was planted, and the produce was marketed at the local farmers market. The hope was to provide some cash until the raspberries, asparagus, apples, and Christmas trees became profitable. The vegetable garden was stopped after 2 years due to the management requirements of the perennial crops and the intensive labor and poor economic returns on the annual crops.

1982–87: The "pick-your-own" business grew, with asparagus in May, raspberries in late June into July, apples from mid-August to November, and Christmas trees in December. The Taits also attended the late-season farmers market.

1987: A bumper crop of black raspberries blessed the farm, but the weather was very poor for pick-your-own. So the farm picked the berries and froze them, rather than letting them go to rot. The hope was that there would be a winter market for frozen raspberries, but that didn't turn out to be the case. A friend of the family reminded David of an old Colonial recipe she had once made called Raspberry Shrub. The word "Shrub" came from old English, meaning acid fruit drink. The base of the product was raspberry vinegar, which in this case was a very handy way to transform all those frozen raspberries. And so a value-added food business was born.

1988: The first bottles of Raspberry Shrub were filled and labeled by hand, then sold to pick-your-own asparagus, raspberry, apple, and Christmas tree customers in 1988. The Colonial fruit drink concentrate was very well received.

1988–89: The winter was spent developing a new label and an informative "Book of Shrub," which included historical information as well as recipes. In the spring of 1989, Raspberry Shrub had a new look and was taken on the regional road. The first successful sales came at a farm market show and to specialty stores in the State College and Philadelphia areas. The old milking parlor in the barn was converted to a value-added processing area, with a used pasteurizing tank being donated by a family member and inexpensive, used stainless steel equipment purchased from Penn State salvage.

1990–93: The value-added business started expanding. After we attended several trade shows where the product was demonstrated, we realized that customers wanted ready-to-use food products. They didn't want to have to assemble all the ingredients to make teriyaki sauce from Raspberry Shrub. They wanted the teriyaki sauce already made. So we created Raspberry Teriyaki Sauce. Another seed was also planted in this ever-changing business—gift baskets. The farm began assembling baskets filled with Tait Farm and other local products. This was the beginning of our gift collection business, which today makes more than 2,000 collections each year. We sell them in our Harvest Shop, to regional businesses, and through our mail order catalog and Internet site. During this time period, we sold the value-added products out of a small, mobile wagon located where people purchased their picked crops or Christmas trees.

1992: We built the first farm retail store by converting an old, 8'x15' turkey shed into the Harvest Shop. The store was open from Labor Day to Christmas.

1994: The farm business known as Tait Farm, Inc., was made into two corporations, Tait Farm, Inc., and Tait Farm Foods, Inc. We put together a business plan to develop more value-added food products, new packaging, and marketing materials. We took the plan to the bank and got a $25,000 loan to expand the vision. We researched and

developed a new packaging concept using wood-engraved images from 1860–80, and we added three new flavors of fruit shrub, 3 fruit vinegars, two international sauces, and preserves to the line.

1994–97: We developed more value-added products and marketed them to upscale stores in the mid-Atlantic.

1997: We decided early in the year to build a year-round Harvest Shop. We put up a 15'x40' timber-framed building in September and opened it up for business in early November. When my husband, David, passed away in early December, I became solely responsible for running Tait Farm Foods.

1998 to present: The company now manufactures 35 value-added products and sells the line to a variety of wholesale customers, including Colonial Williamsburg, Fresh Fields, Dean & Deluca, as well as many regional stores. We have an e-commerce site and a 16-page hand-drawn catalog. The company currently has four full-time and six part-time employees. In 2000, a Community-Supported-Agriculture project called Community Harvest was started. The members come to the farm to pick up their produce. The farm supports somewhere close to 100 families each season. All the fruits and vegetables are grown using organic methods. The CSA runs at least 27 weeks, starting with asparagus in the spring and ending at Thanksgiving with the root crops. This year, the CSA added a winter share that extended the season into February.

How did you make the transition?
The farm really did not have a transition plan. Most of the transitions were a result of certain ideas either working or not. After the 1994 division of the farm into two corporations, Tait Farm, Inc., was operated by John Tait. He raised Basset hounds and Christmas trees. David and I formed the other corporation known as Tait Farm Foods, Inc. Prior to the new incorporation, we had developed a 3–5 year business and marketing plan. This gets updated yearly with the help of the state funded Ben Franklin Transformation Project, designed to help manufacturing based businesses.

Marketing has been one of the major challenges in making the transition from direct to wholesale sales. Our marketing efforts have evolved from the local farmers market, to the roadside stand, pick-your-own, retail farm store, food brokers, mail-order business, and the Internet. Initially, a newsletter was sent out four times a year to customers to promote the asparagus crop, raspberry crop, apple crop, and Christmas trees. It originally contained farm info and seasonal recipes and later was expanded to show gift collections. This was the start of the mail order business, which today is a 16-page graphically designed catalog. (See www.taitfarmfoods.com).

We took two *planned* steps in developing and marketing our products. First, we developed unique products, including Fruit Shrubs and International Sauces for cooking, grilling, and stir fry. Second, we put a lot of effort into selecting images which gave us a very unique identity and attractive labels for the products and catalog. We wanted to create a visual presence that said "Why is this different?" It has worked very well for the company. We have developed a significant market with historical-site gift shops throughout the East. The Eastern National Park Service and Colonial Williamsburg are two of our largest accounts. The e-commerce site has increased mail order business by approximately 25percent since being developed in the fall of 2000.

I have not been embarrassed to ask for help in all nearly all areas of the business, including production, marketing, and accounting. As a result, I have several mentors who have helped the company and kept us from reinventing the wheel.

How did you acquire information on the alternative enterprise? The brothers started in 1980 relying on Exension Service

information. Information regarding organic production methods and marketing was lacking, so talking to others became the main source of information. They asked a lot of questions and searched out the answers, and made up the rest. They went to seminars, conferences, and workshops, purchased books and subscribed to magazines. The network they developed is still used today.

How do you price your products? We price all of the fresh and value-added according to different margin formulas. For the value-added products, we use the cost of product (food ingredients, containers , labor) plus indirect costs (electricity, insurance, water, etc.) plus a margin for profit to arrive at a wholesale price. The retail mark-ups are based on industry margins.

What went wrong? and How did you correct the situation?
The spring and summer rains of 1987 left the brothers with hundreds of pounds of frozen berries and no market. By looking for alternatives, they were able to develop the value-added product Raspberry Shrub. This has led to a whole different set of processed products and direct sales. Most likely, they would have stayed in the business of direct marketing perennial crops had this situation not occurred.

Value-added products led to better business planning and marketing management. We would have never obtained loans without the business plan. I found myself in charge of all production, marketing, and administration of the business without any training. Being able to ask people for help saved me from going frantic. These mentors have been a life-saver for me and continue to be a strong base of support and advice. The business plan developed in 1994 also provided a strong guide as to where we wanted the company to go.

What went right? How did you build on your success?
People liked our food products and they wanted more! We listened and expanded our product line. The first gift baskets were nicely decorated and filled with various value-added items. This resulted in people buying a $20–25 basket rather than just a $7.50 bottle of Raspberry Shrub. These early successes paved the way for many of today's offerings.

My strength in the company is my creativity. I love to cook, so working with my product development person is a real joy. Coming up with the new ideas for the business is fun.

What would you have done differently?
If I had known early on all the turns my path would take, I would have been very tempted to walk away. But I have always felt that a certain sense of purpose, stewardship, and fate have kept me on the farm.

Where do you plan to go from here?
The company is focusing on expanding the offerings at the Harvest Shop, as well as the wholesale business. I hope to open up more market opportunities, including specialty and natural foods stores. I am also going to hire more brokers to sell our products in a broader geographical territory.

In the Harvest Shop, I plan to add more locally and regionally made products. My goal is to support as many local agricultural producers and artisans as possible. Another dream of mine is to have a display and cut-your-own flower garden, as well as a tea house located in the flower garden.

What would be the most important advice you would give other farmers considering an alternative enterprise?

- Don't hesitate to ask other people to help you. Most people are willing to be of assistance. This helps you avoid mistakes.
- Capital planning is a must. Develop a business plan that addresses management, growth, and other types of assistance. Do your homework before you start.

- Love what you do! You need a passion to succeed because this is "a road less traveled."
- Develop a loyal local following. This will be your primary customer base.
- Be honest about what you don't know because you will only deceive yourself!

How did you handle the liability concern?
I highly recommend using a good insurance company. Most farm policies do not cover value-added and other direct marketing enterprises. I have a $5-million umbrella policy for Tait Farm Foods.

What do you dislike the most and like the most?
My dislikes include the administration, management of people, and financial stress. I like the creative aspects of new products, creating collaborations, and marketing. I love providing beautiful food, information, and inspiration to our customers.

Would you start this alternative enterprise business today after learning what is involved?
When one enters this type of an enterprise, you are not really sure where it will lead you. On bad days, I wish Tait Farm Foods were a simpler operation, more like it was in the early days. However, the creativity needed today to develop new products and new markets is very rewarding. Next time around, I would wish for less stress and loss.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
I have become involved in sustainable agriculture and business groups. I am Vice President for the Pennsylvania Association for Sustainable Agriculture, which has about 1,500 members and holds an annual conference with 1,200 farmers and others attending. I am also a member of the Chamber of Commerce and Professional Business Women's Group of State College, PA.

What conservation and education activities do you have?
The farm's conservation activities are focused on sustainable/organic agriculture. We won the 2000 Pennsylvania Recycle Award for the re-use of composting bins and the composting of municipal leaves to provide soil fertility. One of the company's goals is education through a series of workshops, talks, walks, and farm/garden tours.

What did your customers like the most about your product(s) or enterprise(s)?
The customers appreciate that we are a family farm, sell unique products, are local, and are committed to the environment. We symbolize and provide a connection to the land.

Would it be ok for people to contact you?
Yes

Do you want additional information? For more success stories and other information, see the website:
http://www.nrcs.usda.gov/technical/RESS/altenterprise

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May 2001

Alternative Farm Enterprises – Agritourism Success Stories

'Agritainment,' Weddings, Reunions, and Organic Dairy Products

Interview with Tony and Carol Azevedo, Double T A-Cres Ranch and Museum, 22368 West 2nd Avenue, Stevinson, CA 95374, 209-634-0187, fax (209) 632-1965

What is the history of your farm and farming experience?

We've been dairying for 27 years. I'm second generation in the business in this country in that my father came from the Azores Islands of Portugal. But even back in the islands, my grandparents had dairy cows. We've been organic now for probably three years or a little bit longer, and we started our transition probably about five years ago.

The conventional dairying and farming was losing us money. We needed to find some way to turn things around other than doing what my neighbors were doing, which was expanding by doubling and tripling. We didn't see them in any better shape than we were.

Describe the alternative enterprise in which you are presently engaged.

We have a collection of carriages, and the family also had a collection of paraphernalia—more than 100 kerosene lamps, for example. We organized these artifacts so groups of people could come out and see what we had. We held class reunions, company parties, and other activities along that line. We kind of fell into a situation in which our bread and butter turned out to be weddings.

The weddings are probably about 95% of what we do. Once the family has made an appointment with us, we take care of the details of putting on the wedding—the setup, the cleanup, other details. All the weddings are done with a horse-drawn carriage. The things that we don't do are the cake, the tuxedos, the flowers, the wedding dress. But other than that, we take care of all the details.

What made you decide to go into this enterprise?

Several years ago, we had a large anniversary party for Tony's parents. About 500 people came, and they enjoyed the ranch. After that, we started getting calls wanting to know if we could do this or that for them.

We found out that the American public is looking for an adventure as long as the bathrooms are clean and the food is good. So when we do a wedding we focus not so much on the bride and the groom, but on their guests. If the guests have a good time, the bride and groom have a good feeling about what they did, and we keep getting more and more customers from there.

Describe your business planning process.

We critique every event. The first thing we found was that if this turned into a full-fledged business, we would quickly get tired of it. So, we focus it just from April to the end of October. We also focus it to one or two days a week.

Has anything gone wrong?

At the beginning, it took some time to get the logistics straight. The county [Merced County] was very firm about telling us that they could not

give us police protection, so we have to have our own bonded security. We have to have fire inspections to make sure we can take care of things like that. This is a very specialized type of facility even though I think there can be a facility like this every 50 miles. They would all do well.

Once when we were expecting 300 people, the beer cooler broke down. We had to hustle and find half barrels and chill down the beer. Sometimes, our security hasn't shown up. One time one of the cooks got in a car accident and almost didn't make it with the food.

What would you have done differently if you could start over again from the beginning?
We have ongoing discussions about having more indoor events. Even though we're open only at certain times of the year, it's hard to hit the right temperature all the time. The problem is that if you have a temperature-controlled building, it becomes harder to say no. Suddenly you find yourself open year-round.

Where do you plan to go from here?
We want to improve on what we have. We don't want to expand because it could become a monster that consumes us. We think that we could enhance the appearance of the ranch.

What is the most important advice you would give other farmers or ranchers considering an alternative enterprise?
1. Do what you like doing.
2. Be very aware of your neighbors. Farmers need a little time to adjust to a business like ours.

How about financing?
We built our business little by little because, first of all, we couldn't take this idea to a bank and say, "Hey, guess what we're going to do in the middle of Stevinson." It took the bankers a little time to adjust to agritainment as an enterprise.

How did you handle the liability concern?
You just need to have a million-dollar policy. That's all that's required. The liability insurance that is hard to get is the insurance concerning horses. And we just kept our homeowner's policy. That was kind of a plus because a farm is a residence.

For a wedding, the client also has to provide additional insurance. They usually pick that up off their homeowner's policy. If there was an injury—and so far in 9 years we haven't had any—their policy would pay first before ours kicks in.

The strategy behind that is two-fold. First, it should not cost the client extra to pick up one night's entertainment. Second: If you have guests who get hurt, they have to sue their host before they sue us. This gives us a buffer for those people who are out there making a living suing other people. It also makes our clients more cautious.

What do you like most about the entertainment business and what do you dislike?
We like serving the public, we're forced to keep the yards neat and the flowerbeds cleaned up. We dislike watching mothers and brides go through the torture that they go through not realizing that they have nothing to worry about because we take care of it all. We give them a list of what they need to bring. If they go down the list and check it off, we'll do all the rest. We also dislike the cleanup work.

What groups/ organizations/activities have you joined or become involved in because of the entertainment business?
We were already boosters of FFA, 4H, Girl Scouts, Sober Grad Night, and the historical society. Now other museums are visiting our museum trying to figure out how they can generate more visitors.

Because of the kids, we were always involved with the community. Now we're starting to get international guests. We were invited to go to Ethiopia to see if we could help their farmers. There wasn't much we could teach them because they were on their third year of a drought. We thought it would be much more important to try to get some immediate aid. So when we came back

we focused on getting 38,000 pounds of whole powdered milk distributed there.

What conservation and education activities do you have on your farm?
We had a school program that we had targeted for fourth and fifth graders. The program was going so well that the schools were actually canceling their trips to Columbia [Columbia State Historical Park is a restoration of a Sierra-Nevada Gold Rush town] to come here. We hosted a hands-on day when kids would be split into groups and they would learn square dancing, how to shell and grind corn and other basic farm work. It was just a full day of early Western activities, but we had to quit it because of the liability. If we were to chase down a grant, it would be one that would allow us to open up that project again.

Do you do dairy tours?
We do the dairy tours in conjunction with the organics, but because we're not the average dairy it is very difficult to do tours as a California dairyman. We do organic dairy tours for the Ecological Farming Association and charge the visitors only if we do a lunch.

What do you think your customers like most about Double T A-Cres?
Most of our customers don't come from our local area. Most of them are from Turlock, Modesto, or beyond. We get a lot from the Bay Area, and I think that they're looking to go someplace different for their event that's more of an adventure. A lot of them have commented that they like the idea that they are off the main roads, their children are safe, they can enjoy the evening because they know their children can't get into the street, and no one is going to take off with them. They relax more.

Are you willing to share your information? Yes

Do you want additional information? For more success stories and other information, see the website:

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May 2002

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Organic "Farm-to-Table" Herbs, Berries, and Vegetables

Interview with Beverly Morton-Billand, Patowmack Farm, Loudoun County, Virginia, tel. 540-822-9017, patowmackfarm@megapipelnet

What is the history of your farm and farming experience?

Patowmack Farm grew from our love for good and healthful food, the farming lifestyle, and Nature. During the course of several years, we have looked for niches that would help us continue farming when traditional farms are struggling to survive. My partner, Chuck, and I have been avid gardeners wherever we lived.

We purchased this 40-acre farm in 1986, high on a hill overlooking the Potomac River in Loudoun County, Virginia. The farm was named Patowmack following the old English spelling. George Washington ran a trading company in the area with the same name, and the Piscataway Indians migrated to an island opposite Point of Rocks, Maryland, in 1699. The farm is surrounded by wooded hills with a Potomac River view and the Catoctin Creek on the edge.

Early on, I took the Extension Service Master's Gardener course, which helped me develop and care for extensive gardens—herbs, vegetables, and flowers. I am the full-time farmer, and Chuck has two full-time jobs, the farm and his career, which takes him to Washington, D.C., on a commuter train.

Describe the alternative enterprises in which you are presently engaged?

Before we decided on our niche market, we did extensive research. First, we wanted to farm organically. The farm began with fresh herbs and vegetables. We now market elephant garlic, herbs, tomatoes, peppers, a variety of seasonal vegetables; pick-your-own/market strawberries, blueberries, blackberries and raspberries; and organic free-range eggs (from our 80 free-range layers) and market all at our Wayside Market and in "Dinner in the Garden." We grow several different herbs that are fresh cut with the customer at my side, 20 varieties of tomatoes, and 25 varieties of peppers. We produce value-added products, which extend the season. Adding jams, herbal vinegars, salsa, and pesto adds a longer period of revenue to our business.

What made you decide to go into the present alternative enterprises? What were your goal and vision?

We always wanted to be farmers. We were gaining considerable experience with our large suburban garden. We also knew that we wanted to be in the alternative small farm category. Plus, we raised herbs in our garden.

We have a very definite mission, vision, and goal. Our mission: Promote an economically viable, small, family-owned rural enterprise that provides safe, healthful, and highest quality foods while protecting the environment and countryside. Our vision: "Sustaining the environment while developing a strong family-owned business." Our goals: (1) Develop value-added products; (2) Market directly to the clientele; (3) Educate the public about safe and healthful foods and the need to protect the environment; (4) Rely on and support family members and local employees to ensure the delivery of highest quality products and services;

and (5) Promote rural economic development by partnering with other rural enterprises.

How did you make the transition?
In the early 1980's, we had the opportunity to work overseas. During that time, we developed a strategy that would allow us to purchase a farm. During our 5 years in a foreign country, working as a nurse and for USAID, we researched the possibilities. Upon our return, we purchased the farm. We now produce herbs, berries, vegetables, and eggs on approximately 7 acres and run "Dinner in the Garden," a farm-to-table dining experience which overlooks the Potomac River.

What is your business-planning and goal-setting process?
Before purchasing our farm, I did an enormous amount of research about what products we could grow within our budget. I developed the business plan so that we could see a 5-year projection. The business plan is the basis for our decision making and operation. It has been revised many times and is a work in progress. The cost of production/investment had to be very low because we did not have unlimited capital.

We encourage people to share our farm and join us in fulfilling our dream. We communicate and listen to our customers. Our "Dinner in the Garden" restaurant provides a tremendous amount of information, as I visit all the tables every evening and listen to people's ideas for future planning.

How did you acquire your information on the alternative enterprises?
I do a considerable amount of research and information gathering, from which we develop our business plan. This has been done for every phase we have entered into. I research, read, go to libraries, attend special classes and seminars, talk to people, and visit markets. I joined associations such as the Virginia Herb Association, Chamber of Commerce, Loudoun Visitor and Convention Association, and Organic Trade Association, and I stay active by speaking to interest groups. I subscribe to the leading publications in the area that I am interested in or that I am researching.

How do you market your business?
I have an extensive, low-cost marketing plan. In 2002, we plan to only spend $100 per month to market all of our enterprises, including the restaurant. Marketing has been the most difficult area for me due to the lack of any formal education or experience in this area. I have attended classes and seminars where networking is done and the business can have the most exposure.

In 1997, the Loudoun Convention and Visitors Association held a conference on "Eco-Tourism: A Rural Escape to Northern Virginia," which was developed and presented to the Association by Patowmack Farm. This project gave increased exposure to the farm.

My major emphasis has been on press releases. I draft press releases several times a year and send them to the neighboring small-town newspapers as well as the Washington Post. I follow that up with telephone calls to obtain editors' reaction to the news release. I advertise in the local papers, the Loudoun County Convention and Visitors Bureau guide, and the local Chamber of Commerce paper, and I maintain a mailing list of about 3,000 customers. I mail a newsletter twice a year and send out a reminder card when the restaurant is open for the season.

Of course the best advertising is a satisfied customer. In our restaurant, we give a small gift such as preserves or similar organic products to customers celebrating birthdays, anniversaries, or other special occasions.

How do you price your products?
I visit local stands and markets and price to be competitive, even though our products are organic. I also consider my production costs (which, because we grow organically, tend to be higher), especially the value-added jams, vinegars, salsas, and pesto. I occasionally give

quantity discounts to customers. I do not bargain for price. I check the wholesale price of products. I look at the national listing of organic wholesale prices. Finally, I determine what the market will bear! I have been too low at times and too high at times. I make the necessary adjustments.

What went wrong? And why? How did you correct the situation?

When I first started growing herbs I produced some of them in volume such as elephant garlic. I found it was difficult to market these volumes from my farm. I re-evaluated the herb business plan and decided to increase my variety and sell smaller quantities at my Wayside Market and to restaurants.

Marketing surprised us. I soon found that I was not prepared and had not researched or studied the direct marketing business. So I became involved in the Mid-Atlantic Direct Marketing Association and went to seminars, workshops, and conferences. As I look back, I should have taken some marketing courses since I had no experience or training in that area.

Advertising is a must. We found that our advertising budget was too small, but we could not do anything about it. Now, although we have developed a marketing plan, it is still low cost. This aspect of the business will continually be revisited, especially as the restaurant grows and the goal of promoting the wayside stand strengthens.

Labor supply has been a challenge. I am not large enough to keep full-time employees, and as age creeps up I find that working from sunup to sundown requires assistance. Because I could not provide full-time employment, I went to neighboring farms and found that the need for labor was the same. By working cooperatively, we were able to provide full-time jobs for the laborers. Everybody was happy.

What went right? And why? How did you build on your success?

I communicate with my customers at the Wayside Market and through the mail. We ask for feedback and suggestions. We make changes and improvement based on this feedback. One needs to combine this with "watching what you are doing and feeling" and build upon the successes. This is how "Dinner in the Garden" was started.

We participate in the Loudoun County Farm tours. In the spring tour of 1998, we served organic soup and samplings to people visiting our farm. The visitors asked us to start serving dinners. By mid-1998, we cleaned up the Wayside Market and set up tables to serve 20 people four evenings a month. In 1999, we expanded to outdoor open air seating on a terrace, which provided an exquisite view of the Potomac River. Here we could serve about 40 people four times a month. We set up a tent on the terrace in 2002. The Washington Post did a feature story in its Food Section in 2000, and we have been full every night since. Now, we are starting construction on a pavilion, commercial kitchen, tent, and gazebo that will seat 125 people.

What would you have done differently?

I would have learned more about growing the crops before I started producing so many for market. I would have taken some marketing courses to better understand how to develop and implement a marketing plan. This has been a very difficult learn-as-you-go process for us. I would have started to partner with neighbors and others sooner since the benefits are so great for all.

Where do you plan to go from here?

Our main focus for 2002 is to expand our organic Farm to Table enterprise. Working with the local government to establish a rural enterprise has been a challenge. Throughout the years, we have made significant changes that have enhanced our viability and created an opportunity for others to share the experience of this serene lifestyle. Completing our construction so that we can open with a new facility in 2003 will be a test of durability. This must be done

while still running a successful business during the current season. Marketing the "Dinner in the Garden" will be different for 2003. We must market to a different audience if we want to add weddings and corporate parties. Better marketing our pick-your-own enterprise, partnering with local businesses to develop and market products, and expanding the value-added enterprise will benefit our overall goals. We will continue to partner with other local businesses to enhance the rural economy. We make every effort to partner with other businesses, such as those promoting overnight stays with bed and breakfasts, we serve Loudoun County wines, and we encourage customers to visit sites and farms in the County. We are all different farmers, but we can share information, customers, successes, and failures. This benefits us and gives the consumer more choices.

How do you obtain your financing?
The house was on the property in 1986 when we purchased it. We built the barn (storage for hay and equipment) and later the Wayside Market when we recognized the need for an onsite sales point. The chicken coop is a modified old outbuilding that accommodates the hens. The barn is still waiting to be finished because other production cost needs have been more pressing. We have chosen to minimize our debt; therefore funding becomes a challenge every spring. Offering diversified products and a longer season helps extend the revenue period. Funding the large farm-to-table expansion is a risk and borrowing money will be a factor.

What do you consider the most important advice you would give other farmers considering an alternative enterprise?
- Don't be afraid to dream the possibilities.
- Have a strong business plan.
- Remember, you are the CEO of this business; run it like a business.
- Market your products, experiences and yourself well.
- Most of all, laugh, enjoy, smile, and have fun.

How did you handle the liability concern?
We obtain our insurance through a local independent insurance broker at a cost of approximately $1,200 per year for a $3 million umbrella policy. We keep the farm clean and clear of debris. I rope off areas during large events. We inform the public about the dangers of farm equipment and the importance of being cautious. We have not had a problem, and we don't have areas where accidents are waiting to happen. I also make extensive use of signage on farm tour days and for our Wayside Market customers.

Do you mind sharing your promotional material?
I have promoted my enterprises in several ways: newsletters twice a year; postcards; press releases to local, regional and national papers; speaking before groups; and advertisements. Finally, I am an advocate of producing healthy food and a safe environment. As a result, I am involved in interviews and asked to speak on occasion. For example, the Washington Post would do a story only if it involved more farms. So they came out and did a story on three farms in Loudoun county. I have been interviewed on television about USDA organic regulations and visited by Australia's Secretary of Agriculture. I have been interviewed by three national television stations on small farms and alternative agriculture. I was on "The Morning Show" in 1996 as a follow-up to the story in the Washington Post. This has all helped market my business and enterprises.

What do you dislike the most and like the most?
I like meeting customers and discussing organic foods. I dislike the stress caused by the lack of finances to carry out the business plan as designed. This especially occurs in the spring

when there are not enough funds to purchase all the crops and inputs needed for the farm.

Would you start this alternative enterprise business today after learning what is involved? Definitely yes! I am living a dream!

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
I belong to the Loudoun County Convention and Visitors Association, the Chamber of Commerce, Mid-Atlantic Direct Marketing Association, and Organic Trade Association; I am involved in Extension agencies; and I was a former member of the county's Agriculture Advisory Commission. In 1999 I was recognized as the Loudoun County Agri-Business of the Year, and in 2000 I received the Loudoun County Small Business of the Year Award. Patowmack Farm was photographed and featured in the Loudoun County Chamber of Commerce book *Loudoun County: Blending Tradition with Innovation.*

What conservation and education activities do you have?
I am a certified organic grower of vegetables and berries and producer of free-range eggs. In 1996, we joined in partnership with the Virginia Department of Forestry to develop a Forest Stewardship Plan for the farm. Our nature trail along the Catoctin Creek identifies 25 species of trees for our dinner guests and other customers to enjoy. We have a thermal heat pump to conserve energy.

What do your customers like the most about your place?
Our customers like the freshness of our products. We pick the herbs fresh upon order. Customers like to know where their food is produced and who produces it. Customers really like feeling part of the farm family. We are marketing a relationship with the customer as well as an edible product.

Would it be ok for people to contact you? Yes, we welcome sharing information.

Do you want additional information? For more success stories and other information, go to:
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Horse-Drawn Wagon Rides

Interview with Larry Edmonds, Three-Rock Ranch, Spokane, Washington 99026, 509-466-4936, 3rock@omnicast.net, www.3rock.com

What is the history of your farm and farming experience?

My wife and I purchased this ranch of 25 acres 15 miles northwest of Spokane in 1980. I worked for the Natural Resources Conservation Service (NRCS) in Spokane, and the ranch allowed us to pursue three career goals: living in the country, ranching, and a full-time job for me. We purchased the ranch to raise Monmouth Jack stock, which are horse-sized donkeys.

Describe the alternative enterprise(s) in which you are presently engaged.

I provide wagon hayrides during the Christmas season in a residential area of Spokane, which is nicely decorated for the season. I use two Clydesdale mares for raising the Monmouth Jacks and for pulling the wagon. I initially provided free wagon rides at church functions, Grange events, and other community activities.

For the Christmas hayrides, I operate from the second Saturday in December to December 30. When I started the hayride business, I set myself up at a corner of the neighborhood and waited for the people to come. Now 90 percent of the riders make reservations by telephone or e-mail to avoid waiting, especially in cold weather.

My rides are 30 minutes long, and I schedule five rides each night. If the temperature drops to zero or if it gets too windy, I cancel the ride. If it snows, I schedule more rides each night.

I replaced my old hay wagon with a brightly painted trolley that has a roof. We have lights and music powered by a small 1,500-watt inverter powered by two dry cell batteries. Over 60 percent of my customers return each year.

I have a helper. This young man started when he was 10 and would help for a free ride. Now, I pay him to help me.

What made you decide to go into the present alternative enterprise(s)?

Neighbors and friends started to come out to the ranch to see the mules, horses, and Jacks. I had an old wagon, and I would give them rides. It was very low budget. Once, I was at the local county fair with the mares, and I was asked if I could haul people from the parking lot to the fair. We gave free rides to several hundred people in the following 3 hours. Also, these people were very interested in how the horses were harnassed, hooked to the wagon, and driven.

How did you make the transition?

I made some improvements by putting a fifth wheel on the wagon so I could turn shorter more safely. Thinking about safety led me naturally to think about liability, so I bought insurance for $400.00 to protect myself and the family. Insurance started to increase, so I switched to a different insurance, which costs us $700.00 today.

Then, 12 years ago I started the Christmas wagon hayride business. I obtained a business license and went to work. I advertised in the paper and on the radio, local TV, handed out business cards, and put an ad in the Nickel. I was even on national TV one time.

How do you market your services?
I advertise in the entertainment section of the local newspaper, put up flyers, and hand out business cards to everyone I see. I place a 2-inch by 2-inch ad in the local paper eight times during the season. The ad runs Friday through Sunday for a total cost of $630.00. It reads "Horse Drawn Christmas Lights Tour, call 509-466-4936." Now I put in my e-mail address. My wife takes care of all the appointments.

This ad generates about 200 to 300 calls a week. I use the radio to market free rides. I have a total of 1,000 to 1,200 customers per year.

On some occasions, I provide free rides for senior citizens and the disabled.

How do you price your products?
I charge $5.00 for adults and $2.50 per child ages 3 to 12. For groups such as nursing homes and others, I charge one price for the whole group rather than per person.

What went wrong? Why? How did you correct the situation?
I spent too much money on advertising. I would spend about $400.00 a year on radio alone, plus newspaper ads. I found out that flyers, business cards, and advertising only in the entertainment section of the local newspaper have been the best advertising value.

I had to buy manure bags for the horses. One year the horses messed the street in front of a house that was having a party. It turned out terrible. I cleaned the carpets in the whole house.

What went right? Why? How did you build on your success?
I have a 60-percent return rate on customers. They tell me that they keep coming back not for the ride but because of me. Building personal relationships with people is very important. I guess I just have a very friendly personality that people appreciate. I don't rush the customers. I am on time. Kids drive the team and build self esteem, and I give a little talk about the area and about ranching. They love it.

My focus is on the ride, horses, Christmas music, and Christmas decorations. Thus, I do not serve cakes, cookies, or hot cider. That would take more help and take away from the ride. Also, the health regulations are complex and expensive to comply with in Spokane.

What would you have done differently?
I could charge more.

Where do you plan to go from here?
I plan to get a new wagon that's easier to get into. I need a new team of horses; my mares are very old. My neighbor has started to raise bison. We are talking about giving sleigh rides through the herd. We are going to check this out during the winter of 2000-01.

What would be the most important advice you would give other farmers considering an alternative enterprise?
1. Have, or develop, people skills.
2. Look at the enterprise as supplemental income.
3. Cost it out.
4. Pick a business that makes sense.
5. Study ads in your papers to determine what you want to do.
6. Get your niche and do it well.
7. Price low enough to keep the competition out when there is not enough business to go around.

How did you handle the liability concern?
I purchased insurance through my local agent.

What do you dislike the most and like the most? I dislike the liability aspect of the enterprise. I work with the horses all day, but there are so many people around and something could go wrong. I like the kids the most. This is a non-monetary reward that cannot be measured. I get an opportunity to meet special people and groups. One example is an entire wagon of 22, a nationally known group called the "Singing Nuns" who played their guitars and sang the entire trip.

Would you start this alternative enterprise business today after learning what is involved? Sure!

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Cool's Pond—Fee Fishing, Farm Stand, and Crafts

Interview with Sam and Barbara Cool, 14425 Edgemount, Smithsburg, Maryland 21783, 301-824-6353, scool6353@aol.com, Web site: www.cool-homes.com

What is the history of your farm and farming experience?

This farm has been in Sam's family since 1878. There were 102 acres in orchards and raspberries for many years. Now, the farm is 70 acres—40 acres in orchards and 30 in woodland. Sam grew up on the farm and joined the Air Force at the age of 18. He moved back to the farm in 1975 after 10 years in the Air Force. At that time, his Dad and Mom raised several different fruits and berries. Today, we have peaches, apples, raspberries—and the fish.

Describe the alternative enterprises in which you are presently engaged.

We have two catch-and-release, fee-fishing ponds. We rent fishing rods and sell bait, sodas, candy bars, and other prepackaged foods. Three years ago we started tent camping for groups who want to fish all night. At this time, groups—seniors, YMCA, church, special education—started to come, and we prepare barbeque lunches and dinners for them.

We also make wooden miniature replicas of people's homes, artfully scaled and hand painted in detail. This year, our newest venture has been to duplicate homes as birdhouses. See us at *cool-homes.com*. In June, we will advertise in *Country Sampler* magazine. These crafts have proved to be unique gifts and cherished keepsakes. We have shipped this work all over the country.

What made you decide to go into the present alternative enterprises? What were your goals and vision?

We were forced into developing another source of income after our crop was frozen out. We looked at ways to make the resources on the farm bring in additional income. Sam's father had put in an acre pond in the 1950's with Soil Conservation Service (now Natural Resources Conservation Service) assistance. The pond is 15 feet deep and clear, and it is fed year-round by a 55-degree spring. It has never gone dry. The pond's main purpose was to provide irrigation water during drought. The cold water is perfect for trout.

How did you make the transition?

We did our production research—reading magazines and research reports, talking to other aquaculture entrepreneurs, etc. We got a lot of technical assistance help from the University of Maryland and their alternative enterprise Extension agent. We decided to raise catfish, trout, and bass and added local bluegills and crappies. As the business grew, we added another half-acre pond above the older pond.

We also added the open-air market and enclosed the roadside stand. We sell in-season fruits, berries, vegetables, crafts, eggs, milk, and baked goods. We use this store for renting rods and selling baits and sodas and prepackaged snacks. Some people asked if they could tent camp, and now we have campers during the summer. We use an honor system at the pond to collect fees. People who come and fish at the pond simply drop their money through the slot of a lock box. We have come home after a 3-day weekend to as much as $200, even though a lot of people misread the "fee fishing" sign for "free fishing."

Groups started to come and Sam likes to barbeque, so we have provided this service on several occasions.

We did not have a business plan. We would think about an idea and discuss it over breakfast. Then, we would go ahead and test the idea. We did a little bit at a time—take small steps so if something went wrong we would be able to pay for it with side jobs or withstand the financial cost using the other enterprises without jeopardizing the farm. We still use the same decision process today.

We did essentially all of our own financing. If we did not have the money, we did not do it or we did it for less. We had a couple of bad crop years and developed the craft business in order to survive on the farm. It works out great because most of the craft business is during the winter when farm chores are at a minimum.

How did you market your products?

We started out by advertising in the local paper thinking we would be overrun by people on the first day. Not a single person came. We have found the "Cool's Fishing Pond" sign and word of mouth are our best advertisers. We spend about $200 a year on a classified ad in our local newspaper. We developed a brochure and placed it in the visitor centers along the Interstate.

If we want to open a new market, we talk to the group. This is much more effective than writing a letter or putting an article in the paper. Taking pictures of people fishing and sending them to the newspaper is the best free advertisement. Local newspapers are always looking for stories about people.

How do you price your products?

We just look at our costs and then set a price that will turn a profit. For example, we started fee fishing at $3.00, but we were losing money at that price so we quickly increased it to our current rate of $5.00. Now, we charge $5.00 whether you fish all day or for 20 minutes. We charge children and adults the same fee. We rent rods for $2.50 and sell bait at $2.50 a container. We sell frozen 9-inch fresh berry pies for $6.50. We list Cool-Home products on our Website, *www.cool-homes.com.*

What went wrong? And Why? How did you correct the situation?

Our first idea was to raise caged trout for the wholesale restaurant market. But we found that we raised enough fish for only about a one-month supply. So, we let the trout out of the cages and put up a sign that said "fee fishing." Our business has been growing ever since. When we first started, we charged a modest fee to fish and a separate fee for each fish caught. Soon, we found out that too many fish were being caught too quickly. We were being fished out. So, the business quickly became catch-and-release fishing. People could still keep fish, but now we charge $5 for every fish kept.

What went right? And Why? How did you build on your success?

The fishing enterprise has saved the farm financially several times over the past 15 years due to crop failures, low prices and droughts. People love to be outdoors. We have a beautiful view of a rural farming valley. People love the peace and quiet. They love to see their children catch fish or enjoy catching fish themselves.

I purchased my trout rather than obtaining them from the state fisheries. I have a Maryland "fee fishing" license. This eliminates the problem of having a fishing license to fish at my pond. In Maryland, any State stocked fishing requires an angler to have a license before he or she can fish.

What would you have done differently?

Nothing!

Where do you plan to go from here?

In the past two years, we have gone into the craft business. We use our Web site to market our crafts, and we ship them all over the country. This has made up for the bad years. It is hard to make a good living on a farm our size without these alternative enterprises. They have carried the farm. We hate to say it but the small family farm is going to be a thing of the past.

What would be the most important advice you would give other farmers considering an alternative enterprise?

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Resource Economics and Social Sciences Division

October 2000

Alternative Farm Enterprises – Agritourism Success Stories

Catering, Picnics, Weddings, and Meeting Facilities

Interview with Randy Nixon, 2800 Nixon's Farm Lane, P.O. Box 70, West Friendship, MD 21794, 410-442-2151, nixonsfarm@nixonsfarm.com

What is the history of your farm and farming experience?
My Dad and Mom purchased this farm of 165 acres in 1952 as a place to raise the family. It was a working, diversified farm. Today, we lease out about 90 acres for corn silage and all but 20 acres is used for hay. In 1952, we lived in the barn because the house was so old that it toppled down. Dad converted one part of the stalls in the barn into the living area, and the cattle were at the other end.

Describe the alternative enterprise(s) in which you are presently engaged.
We are a service business. We provide food, open space for entertainment, weddings, conferences, retreats, and seminars. There are basketball courts, swings, slides, and jungle jims, a water dunk tank, open space for soccer and ball games, and hiking paths. We mainly serve groups: church groups, corporate picnics, family reunions, other organizations. Last week we fed 2,000 people, and this coming week we are feeding 3,000 people. My Mom is the head chef but does not spend much time in the kitchen now. She is 74. I operate as a restaurant 4-5 times a year as a promotion for the business.

What made you decide to go into the present alternative enterprises?
My father died in 1972. My mother did some research and found the most valuable use of land is recreation. She said, "What can you do with a farm?" She developed the farm into a catering business and a recreational farm. As she said, "We are growing people!" And you can keep on growing people because they grow forever. This was her view, and in the late 1970's we started this service. We first started with church groups and just grew to where we are today with weddings, seminars, business meetings and conferences. My mother loved to cook. So she went to work.

How did you make the transition?
My Dad formed the Small Businessman's League of Baltimore. This League was formed because Black and Jewish businessmen could not join the Chamber of Commerce. As the group grew in size they migrated to the farm for meetings and a place to go on Sunday with the family. It became the League's Country Club, and a membership fee was charged. My mother loved to cook and so as the people began to come she felt a responsibility to feed them. The business just grew from there. I was a corporate lawyer for 5 years and quit to run and grow this people business. I do not have any formal training to operate and manage a service business such as this. I read, listen, and talk to people in the business. Most of all I listen to my customers. I have been operating this business for 13 years.

Describe your decisionmaking process.
We went through the strategic planning process with goals, objectives, and mission. That is important for the long run. But the "Battle Plan" is the important one. It shows every single aspect of this business. From the minute detail of how to take

a telephone call, to an inquiry about the use of the facility, to how to order food for the kitchen. Every staff position has a job description and what it entails. I have this in hard copy and in the computer. I have developed this over the years. This runs the business.

How do you obtain financing?
I just obtained a loan to build a "state of the art" kitchen, remodel the upstairs to the barn, septic, bathrooms, walk in freezer, etc., for $1.5 million. It was difficult to get the loan. I had a business plan and history of business activity. But it was still difficult to convey to them that I am a great manager and that this is a sound business.

How do you price your products?
School groups are charged $10.00 per person, and they get a meal and fun activities depending upon the season. Weddings are $50.00 per person. Retreats, seminars, and conferences cost $30.00 to $70.00. Corporate meetings are $20.00-$40.00.

What went wrong? And Why? How did you correct the situation?
When Mom first started the business, she hired caterers. Their quality was inconsistent, and several other catering problems arose. She kicked all the caterers off the farm and started to do her own cooking. A person needs to have firm goals but also to be flexible about achieving objectives to accomplish those goals. There is a Spanish saying, "Act boldly, and unforeseen forces will come to your aid." Or as they say in business, "Jump off into a business and build your wings on the way down."

What went right? And Why? How did you build on your success?
I make sure my staff and I deliver a very consistent service that will have a very good predictable outcome. I do a lot of teaching in my work to both the staff and the people who visit the farm. Consistency is the most important product. We do things one way when serving people, and that is *my* way. I have received comments from people that my staff speak and act as if I am sitting on their shoulder. I team up with entrepreneurs in the area—like rural golf courses. Businessmen come here for the meeting, then we take them to the golf course 10 minutes away and then they come back here for dinner. I train my staff in food service at a cost of $1,000 per person. This has gotten me several contracts because my competitors are not as fully qualified as I am.
We have a rural setting to sell and we make the most of it! And, it is working.

What would you have done differently?
One needs to be sure to maintain the courage to succeed in your business. Don't get sidetracked. I hired a manager but did not have a clear set of plans and responsibilities developed, so the manager could not help me achieve my goals. It took several years before I was ready to jump in and take over the management myself. A plan must be in place to accomplish your goals; otherwise you will get sidetracked by others, including paid consultants. You need to process all the information you receive in the context of your goals.

Where do you plan to go from here?
My next step to begin government and institutional feeding. I plan to grow this business into a $16–20 million a year food and conference service business.

What would be the five most important pieces of advice you would give other farmers considering an alternative enterprise?
1. Market your product
2. Be consistent
3. Be efficient
4. Provide the service one way—*my* way!!
5. Have trained staff.

How did you handle the liability concern?
We purchase our insurance through regular agencies. I called several insurance agents in search of specialty coverage for a theme park or pick-your-own business. The prices varied considerably. I have $2 million umbrella coverage today, and I plan to increase it. It costs me about $4,000 a year.

- Don't put pressure on people. Give them freedom to fish. Be helpful but not judgmental. Help them make the most of their experience. Help them feel welcome.
- Remember: Your customers are your guests.
- Do your research. Contact the NRCS, Extension, state university system. Talk to others, and go to seminars.
- Be realistic. Ask how this enterprise fits into the family goals. What are the start-up costs? What are the labor requirements?
- Build and learn. You will never develop the perfect plan. Don't grow too fast.
- Maintain the water and the grounds to keep them neat and clean.
- Keep good records and use them to determine what does and does not work.
- Use a guest book to get names for mailings.
- Have a good source of water if you are raising fish.

How did you handle the liability concern?
We have a $1 million liability policy on the

farm. It covers the pond because aquaculture is considered a part of agriculture for insurance purposes. The insurance is very low cost.

Do you mind sharing your promotional material? (Including your prices.)
We tag some fish. Anglers who catch a tagged fish can claim a prize ($10-25, or fishing equipment). This has really stimulated interest.

What do you dislike the most and like the most?
Our favorite part is meeting the people. It's something to see the little kids come in and catch their first fish. Some people who came when they were kids themselves are now bringing their own kids back to learn to fish.

We dislike the difficulty of working with the state and county governments. They are not very supportive of helping farmers implement non-agricultural businesses on their farm. We tried to put up rustic cabins but forgot the idea after seeing all the county requirements. State and county requirements were inconsistent.

Would you start this alternative enterprise business today after learning what is involved?
We farm by choice. But in today's world, our farm is pretty small. Doing what we've done with the pond, crafts, and store has helped us keep the farm. We are having a great time. It gets hectic at times but it is very rewarding!

Would it be ok for people to contact you?
Yes!

Do you want additional information? For more success stories and other information, see the website: http://www.nrcs.usda.gov/technical/RESS/altenterprise

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September 2001

Alternative Farm Enterprises – Agritourism Success Stories

Sylvanus Farms--Farm Stays, Hunting Leases, Fishing, Conservation, Education

Interview with Becky Kelley, 1741 Creamery Road, Afton, Iowa 50830; 641-347-5310; kelley@mddc.com

What is the history of your farm and farming experience?

"Sylvanus" means woods, and it also refers to the Greek God of Woods and Trees. We manage Sylvanus Farms' 600 acres on three farms in Union County, southern Iowa, which we purchased over the last 40 years. We raised the traditional cattle and hogs for 20 years and corn and soybeans for 30 years. The land was put into the Conservation Reserve Program in 1990. My husband Paul recently retired (1996) from the Burlington Northern Railroad, and I retired from being a former Certified Dental Assistant. We have planted native grasses, trees, and riparian buffers and instituted wildlife habitat management. The farms are in a state of use similar to what they were when they were first homesteaded in the mid-1800's.

Describe the alternative enterprises in which you are presently engaged?

The conservation and habitat improvement on the farms are conducive to wildlife such as deer and turkeys. Neighbors and others were always asking permission to hunt, and of course some did not. We said yes to some and no to others, and it became controversial. In 1999, an out-of-state hunter leased the 600 acres and sold deer hunting packages. We reserved the right for turkey, pheasant, and quail hunting. The hunters asked if we could provide lodging, and we said yes. We had purchased a railroad crew car (sleeping and eating facilities for four railroad workers) in 1996 for relatives to sleep in during visits to the farm. We changed the crew car—what we now call our "Bunkhouse"—to include a kitchen, bath, television, and dining facilities for four. I provide the linens, towels, utensils, and basic household supplies.

What made you decide to go into the present alternative enterprises? What were your goal and vision?

Our county rents cabins on Three-Mile Lake near us. These cabins are always full in both summer and winter. In January 2000, the county asked us if they could send the overflow to us since we had the Bunkhouse. We said yes and immediately found out that we also had an overflow lodging problem. We finished off the upper level of the building we had constructed over the crew car to increase the lodging space. We call this the "Loft." It includes a sleeping area for six people, kitchen/dining area, bathroom, and living room. We also built a fish cleaning station and picnic areas, installed grills, and built a bonfire pit. We have several bird feeding stations for various species, including hummingbirds. We have constructed birdhouses for bluebirds, wrens, and wood ducks. We have cut walking trails to our ponds and through the woods. All of the trails are mowed and maintained for easy access and use. The woods and trails are very conducive to wildlife sightings and birdwatching. One pond is stocked with bass and bluegill, while the other ponds contain a variety of fish, a number of which have been placed there by our friends and guests.

How did you make the transition?
We moved slowly as the business grew. We started with two to three hunters for three to four days or three to four fishermen for two or three days on two or three weekends a month. This has grown from one-night stays to two-week family vacations. In August 2001, our Loft and Bunkhouse were in use 28 out of 31 days, and only one weekend is left in June 2002. This growth rate over the past 20 months has allowed me to learn aspects of the lodging and hospitality business such as scheduling, bookkeeping, room cleanup and maintenance, personal time management, and catering to the customers to make sure their stay is as pleasant as it can be. Being able to find out how to meet every little need of our guests to make them feel welcome and have a very happy time is our major goal.

What is your decisionmaking process?
The lodging business has grown without any real planning other than providing our guests the best experience possible. The demand has been greater than our supply of space. Paul and I discuss the larger construction type projects that we need to accomplish. As far as day-to-day needs, I make the decisions, which are really in response to requests from our guests. I ask them what they need to make their visit more pleasant.

What is your business planning and goal setting process?
We don't have a formal business plan or process. I have a two-year degree in Business Administration. I use my training continually in running and growing our business. I do have a business plan outline, which I developed if our banker asks us for information.

How did you acquire your information on the alternative enterprises?
I developed and taught a seminar course at our local community college on non-traditional agricultural enterprises. I found local landowners were very skeptical of this type of income-producing opportunity, so I decided to act upon the opportunity rather than let it slip away. Now that I have been successful, maybe others will be more inclined to try some new enterprise. This has given me a very solid base for organizing, operating, and managing our non-traditional enterprise.

How do you market your lodging business?
I have done very little marketing outside the farm. Our business started from referrals and continues to grow. I leave my business card with many people. I focus my efforts on relationship marketing, and my guests do the marketing by word of mouth. A satisfied customer is our best marketing tool. Paul and I take every opportunity to make our guests feel welcome and very special. We provide the best personal service we can to each individual.

How do you price your products?
I price my lodging so families can afford to come on the fishing trips rather than just the father taking a trip "with the boys." We are developing our business to meet the needs of a family. We could probably charge more, but we are very happy with the revenue we receive. We are part of the community and plan our business to support and grow the community.

What went wrong? And why? How did you correct the situation?
We underestimated the capability of our plumbing in the Bunkhouse, mostly due to the age of the faucets and water lines, since they were all original to the crew car. We had to make some fast repairs. One guest acted in a very indignant way and was asked to leave. As a result, we put up signage and guidelines about what is expected of our guests and there have been no further problems.

What went right? And why? How did you build on your success?
Paul and I are very interested in people. What do they think? What do they do? As a result, our guests feel very welcome and receive the best service we can provide. This is measured by our repeat business; one fisherman returned five times with his family in 2000. With all the seasonal activities of fishing (water and ice), hunting, camping, and fall foliage, we are busy every month

except March when the ice is going out on the lake and there is no hunting season open. We enjoy making our guests feel extra special.

What would you have done differently?
We receive numerous inquiries about cabin lodging. However, people don't turn us down when they find out we have a Loft and a Bunkhouse. I would have considered building a few cabins if I had realized the need for lodging in this area was so great.

Where do you plan to go from here?
The demand is very high in our area for lodging, and there is no competition. We are now building a lodge with four bedrooms, four baths, a fireplace, a kitchen, a television, lounge and dining areas. The lodge is located on a ridge overlooking a small rural town in the distance, beautiful oak timber, hills, and a pond. The lodge will be completed at the end of 2001, and it is already rented for December (Five months before it is completed.). We have a laundry facility in each location; although this facility is primarily for laundering the bedding and linens, our guests may use it, but only with special permission and for special reasons, such as the children fell into the lake or pond and soiled all their clothes.

Where did you get your information on how to build your lodges?
Paul lays out the dimension of the building, and I began designing the inside. I draw out the room sizes, storage, kitchen, bath, and lounging areas. We have not hired consultants on layout and design.

How do you obtain your financing?
We have been using our own capital except for the large projects such as finishing off the Loft and constructing the Lodge. We tried to obtain funding from Federal and State grants or loans. We found no grants available, and government agencies absolutely were not interested in funding our enterprise. So we went to our local banker who supported us.

What do you consider the most important advice you would give other farmers considering an alternative enterprise?
1. All family members need to be included in the decision and must be in favor of the enterprise.
2. Some family members must love to work with the public, as you are in constant contact with people.
3. Be realistic about the cost of getting started on a new project; it's easy to underestimate the cost.
4. Keep good records and document events
5. Enjoy what you are doing, or get out of the business.

How did you handle the liability concern?
We carry a $1 million umbrella policy. This was obtained from the same insurance agent and company that insures our farm.

Do you mind sharing your promotional material?
I want to prepare a brochure for our guests to take back with them to share with their friends. We plan to do this after the new lodge is completed. Now, I just hand them my business cards. Again, our biggest promotion effort is to make our guests feel special.

What do you dislike the most and like the most?
I dislike cleaning the facilities, but this is the most important job. I am known for very clean lodging and for the special personal touches I give the place. I like meeting all the different people no matter how young. For example, one guest is a professional turtle trapper. It was such an educational experience for us to see how he traps turtles and how he can tell the ecology of a pond or lake by what kind of turtles turn up in the traps. He sells the turtles mostly in the Far East and Australia, usually live, where they are considered delicacies.

Would you start this alternative enterprise business today after learning what is involved?
Yes.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
We have been very active in our community and serving on national boards. We have not joined any additional groups or organizations pertaining to our business.

What conservation and education activities do you have?
I have displayed state publications on wildlife in rural Iowa that the guests can use as they walk the trails, fish in the ponds, and look for birds, flowers, and trees. I have a state plant identification handbook that can be used to identify the plants. The children are very interested in doing that activity. The state has a poster showing all the plants and animals in Iowa by different areas such as dry prairies, wetlands, mesic prairies, and oak savannahs. I make sure every child receives one of these.

Paul has been involved in conservation his entire life. He has been planting trees on all the farms from the day he purchased the land. Since the 1980's, the farm bills have had several new conservation programs to help farmers improve their soil, water, plants, animals and air. Paul has been very involved not only on our farm, but as a member of our local RC&D (Southern Iowa Resource Conservation & Development Area, Inc.). He is also President of the North Central Region of RC&Ds and a member of the National Board of RC&Ds in Washington D.C. These programs were used to transition the farm from traditional agriculture into non-traditional uses. We are enrolled in the Conservation Reserve Program to retire cropland and return it grasses, which encourage wildlife. The Wetland Reserve Program helped us restore 20 previously drained acres; this land now attracts waterfowl and wildlife, as do the six ponds that we have on the three farms. We used the upland and stream buffer program to enhance water quality and wildlife habitat, and the agroforestry program to increase forestry on the farms. Our long-range plan is to have sufficient wildlife on the farm to provide the needed income through hunting and lodging so we do not need to use our land for crop and livestock production.

What do your customers like the most about your place?
This is best shown by the comments in our guest book:

- "Awesome."
- "Best place I have ever stayed and will ever stay."
- "You're the best ambassadors for Afton, Iowa."
- "My 3-year old daughter is still talking about the bonfires and the deer a month later."
- "You have a wonderful place."
- "We are going to bring Mom down."
- "Thanks!!!"

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to http://www.nrcs.usda.gov/technical/RESS/alenterprise

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Alternative Farm Enterprises – Agritourism Success Stories

Hardwood Forest, Hunting, Conservation/Education, B&B, Birding, Horse Rides

Interview with Vern and Peg Knapp, 43778 Thompson Run Road, Titusville, Pennsylvania 16354; 817-827-1092; knapping@csonline.net; www.pafarmstay.com

What is the history of your farm and farming experience?

The land was part of the Holland Land Company, which was granted to William Penn by the King of England in the 1600's. The Knapp Farm dates back to 1813. Daniel Knapp of Vermont received this land for fighting in the War of 1812. Vern represents the sixth generation of Knapps on this farm. We've been here together since we married more than 30 years ago. The farm is more than 1,000 acres in hardwood forest and cropland. We switched from dairy and grains to beef backgrounding in 1991. We now operate a hunting preserve and a bed-and-breakfast with rural farm amenities, and harvest hardwood trees from our Pennsylvania-certified tree farm.

Describe the alternative enterprises in which you are presently engaged.

In 1995, we converted the 1870 farmhouse into a bed-and-breakfast. This is a country style building with four bedrooms, private baths, front porch, dining room, large living room, pool table room, kitchen, and business office. We use farmhouse only for guests. We moved into a smaller house next door that Peg's mother had built in 1979. Then, we established the hunting preserve for deer, wild turkey, and other upland game. In 1996, we added trail rides, and by 1998 we started to add and enhance the wetlands. We rent the best cropland to neighboring farmers. We are currently developing fishing, bird dog training, guided nature trail walks, and bird watching/listening.

What made you decide to go into the present alternative enterprises?

We knew we had to consider alternative enterprises by the early 1990's, when the changes in agriculture had put us into a financial bind. We had the old farmhouse and Peg's mother's house and more than 1,000 acres, which is a very large farm for northwest Pennsylvania. We enjoyed visiting B&Bs and thought about how we would enjoy that kind of operation here. Because Vern was a member of the soil and water conservation district board, he was very aware of the land capabilities. Our county, Crawford County, had been covered twice with glaciers, which resulted in some of the best hardwood production conditions in the United States. On the other hand, 40 percent of the county could be considered wetlands, making it poorly suited for crop and livestock production. So we decided that the best way to keep the farm in the family and have it pay its own expenses was to manage and preserve our natural resources for income-producing sportsman and tourist enterprises.

How did you make the transition?

Vern talked with a neighbor who had extensive deer and turkey hunting experience on our farm. He asked him about possibility of being a guide for our new business venture. He was very excited about the idea because it was something he had always

wanted to do but did not have the land to make it work. He also suggested that we consider an upland bird hunting enterprise. He shared his experience, knowledge, and involvement with raising pheasants from chicks and eggs. He was the one that put this enterprise into action. About the same time, a nearby upland hunting preserve shut down. They were happy to sell us their equipment and share their knowledge, encouragement, and help. The timing was just right for us to start this enterprise.

We gradually added more activities and improved on the ones we already started. We converted a woodshop into a clubhouse for the day hunters. This building is also our customer greeting area; we use it for safety briefings before each hunt. In Pennsylvania, you can purchase a license to make your farm a hunting preserve. This lengthened our hunting season from a couple of weeks for deer and turkey season to about nine months—September 1 to April 30. The upland game hunting includes pheasants, chukar, Hungarian partridge, and quail. We also added an upland bird cleaning service and provided food service upon hunters' arrival. We added bird dog training and horseback riding so we could develop our farm into a year-round business.

We rented our productive cropland to neighboring farmers and began a program of reclaiming (converting) our marginal lands back to wetlands. Vern went to the Natural Resources Conservation Service and told them that he wanted to participate in the Wetlands Reserve Program by reclaiming some of the wet areas that had been drained more than 40 years ago. Our local soil and water conservation district board works with many partners to restore and enhance our natural resources. In 1994, our first pond was funded in part by Ducks Unlimited along with Federal, State, and local agencies. We have constructed 11 ponds since then. A total of five ponds are multi-functional wetland and fishing pond combinations.

The transition has been slow and methodical. We have been able to progress with the help of government agencies, friends, and neighbors.

What decisionmaking process did you use?

We started small and added new activities that seemed to fit the needs and requests of the guests. We started with 350 pheasants plus the wild deer and turkeys. In 2000, we raised over 3,000 pheasants. We buy our other upland game birds from an area entrepreneur on an as-needed basis. These numbers have grown at about the same rate as the pheasants. We do not do any actual planning in this area as the number of hunters determines it. The hunting decisions are made with the guides. We have a very tight set of guidelines for raising the upland game, releasing, and hunting. We meet often and take the guide suggestions as to needs and improvements for the preserve. The guides are the ones in the fields working with the hunters, and we greatly respect their thoughts. Our decisions for the most part are by total group agreement. We operate as a team and conduct each hunt as a team effort.

We make the B&B decisions jointly. We have gathered lots of ideas from others who have been in the business. We did not have a formal business or marketing plan at the beginning but we highly recommend it. We now operate with a business and marketing plan. It helps us avoid mistakes.

How did you acquire information?

Vern grew up in rural America, and he understood wildlife and their habitat requirements. He basically changed the management of the resources from cropland and pasture for livestock to habitat for wildlife. The State Game and Fish Commission, U.S. Fish and Wildlife Service, and Natural Resources Conservation Service provided great technical assistance in wildlife management, wetland development, and pond management. In Northwest Pennsylvania, we have accumulations of heavy, crusted snow (132" total accumulation in the winter of 2000) which creates quite a challenge in meeting wildlife needs. The grasses we grew for livestock did not meet the requirements of nesting birds. So, Vern started planting warm-season grasses to provide the nesting needs and winter food needs. The eastern gamma grass and switchgrass are serving these needs.

We joined several B&B organizations, attended their meetings and upon return home, tried to

implement their suggestions. We learn from others and from listening to our customers.

How did you finance your enterprises?

We were very fortunate to have inherited the land and buildings. This has helped us get started in the B&B and guided hunting businesses. We have understanding lenders who have shared our vision. We were fortunate to have some savings to draw upon. We grow fine hardwood—furniture grade cherry, maple, and oak—that provides a source of revenue. We are very careful with our growth and investment. We justify any changes that we make. Our labor and guides are subcontract employees at this point, so this helps with insurance and taxes. We will eventually need full-time employees, but the subcontract labor has been a great help getting the business off and running. We grew slowly, carefully planning each step, but have remained flexible.

How do you market your business?

You can have the most wonderful idea and facility, but if you don't market it properly, no one will come! We market the B&B, horseback riding, and tourist related activities through organizations such as Tourist Promotion Associations, B&B groups, Pennysaver newspapers, visitor centers, Internet, brochures and flyers. I place brochures wherever people allow me to. Word of mouth is a good advertiser for our B&B. Also, we work closely with other local B&B's in sharing overflow bookings.

Marketing the hunting is a completely different approach. We work sport shows to have actual contact with the hunters who come looking for places to hunt. We are very people oriented, and really enjoy visiting and listening to the hunting stories. Also, we have good luck with hunting magazines and newspaper ads. We are very careful to advertise the hunting only in the hunting-related sources. We have produced a video of the hunts on the farm, and play it at the sport shows. This really draws the crowds. We send out hunting newsletters several times a year. We keep mailing lists of all hunters and calls, and keep in contact as often as possible.

We have more marketing plan ideas to scope out but they take a lot of money and time. It is all worth the effort, but time is so very important, and we do not want to neglect what we have now. It is possible that we will hire a professional marketing team at some point in the near future.

How do you price your products?

We discussed the B&B prices with other operators in the area and priced our rooms in line with theirs. The same process was used for horseback riding. The hunting is sold as packages, which may include birds, dogs, meals, lodging, and other services. The prices depend on the services wanted. Packages are very attractive to the customer calling for information. The word "package" and what it includes helps sell the business. We will be developing more packages.

What went wrong? And why? How did you correct the situation?

There was a horse arena on the property. We hoped to use it for financial gain. We employed a horse manager to arrange and conduct horse activities such as team penning, roping, cutting, barrel riding, etc. The manager failed to obtain national and state sanctioning twice, and this doomed the enterprise. The smaller non-sanctioned events were poorly attended, so we eliminated the business.

What went right? And why? How did you build on your success?

The B&B was a hit because the guests loved the farm and country atmosphere. But they also liked their privacy and really wanted private baths. The first winter, we shut down the B&B and put in private baths and business increased rapidly. Also, guests requested larger beds so now the rooms have king and queen beds where possible.

The hunting grew very fast. We had to hire more guides and order more upland birds. Our pointer dog had puppies that we sold. This added another enterprise of bird dog training and a kennel. We added ponds throughout the property for the hunting dogs' comfort and to improve the habitat for the wildlife. We have outgrown our clubhouse (old woodshop) and have plans to enlarge the

facility. We sell electric dog training collars and instruct owners on how to use them properly. We continue to grow as our guests and the industry identify new needs.

What would you have done differently?
We would not have invested so much money preparing for the horse events at the arena. There were a number of starts up costs—electricity, food preparation and eating area, prizes, and etc. One needs to be more financially conservative when you start a new project. You need to go a little bit slower even though you have faith and belief in the new enterprise you are starting.

Where do you plan to go from here?
In the spring of 2001, we concentrated on improving the existing ponds for fee fishing. Also, we are adding three more ponds in the preserve area. We will improve our native grasses and have the neighboring farmer plant corn in the preserve areas. We added small primitive cabins in the preserve areas during the summer of 2001. Campers can use these during the tourist season, and hunters can use them to temporarily escape from the weather or just to take a rest. The cabins are sparsely furnished with bunks, table, chairs, gas stove and a few pots and pans.

Near-term goals are to build a large picnic shelter where we can have picnics for the hunters before and after the hunting season. This will be a fun-time gathering of hunters, their families and hunting buddies. We will also enlarge the clubhouse and install restrooms with showers. Long-term goals are to enlarge our farm by purchasing adjoining lands. We also plan to construct some type of a practice shooting area. We also plan to add some type of horse-drawn buggy or carriage rides for those who would like to see more of the farm, but cannot walk or ride a horse. We would like to conduct off-the-farm seminars for youth on gun handling and safety, hunting dogs and the different breeds and abilities, and wildlife habitat management. Then, we would take these youths to the farm preserve and demonstrate first hand the joy of hunting safely and show them how we manage the habitat. Finally, we would like to work with the game commission and extend this to the scouts and other youth groups interested in hunting and fishing.

What would be the most important advice you would give other farmers considering an alternative enterprise?
1. Build on the activities in your area. Cooperate with the existing facilities. For us, Pittsburgh University is nearby. The Drake Oil Well, the first oil well ever drilled, is nearby as are water and golf activities.
2. Develop a business and financial plan that outlines how you will develop and operate your business.
3. Obtain a good quality, people-oriented, well-educated workforce.
4. Use the Internet to market your business, as over 80 percent of our business now comes from people who have seen us on the Internet.
5. Work closely with your accountant, lawyer, and insurance and financial advisors. They can be of great help.
6. Be proud to be a farmer.

How did you handle the liability concern?
We worked closely with our lawyer, who advised us to incorporate our business. The state of Pennsylvania helps protect personal assets through the incorporation process. Our accountant advised us how to set up the bookkeeping system, so that all activities were in this "incorporated account" and protected. We also purchased a $1 million liability umbrella policy. This also offers small medical coverage for the guides. We purchase the insurance from an "outfitters" insurance company, as they are familiar with our type of business.

Do you mind sharing your promotional material? (Including your prices.)
No, people helped us, we would be happy to offer guidelines for others.

What do you dislike the most and like the most?
We dislike the need to make major changes this late in life. Vern worked all his life to get the fields drained and maximize crop production. Now, we're

changing back to wet fields! We did not like telling our neighbors that the farm is now a preserve and that they could no longer hunt on the property. Some of them had been hunting on our land since they were children. This was a very difficult period for all of us, but we are all still friends. The old family farmhouse has been changed from large roomy bedrooms that are now small and the closets are gone. It is also chopped up with lots of bathrooms. It was a time for us to change or sell the farm to someone and watch them change it.

We like sharing the farm we love and watching others enjoy it. We hear such nice complements, like "the magic of this farm," "this little paradise here," or "we'll be back and will tell our friends." It is very enjoyable meeting new people from around the country and the world. Every weekend is different; you get lots of practice remembering names. It is very nice to have the bills paid at the end of the month, and have extra left over to go out ourselves.

Would you start this alternative enterprise business today after learning what is involved? Yes.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises.
North American Game Bird Association, Pennsylvania Farm Stay Vacation Association, Western Pennsylvania B&B Association, Crawford County Tourist Promotion Association, and Oil Heritage Tourist Promotion Association.

What conservation and education activities do you have?
Educational activities include guided nature walks, guided bird watching and listening, fly fishing lessons, horse riding lessons, and instructional shooting. Conversation around the B&B breakfast table is often educational about farming and the oil history in the area. All of the hunters go through a safety instruction course before each hunt begins.

Conservation practices include 10 acres of highly erodible land in the Conservation Reserve Program tree plan since 1985. As part of the fishing and nature trails, we plan to use the hunting clubhouse as an educational center where we can show videos and discuss the wildlife on the farm. Every tree cut plan includes den and cavity trees to be preserved for the wildlife. The Wetland Reserve Program is used to develop the eleven areas in the preserve.

What do your customers like the most about your product or enterprise?
The B&B guests tell us they are coming to see the country, farming, and rural areas. They like the down home feeling, and many remember visiting their grandparents' farm. It brings happy memories to many.

The hunters comment on the quality of our guided hunts. Several have hunted across the nation from large estates to the wild. They compliment us on our farm being as close to an actual wild hunt as possible.

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to http://www.nrcs.usda.gov/technical/RESS/altenterprise

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October 2000

Alternative Farm Enterprises – Agritourism Success Stories

Pasture-Fed Broilers, Free-Range Eggs, and Veal

Interview with Lilly and David Smith, Springfield Farm, 16701 Yeoho Road, Sparks, MD 21152, 410-472-0738, dsmith0011@comcast.net

What is the history of your farm and farming experience?
This farm has been in our family since the early 1700's. It was originally part of a 5,000- to 10,000-acre farm granted by the King of England. My great grandfather was deeded this current farm (65 acres) in the mid-1800's. I grew up here. The farm has been leased since my Dad retired.

Describe the alternative enterprise in which you are presently engaged.
My wife Lilly and I raise pasture-fed chicken broilers using the Joel Salatin cage method. We also produce pastured free-range eggs and pink veal. We have a few ducks, geese, and a pair of peacocks for scenery.

What made you decide to go into the present alternative enterprise(s)?
I wanted to make this farm profitable again, and alternative enterprises are the only way this is possible. The farm is not big enough for us to make a living on corn, wheat and beans. We tried a vegetable garden the first year, about one-half acre. Everybody was doing that, and the work is very hard and time consuming. So I investigated and researched what small-scale enterprises were not being done in this area. Entrepreneurs had greenhouses, U-Pick, and forestry, etc. So I ended up with chickens and pink veal.

How did you make the transition?
I retired from the Army after a 23-year career and retired again after 13 more years in corporate America. In 1999, I started going to meetings and conferences, subscribed to magazines, went to on-farm workshops, researched the library and the Internet, visited other small farm entrepreneurs, and talked to a lot of neighbors and local farmers alike. We started with 75 layers, a few broilers, and four veal calves. Word of mouth sold the broilers and calves before they were ready for market. We were selling the eggs locally from the farm and through the Community Supported Agriculture (CSA) venture of a neighbor. Then we met a chef who wanted to buy eggs for his restaurant. By January 2000, we had four regular customers buying 200 dozen eggs a week and six more restaurants waiting until our new layers started producing. In 2000 we have 10 veal calves, 1,000 layers, and 225 broilers.

Describe your decisionmaking process.
We do not have a formal business plan. My industry experience was in planning, production, and marketing. As a result, the business plan is in our heads. The demand far exceeds the supply, so this has delayed formal planning. We are investigating other alternative enterprises.

How do you obtain financing?
We have been able to provide all of our own financing. If we don't have the money to buy something, we wait until we do.

What do you charge for your products?
We sell small eggs for $1.50 a dozen and large/jumbo eggs for $2.00, mostly to restaurants. We sell pastured chicken for $2.50 a pound and

pink veal for up to $9.60 a pound wrapped weight. We could charge more, but we are making a good profit.

What production methods do you use?
I went to the ACRES-sponsored Joel Salatin workshop in July 1999 to study his pasture-fed operations and marketing techniques. Joel advised that your labor requirement should not exceed 6 hours per day in order to leave adequate time for marketing, management, and other farm work. Our labor requirement for the livestock and poultry we have now is 28 hours per week.

What kind of modifications did you have to make at the farm?
We remodeled the farmhouse, built a caged house and brooder house, and added refrigerators and now recently a walk-in cooler.

What went wrong? and Why? How did you correct the situation?
The veal calves had diarrhea and pneumonia the first year (we lost one), and we had to nurse them back to health. After I discussed my problem with a local rotational grazing and seasonal grazing dairy farmer using the New Zealand method—feeding the calves with a nipple attached to a hose in a barrel. The barrel is seldom cleaned, which allows bacteria to develop and the calves to become naturally immune, thus eliminating the pneumonia. The feeding of milk through the sucking of the nipples generates salvia, which is a natural antacid for the calf, which eliminated the diarrhea.

What went right? and Why? How did you build on your success?
I selected the right enterprises, and they are growing by themselves at this time. Word of mouth has sold everything that we have been able to produce. We have a nursery, so as soon as a chicken gets sick it is taken to the infirmary.

What would you have done differently?
Nothing.

Where do you plan to go from here?
We have discussed these enterprises with our daughters. One said that her husband is considering early military separation to become a partner. Another daughter's husband is a doctor, and he is thinking about quitting and also becoming a partner. Our plan for the year 2001 is to have 1,500 layers, as many as 13,000 broilers, and 25 pink vealers. This should gross us over $250,000, which would yield a profit of over 50 percent. We plan to produce pastured chickens for restaurants on a 12-month basis. This means we will need freezers and equipment to properly prepare and store the chicken for the winter months. I am also in the process of getting the farm organically certified by Maryland.

What would be the five most important pieces of advice you would give other farmers considering an alternative enterprise?
1. Learn how to market, the most important aspect of success. No customers = no sales
2. Know your limitations
3. Balance financing and overhead with income
4. Limit yourself to 6 hours per day on production
5. Become an involved observer of your animals so you can immediately spot needed corrections

How did you handle the liability concern?
We have a standard farm rider on our homeowner's policy. By year's end, we will have a company policy as a part of our incorporation process.

Do you mind sharing your promotional material?
We send out a newsletter to our customers at the beginning of the year. I have visited some restaurants and given them a few dozen free eggs. Otherwise, we have a roadside sign and rely on word of mouth. We do supply eggs to our neighbor's 30-member CSA subscription customers for 25 weeks during the year.

What do you dislike the most and like the most?
We especially like being on the farm, working with the animals and telling visitors about our activities.

If there is anything we like least, it would probably be the time it takes to clean and grade the eggs.

What groups or organizations do you belong to, and what presentations have you made?
We joined the Pennsylvania Association for Sustainable Agriculture (PASA), The American Pastured Poultry Association, Chesapeake Association for Sustainable Agriculture-Future Harvest (CASA), and ACRES. We order "Small Farm Today" in additional to the organization publications. I will be speaking at the Future Harvest workshop in January 2001.

What conservation and education activities do you have on the farm?
We overseeded a 15-acre pasture with a no-till drill that we rented from the Soil and Water Conservation District. I am in the process of getting the farm organically certified by Maryland and working with the USDA-FSA and NRCS to improve the pond and creek and better understand the soil characteristics of the farm.

Are you willing to share your information?
Yes!

Do you want additional information? For more success stories and other information, see the website:

http://www.nrcs.usda.gov/technical/RESS/altenterprise

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September 2001

Alternative Farm Enterprises – Agritourism Success Stories

Fruits and Vegetables/ Farmers' Markets

Interview with Francisco Resendiz, 4342 Geer Road, Hughson, California 95326, Telephone 209-883-0100

What is the history of your farm and farming experience?

My parents traveled from Mexico to California each year to work in the fields. They would return home in the fall so the children could go to school. I was 13 years old when my parents made their first trip, and I also worked in the fields. My plan was to go to college and get a job in Mexico, as I did not like the United States. But I was the oldest and had to work to help support the family.

At 15, I started working full-time on a 350-acre almond and peach ranch. I would return to Mexico during the winter for visits, and I still wanted to get a job and live there. At 21, I set a 5-year goal to be a farm manager and save enough money to buy a piece of land. In a year and a half, the owner made me the manager. I made all the production decisions for the ranch. At 23, I started attending conferences and seminars on agriculture, which gave me confidence about farming. I also set a goal that I needed to change my attitude about agriculture and the United States. Then, everything became positive. I learned to read and write English, but speaking was very difficult to learn as we always spoke Spanish at home and in the fields. I worked there as an employee for 10 years and as the manager for 20 more years. My wife and I purchased our 33-acre farm in 1987.

Describe the alternative enterprises in which you are presently engaged.

The Resendiz family owns 53 acres and rents 50 acres for the production of fruits and vegetables. My wife Gregoria, son Diego, daughter Diana, youngest son Frankie, and I operate the ranch with the assistance of 35 employees. We grow four cherry, six apricot, four apple, four grape, ten plum, and seven pluot varieties, and about 70 varieties of peaches and nectarines. We also raise tomatoes, squash, peppers, melons, okra, eggplant, strawberries, onions, and cucumbers.

We sell our produce at the ranch—The Resendiz Family Fruit Barn—and at 25 farmers' markets each week in the San Francisco Bay Area (120 miles away). The Fruit Barn also houses our offices and a commercial bakery. We bake fresh fruit pies made from scratch, bread, scones, cookies, turnovers, and apple dumplings. We use six greenhouses to produce vine-ripened tomatoes (about 20 lbs. per plant). I am building a 3-acre farm park to show adults and especially children how their food is grown. We will demonstrate how local vegetables, trees, and landscape nursery crops are grown. How irrigation is used. We will also have a working miniature feed mill. The park has a large pond for fish and a pet farm.

What made you decide to go into the present alternative enterprise?

We purchased the farm with the idea of growing fruits and vegetables for the direct sales market. I planted 15 acres for fresh fruit sales and some vegetables. (The main purpose of growing the vegetables was to keep my children busy. My father always made sure that his children were busy and out of trouble. I followed in his footsteps.) I set up the roadside stand as a means of selling the fruit and vegetable produce. My 5-year old son, Diego,

had to be at the stand with my wife to understand and translate customer requests. It was fun for the children and successful. In 1987, our first year, we sold about $36,000 worth of vegetables and fruits. This has grown to over $700,000 with the associated products and services.

How did you make the transition?
I managed both ranches for 11 years. I supervised 50-60 employees at the 350-acre ranch and 3-4 employees at my ranch. An 18-hour day was common, especially during the growing season. We outgrew the small roadside stand in a couple of years and expanded on a temporary basis. In 1994, we built the 3,500-square-foot Fruit Barn. It is a hip roof styled barn that is very cheerful, open, and customer friendly. In 1999, I quit my job and applied all of my production, marketing, and management skills to our ranch. We continued to expand our farmers' markets and roadside stand sales.

It was difficult to obtain all the permits and approvals for the Fruit Barn. The County Commissioners turned down our first request. But after a little explanation, we received our permit. It was also difficult to obtain the health certificates and clearances since we are located in the country. This process took more than 6 months.

What was your decisionmaking process?
I attended several seminars and workshops. I wanted to do something new and different that was not discussed at the marketing conferences. Everybody was selling vegetables and crafts, but no one was heavily into the fruit business. So I decided to build my business around a fruit stand.

Describe your business planning/goal setting.
We did not have a formal business plan when we began in 1987. I started with the idea of having a garden and some fruit trees to keep my children busy. This grew into the roadside stand and the farmers' market business. We still don't have a formal marketing plan. We stop and look at what we are doing and what types of new ideas we need to develop and implement. We test new ideas and move ahead with the good ones.

How did you acquire information?
I attended several seminars and marketing conferences in California and the West. I heard farmers and ranchers speak about their businesses. Most of these were pumpkin and apple businesses, and some were very large.

How did you obtain your production information?
The ranch owner taught me a substantial amount when I was working on his ranch. I went to many conferences and seminars on production practices for peaches and almonds. I read publications, books, and magazines about fruit production.

How did you obtain financing?
We saved our money for 6 years. It took us quite a while to understand the land real estate market, finances, and the loan system. When it came time, I went to the Federal Land Bank for a loan. Since then, we have mainly used our own finances to make improvements on the ranch.

How did you market your products?
We started by being very local—with our friends, support group, and people who just drove by our roadside stand. We started advertising in the local newspapers. This is very costly, and the response is not very great, but it is necessary when starting a new business. We have a $10,000 advertising budget today, but we don't spend it on newspaper ads. We have been holding a "Festival of Thanks" every October since we built the Fruit Barn in 1994. The Fruit Barn, 3-acre park, and the festival are designed to entertain adults and kids.

The festival began slowly and reached close to 10,000 people in October 2001. Everything is free—hay rides, horse rides, games, 1,500-bale hay maze, free gifts, music, and fruit. We also have crafters, police cars, a fire truck, and an ambulance for the kids. We have a pumpkin patch where kids can pick pumpkins. We also show them how their food is produced.

School tours come constantly. The tours started with 300 children in 1994, and in 2000 we had 4,800 students. We charge them $2.50 apiece and they get a one-hour tour, and a bag of goodies

(pencil, coloring book, apple, cinnamon crisp, and a pumpkin). We also have them plant crops such as broccoli that we harvest and deliver to the school for the students to take home.

Our goal is more than just numbers and dollars. We want our customers to be happy—happy so they go tell a friend. We want a balance between our customers and ourselves that results in a friendly relationship. We look at it as our social responsibility. We give all of our leftover bakery items, fruits, and vegetables to the local Salvation Army every day.

A very important part of marketing is a name. We started as the Resendiz Farm Market, but we found it was difficult for people to pronounce our name. Also, my family and I realized what it means to use your name on a business. It is such a responsibility to represent that name properly at all times. People need to consider this when selecting a name. We are proud of our name but needed something more unique, so we call our business The Resendiz Family Fruit Barn. The public calls it the Fruit Barn. It is a good marketing trademark that stands for freshness, quality, and service.

There are now five similar businesses in the Modesto, California, area, which has a population of about 500,000.

How do you price your products?
We arrive at a price that is fair to our customers and ourselves. Our fruit is fresher, high quality, fruits are sweeter and vegetables more sound. My production management practices are designed to bring out the sweetness of the product. Our 9-inch pies are $9.50, bread is $3.95 per 1.5 pound loaf, apple dumplings are $3.00, and turnovers are $2.25. We also sell scones for $1.00 and cookies for $1.00.

What went wrong? and Why? How did you correct the situation?
We made a few mistakes. First, I over-planted watermelons—5 acres was just too much. I tried new varieties—like yellow watermelon. They tasted great, but they had to be red for people to buy them. I had difficulty learning how to prune all the new varieties correctly. Some years I had more fruit than we could sell, but there was not sufficient time to wholesale the produce. I tried tomatoes of different sizes and shapes. It did not work as I planned because the customers wanted red, round tomatoes. Today, the market has changed, and there is a niche for these tomatoes. I tried to use hormones to reduce the spray requirements. The idea was good but sound research was lacking. It was too risky and I lost money for a few years. Today I use about half hormones and half spray on the fruit crops.

What went right? and Why? How did you build on your success?
When I became manager of the ranch, I treated it as if it were my own. My accomplishments in management grew. It was educational, and it prepared me for buying and managing my own ranch. I was able to build a considerable level of confidence in my ability to manage a ranch, and I was not afraid of trying ideas and making them successes. Our Fruit Barn has become known in the community, and the people understand what we are trying to do. So they are very supportive of the business. They would drive out of their way to purchase our products. Now, we give back to the community through our Festival of Thanks.

What would you have done differently?
Basically, I would not have done anything differently. One always has to develop new ideas in a competitive business of this type. This places a considerable amount of stress on you and the family. These new or unique ideas and products are needed to continue to build your business. However, they can also be the cause for failure if not implemented or managed correctly.

Where do you plan to go from here?
We need the next few years to get better at what we are doing. The business has grown very fast. We need to make changes to make it better. I want my children to receive that all-important college degree and then decide what they want to do. I want to grow fun! I have a responsibility to help my community to grow, which will require more of my

time. My dream is to have a special place for children to learn about agriculture.

What would be the most important advice you would give other farmers considering an alternative enterprise?

1. The business/enterprise must come from the heart.
2. You must be yourself in your business and not copy somebody else.
3. You must be committed to the enterprise.
4. You must be willing to serve the public.
5. You must have and maintain a quality product and/or service.
6. You need to maintain a community/business balance. You must develop a relationship with the community. The business cannot be focused only on making money. You must return something to the community. The community needs to understand and appreciate what you are doing as a farmer.

How did you handle the liability concern?
I have a $3 million umbrella policy with my farm insurance company.

What do you dislike the most and like the most?
I find working with and serving the people the most enjoyable part of the business—especially working with the children. We have 400-500 children on this ranch at one time many times during the year.

I dislike the uncertainty that weather has on food production. People just do not understand how weather affects the quality and types of food they see at the farmers' market.

Would you start this alternative enterprise business today after learning what is involved?
Yes.

What groups/organizations/activities have you joined?
I have not joined any groups associated with my farming or marketing activities. I have made presentations at seminars and to schoolchildren about agriculture.

What conservation and education activities do you have?
I have been involved in conservation activities since the first year. I have tried many different hormones and used minimal pesticide application management techniques such as Integrated Pest Management. We plant cover crops to attract beneficial insects and use irrigation water efficiency technology. I am very much into educating the public about agriculture and how their food is produced. My agricultural park is my main education activity, but I hope to interest neighbors in building upon my actions to teach people about agriculture.

What did your customers like the most about your product and services?
They enjoy seeing the Resendiz family and employees working as a team. They appreciate seeing who we are and what we are. They see us as producers of quality, flavorful fresh fruit and vegetables. They also appreciate our honesty and our policy of bring it back if you don't like it.

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to www.nrcs.usda.gov/technical/RESS/altenterprise

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Natural Resources Conservation Service

Resource Economics and Social Sciences Division

October 2000

Alternative Farm Enterprises – Agritourism Success Stories

Direct Marketing of Dairy Products

Interview with William W. Lesher, Way-Har Farms, P.O. Box 325, Bernville, PA 19506, 610-488-1281, fax 610-488-9308, lolly@early.com

What is the history of your farm and farming experience?
The farm has been in the family for three generations. My father and uncle were diversified farmers, but dairy (about 70 cows) and crops (1,000 acres of corn and wheat) were the dominant enterprises. Their focus was crop production. We own 265 acres and rent 100.

Describe the alternative enterprise in which you are presently engaged.
The business really got started in 1970 when my father and uncle installed a bottling unit to open an on-farm retail store. They increased the herd to 95 milking cows. Today, we have four Jerseys and 91 Holsteins.

Our business is direct marketing of milk (chocolate and strawberry) and ice cream—40 flavors at an on-farm retail store and at four farmers' markets. Two of these markets are indoors and open year-round, and two are open from May to October. We have a small delivery route of 15 customers to whom we deliver once a week. We also have had a wholesale business since 1987; we deliver twice a week to 25 or 30 restaurants. In 1997, we added a mobile ice cream and milk store.

We also started farm visits in the 90s.

What made you decide to go into the present alternative enterprise(s)?
My father and uncle wanted to increase their income. Crop production could not easily be expanded. Thus, a higher price for the milk was the only alternative. There was a location advantage, as they lived on a very heavily traveled two-lane highway. Then, the papers advertised that farmers' markets were being opened and needed vendors, and we started that in the 90s. The mobile ice cream and milk store grew out of people asking for ice cream for special occasions. In 1997, we bought a covered trailer to which we added two sales windows, a freezer, a refrigerator, cabinets, a sink, and storage at a cost of $4,000.

About 1,000 children come to the farm each year, mostly from Reading, which is 25 miles away. We take the groups on a 2-hour tour of the farm and give a talk on milk production and the care of animals. There is a picnic area where the children can eat lunch. We charge $3 per person for groups, and the children get ice cream and a mug.

We also rent out the mobile unit to non-profit groups, who use it as a fundraiser. The only condition is that they have to buy the ice cream and supplies from us. This builds relationships and is great advertising.

How did you make the transition?
The milk-processing firm that bought the milk this farm produced was a small one. When it went out of business in 1970, my father and uncle decided to sell directly to the consumer. They began marketing the ice cream and milk at the farm. They joined the Pennsylvania Producer Handlers Association to learn about direct marketing. I majored in dairy

science at Penn State, and when I graduated in 1987 I bought my uncle's share of the business.

Financing is very difficult for a farmer who wants to do direct marketing. We developed a business plan and pulled together all the farm records before discussing a loan with the banker. We had to educate the banker about the retailing business. Now, that banker is one of our biggest supporters.

What are your goals for the operation?
We want to keep this a family operation of high quality. We're proud of the products, the farm, and the animals. The health and treatment of the animals are a high priority for us. The cows are our pride!

What went wrong? And why? How did you correct the situation?
Direct marketing is becoming more difficult. In 1970, there were 350 direct marketing dairies in Pennsylvania, and today there are 30. They've sold out to the big milk producers. The change in retailing where stores sell everything from clothes to food and milk has been a factor. Also, the gas-station stores are competitors. Many families want to do one-stop shopping. They don't have the time to drive out of their way to get milk and ice cream directly from the farmer. Our steadiest customers are price conscious people such as the Mennonites in the area.

Finding employees for an acceptable salary has really become a challenge. We hire high school and college students to help us. There are plenty of other things around the farm I'd rather do than address employee concerns.

What went right? And Why? How did you build on your success?
I enjoy the retail side. I like to meet my customers and see the satisfaction they get from eating a great, high-quality product.

We also have a good location. We're on a main road leading into Reading. When mining stopped in the county up the road, the people there had to go to Reading for work and shopping, and we get most of our sales from this traffic.

The rule of thumb is that you need a dollar in gross income for every dollar in assets to be profitable. The dairy operation does that, as we sell about $1 million in products every year. The mobile ice cream and milk store does more than three times its cost/value of $4,000, so we push it as much as possible. Saturdays and Sundays are our busy days, and we use it to our advantage.

Are there any other insights you would like to share?
There is a considerable amount of work with this effort or any direct marketing enterprise. The quality of farm life and style offsets the hard work. We take two vacations every year to spend some time together. Not having an adequate amount of family time together is probably the most difficult thing to accept. This could only change if hired labor increased— which has its associated problems and issues.

Where do you plan to go from here?
We plan to keep this a family business. We're trying to minimize the labor requirement through automation and maintain a good environment for the cows. One person can now milk, feed, and graze cows each day. My wife did it this morning. Our only part-time help are in the bottling plant and staffing the mobile store. We hope to bring our children into the business as soon as they're old enough.

We've reduced purchased inputs by going to more rotational grazing. The heifers have always been on rotational grazing. Now, we've placed the cows on 65 acres of rotational pasture. We've installed four watering troughs and broken the large field into 2-acre paddocks. The grazing provides half of the daily feed requirement, and the other half is concentrate feed.
Because we're in the Delaware Bay watershed, we're environmentally conscious. We used NRCS

technical assistance and cost sharing to install buffers and waterers, which will be completed next year. We used to water the heifers on the creek, but now we have two watering troughs, and we restored the buffer area with cost share.

What would be the most important advice you would give other farmers considering an alternative enterprise?

1. Have a high-quality product.
2. Be prepared to work hard and long hours with direct marketing.
3. Maintain a good environment for the livestock.
4. Don't get too large.
5. Minimize labor requirements.
6. Build only as fast as income allows—pay as you go.

How did you handle the liability concern?
We purchased insurance from a local ag company called Old Guard—a $500,000 farm policy and a $2 million umbrella. This was required when we expanded to USDA farmers' market in Washington, D.C. We had no problem getting insurance.

Do you mind sharing your promotional ideas?
We had a very successful promotion in which we joined with a trucking company, a nursing home, and a furniture store and gave away free ice cream to everyone who purchased a ticket to get into a car race. On en ongoing basis, we advertise in two local weekly papers and on radio. Our strategy is to advertise very frequently for 3 weeks and then stop for 2 months. This seems to work best for us.

We no longer use specials. We price our milk at $1.99 a gallon, compared to store prices of $2.40 to $2.75. Our ice cream and other products are competitively priced.

What do you dislike and like the most?
I dislike the lack of time to spend with the family. Both my wife and I are very busy. I like working with the cattle and the people I meet while selling ice cream and milk.

Would you start this alternative enterprise today after learning what you know about direct marketing dairy products?
Yes!

What groups or organizations have you joined?
Along with some other young farmers, I have joined our city planning commission. Our presence helps ensure that farmers' concerns get heard and that our county retains its rural character.

Are you willing to share your information?
Yes!

Do you want additional information? For more success stories and other information, see the website:

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July 2001

Alternative Farm Enterprises – Agritourism Success Stories

Greenhouse Bedding Plants, Welded Sculptures, Wetland Restoration, Hunting and Beef Cattle

Interview with Jeff and Lisa Weber, 11577 157th Avenue, Bloomer, Wisconsin 54724, Tel. 715-568-2569

What is the history of your farm and farming experience?

We live in Chippewa County, Wisconsin, with our children, April, Adam, and Andy. We purchased our 200-acre dairy/woodland farm in 1979 and rented another 100 acres for corn and small grain production. We milked 35-45 cows and sold Grade A milk until 1996, when I had spinal surgery after a farm accident. We replaced the dairy herd with 35 beef cattle, while I pursued my hobby of welding art, and Lisa started to work off the farm to offset the loss of income from the dairy cows and to provide health insurance benefits.

Describe the alternative enterprises in which you are presently engaged.

I have three different enterprises other than the beef cows. (1) I have long enjoyed welding as a hobby. I would take old machinery parts and rearrange them into horse heads, sheep, cows, dinosaurs, birds, flowers, etc. After my surgery, I began to focus on welding art as a source of income. After an article appeared in the local paper in April 2001, I received calls for two pieces I had made and shipped the product to very happy customers. (2) In 2000, I began operating a greenhouse to produce bedding plants—annuals, vegetables, and perennials. (3) I am also restoring 40 acres of wetlands, using the Wetlands Reserve Program, with plans to open it to hunting for the disabled.

What made you decide to go into the present alternative enterprises?

After my surgery, AgrAbility of Wisconsin worked with me to care for my dairy herd. This program, an Easter Seals and University of Wisconsin Extension partnership program, assists injured farmers. I took job evaluation tests and found out that I was best suited for what I was doing: Working outdoors and being my own manager. I enjoyed growing plants and came up with the idea of purchasing a greenhouse. There are several greenhouses in our area.

How did you make the transition?

My welding art has not been progressing as fast as I would like, because I ran out of parts. Most of my art was based on hay rake wheels and other used farm equipment. So, I transitioned into using new metal, purchased a circular framer, and made the same art but with new metal. In my earlier years, I had gone to a technical school and learned a little about welding. The arc welder and wire feed welding with argon gas produce very fine welded work. I even autograph each piece. Welding has mostly been a self-taught process.

I purchased a greenhouse and its entire fixtures, stocks, and supplies for a very good price in 1999. I found out I lacked a lot of knowledge, so AgrAbility of Wisconsin paid for my Garden Masters schooling, which was much better than purchasing automated equipment to keep me in dairy.

In the spring of 2000, I put in my bedding plants and began the greenhouse enterprise. I had everything I needed, so no additional purchases were necessary. When it came time to sell, I ran ads in the paper and put up signs.

What is your decisionmaking process

I don't have a formal decisionmaking process. I do only what I have money for because I will not mortgage my farm. I have found that starting small and building is the best way. You learn from your customers, neighbors, and friends. I know I want to continue to grow my horticulture and welding art businesses. I am going to develop the wetlands preserve. As time permits, I will promote these enterprises after I have set aside family time. I need to move forward slowly because I don't know what the next day brings as a result of my spinal surgery.

How do you go about business planning and goal setting?

My business plan is informal and evolving. For example, people drove past my place to buy bedding plants and other horticultural crops at greenhouses on both sides of me. I just said, 'I can get some of that business,' so I changed my signage to attract more people.

My first year was very successful because I had paid for my first greenhouse, so I purchased a second one in 2000. I also planted pumpkins and sold them to a major greenhouse marketer about 20 miles from me. In 2001, I needed backup for bedding plants if my sales exceeded my supply. I found this source and purchased plants as I needed them. I keep my costs to a minimum with no hired labor and use basic production systems. I did the welding art as a hobby, and now, I am finding out people are waiting for this type of product. I will search out the markets and determine the best place to market my art. I don't have a lot of time for travel, as my beef cows take daily care.

How did you acquire information.

I started by going to a formal class of Garden Masters given by the Extension Service. In fact, I ended up teaching a couple of classes. I gained a tremendous amount of knowledge from all of the participants. This course really helped build up my confidence in greenhouse operation. I read many magazines and talked to a friend with greenhouses to develop a network. I went to seminars, distributors' meetings, and buying shows, seeking information and a network. I would go and ask them some very detailed management questions. They were very generous with their information. This is what rural America is all about—helping each other. I became a close friend with one of the local greenhouse owners, who is a mentor to me. I gave him straw because he was so generous with his information. Now, we partner in starting and raising plants. I will raise one kind and he another, and we purchase from each other.

How did you market your products?

This is the most difficult area to carry out. I placed ads in papers and found them essentially useless. Road signs and word of mouth are the best. I deliver personal service and relationships. Many of my customers are elderly, so I go the extra mile to help them. I will bring plants out to the car for them to make their choices, and I make special walkways for them. I am going to expand my plant variety and enlarge the price signs so the seniors can readily read them. One greenhouse is handicap accessible. People like to bargain and so do I, so I give quantity discounts, bargain for prices, and give away free plants to kids. If I have extra or slow-moving varieties, I give them to adults. I place the sun-loving plants in one area and shade-loving plants in another area of the greenhouse. Customers have really commented on this helpful feature. I have purchased colorful posters of the bedding plants I sell so the customers can see how they look when grown. This has helped sell many plants in 2001. I sell quality products. Last week, I would not sell some plants because they had white flies on them. My goal is to make people feel good, build my return customer base, make money, and sell my plants.

How do you price your products?

I visit neighboring greenhouses and set my price at or a little below theirs. I also gave away free plants, which draws a number of visitors.

What went wrong? How did you correct the situation?
I did not check out all the requirements for signage. I found out that I needed state and county approval. It was time consuming to obtain approval from landowners to put up signs on their property. Also, the state and county required fees, and I had to lease the space on the privately owned land. Now, I have agreements in place with the appropriate governments and landowners for 2002 and beyond.

I was not prepared for all the questions my customers would ask me about flowers and vegetables. Some of them have no idea as what to buy. I have done more reading and learned from those who are knowledgeable gardeners. I search out answers to questions I cannot answer.

What went right? How did you build on your success?
Several things went right for me. The road signs worked great to pull the people off the road and shop at my greenhouses. My personal service, and one-on-one discussions, and pricing have grown my business through word of mouth. I price according to what people will bargain for, and I give quantity discounts and free plants.

I work with other greenhouse operators to exchange information and products. For example, I market all my pumpkins to a large greenhouse operator. Last year, he saw my pumpkins and paid me more than we had agreed upon. Now, I grow his varieties, and we are both happier. I help people plan their perennial and annual gardens—one time I drew out the customer's garden in the gravel and placed the perennial plants in the appropriate locations. She was very appreciative. I started small and my business is growing with me in control. I now have ten tomato varieties, six peppers, two cucumbers, two squash, a dozen herbs, and about 75 perennials.

My welding art is just waiting for my attention to promote the business.

What would you have done differently?
I would have planned further ahead in developing the signage. My prices and plant labels need to be in front of the customer. Each plant needs a label and a price. Everything about the plants and prices needs to be more visible. I have found that end-of-season shoppers get upset when all the plants are not top quality. I need to impress upon my customers that you need to shop early to get the best quality.

Where do you plan to go from here?
I am going to expand my welding art during the winter by marketing more vigorously. I am going to make one-of-a-kind decorative plant holders to accommodate the plants I sell. I am going to use one greenhouse for perennials and one for annual flowers, and I will construct a small plastic hoop house for the vegetable bedding plants. I have set aside one-third of my shop for starting annuals and perennials. I am going to expand outside the greenhouse by growing perennials, shrubs, and trees by buying small bare-root plants for about $1.60, pot the plants, and then 2 years later sell them for $7-15.00. I am also increasing my pumpkins to 2,000 plants. I want to reduce my cattle numbers and switch over to marketing grass-fed beef, as whole-cow hamburger, to my customers. The plant holders and grass-fed beef will attract a new group of consumers.

I am going to investigate the possibility of turning the top of the barn into an antique consignment store. This would lengthen my business season and open up other opportunities. I am going to expand my hot water heating system that now heats my house, shop, and greenhouses to the top of the barn. I burn wood from all sources. (I call it recycle wood that other people throw away.) I am going to make the wetlands handicap accessible by building a couple of platforms with ready access for waterfowl hunting.

What would be the most important advice you would give other farmers considering an alternative enterprise?

1. Keep your place clean and neat.
2. Make sure your premises are safe.

3. Research every step of production, marketing, signage, etc.
4. Make sure your new enterprise is what you want to do.
5. If you sell to people, you have to like working with people, the good and the not so good.
6. You have to be willing to be open seven days a week for 12 hours a day during the selling season.

How did you handle the liability concern?
I am a small producer and thus, my farm insurance is adequate. I have a Farm Insurance Liability Plan.

What do you dislike the most and like the most?
It is the people. I like sharing information, helping others, making deals with people, learning from others, and working with people of all ages. I dislike people who do not understand the business and then make derogatory statements because they are not informed.

Would you start this alternative enterprise business today after learning what is involved?
Yes, but I would have started sooner. I would have invested some of my money into the greenhouses rather than farm equipment. It would have been a wiser use of my money.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?

I joined the Master Gardeners Program. We meet several times a year in a workshop format to learn and share about greenhouse production and gardening.

What conservation and education activities do you have?
I have been involved in conservation and resource restoration for years. I have built ponds over the years with assistance from Fish and Wildlife Services, the Wisconsin Department of Natural Resources, and the Natural Resources Conservation Service. I am now working with NRCS and DNR to restore 40 acres of wetlands for hunting for neighbors, friends, and myself. I also have a barnyard diversion, grass waterways, and contour strips on the land. My education effort is sharing knowledge with my customers on a one-on-one basis. I am planning to work with children in the area of art as others are working with gardening.

What do your customers like the most about your product?
My customers like it when they know I planted the seeds and I grew the plants, and now I am selling the plants. Some people cannot believe I do all of it. My customers also like my special assistance such as landscape advice and variety selection. They also like my unique welded art.

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United States Department of Agriculture

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Resource Economics and Social Sciences Division

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Cherry Tree Farms—Grass-Fed Beef, Goats, Sheep, Chickens, and Honey

Interview with Doyle Freeman, 478 Juniper Road, Cherry Tree, PA 15724, 814-743-6589, ctfarms@helicon.net

What is the history of your farm and farming experience?

I grew up in South Dakota and spent summers on my uncle's cash grain and beef farm. It was great fun and a wonderful learning experience. The farming seed was planted in my blood, and I wanted to be a full-time farmer ever since. I went on to complete a degree in computer science at Pennsylvania State University and ended up being a building trade construction engineer foreman in Pennsylvania. However, I took every opportunity to satisfy my need to farm by living in a rural area and helping local farmers. A beekeeping friend asked me to help him manage his hives in 1990, and he became my mentor. This was the push I needed to rent a farm and become a part-time farmer with several enterprises—beekeeping, beef, and goats.

What are your present alternative enterprises?

I rent 350 acres and own 87 acres, mostly pasture and hayland. I sell hay and manage 70 head of beef, 35 meat goat/kid pairs, 160 ewe/lamb pairs, 200 grass-fed meat chickens, some hogs, and 37 beehives on three different farms. I practice rotational grazing for the livestock, managing for maximum forage output with minimum inputs. I keep all the animals together and move them from one field to another as pasture conditions dictate. Honey is my primary enterprise.

How did you make the transition?

In 1996, I rented 54 acres and started my animal enterprises in addition to the bees. In 1998, the construction company downsized, which left me without a job, so I started farming full time and added sheep to the enterprises. But the farm I was renting was sold for development, so I began the long search for an affordable farm. I looked at 181 farms before I found one that was affordable and would pencil out a profit for me. This 87-acre farm had had no care or management for 28 years. The buildings and land were in poor condition, but it was all I could afford. I enjoy the animals, the outdoors and working for myself. A farm is a great place to raise my son. Life is getting better every day as my son and I improve the farmstead buildings, update our equipment, and improve the productive capacity of the farm. We are slowly making it *our* farm through these improvements. We are covering our costs with enough left over for family expenses.

What is your decisionmaking process?

I discuss my business decisions with my son. He has a vested interest in these decisions if he decides to take over later. I make my changes based upon changes and growth in the marketplace for my products. One needs to move slowly in developing a direct marketing enterprise. You cannot afford to make a costly mistake in a "learn as you go" business. We address production and marketing problem areas from the perspective of time and dollars. I minimize my expenses by operating with

old farm equipment ranging from a 1928 John Deere #5 mower to my newest piece of equipment, a 1965 Oliver tractor. These will be replaced as profits permit us to do so. My decision criteria are that each enterprise and the farm as a whole have to show a positive cash flow or I don't do it. I keep a record of every single expense so I can determine if an enterprise is profitable.

Do you have a business plan?
I do not have a formal business plan. My livestock production plan is to maintain a debt-free breeding herd. I want to keep improving the herd by buying replacements, especially the males to improve the beef, goat, and sheep herds. This is done on an "afford as you go" basis. I want to improve my haying operation so we have enough wagons for a complete day of haying.

How did you acquire information?
I subscribed to the Lancaster Farming Journal, helped my neighbors, attended conferences, read association newsletters, and networked. These are still my major sources of information.

How do you market your product?
Today, I market my products through the Penn's Corner Famers' Alliance and to my friends, neighbors, and other local customers who hear about my products. I do not advertise. All publicity is word of mouth. The products have that special pasture-fed taste and are low in fat. It is what the public is looking for. The product sells itself. When I first farmed and worked full time, all my products were sold at the auction barns. Now, I never use this method of sale.

How do you price your products?
For the meat products, I check the local supermarket retail prices. Then, I work backward using percentages and other information to determine the price for hanging carcasses. Then, I check these prices against those of area purveyors. I also keep detailed records of my costs of production by enterprise. I use this cost information to determine the price that is profitable for me. My local beef customers buy a quarter or half which is priced about five percent above the local purveyor price. I also sell by the cut. I charge about three percent more for my retail cuts than the local grocery store. I sell mainly frozen ground beef and pot roasts, as the restaurants take all the top quality cuts. I sell my sheep, lamb, and hogs in a similar manner. My chickens sell for about $2.75 per pound, and I can't produce enough of them.

For honey, I charge the restaurant $1.80 per 12-oz.bear squeeze bottle, and the farmer's market price is $2.00. The package/label cost is 10 cents per bottle. I do not sell honey at the wholesale price of 43 cents per 12-oz. bottle, because that does not cover my cost of production.

What went wrong? How did you correct the situation?
The beehives at my new farm in Cherry Tree had a parasitic mite problem that I did not have at the rented farm. This is plaguing the whole bee industry today. I began analyzing the differences in my production practices at the old and new farms. I took each step of the production process and broke it apart, and that is when I discovered that the herb spearmint was not growing on the new farm. I planted the spearmint, which drastically reduced the mite population. I also dispersed the beehives to minimize the impact of a bear attack on honey production.

My bull gored me in 2000, which made it impossible for me to work for about three months. This placed an enormous responsibility on my 11-year-old son. However, he became very adept at driving the tractor and operating other farm equipment. This experience resulted in him participating in the 2001 statewide 4-H tractor driving competition where he placed third as a 12-year old among 18-year old competitors. This responsibility has also taught him how important it is to manage your livestock and poultry in a sound and environmentally friendly way.

What went right? And why? How did you build on your success?
The pastures were weedy at the new farm. I wanted to operate a grass-based livestock operation with minimal input, so I began mowing the weeds. The grass soon recovered and the red clover reseeded itself. Today, I have a very nice mix of grasses and red clover including some orchard grass. I fenced my pastures into permanent paddocks for rotational grazing as well as fencing the livestock out of the creeks to control erosion and limit livestock access for drinking water purposes. I knew this rotational grazing would work because I grazed six horses, 16 sheep, and four beef cows on 8.5 acres at my first farm with this practice. It surprised all the neighbors.

What would you have done differently?
There is really no glaring point that appears. I am very happy with the quality of life that comes from living on the farm. It would have been difficult to continue the stressed life of a construction foreman. It is very difficult to measure success, there are so many monetary, nonmonetary, and social factors to weigh. I am very satisfied!

Where do you plan to go from here?
I plan to grow this farm with my son. I think we will top out at about 60 beehives, 200 ewe/lamb pairs, 100 beef, 50 goat/kid pairs, and 200 chickens per cycle.

What would be the most important advice you would give other farmers considering an alternative enterprise?
1. Consistently deliver quality products on schedule.
2. Marketing through a group is superior to doing it as an individual.
3. Marketing directly to the consumer increases your share of the consumer dollar because today's farmer receives only about 20 percent of the retail dollar through the current marketing system.
4. Know your costs. Keep track of your inventory and accounting costs by enterprise.
5. Chefs appreciate suggestions and ideas, but don't tell them how to do their job. Listen to them and produce the goods the way they use them.

How did you handle the liability concern?
I have a $1-million-per-occurrence policy and a $2.5 million umbrella policy. I purchased it from my local agent for about $375 a year.

What kind of promotion material do you use?
Except for business cards, I don't have material other than what I do for the Alliance. The Alliance publishes a quarterly newsletter for its customers, members, and friends. I prepare a list of products and prices each week and e-mail them to chefs. I use these for my customers who come to the farm, but the farmers' market prices are slightly higher.

What do you dislike the most and like the most?
I dislike the frustration of an expected sale not occurring. Also, it is difficult working with some farmers because they need to be in charge of everything they are involved in and want every decision cleared with them, like some of the Alliance marketing decisions. On the other hand, I like working with people, working together and forming an organization. I like helping other farmers and myself increase our income through different marketing opportunities. I dislike big business trying to undercut and drive us from the marketplace using tactics such as selling lettuce-mix at $2.50 per pound when the general market and we were selling at $7.50 per pound in January.

Would you start this alternative enterprise business today after learning what is involved?
Yes, this lifestyle is much less stressful.

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
I belong to and am active in local and state beekeeping associations, I am a member of the Pennsylvania Association of Sustainable Agriculture, and I am a board member of the

Northeast Federation of Family Cooperatives, and I participate in the "Farm Link" program.

What conservation and education activities do you have?
I use several conservation practices on my farm. I use rotational grazing and other best management grazing practices to eliminate the use of commercial fertilizers and pesticides; I am becoming an Organic Crop Improvement Association certified organic grower; I fence my livestock out of the stream and provide controlled stream access for drinking; and I have established a cattail bed down stream so water quality is improved before leaving my property. Water quality is a concern of all county residents because of the numerous abandoned mines we have in the area. I have been working with the Natural Resources Conservation Service on improving stream crossings. My education activities range from writing articles for national beekeeping magazines; speaking to agricultural, non-agricultural, and children groups; to testifying on the National Organic Standards hearings.

What do your customers like the most about your products or enterprises?
The most frequent comments I hear are that our products are fresh, good, and tasty; that we use no hormones or pesticides; and that our products provide nontherapeutic antibodies.

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to www.nrcs.usda.gov/technical/RESS/altenterprise

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USDA NRCS **Alternative Farm Enterprises – Agritourism Success Stories**

United States Department of Agriculture

Natural Resources Conservation Service

Resource Economics and Social Sciences Division

November 2001

Penn's Corner Farmers' Alliance—Farmer to Chef, Food Stores, Food Bank Marketing

Interview with Doyle Freeman, Manager, 478 Juniper road, Cherry Tree, PA 15724, 814-743-6589, ctfarms@helicon.net

How did the Alliance get started?

The Alliance officially started as a marketing group in 1999. All of the members had been selling direct at farmers' markets; to neighbors, friends, and restaurants; and through Community Supported Agriculture. Here's the background:

In 1997, the Pennsylvania Association for Sustainable Agriculture (PASA) surveyed farmers around Pittsburgh to see if they wanted to be listed in a publication promoting their products. PASA also surveyed Pittsburgh-area chefs to see what local products they wanted to purchase.

A number of us attended a December 1998 PASA meeting on developing a "Regional Market House." This was a good long-range project, but we needed something *now!* On the way home, two other farmers and I hatched this idea of a marketing alliance. During the next month, Pam Bryan, Ron Gargasz, and I wrote a concept letter about the alliance and requested feedback from interested farmers listed in the PASA directory.

In early 1999, PASA held meetings on several of their projects. We presented the idea of a marketing alliance that would sell to Pittsburgh chefs. A total of 125 farmers attended these meetings, but we found that farmers could not separate out all the different PASA projects and the marketing alliance. We recommend that only one project or concept be presented at information meetings to minimize confusion.

Eight farmers decided to participate in the Alliance. We had growing pains, but nothing we could not solve. We operate as a group of farmers working together to sell our products.

PASA helped us get underway. They found meeting places and publicized meetings. They wanted to make sure we grew our products in a nature-friendly way, provided guidance as we formed the Alliance, and helped us obtain a USDA Rural Business Enterprise Grant for our truck.

How has the Alliance grown or changed?

The first year our volume was low because we were very busy developing demand and an ordering and delivery system. The chefs wanted only one account and a single delivery person. We started with eight farmers rotating the delivery responsibility. That did not work very well because our deliveries were not always on time and we didn't always put the food where the chefs wanted it. We now have one delivery person, and I am the backup. Chefs have two demanding business traits: (1) You must be dependable. (2) There are no excuses. Their attitude is that farmers are not very dependable because if the crop is not ready they don't show up!

Farmers pay 15 percent of their gross sales to support our delivery truck, driver, and office/ accounting costs. The Alliance has three pickup locations in the nine-county Pittsburgh area. Thus, our farmers spend only about 20 minutes driving and 15 minutes unloading their product.

Our growth has been satisfying. We grew from four chefs in 1999, to six in 2000, to 17 in 2001. We also deliver to a regional food bank and three natural foods stores. Between 1999 and 2000, we grew 500 percent to a sales volume of $88,000 and increased to about $142,000 in 2001.

We started out with eight farmers and reached 11 farmers in 2000—six farmers have left the Alliance and nine have joined—with over 200 products. We do not market everything each

grower produces, and we grow "custom products" for chefs. We now deliver to our Pittsburgh customers on Mondays and Thursdays.

We grew from a seasonal to a year-round marketing alliance with the addition of nine new greenhouses in 2000 and year-round meat supplies. Three factors helped us decide to make this transition: (1) The chefs said, "You aren't going away this fall, are you?" (2) It is very difficult for marketing managers to go to a chef in the spring and say, " Hi! Here I am again." (3) Two farmers joined the Alliance who grew products during the field-grown off-season— mushrooms and hydroponic tomatoes.

Members of the Alliance are looking at becoming a cooperative. I have attended the Cooperative Business Leadership Institute for a couple of years. The structure of the cooperative, the board of directors' responsibilities, and the allegiance of members to the cooperative make a tighter organization. Also, I am a board member of the Northeast Federation of Family Farm Cooperatives, which are cooperatives with under $10 million in annual sales. There is a very strong support group for newly formed cooperatives.

The Alliance is struggling to pay off its debts: Organizational costs and capital investments (the truck). We need more business volume to cover the cost of operation. The first quarter is our slow season, and the Alliance operates at a loss. The individual farmer is not affected. The high-volume summer months help us recover the annual operating cost, but we are not building much of a reserve to cover unexpected costs.

What kind of insurance do you have?
I carry the insurance for the Alliance since all sales are transacted in my name. I have a $1 million umbrella for each occurrence and $2.5 million total coverage. I purchase my insurance from my local agent at a cost of about $375 a year.

How does the Alliance market its products?
We do it several ways:

- PASA provided mailing seed money.
- Individual producers who develop a new market for the Alliance do not pay the overhead charge on a product that they market to a new customer during the first year.
- I set up appointments to visit three new customers each month. Another board member or I visit the potential customer with lots of samples and service information.
- We proceed along a measured growth rate so there are no surprises that we cannot handle.
- We have promoted our Alliance and its members on the local PBS television channel.
- We team up with other promotional activities such as the West Pennsylvania Food Systems Council, a local wine tasting organization, and the American Heart Association.
- The Alliance publishes a quarterly newsletter for its customers, members, and friends. I prepare a list of products and prices each week and e-mail or fax them to the chefs. The chefs phone, fax, or e-mail their orders to me, and I consolidate the list. I tell the farmers how much to bring to the pickup point. The chefs appreciate this form of operation because they need to contact only one person for all the locally grown products and pay only one invoice.

Would it be ok for people to contact you? Yes

Do you want additional information? For more success stories and other information, go to www.nrcs.usda.gov/technical/RESS/altenterprise

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Do you mind sharing your promotional material?
I spend about 5-7 percent of the gross sales on marketing. About 95 percent of marketing is by word of mouth, and 5 percent by formal advertising. For the weddings, I work with the wedding and bridal coordinators. I have a mailing list of church groups and organizations. I have been working with corporations. I contact the human resources or promotion people and then go and make a laptop presentation that is very snappy and convincing. I spent $25,000 to develop the brochure. I ask my customers to make sure they are getting what they want. I do some media and print advertising. I direct mail on an occassional basis.

What do you dislike the most and like the most?
I like the ability to build something that goes beyond you. The people who work for you, the customers. I love the vision of the business. There are several issues I dislike—learning how to borrow money, construction of facilities, the financial and regulatory aspects. Regulatory aspects are the single biggest issue for me because there are warring factions among state, county, and local governments. Sometimes, I just ask the state or county inspectors what the objectives are in achieving compliance, then I do the thinking and take the actions necessary to comply rather than have someone else try to tell me how to run my business. Everyone has to be flexible.

Would you start this alternative enterprise business today after learning what is inovlved?
I would be doing exactly what I'm doing today!

What groups/organizations/activities have you joined or become involved in because of the alternative enterprises?
I am involved in several organizations and have been officers in most of them—the local Chamber of Commerce, Farm Bureau, YMCA, Heart Association, Farmland Preservation, Farm Marketing Groups, and Tourism Council. It is very important to be members of these groups so they understand that farming is a business and that the groups promote farming.

What conservation and education activities do you have?
I speak to the groups that come to the farm, especially the schoolchildren. I talk about farming, people's connection to the land, and the preservation of farmland. I have a theater system set up in the bank-barn—which I have turned into a conference hall—to do small plays. I am currently co-authoring a play called "The Harvest," which is about American agriculture. I am going to extend this education program nonprofit foundation that we are currently organizing. I plan to teach conservation as part of the education program. We do not have any special wildlife habitat planting. No pesticides are used around the public assembly and activity areas.

Are you willing to share your information?
Yes!

Do you want additional information? For more success stories and other information, see the website:
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Wetlands are an integral part of the agricultural landscape in the Northern Plains. The "prairie potholes" that dot fields across much of this semi-arid region play a big role in recharging groundwater and preventing flooding. They also provide rich habitat for wildlife, particularly migratory waterfowl.

To many farmers, however, wetlands remain a nuisance. It's tough to maneuver large tillage, planting and harvesting equipment around their perimeters. Adjacent cropping areas are slow to dry out in spring, often delaying planting. Venture too close, too early and the soggy soil can mire a big tractor up to its axles in mud.

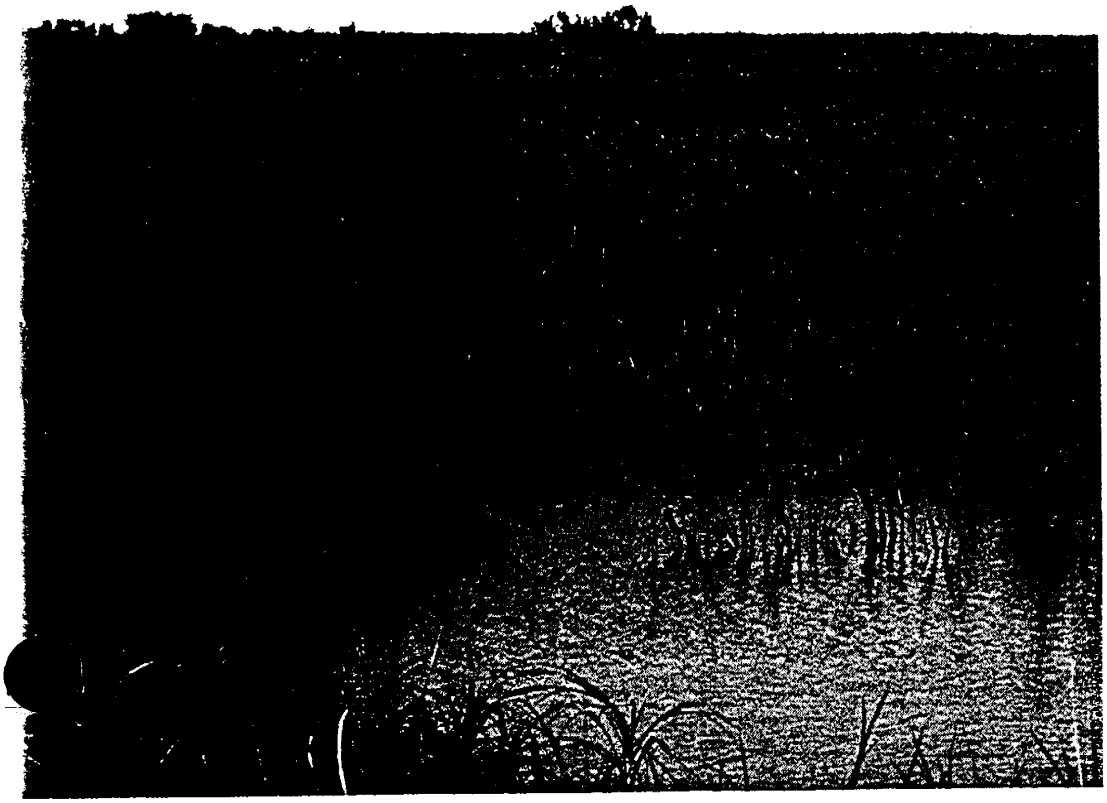
Fortunately, an interdisciplinary SARE-funded study is showing that what's good for the wetlands and the birds also can be good for a farmer's bottom line.

"Some people think that farm profitability and environmental concerns are always at odds," says Diane Rickerl, an agroecologist at South Dakota State University. "But in this case, they don't compete. They complement each other."

Rickerl headed up a study team that included agronomists, economists, wildlife experts, soil microbiologists and others who exhaustively analyzed the wetlands and farm management on three cooperating farms: a typical conventional farm, a farm in transition to no-till farming practices and an organic farm.

The species richness of waterfowl breeding pairs was greatest in wetlands on the organic farm, researchers found, with 78 bird species present on the organic farm compared to 57 in the conventional system. Wetland plant species also were more diverse.

"All in all, you can see what a wonderful pocket of diversity wetlands are," says Rickerl, who credits South Dakota for retaining about 65 percent of its original wetlands, when other agricul-



CREATIVE FARMERS SEED A MIX OF FORAGES AROUND WETLANDS, ALLOWING FOR BIRD NESTING IN THE SPRING AND LATE-SUMMER GRAZING FOR LIVESTOCK. PHOTO BY DIANE RICKERL.

ALL THREE FARMS WERE LOSING MONEY ON LAND CROPPED WITHIN 75 FEET OF WETLANDS.

tural states in the Midwest have dropped to less than 5 percent.

The nature of the wetlands themselves and the surrounding landscape probably had more effect on wildlife than the farming practices, Rickerl suspects. But the organic farm also benefits wildlife because of the greater diversity of crops that are found in fields adjacent to the wetlands.

Maintaining small fields of different crops in a patchwork pattern on his 1,200 acres preserves diversity for Charlie Johnson, an organic farmer near Madison, S.D., whose operation served as the project's organic test farm. A third of his land is in forages Johnson rotates with small grains, corn and soybeans. In many fields, rye cover crops protect soil that would otherwise be vulnerable to erosion over the snowy winters, and prairie potholes dot the landscape.

The study's economic analyses found that the organic farm is the most profitable of the three systems if the premium prices received by Johnson for his grain and beef are included. If the premiums are ignored, the organic system is the least profitable.

More importantly, it turns out that all three farms were losing money on land cropped within 75 feet of wetlands.

"Attempting to raise crops close to wetlands can be futile," Johnson says. "Rather than investing in a crop there year after year and watching it fail more often than not, a better alternative is to plant permanent vegetation."

Johnson did just that, seeding a forage mix of switchgrass, bromegrass and alfalfa around some of his wetlands. "We leave the spring growth for nesting habitat. Then we graze it or hay it later in summer when our other pastures have dried up," he says. "The wild hay makes excellent feed for our young beef stock."

Not only are those permanent wetland buffers more profitable for Johnson and good for wildlife, but the study team also found them to be effective nutrient filters. Forage vegetation trapped half of the nitrogen and phosphorus that would otherwise have ended up in the wetland, their study found.

"We usually think of wetlands as being the buffer that filters out the nutrients," Rickerl says. "But now we're seeing they're even more efficient if we buffer the buffer with permanent vegetation."

The study team also found that the smaller wetlands ducks prefer are better at filtering nutrients out of water. "That's important because it is the small wetlands that cause so much controversy in the Prairie Pothole Region," Rickerl says, referring to the reluctance of many to leave small pockets of wetland around which they need to drive their heavy equipment.

Where wetlands are farmed through, the soils can become so overloaded with phosphorus that the nutrient can move into groundwater, or flow out of the wetland to contaminate other surface waters, the team speculates. That situation is very unusual for phosphorus, which normally is bound tightly in the soil, Rickerl says.

"What's the effect?" she asks. "No one knows. But the point is that farmers are wasting money by adding phosphorus fertilizer to these areas that their crops can't retrieve."

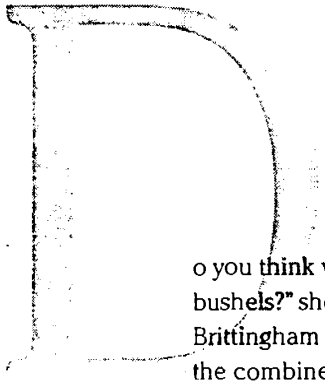
Wetlands play an important role in storing water and replenishing both soil moisture and groundwater. Forty percent of the water entering wetlands either remained there or moved into the soil or groundwater, researchers found.

Water budgets from the study also showed that 60 percent of the water entering wetlands is runoff from surrounding fields, which has a tremendous potential to be contaminated with nutrients and other ag chemicals.

"That points out the tremendous role wetlands play in the water cycle," Rickerl says. "That's water that we should be using to recharge the soil and groundwater. Without the wetlands we'd be sending it down the river to cause flooding elsewhere."

Rickerl is continuing her efforts with educational programs to help farmers understand that wetlands and profits can go hand-in-hand. "Regardless of the wildlife benefits, our surveys show most farmers still want to drain wetlands," she observes. "We're trying to show that by managing wetlands properly, money and nutrients can stay on the farm."

Johnson already knows that from experience. "Sometimes we forget why the wetlands are there," he says. "With the forage borders, they can be good for wildlife, good for flood control and produce good feed for livestock. You can't ask for much more than that." —*Craig Cramer*



"Do you think we're hitting 200 bushels?" shouted Norman Brittingham over the din of the combine as he maneuvered through one of the strips we had marked in his corn field.

I was riding shotgun with a map of the fertilizer treatments we were testing in a cover crop research project on his Maryland farm. We were measuring corn yields to find out if Brittingham's use of cover crops as a non-synthetic fertilizer was an adequate substitute.

EXTENSIVE RESEARCH AND FARM DEMONSTRATIONS HAVE SHOWN THAT A WINTER COVER CROP OF HAIRY VETCH CAN FIX MOST — AND SOMETIMES ALL — OF THE NITROGEN.

Brittingham was one of 10 farmers who collaborated with University of Maryland researchers in a SARE-funded project studying cover crops as a tool to reduce nitrogen pollution in the Chesapeake Bay watershed. The bay, an estuary of national significance, had become a cause celebre among politicians, environmentalists and area residents looking to restore the once-productive fishery.

Morris Decker, a University of Maryland researcher, sought a possible remedy for one of the biggest suspected bay pollutants: nitrogen from crop/livestock farms. He was trying to determine whether Bay-area farmers could reduce their fertilizer use — thereby further lessening their impact on the watershed. My role, as a Ph.D. candidate at the university, was to assist Decker in designing, coordinating and analyzing studies throughout the state.

Brittingham volunteered to test the amount of nitrogen fertilizer we could replace by growing a winter cover crop of hairy vetch just before planting corn. By adding different amounts of fertilizer to the corn, we determined how much of the purchased nitrogen could be replaced by growing the vetch, a legume that "fixes" nitrogen without sacrificing crop yields.

Grass cover crops like rye, wheat and barley take up excess nitrogen in the fall and winter, preventing it from leaching and ending up in the bay. Legume cover crops such as crimson clover, winter peas and hairy vetch "fix" nitrogen by transferring it from air to soil via nodules on their roots.

Mixing grasses and legumes proved a great option. Farmers could realize multiple benefits, including guarding against erosion, preventing nitrogen leaching, adding low-cost nutrients for their crops and providing a water-conserving mulch that helped to increase yields during Maryland's typical hot, dry summers.

"Extensive research and farm demonstrations have shown that a winter cover crop of hairy vetch can fix most — and sometimes all — of the nitrogen required for maximum corn yields," Decker says. "The cover crop mulch conserves moisture, increasing yield by helping the corn use the nitrogen more effectively."

Most of the corn strips in Brittingham's irrigated field yielded 150 to 170 bushels per acre, whether we had applied low or high rates of synthetic fertilizer. That meant hairy vetch supplied most of the nitrogen needed by the corn crop. Brittingham could save on his fertilizer bills, and by applying the right amounts, would not send any extra nitrogen to pollute the bay.

WAITING UNTIL HAIRY VETCH FLOWERS TO INCORPORATE IT INTO THE SOIL MAXIMIZES THE AMOUNT OF NITROGEN THE LEGUME WILL SUPPLY FOR THE NEXT CROP. PHOTO BY ANDY CLARK.

Other cooperating grain or crop/livestock farmers in Maryland planted rye, wheat, barley, crimson clover, winter peas, hairy vetch or mixtures of grasses and legumes. Cover crops protect and improve the soil during a time when no other crop normally would be grown, such as during the winter in the Northeast.

"A vetch/rye cover crop mixture provides more benefits than either one alone," Decker says. "When residual fall soil nitrogen is high, rye will dominate the mixture, but when soil nitrogen is low, vetch will dominate, fixing more nitrogen. This provides producers an excellent management tool."

We had tested those cover crops in very small plots on university research farms and needed to validate our findings in the field. Cooperators used different rates of nitrogen fertilizer to help us tease out more information about how the cover crops affected nitrogen dynamics on a farm scale. Decker also took the opportunity to demonstrate to farmers the value of using cover crops in their operations.

The farmers helped us confirm it usually was best to wait until late April to kill the cover crops, especially legumes or legume/grass mixtures, in preparation for the cash crop. This allowed the legume to fix more nitrogen, and resulted in more cover crop mulch and better moisture conservation. Many farmers like to plant their corn at about this time, so we hoped to show them that corn yields often were better if they waited the extra week or two to realize the full benefit of the cover crop.

On the bay's western shore in Frederick County, Joe Hottel took the fertilizer test one step further. He dedicated more than 90 acres of his diversified crop/livestock farm to test three- to-10-acre strips of cover crops, different fertilizer rates and applications of sewage sludge.

Cover crops could play a role in managing the nutrients contained in the sludge—taking up excess nitrogen in the fall and releasing it back the following year for the corn.

"I like what cover crops do for my soil," Hottel says. "They keep the soil from eroding, which I really like when we get heavy rains. This farm was full of erosion gullies when I took it over. They're all gone now."

By season's end, Hottel's yields ranged from 130 to 160 bushels per acre, comparable to his usual take. Moreover, the combination of cover crops and sludge reduced his fertilizer bill by about $30 per acre. He also saved about $20 per acre in tillage costs and $10 per acre in lime costs.

Hottel was on board. Now he puts all of his 1,600 acres in cover crops and uses sludge where he can on his corn-soybean rotation.

"I grow cover crops on as much land as I can every year," he says. "When you have something that works, you don't change. And, if yo don't take care of your ground, it's not going to take care of you." —*Andy Clark*

NATURAL RESOURCE PROTECTION

ones Creek whips through John Briscoe's cotton field like a garter snake. During a rainstorm, water moves in sheets down the sloping field toward the bank, taking Briscoe's soil with it.

"Every year, two or three new ditches washed out too deep to cross with a picker," recalls Briscoe, who raises cotton, soybeans, corn and beef cattle on a third-generation family farm in north Mississippi. "One year we had an absolute gulley washer that left a hole big enough to put a house in. We had to use a 'dozer to fill it in and put a levee around it."

In 1995, he had only two choices to comply with Mississippi's erosion control rules: He could build terraces or convert to no-till farming. He opted to build a terrace. While it did slow the wash of topsoil from below the terrace, a year later ditches began forming above the structure.

This time Briscoe had a third choice for conservation compliance: He could plant an inexpensive vegetative barrier above the terrace to slow water flow and trap sediment.

In part thanks to SARE research headed by Seth Dabney, vegetative barriers—or grass hedges—have been added to the Natural Resources Conservation Service Field Office Technical Guide for Mississippi as an approved erosion control practice. Grass hedges also are eligible for cost share through the Environmental Quality Incentives Program (EQIP).

An NRCS district conservationist recommended that Briscoe talk to Dabney about trying a hedge in his field. The researcher and the farmer walked the field together and reviewed the options.

Though he was skeptical about the effectiveness of a hedge, Briscoe opted to plant one rather than use more precious topsoil to build another terrace. It was a purely financial decision. At $6 a pound for switchgrass seed, Briscoe could sow a 10-foot hedge across his field for about $100. The terrace would have cost about $2 per foot, or $4,000 to cross the 50-acre field.

After evaluating the hedge for two seasons, Briscoe is convinced he made the right choice. A 10-

RESEARCHER SETH DABNEY GESTURES TOWARD A $100 GRASS HEDGE THAT CONTROLS EROSION; CONSTRUCTING A TERRACE COSTS $4,000. PHOTO BY GWEN ROLAND.

IN PART THANKS TO SARE RESEARCH, VEGETATIVE BARRIERS—OR GRASS HEDGES—HAVE BEEN ADDED TO THE NRCS' TECHNICAL GUIDE FOR MISSISSIPPI AS AN APPROVED EROSION CONTROL PRACTICE.

foot swath of blue-green switchgrass waves across the sloping cotton field like a Mohawk haircut. At ground level, the space between thousands of reed-like stems is clogged with soil trapped on its way to the creek. But most telling of all, no new gashes are splitting the hillside.

"Not only is it working, but it takes up less space than terracing," says Briscoe, sweeping his arm over rows of cotton blossoms jostling against the hedge. At 50 feet wide, the terrace takes up about two and a half acres of his field. At only 10 feet wide, the hedge takes up about one-fifth that space.

Mowing once or twice a season is the only maintenance required once the hedge is well established, says Dabney, who has been researching vegetative barriers for nearly a decade. "During the first season there may be washouts in the hedge at the points of highest water flow," he says.

Such washouts can be fixed in a few minutes with a shovel. A terrace, on the other hand, needs regular maintenance often requiring earth-moving equipment.

Although many plants may make up a hedge, the ideal hedge grassplant is cold hardy with thick, woody stems and dense, erect growth. Dabney's research shows that Alamo switchgrass has those characteristics, so that's what is specified in the Mississippi standards. Switchgrass also has the advantage of being a native plant that doesn't invade the cash crop.

"It's not invasive because it is kind of a slow starter," says Dabney. "Crabgrass and other annuals can choke it out if given a chance, but John established an effective barrier the first season. By the second season, it is solidly established."

Farmers should not assume vegetative barriers can replace terraces in all situations, Dabney cautions, since there are areas of concentrated water flow where vegetation couldn't withstand the force. "Hedges can slow down runoff waters and trap sediment," he says. "They may even enhance infiltration, but they will not completely intercept and cut off runoff waters. As field sizes increase, hedges reach a limit where other technology is needed to handle the accumulated runoff."

The official acceptance of vegetative barriers doesn't mean the research is over. Far from it, says Dabney. Among other things the research team is looking into the pest management characteristics of the hedges. An Arkansas researcher determined hedges attract big-eyed bugs and other beneficial insects.

"It may turn out that there are enough benefits to work hedges into an IPM program," Dabney says.

The search for better varieties of switchgrass continues. Project cooperator Joel Douglas of the Jamie Whitten NRCS Plant Materials Center has been breeding switchgrass from wild collections since 1993. He hopes to develop a shorter switchgrass that would require less mowing, saving farmers time and money.

Douglas' research plots have reduced a slope at the Whitten Center from 7-percent grade to 5-percent grade in just four growing seasons. "All we did was plant them and leave them alone," he says. "In addition to the soil buildup and leveling, we also have improved filtration when it rains."

Even though vegetative barriers have been used for thousands of years in other countries, Mississippi is the first U.S. jurisdiction to officially recognize their effectiveness. The inclusion of vegetative barriers in Mississippi's interim standards also marks the first time a SARE project has directly influenced state agricultural policy.

Dabney, who is based at the ARS National Sedimentation Lab at Oxford, is now working with a committee revising the National Interim Practice Standard for grass hedges.

As for Briscoe, seeing how the hedges hold soil in place is encouraging him to consider additional changes on the family farm.

"In my lifetime I've seen ditches get bigger. That may be the result of so much timber being cut in the area—or it could be from our farming practices."

Briscoe, whose neighbor no-tills 2,500 acres of cotton, now is considering incorporating the practice. "The savings in just labor is enough to make you take it seriously," he says. —*Gwen Roland*

NATURAL RESOURCE PROTECTION

In a 39,000-acre national wildlife refuge that borders the California-Oregon state line, agricultural and wildlife habitat protection interests have maintained an uneasy relationship since the 1960s.

In 1964, the Kuchel Act set up the Tulelake National Wildlife Refuge to help preserve one of the nation's premier nesting sites for waterfowl, with a twist: It mandated that "optimum consideration" be given to agricultural enterprises in the area. Since then, farmers have leased land in the refuge to grow potatoes, small grains, alfalfa, onions and sugar beets.

IN JUST THE SECOND YEAR AS WETLANDS, A FORMER FARM IN PRODUCTION FOR 40 YEARS SPROUTED DIVERSE FLORA JUST MONTHS AFTER FLOODING.

The farmers are following in the footsteps of their parents and grandparents, who migrated to the fertile valley in and around the present-day refuge in the late 1800s. But their farms bordering and within the Tulelake Refuge, while yielding about three times more per acre than in less fertile areas, are part of a stop on the Pacific flyway that attracts 1 million waterfowl each year.

While such competing interests usually come to a head, a compromise of sorts has worked in the Tulelake Refuge since the Kuchel Act. That act recognizes the incredible soil fertility and importance of agriculture to the local economy as well as the vital source of food farming provides to the waterfowl. The complementary relationship worked for years until scientists discovered the wetlands were declining.

As opposing forces debate the future of the Tulelake Refuge, a group of researchers, refuge staff and farmers have devised a system to rejuvenate the wetlands while perpetuating agriculture. A key player in that work, SARE-funded researcher Carol Shennan, has helped set up a system that rotates wetlands and farming to rejuvenate the marsh and offer prime soil to participating farmers.

"The wetlands are no longer good habitat for birds," says Shennan, an agroecologist at the University of California-Santa Cruz. Studies have shown agricultural runoff is a not a major factor in that decline. Most of the refuge, governed by an old flood control plan that ended the alternating ebb and flow of water that occurs in a natural wetlands system, is stagnant.

"We have a very mature unproductive marsh where few new plants germinate because of stabilized water depths, and there is little habitat diversity," Shennan says. "Under rotational management, we can use agriculture as a disturbance to break the cycle and restore young stages of marsh development."

The project creates rotational land uses—wetlands or farms—that switch every three years. Farmland is flooded to create wetlands of differing water levels, while unproductive wetlands are drained to create farmland on soil untouched by a plow for decades, at least. The system promises more diverse wetlands and fertile farm soil that needs few, if any, amendments.

The complicated system already has brought results. In just the second year, a former farm in active production for 40 years sprouted diverse flora, with tules, bullrushes and cattails growing just months after flooding.

"It's been really astounding," says Dave Mauser, a wildlife biologist at the refuge. "In little marshes we've created, we're getting wetland vegetation the first year out of farming. It's a quick transition, and the bird use has really followed suit."

For farmers who lease land in the refuge, the project

GEESE RETURN TO TULELAKE NATIONAL WILDLIFE REFUGE'S REJUVENATED WETLANDS NEXT TO FARMS THAT PROVIDE A VITAL WATERFOWL FOOD SOURCE. PHOTO BY CAROL SHENNAN.

offers an unparalleled opportunity to reduce their use of purchased fertilizers and pesticides. The virgin soil hosts few, if any, soil-borne pathogens like nematodes.

Sid Staunton, who grows potatoes, small grains and onions on 1,500 acres both adjacent to and on refuge-leased land, hopes to secure a lease on the converted wetlands. He anticipates a big savings in input costs such as nematacides, which can run $250 an acre.

"We'd have a disease-free soil that's really rich in nutrients, so we wouldn't need to put in huge inputs," says Staunton, who serves on Shennan's 10-member farm advisory committee. "It's a good way to use a natural system to clean up some of the soil-borne problems that build up over time."

Rotating the two land uses for the mutual benefit of farming and wildlife habitat perfectly meets the intent of the Kuchel Act, Mauser says. The legislation creating the farm lease program provided surplus ag crops for birds while keeping them from the high-value rice crop in California's Central Valley.

Farmers leasing refuge land are used to bird pilfering, Staunton says. Most of that occurs on grain stubble because the birds migrate in fall after harvest or in spring before planting.

Shennan also is working with farmers to increase their use of cover crops to provide habitat for nesting birds, reduce soil loss through wind erosion, suppress weeds and improve soil organic matter. It's especially challenging in the basin because of a 4,200-feet elevation that can bring severe frosts year round.

The project also establishes the long-term transition of farmland into what Shennan hopes will become a productive, mature marsh. Using computer modeling, she will study different rotation scenarios on a refuge-wide scale.

"We want to set up a framework to judge impacts of each potential rotation design on water quality, habitat diversity and economics," she says. "It involves looking at the system from multiple perspectives so we can use it as a tool with farmers, environmental groups, hunting groups and refuge managers to quantify benefits and tradeoffs. There's a tremendous amount at stake."

Some farmers remain skeptical about the future of farming in the Tulelake Refuge. Staunton, on the other hand, is optimistic the new system will lower costs for farmers while improving wetland and wildlife values.

"It's a real on-the-ground solution, and, for the amount of money invested, the dividends are incredible," he says. "This thing could solve this area's resource conflicts quickly, and we can continue to have good food value from this area." — *Valerie Berton*

The *New* American Farmer

Profiles of Agricultural Innovation

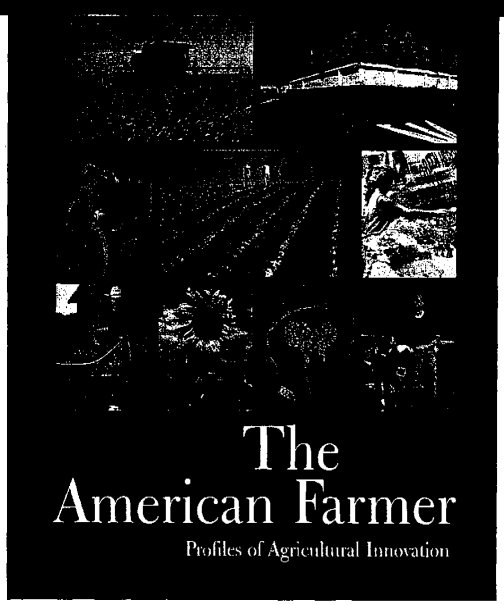
The New American Farmer is a collection of in-depth interviews with farmers and ranchers across America. The book's diverse profiles detail the effects of farming practices on profitability, quality of life, rural communities and the environment. By publicizing their stories, SARE demonstrates that sustainable farms and ranches are no longer few and far between. Instead, they are viable throughout American agriculture.

There's something in the collection for everyone. From a banana producer in Hawaii to a potato farmer in Maine — and almost every state and commodity in between — the producers featured in *The New American Farmer* are meeting their financial, stewardship and community goals.

[redacted] the 160-page *The New American Farmer* book ($10), contact (802) 656-0484; *sanpubs@uvm.edu*

The New American Farmer on CD-ROM offers many options for learning — or teaching others — about dozens of farming and ranching systems that provide profitable alternatives and a satisfying way of life. Search the CD by subject, state or farmer name to find and download profiles of interest, then combine them with information about your institution or programs.

Point others to the resource on the web at *www.sare.org/newfarmer*, where you will find links to other profiles and case studies.



"Today I spend about the same on fertilizer as I did before I cut back. But now that fertilizer covers 600 acres instead of 300."

— Rich Bennett
Napoleon, Ohio, grain producer

"We have increased our sales by 100 percent in the past 10 years...To be operating in what we think of as a sustainable way, we're not depleting soil. We're building up the resources, which is very important to us."

— Jim Crawford
Hustontown, Pa., vegetable producer

"Our basic herd health is excellent. Our vet feels that our pasture management is the most important factor."

— Peggy Sechrist
Fredericksburg, Texas, cattle rancher

"We're trying to focus on understanding the whole system and having a rotation that provides weed and pest management and quality crop production."

— Bob Quinn
Big Sandy, Mont., wheat producer

✂

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The New American Farmer was published by the Sustainable Agriculture Research & Education (SARE) program, part of USDA's Cooperative State Research, Education and Extension Service. SARE is a national grants program that seeks to advance farming systems that are more profitable, environmentally sound and good for communities. For more information, visit www.sare.org

The *New* American Farmer

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The New American Farmer is a collection of in-depth interviews with farmers and ranchers across America published by USDA's Sustainable Agriculture Research and Education (SARE) program and its national outreach arm, the Sustainable Agriculture Network (SAN).

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Rich Bennett, Napoleon, Ohio
Richard DeWilde & Linda Halley, Viroqua, Wisconsin
Mary Doerr, Kenyon, Minnesota
Diana & Gary Endicott, Bronson, Kansas
Carmen Fernholz, Madison, Minnesota
Bob Finken, Douglas, North Dakota
Greg & Lei Gunthorp, LaGrange, Indiana
Charles Johnson, Madison, South Dakota
Tom Larson, Saint Edward, Nebraska
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Dan & Jan Shepherd, Chiftonhill, Missouri
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Lon Inaba, Wapato, Washington
Karl Kupers, Harrington, Washington
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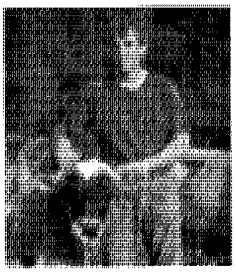

The New American Farmer

Online Farmer/Rancher Profiles

NAF Table of Contents

The New American Farmer is a collection of in-depth interviews with farmers and ranchers across America published by USDA's Sustainable Agriculture Research and Education (SARE) program and its national outreach arm, the Sustainable Agriculture Network (SAN).

This page contains links to stories about sustainable farmers and ranchers across the United States, and also points to a few international profiles. Browse profiles by category: SARE, Natural Resources Conservation Service (NRCS), other sustainable agriculture programs & organizations, and international stories.

Do you know of other case studies that could be included here? Please contact us (san@nal.usda.gov).

SARE

Ten Years of SARE (html)

The book features 40 SARE projects, one from each of the four SARE regions, in the following ten topic areas: crop production, animal production, natural resource protection, marketing, community development, education, pest management, horticulture, professional development, integrated farm/ranch system projects.

SARE Highlights (html)

Farmers are profiled in many SAN publications, including

- Steel in the Field: A Farmer's Guide to Weed Management Tools
- Managing Cover Crops Profitably, 2nd Edition
- The Real Dirt: Farmers Tell About Organic and Low-Input Practices in the Northeast
- A Whole-Farm Approach to Managing Pests
- Marketing Strategies for Farmers and Ranchers
- Diversify Crops to Boost Profits and Stewardship
- Exploring Sustainability in Agriculture

Western SARE Profiles from 2000 Conference 25 profiles (html)

North Central SARE -- Field Notes include featured farms (9). (pdf and html).

- Diversification (Tom Larson)
- Alternative Marketing (Bosserd Farm)
- Kevin Smyth (Striking it Rich B Farmer Finds "Gold" in French Drain System)
- Farmer Networks
- Kansas ranchers Diana and Gary Endicot
- Nebraska farmer David Bosle (pastured poultry, co-op style)
- Composting (several farmers)
- Swine Production (Nolan and Susan Jungclaus, Tom Frantzen, others)
- Cover Crops

NE SARE (html)

- Organic hops
- Niche marketing high-quality meats
- Elk farming

Natural Resources Conservation Service (NRCS)

NRCS Mid-Atlantic Interdisciplinary Resource Team

Two 8-page fact sheets (pdf) on sustainable. Each has a 4-page feature of a mid-Atlantic farm:

- *Polyface Farm*. Joel and Theresa Salatin, with the help of their two children, Daniel and Rachel, display a level of sustainable management and organic farming that few farmers achieve.

- *Cedar Meadow Farm*. Cedar Meadow Farm is a crop and vegetable operation. Products include corn, soybeans, hay, and annual vegetables including tomatoes, pumpkins, sweet corn, broccoli and peppers.

NRCS Watershed Science Institute, Lincoln, NE

Sustainable Agriculture Case Studies (pdf)

- John and Vicki Swift own *Mother Goose Farms*, a 5-acre coffee orchard in South Kona, Hawaii.

- *Ray Eck* grows organic almonds in the San Joaquin Valley.

- *Lamar Black* has been managing a 2,300 acre farm in Jenkins

and Burke Counties in east central Georgia since 1982.

- *Ed and Dorothy Kalin* operate a 150-unit cow/calf operation on a 1,160 acre farm in Pawnee County, NE.

Making the Transition to Sustainable Agriculture (Technical Note 2)

- *Bob Ekre* has been farming in western North Dakota for nearly 50 years.
- *Ken Staten* has been growing vegetables on 4 acres of family-owned farmland in Wakulla County, Florida, just south of Tallahassee for about 7 years.
- Brothers *Terry and Robert (Bobby) Weigel* farm 2,240 acres of land along the border of Emmons and Logan Counties, North Dakota.
- *Dosi Alvarez* is a third generation farmer. He and his wife Norma manage an 850-acre organic farm in the Mesilla Valley, New Mexico, on land his grandfather cleared.

Other Sustainable Agriculture Programs & Organizations

SAREP

Are Case Studies Useful? by Ann Drescher Mayse, SAREP

Case studies-descriptions of real-life businesses and the challenges that they face-are often used by business schools to teach students practical, holistic problem-solving skills. The same approach may be useful in learning how to apply sustainable agriculture's environmental, economic and social principles to practical farming situations. But many of us (at UC) are more comfortable talking only about information that comes from experimental trials, rather than case studies and other information based on farmers' experiences.

Davis Farmer's Market (March, 2000) (html)
The Davis Farmer's Market is one of the most well-known and successful farmers markets in the state of California.

Whole Farm Cooperative (profiling 30 member farms in Central Minnesota)

The Food Alliance (html)

For all of you who want to meet the men and women who put food on our tables, check out our newly created farmer profiles for each Food Alliance-Approved farm in the Northwest.

Innovative Farmers of Ohio
Farm Feature Stories
Farming Without Chemicals in Ohio

Small Farms, Big Ideas (html)
is a series of articles and photos featuring winners of Missouri Sustainable Agriculture Demonstration Awards.

Profitable Practices and Strategies for a New Generation
The North Central Initiative for Small Farm Profitability

This booklet brings you stories of people making a difference in rural America. These people have endured record low prices and a rural economy mired just short of depression. They have seen their neighbors move away and their home town businesses boarded up. But they have not become victims of the times.

International Profiles

Centre for Environment and Society, SAFE-World Research

47 Portraits of Sustainable Agriculture Projects and Initiatives

Getting Started in Organic Farming (html)
Environment Canada and Manitoba Agriculture
Eight Organic Farmers Share Experiences

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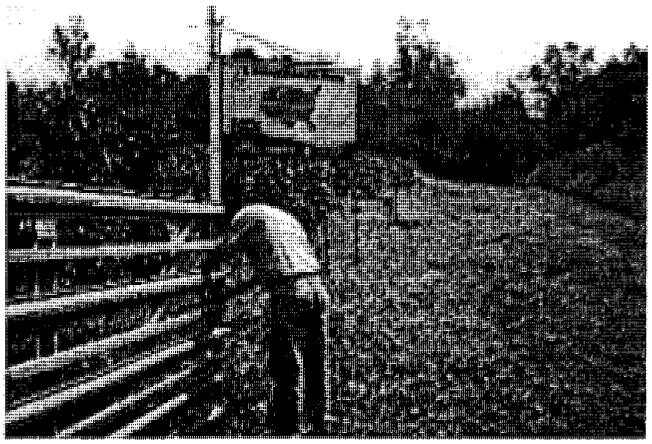
Case Study No. 1: Vicki and John Swift (Mother Goose Farms)



John Jeffredo, Soil Conservationist, opens the gate to Mother Goose Farms, Kona SWCD's Cooperator of the Year for 1995.

Site Description:
John and Vicki Swift own Mother Goose Farms, a 5-acre coffee orchard in South Kona, Hawaii. They own two additional acres of land where they live and raise a few pigs and process the coffee they grow. John also manages 77 acres of macadamia nut orchards for absentee owners. He has 50 breeding ewes, which he grazes under the macadamia nuts to control groundcover. Mother Goose Farms has been a certified organic coffee orchard since 1992. Requirements for organic certification vary by state, but in all cases, use of synthetic pesticides and inorganic nitrogen fertilizers is prohibited.

The farm is located at an elevation of approximately 2,000 ft above sea level. The climate in South Kona is very mild. Temperatures fluctuate little, but rainfall varies widely. Normal annual rainfall is 40 inches, but the past 3 years have been unusually dry with annual rainfall varying only from 13-21 inches. Acid rainfall is common due to the activity of nearby Kilauea Volcano. Except for the unpredictable rainfall, the climate in South Kona is ideally suited to coffee growing.

The farm lies on very young, shallow, rocky organic soils.

Location:
Honomalino, South Kona Soil and Water Conservation District, Hawaii

District Conservationist:
Steve Skipper
P.O. Box 636
Kealakekua, HI 96750-0636
Tel (808) 322-2484
Fax (808) 322-3735

Farmed Acres:
7 (2 locations - see site description)

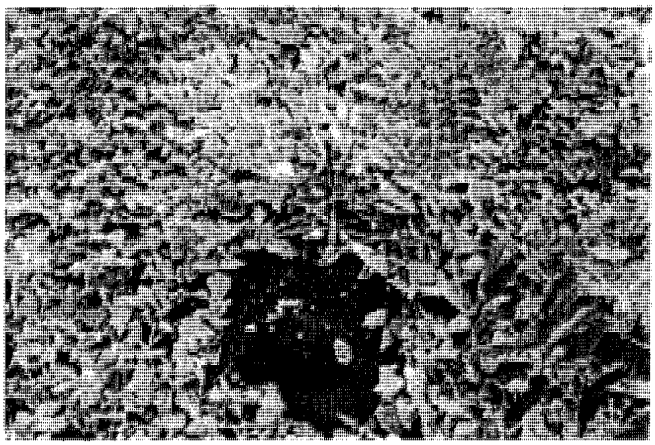
Enterprises:
Sheep, Pigs, Coffee

Sustainable Agriculture Issues:
ENVIRONMENTAL QUALITY & ECOLOGICAL FUNCTION
Erosion
Cultural Requirements for Coffee
Weed Pressures
Insect Pests
SOCIOECONOMIC VIABILITY
Volatile Markets; Uncertain Yields

ENVIRONMENTAL QUALITY AND ECOLOGICAL FUNCTION

Erosion:
All of the soils on this part of Hawaii are shallow and sloping, making erosion control a major concern. However, erosion is extremely low on Mother Goose Farms, since the land is never tilled and remains in permanent cover crop throughout the year. The cover crop provides an added benefit of protecting the soil from baking, a concern with bare soils in Hawaii.

Coffee Cultural Requirements:
In many parts of the world coffee is planted in shade to protect it against drought, erosion and wind. In South Kona, where cloud cover is not as reliable as in the northern part of the island, additional protection may be helpful. With assistance from NRCS District Conservationist, Steve Skipper, and the NRCS Plant Materials Center on Molokai, John and Vicki Swift have recently started an intercropping trial with the fast growing, leguminous tropical tree, *Gliricidia sepium*. They expect this tree to provide protection for the coffee, add nitrogen to the soil, and provide additional food for their geese (see **Weed Pressures** section). Tree cuttings and seeds were provided by the NRCS Plant Materials Center. If the trial plantings prove successful, John and Vicki plan to intercrop more of their orchard, perhaps experimenting with other tree species.



Gliricidia seedling planted for shade, forage and nitrogen mulch.

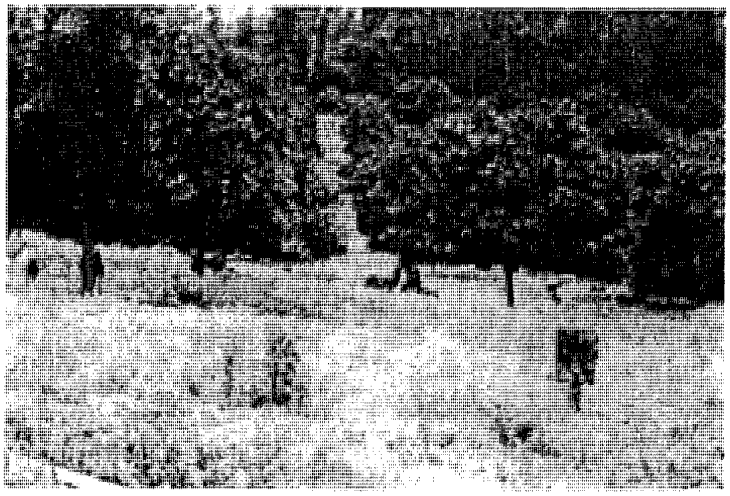
Weed Pressures:
Weeds are a serious problem for both coffee and macadamia nuts in Hawaii. Traditionally weeds are sprayed several times each year with herbicides. In 1989, the Swifts decided to try controlling the weeds in their coffee by non-chemical means (a necessary requirement for organic certification). Desmodium (*Desmodium* spp.), a trailing climbing perennial forage legume, immediately took over the orchard, and weed trimming soon became prohibitively expensive. The Swifts began experimenting with geese for weed control in 1991. First they fenced the orchard to keep out dogs and other potential predators. They bought 25 geese, which they raised on desmodium from four days of age. Once the feathers were developed (6-8 weeks), the Swifts moved the geese to the orchard. They immediately began eating the desmodium in the field and have been controlling its height to the point that it is now an acceptable nitrogen fixing cover crop. The Swifts currently have 60 geese that they move around in the

orchard weekly using portable electric poultry netting. The Swifts estimate they save $5,000 annually on weed control, as well as the energy and time saved by letting the geese do the work.

The use of sheep to maintain groundcover under macadamia nuts is a proven practice in Kona. However, John is using katahidn hair sheep, a breed not previously used for this purpose. These sheep were bred strictly for meat. They produce no wool, which has eliminated many of the typical problems associated with sheep in a warm climate. The katahidn sheep are maintaining the groundcover effectively.

Geese controlling groundcover.

Insect Pests:
The insect pests of greatest concern on Mother Goose Farms are ants and scale, which can lead to sooty mold, another pest of coffee. Ants have increased in the orchard since the irrigation system was installed. Still, Steve Skipper feels that the problem is not as severe as on many farms in the area, since the geese provide some insect as well as groundcover control. Some farms in the area have experienced problems with aphids and mites. These have not been a problem for John and Vicki. To control the scale on which the ants feed, the Swifts apply an ultra fine dormant oil.



Sheep controlling groundcover under macadamia trees.

SOCIOECONOMIC VIABILITY

When they started the coffee orchard 6 years ago, John and Vicki assumed it would take approximately 5 years to turn a profit. Coffee yields have increased steadily since they first began transplanting the trees, and costs for weed control have dropped dramatically. Last year was a profitable one and the Swifts anticipate even better profits in the future.

Uncertain Yields, Volatile Markets:
John and Vicki Swift have taken several steps to sustain their operations in the face of uncertain yields and volatile markets. First, their coffee farm is organically certified. They are able to capture a niche market that is less volatile than the open market. Second, they process their coffee in-house and market directly to local consumers for a competitive price, thereby avoiding middle costs associated with conventional markets and saving transportation and processing costs. To date, marketing of Mother Goose Farms coffee has been primarily by word of mouth; however, Vicki is exploring more aggressive marketing strategies (though still focusing on a local niche market) as coffee yields increase. Third, they have a somewhat diversified operation with both sheep and pigs that can offset losses when coffee yields are low. The sheep are sold directly to a local restaurant. As the herd grows, more aggressive marketing will be needed. Pigs are grown primarily for family consumption. Excess pigs are sold to neighbors. District Conservationist Steve Skipper thinks there may be a commercial market for the weed eating geese. To date, however, they are not consumed. Fourth, John works as a fireman outside the farm, providing additional cash flow.

Case Study No. 2: Ray Eck Farms

Site Description:
Ray Eck grows organic almonds in the San Joaquin Valley. The San Joaquin and Sacramento valleys comprise California's Central Valley, one of the most productive in the world, largely because of its mild climate, deep soils and available water resources. Ray has been farming in this valley for 25 years. His family grew almonds in the area before Ray began farming, so he has considerable experience with the crop.

The climate in Merced County is Mediterranean, with warm, dry summers and cool, moist winters. Average annual precipitation is approximately 12" and occurs almost entirely in the winter months. Frost is a concern here, especially in the spring when trees begin to flower.

The soils on Ray's farm are primarily Hilmar sands, 0-3% slopes. These are poorly or imperfectly drained, alluvial soils with a droughty surface layer but a generally high water table. Hilmar sands are primarily used for alfalfa and dairy production, but with proper management produce a reasonable almond crop, although the trees may be susceptible to fungal diseases and salt damage.

Location:
Merced County, CA

District Conservationist:
Malia Oritz
Merced Field Office
2135 Wardrobe Ave., Suite C
Merced, CA 95340
Telephone: (209)723-3714
FAX: (209) 725-2964

Acres Farmed:
120 (50 owned, 70 leased)

Crops:
Almonds (5 varieties)

Sustainable Agriculture Issues:
ENVIRONMENTAL QUALITY &
ECOLOGICAL FUNCTION
Soil and Climate Constraints
Nutrient Cycling
Pest Management
SOCIOECONOMIC VIABILITY
Volatile Markets; Uncertain Yields
Social Acceptance

ENVIRONMENTAL QUALITY AND ECOLOGICAL FUNCTION

Soil and Climate Constraints:
Ray maintains a cover crop under the almonds, protecting the soil from both wind and water erosion. The buried pipe sprinkler irrigation system he has installed on the land he owns and some of the land he leases causes less erosion than flood irrigation. The cost of buried pipeline is possible under a long-term lease but is difficult to justify financially under a shorter term lease.

The soils on Ray's farm require irrigation in the summer but may be excessively wet in the spring. Moist conditions encourage fungal infections that can lead to significant yield reductions. Salinity is also a concern. Ray's sprinkler irrigation system allows more accurate control of the water each tree receives. Thus he can ensure enough water in the summer to prevent stress but not so much that it promotes fungal disease. By managing water use more carefully, Ray also reduces the potential for nitrate leaching and the probability of salinity problems, that can reduce yield and nut quality.

Because the soils on this farm are sandy, fertility should be a concern, but Ray has noted that soil fertility is improving over time. Organic matter has accumulated on the soil surface since a permanent cover crop has been maintained. There has been a dramatic change in surface soil color, and the soil structure has changed over time from massive to granular. Even the cover crop is looking healthier.

Soil structure of Ray Eck's orchard with organic matter (dark material) overlying sand (light material).

As with most almond growers, Ray uses irrigation to reduce the potential for frost damage when the temperature drops below freezing.

Cultural Requirements for Almonds:
Almonds must be cross pollinated by honey bees each year. It is a common practice to rent bees during flowering to ensure pollination. Ray has a standing rental agreement with a local beekeeper to ensure that bees will be available when they are needed.

Almonds are relatively short-lived trees. They begin producing nuts after 4 years, reach peak production in 12 years, then begin to lose vigor and need to be replaced after approximately 25 years. Almond wood is generally not used in furniture making, though it makes excellent firewood. Ray thinks the best use for his old trees is to recycle them in the soil. He is experimenting with using a brush chipper or turning the trees into sawdust so they can be reincorporated into this agricultural ecosystem.

Nutrient Cycling:
Ray fertilizes with composted dairy manure and dried poultry manure from nearby animal operations. Supplemental micronutrients are foliar applied according to foliar tissue test recommendations. These tests indicate both macro and micronutrient requirements as well as leaf chloride concentration, a potential indicator of salinity in almonds.

Ray maintains a cover crop, consisting largely of annual legumes (vetches and clovers), under his almonds. It serves a variety of functions, including erosion control, pest management, moisture retention,

and nutrient cycling. The vetches and clovers also enhance the nitrogen status of the soil. Ray applies manure to benefit the cover crop and the soil microorganisms as well as the almonds. He estimates the water and nutrients provided to the cover crop this year will be returned to his almonds in the following year in the form of soil organic carbon and recycled nutrients.

Pest Control (Insects and Rodents): Ray admits he has a distinct pest control advantage over many other almond producers in that his orchard is located near the edge of the almond production area. The immediate neighbors do not grow almonds, so serious almond pests are less likely to invade and "take over" in his area. He is surrounded by a diverse set of crops, including alfalfa, corn and oats. These crops harbor different kinds of insects, helping keep the insect population in balance, a key to Ray's pest management strategy.

Traditional orchard without cover crop.

Ray believes that in addition to monitoring insect pest levels to determine when control measures will be needed, farmers should cultivate and monitor beneficial insect and animal habitat and they will keep insect pests in check. Ray has a *Field of Dreams* philosophy: "build it and they will come." The multi-species cover crop is primarily insect habitat. To help the process along he's released some beneficial insects into the orchard, although eventually this may not be necessary. He is also working with NRCS on a relatively new program to strategically install insectary plants (plants that provide habitat for insects) around the orchard. To control rodents, Ray has installed owl boxes. However, the orchard is not pest-free. You have to live with *some* pests to make the system work, he says. The beneficial predators would not stay around if all the pests were gone.

Ray Eck's orchard with annual legumes such as vetch and clover functioning as a cover crop to recycle nutrients and retain moisture.

Ray is participating in the BIOS (Biologically Integrated Orchard Systems) program. BIOS was started as a pilot program by the Community Alliance with Family Farmers Foundation (CAFF) in Merced County in 1993, in response to public pressure to reduce chemical use on farms near urban populations. The mission of BIOS is to "build a community of farmers, other agricultural professionals and public institutions, dedicated to the voluntary adoption of a whole systems approach to farm management that is flexible, maintains long term profitability, and relies on less chemical inputs." (Community Alliance with Family Farmers, 1996) Ray was asked to serve on the BIOS management team because of his experience in biological control. He organizes field days, helps develop management plans, and provides technical assistance to farmers who participate. The program has been so successful in Merced County that it is spreading to other parts of California. Farmers participating in BIOS are eligible for Environmental Qaulity Incentive Program (EQIP) cost sharing through NRCS.

Pest Control (Weeds):
According to Ray, organic farmers have no weeds, they have native vegetation. He admits that some kinds of vegetation are less desirable than others, but his cover crop controls these fairly well. He does not mind the extra water and nutrients needed to maintain the cover crop, since they are eventually recycled into the crop or the soil organic matter.

Pest Control (Fungal Disease):
Spring fungal diseases are the biggest threat to organic almonds. Ray uses copper and sulfur products to control fungi, but during wet springs these are not particularly effective. "The best control for fungal disease," says Ray, "is dry weather." Because of fungal disease his yields are often a bit lower than those of conventional neighbors.

SOCIOECONOMIC VIABILITY

Uncertain Yields; Volatile Markets:
Ray has cornered an international niche market for organic almonds, which helps stabilize his cash flow. While paying others to process the almonds, he retains possession until they are sold to an exporter who repackages for the European market. Ray admits that the restrictions placed by organic certification can sometimes reduce yields, but in the long term, the price differential between organic and conventional almonds more than compensates.

Social Acceptance:
Urban encroachment into farmlands is occurring throughout the United States but is especially apparent in California. People living near agricultural land often fear the use of agricultural chemicals, are disturbed by odors and noises, and are irritated by slow-moving farm machinery on the roads. Urban populations need to understand the constraints under which farmers operate. Conversely, farmers need to understand the concerns of the urban population. Some farmers have found that selling their products directly to local consumers through farmers markets or other means can help them understand where food comes from. It can also increase net farm income by eliminating the "middle". For Ray this is not a viable option, since the volume of almonds he produces is too great for the local market.

Case Study No. 3: Lamar Black

Lamar Black in a row of cotton crops he manages.

Site Description:
Lamar Black has been managing a 2,300 acre farm in Jenkins and Burke Counties in east central Georgia since 1982. The owner, while interested in the farming operations, relies on Lamar for management and marketing decisions.

The climate in this part of Georgia is generally warm and moist. Average annual precipitation is approximately 47" and is fairly evenly spaced throughout the year, although localized summer droughts may occur. Temperatures are generally quite warm, reaching 90^0 F or more throughout most of the summer. Winter frosts are common here. The average frost free period is 235-240 days. The relatively high rainfall and temperature throughout this part of Georgia have contributed to rapid soil formation.

The cropped portion of the farm is dominated by Dothan loamy sands 0-2% and 2-5% slopes. These are well drained upland soils that formed in marine sediments. They are strongly acid except where limed and contain at least 5% plinthite (a highly weathered hardpan soil layer) below approximately 43 inches. This results in moderate to moderately slow permeability in the subsoil. While they are low in natural fertility and organic matter, they tend to have good tilth, and are well suited to cropping. The farm also contains Grady and Fuquay soils, which are far less suited to field crops. The Grady soils are poorly drained and tend to pond water in the winter and spring, while the Fuquay soils are extremely well drained and have a very low water holding capacity (Paulk, 1986). These soils are wooded.

Location:
Jenkins and Burke Counties, GA

District Conservationist:
Rafael Salazar
Burke County Office Park
715 West Sixth Street
Waynesboro, GA 30830
Telephone: (706) 554-5183
FAX: (706) 437-1516

Acres Farmed:
1000 acres arable cropland
1140 acres natural woodland
160 acres planted pine

Crops:
Cotton, Corn, Soybeans, Wheat, Peanuts, Grain, Sorghum

Sustainable Agriculture Issues:
ENVIRONMENTAL QUALITY & ECOLOGICAL FUNCTION
Erosion
Soil and Climate Constraints
Nutrient Cycling
Pest Pressures
SOCIOECONOMIC VIABILITY
Volatile Markets; Uncertain Yields

ENVIRONMENTAL QUALITY AND ECOLOGICAL FUNCTION

Lamar began practicing strip-till on a limited basis in 1977 as an erosion control measure for corn. Gradually he learned to use this system with other crops. Cotton was the last, and four years ago his conversion to strip-till was completed.

Erosion:
A concern over wind and water erosion prompted Lamar to examine options for erosion control. His ultimate solution has been to minimize soil tillage. Using a system called strip-till on all fields. With this system all tillage occurs at the time of planting. Lamar uses a 180 horsepower tractor to pull the strip-till equipment, which consists of straight coulters followed by a subsoiler (required to break up the hardpan that forms under Dothan soils), and two fluted coulters per row. The strip-till system leaves the soil relatively undisturbed except for a narrow seed bed (10-12") through which the planter is pulled.

While Lamar began strip-till for erosion control, many other benefits from the system have been realized. The single pass operation has reduced the time needed to prepare a field for planting, so there is more planning time and thus better accuracy in determining the planting date. Strip-till requires far less fuel than multiple tillage operations, so the wear and tear on equipment has been significantly reduced. Lamar has also noticed that bobwhite quail have been increasing on his farm though they are generally declining in the southeast as a whole. The increase may in part be due to conservation tillage. Finally, water infiltration in the irrigated fields seems to have dramatically improved since switching to strip-till.

Cotton crops that have been strip-tilled to decrease erosion and increase infiltration.

A second technique Lamar employs to reduce erosion on the fields is a winter cover crop, common in this part of Georgia. Annual rye grass is typically used because it is fast growing and winter hardy. Lamar has also been experimenting with cahaba white vetch as a winter cover crop before cotton and has been very pleased with the initial results. The vetch provides excellent cover and residue, adds nitrogen to the soil and helps alleviate the root knot nematode problem .

Climate Constraints:
Soils and climate are moderate constraints on the farm Lamar manages. While rainfall is generally adequate for most crops, it can be spotty,

especially in the summer. Soybeans and wheat are seldom seriously affected by this; however, corn yields may be severely reduced if a dry period occurs between pollination and the soft dough growth stage; and cotton yields may be improved by irrigation. Lamar has two 150-acre center pivot irrigation systems, which are used on corn and cotton. While an adequate irrigation water supply has never been a problem, Lamar is frugal with irrigation water. He monitors soil moisture in the corn fields with tensiometers and irrigates accordingly. For cotton he uses a watering schedule established by the Georgia Cooperative Extension Service and irrigates only when rainfall is inadequate to meet the needs established by the schedule. In a typical year, 2 acre-inches may be applied to the cotton and 4-5 acre-inches to the corn. In a dry year up to 14 acre-inches may be used on the same crops.

Wheat left in the fields acts as a mulch for the cotton, retaining moisture and reducing erosion.

Nutrient Cycling:
Lamar works to minimize nutrient losses. He fertilizes according to annual soil test recommendations, which indicate that the vetch cover crop supplies approximately 70 units of nitrogen per acre for the cotton that follows. Lamar applies a starter fertilizer of 10-34-0 with the corn and cotton seed at planting. Subsequent fertilizer applications are surface broadcast. Petiole samples are used to monitor the nitrogen and potassium status of the cotton through the growing season. If a deficiency is noted these nutrients are foliar applied. Lamar plans to begin performing foliar analysis on corn and soybeans also. Jenkins County is largely a row crop county, and animal manures are generally not available for applying to fields. Lamar relies on winter cover crops and conservation tillage to improve soil fertility, an approach that seems to be working.

Soil analysis performed by the University of Georgia Soils Laboratory indicates the organic matter content of the top 1/2 inch of soil in strip-till fields is 2.5-3%, compared with a typical content of 0.6% on conventionally tilled fields in this area.

Pest Control (Insects and fungi):
Lamar tries to minimize chemical inputs for pest control. He scouts soybeans regularly for pod feeders and worms that feed on foliage. Soybeans are not generally sprayed for these pests more than once during the growing season. A professional consultant scouts Lamar's cotton twice a week for boll worm and other cotton pests. Lamar plants bollguard cotton (cotton genetically altered for resistance to boll worm) on some fields, which has reduced the need to spray for boll worm.

Lamar is also working with Dr. Joe Lewis of the USDA Agricultural Research Service to develop a pest management system for cotton that uses cover crops to harbor beneficial insects. The first year of the experiment, Lamar reduced his pesticide application frequency from 5 to 2 times per year. Eventually he and Dr. Lewis hope to develop a system where no pesticides will be needed.

Insects are generally not a problem in corn or wheat, although the stink bug may be increasing in corn. Lamar plants Hessian fly resistant wheat. The warm moist climate of this part of Georgia encourages fungal growth, so Lamar often applies a fungicide to winter wheat at the boot stage. He also plants fungicide-treated corn and cotton seed.

Pest Control (Weeds):
Lamar applies herbicide to all crops, but no more than he did under conventional till and sometimes less. Cotton is slow to emerge after planting and is therefore the least able to compete with weeds. Lamar has been following the development of a technology called ultra narrow row cotton (<30" row spacing), to improve the cotton's ability to compete with weeds and reduce the need for herbicides. Lamar expects that once harvesting equipment becomes available he will be planting ultra narrow row cotton regularly.

SOCIOECONOMIC VIABILITY

Uncertain Yields, Volatile Markets:
Lamar sells cotton through a regional cotton cooperative, which has been highly successful in obtaining competitive pricing for its members. The price of peanuts is established under government programs and is rarely a question. Lamar markets the other crops directly. Grain sorghum is sold to neighboring hog farmers. Wheat, corn and soybeans are sold to local grain elevators. The price of these crops fluctuates significantly. Lamar uses experience and intuition to determine when to sell and when to store crops. He would prefer to leave these decisions to a cooperative; however, there are no grain cooperatives in this part of Georgia. The one advantage Lamar has over neighbors is that he grows several different crops each year. When the price of one is low, he may make up for the loss with one or more other crops. In addition to the annual crops, Lamar has planted 160 acres of pine for timber production with a goal of long-term, future income. Diversification to stabilize short and long-term income can be an important consideration in developing a sustainable system.

Case Study No. 4: Ed and Dorothy Kalin

Ed and Dorothy Kalin

Site Description:
Ed and Dorothy Kalin operate a 150-unit cow/calf operation on a 1,160 acre farm in Pawnee County, NE. The farm has been in Ed's family for three generations. He hopes to maintain and improve it for future generations. Ed and Dorothy work as a team, both actively participate in all aspects of the operation. They share common knowledge and goals, and work well together.

Pawnee County is located in the extreme southeastern part of Nebraska. The continental climate here is characterized by frequent and extreme weather changes. The average annual precipitation is 33.5 inches but may vary substantially from year to year. Most of the rainfall occurs in the spring and summer. Thunderstorms during this period are sometimes severe, and may be accompanied by local downpours, hail and damaging winds. Temperatures vary throughout the year. While the average late July temperature is 94^0 F, and the average late January temperature is 14^0 F, temperatures as high as 117^0 F and as low as -29^0 F have been recorded in the county.

Most of the farm is on moderately steep, clay and clay loam soils that formed on glacial material. These include soils of the Buchard and Pawnee series (Sautter, 1976). Water erosion is the principal hazard, and many of these soils are sufficiently eroded to warrant separate mapping units in the Pawnee County soil survey.

Location:
Pawnee County, NE

Resource Conservationist:
Don Ulrich
USDA-NRCS
988 11th St. Suite B
Syracuse, NE 68446
Telephone: (402) 269-3446

Acres Farmed:
1160 acres (680 owned, 480 rented)
247 acres cropland
913 acres grass and native hay

Crops:
Sorghum (Milo), Corn, Soybeans, Sorghum Silage, Alfalfa, Wheat

Primary Enterprise:
Cow/Calf production

Sustainable Agriculture Issues:
ENVIRONMENTAL QUALITY & ECOLOGICAL FUNCTION
Erosion
Climate Constraints
Nutrient Cycling
Pest Pressures
SOCIOECONOMIC VIABILITY
Volatile Markets; Uncertain Yields Information

ENVIRONMENTAL QUALITY AND ECOLOGICAL FUNCTION

Erosion:
Erosion is one of the Kalins' primary concerns. Three quarters of the farm is in permanent grass and native hay. The farm's cropland contains 8-10 miles of terraces, and approximately 2 miles of waterways, of which a few thousand feet are tiled. Many of the terraces were installed in the 1930's by the Civilian Conservation Corps and by Ed's father. Ed is careful to maintain these terraces so they always function properly. Terraces installed in the 1930's, 1940's and 1950's were spaced at close intervals compared with modern terraces, which are designed to accommodate today's larger equipment. These closely spaced terraces are more effective at controlling erosion than modern terraces.

Most of the Kalins farm produces hay for the cattle operation.

The pasture land also contains about 12 ponds that trap both water and sediment. To reduce erosion and improve grazing efficiency, Ed is working with the NRCS to develop a rotational grazing system that will involve fencing of additional pastures and existing ponds, installation of several watering tanks, and construction of four new ponds. By fencing out the ponds and providing gravity flow livestock watering facilities, bank erosion is controlled. Water quality is also enhanced by keeping livestock out of the water system.

The Kalins farm on the contour. Not only does it help reduce erosion, it is easier than plowing up and down slope. According to Ed, in the old days, when horses pulled the plows, they wanted to go in a straight line and would just as soon go over a hill as around it. This made contour farming difficult. Today there is no excuse for not farming on the contour.

Climate Constraints:
The climate in this part of Nebraska can be severe, with subfreezing winter temperatures and wind chills as low as -50° F. Ed and Dorothy's farmstead and livestock wintering areas are well protected from harsh winter winds with a series of mature windbreaks and shelterbelts.

A major concern with any livestock operation is a reliable source of clean drinking water. Uneven rainfall and sub-freezing temperatures in the winter can sometimes make this difficult. By the year 2001 Ed and Dorothy plan to install 4 ponds in addition to the ones already on their property. These ponds will be used to water the livestock and provide fire protection for the farmstead. Water from these ponds flows by

gravity to a series of "energy free" watering facilities that use convection to prevent the livestock drinking water from freezing in the winter without the use of costly heating elements.

Calving on the farm currently occurs March through May; however, Ed and Dorothy have plans to switch their calving dates to late spring and early summer. By doing so they can take advantage of growing forage when the cows need the most nourishment (i.e., the last third of gestation). At the same time the young calves will not have to contend with the harsh Nebraska winter weather until they are several months old.

Nutrient Cycling:
Livestock manure is recycled on the fields. Ed and Dorothy have placed their feed barns at different locations on the farm so they can more easily spread manure on nearby fields. The rotational grazing system they are developing should also help cycle nutrients on their pastures.

Hay and silage are produced each year for winter feed. Silage is stored in bunker silos covered with plastic sheeting and weighted down with low quality hay. The hay keeps the plastic in place, reduces punctures, and sheds water more effectively than old tires, and other materials traditionally used to hold plastic in place over bunker silos. When no longer needed, the hay is recycled on cropland fields.

Bunker silo.

Pest Control (Insects):
Insects have not recently been a problem for Ed and Dorothy. Ten years ago the farm was plagued by chinch bugs and green bugs that grew in winter wheat and later attacked sorghum. To solve the problem they stopped planting wheat for several years. Today they use longer rotations that seldom include wheat, and the insects have been brought under control. Ed and Dorothy have noticed that ladybugs are increasing since they stopped using pesticides on the chinch bugs. Ed has a great respect for ladybugs as beneficial insects. He once harvested a "swarm" of hibernating ladybugs from under a pile of small hay bales, kept them in the farm cave over winter so they wouldn't freeze, and spread them back on the field the following April as a pest control measure.

Pest Control (Weeds): The Kalins have traditionally relied on herbicides to control weed infestations in their crops, but they continue to look for ways to reduce the need for herbicides. They have extended the length of the crop rotations, alternating crops with different growth habits and rooting patterns. This year they will experiment with more narrow row spacing to allow for earlier canopy closure, which should help the crops compete with the weeds.

Ed has also learned that fertilizing native prairie hay in late spring gives competitive advantage to the less desirable grasses. He applies no more than 25-30 pounds per acre of available nitrogen to these fields after June 1.

SOCIOECONOMIC VIABILITY

Uncertain Yields, Volatile Markets:
Ed and Dorothy have been concerned but not threatened by the low beef prices that all cattle producers in the U.S. have been facing recently. In 1995 they were able to sell their stored corn and soybeans for a premium price, which helped offset the low price of livestock. Ed notes that when the price of beef is down the price of grain is usually up and vice versa. While Ed prefers to concentrate on the cow/calf production, he agrees it is good insurance to have grain crops for sale when the price of beef is low.

Ed and Dorothy also work to minimize their cash flow requirements by reducing waste (reusing and recycling materials wherever practical) and making efficient use of their assets. Keeping capital costs under control is another way of protecting themselves against major price drops. For example, most of the Kalins' equipment was purchased used. Repair and maintenance is done in-house. Equipment is kept until it is completely worn out or no longer meets their needs.

Ed and Dorothy also offset low beef prices by providing surrogate mothers for a breeder in Grand Island, NE. Once a year the breeder artificially implants a number of Ed and Dorothy's heifers with embryos of known lineage. When the calves are weaned they are sold back to the breeder at a premium price.

Ed and Dorothy have been implementing their own selective breeding program based on the "linear measuring method" since 1988. They now background calves that are 15% larger than the county average. While this does not entirely offset the low prices for beef, it helps.

Information:
Ed and Dorothy are always looking to improve their farming practices. They don't yet have access to the internet but expect that they will before too long. To get information about new, environmentally safer farming techniques, they attend trade shows, listen to radio programs, read books, take courses, work with NRCS, Cooperative Extension and other government agencies, and talk to their neighbors and other people who have implemented new ideas.

SARE 2000 Conference Proceedings

"Farming and Ranching for Profit, Stewardship & Community"

Sustainable Agriculture... Continuing to Grow

The listed producer profiles and scientific abstracts will be added to this site in stages, with more entries on a weekly basis. Visit the site regularly to read a variety of farmer and rancher stories, and overviews of scientific research on sustainable agriculture.

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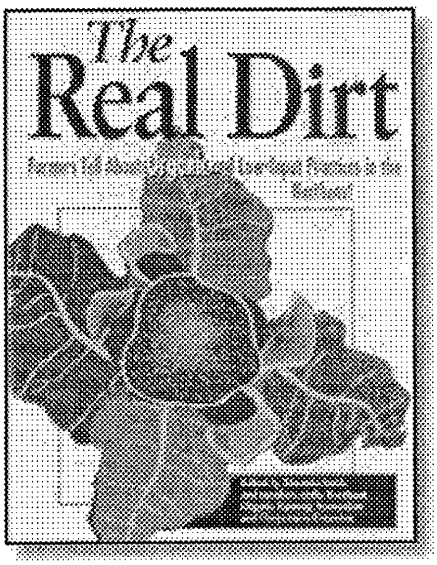
The work to create this publication was sponsored by the Western Sustainable Agriculture Research and Education (Western SARE) program. Western SARE is an effort of the U.S. Department of Agriculture. Since 1988 through federal fiscal 2000, the U.S. Congress has allocated more than $114.6 million to the federal SARE effort; Western SARE has received $26 million. The Western region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming and the Island Protectorates of American Samoa, Guam, Micronesia and the Northern Mariana Islands.

The Real Dirt: Farmers Tell about Organic and Low-Input Practices in the Northeast
1994; 2nd printing in 1998 - $13.95



How to Order

The Real Dirt provides a vivid snapshot of organic and sustainable farming in the Northeast in the 1990s. Based on interviews with more than 60 farmers in eight states, the book summarizes practical methods for ecological soil, pest, disease, crop, greenhouse and livestock management. It offers a farmer's-eye view of how to design rotations, select crops and survive economically in the face of an increasingly chemical dependent and industrialized agricultural system.

Prepared by the Northeast Organic and Sustainable Farmers Network -- a collaborative group of farmers, farm organization representatives, northeastern Extension agents and university researchers -- *The Real Dirt* responds to increased interest in sustainable and organic farming. Producers and Extension staff can turn to *The Real Dirt* for answers to questions about organic and sustainable agriculture.

Its 264 pages of readable, farm-tested experiences are even more accessible thanks to a comprehensive index, bibliography and eight appendices. The glossary, resource directory and lists of organizations and Cooperative Extension contacts for the Northeast region were all updated in 1998 for the second printing.

> "What an amazing catalog of ingenious responses to variable conditions faced by farmers. It will encourage the creativity of aspiring and experienced farmers everywhere. With its plain, practical advice, the book can be used around the country and the world to help build a sustainable agricultural community."
>
> -- Sam Smith
> Caretaker Farms
> Williamstown, Mass.

Pastured Poultry - Preface

A Heifer Project International Case Study Booklet

Appropriate Technology Transfer for Rural Areas
PO Box 3657
Fayetteville, AR 72702

Phone: (800) 346-9140
FAX: *(501) 442-9842
www.attra.ncat.org
**new area code (479)*
1/20/02

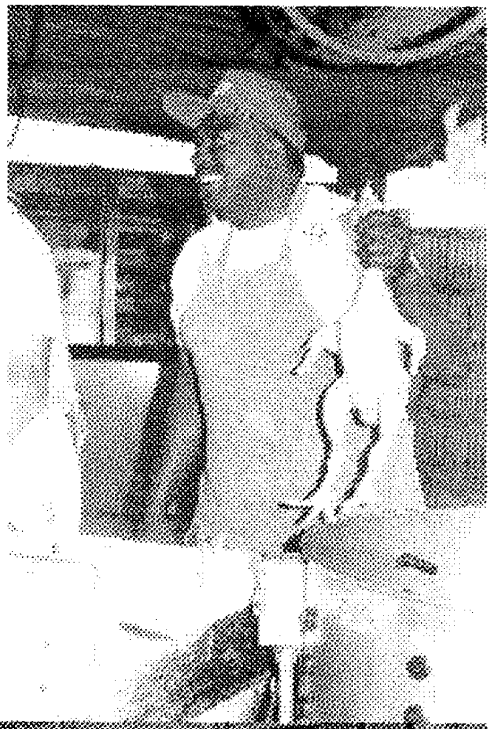
An Ark for Today's World

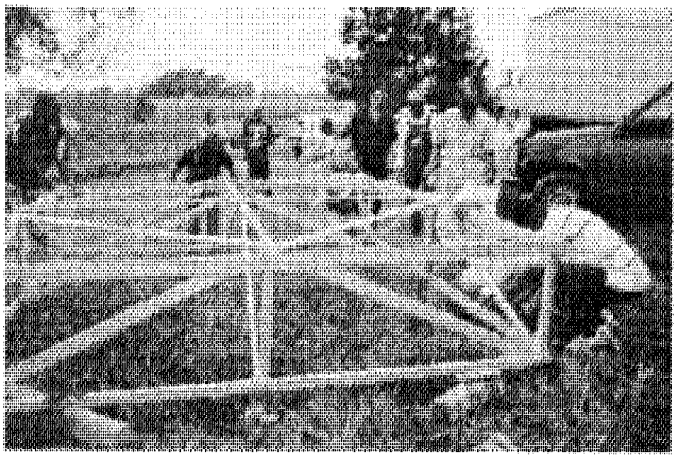
Heifer Project International
1015 Louisiana Street
PO Box 8058
Little Rock, AR 72203
Phone: (800) 422-0474
E-mail: info@heifer.org
http://www.heifer.org/

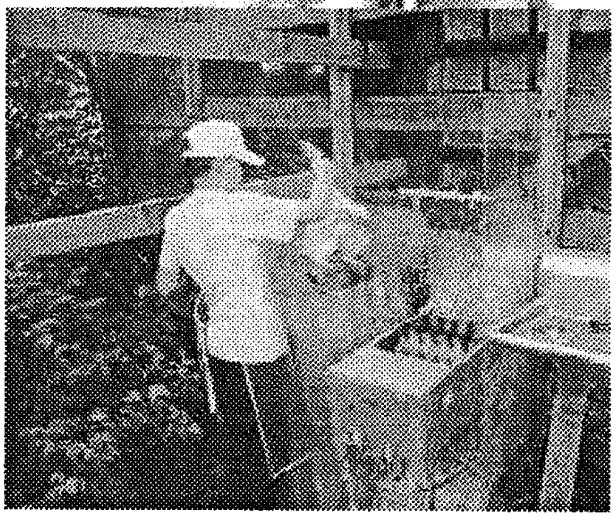
The PDF version of this document is available at
http://attra.ncat.org/attra-pub/PDF/pasturedpoultry.pdf
34 pages — 3,766 kb

Introduction **Featured Farmers** **Round-Ups** **Appendices**

This booklet was compiled by Anne Fanatico of the National Center for Appropriate Technology (NCAT) as a guide and summary of the "Integrating Pastured Poultry into the Farming Systems of Limited Resource Farmers" project. The project was conducted from 1996-99 by NCAT and Heifer Project International (HPI). It was funded by Grant #LS96-79 from the USDA's Southern Region Sustainable Agriculture Research and Education (SARE) program.







Heifer Project International

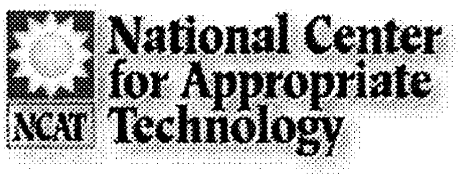
An Ark for Today's World

HPI is a private non-profit corporation dedicated to community development through sustainable livestock production.
The headquarters is located in Little Rock, AR.

NCAT is a nonprofit organization with offices at Butte, MT and Fayetteville, AR, which manages a host of public programs dealing with sustainable agriculture, along with energy conservation, low-income

energy and housing issues, and sustainable community development. NCAT's role through its projects is to improve the economic well-being and quality of life of urban and rural residents,

all the while working to improve the environment and conserve America's natural resources.



Foreward and Acknowledgments

This booklet summarizes the experiences of 35 Southern farm families who from 1996-1999 participated in a project titled "Integrating Pastured Poultry into the Farming Systems of Limited Resource Farmers."

The experience proved favorable for 27 of the project families who continue to raise range poultry for home-use and for sale to growing customer bases.

We hope this booklet will prove useful as a decision-making guide for other farmers interested in adding diversity and improving profits in their own agricultural enterprises through pastured poultry production.

We are thankful to many people who assisted in compiling this booklet. Especially helpful were the farmer grantees who took special care to keep close records of their enterprises and share that information for the benefit of potential producers.

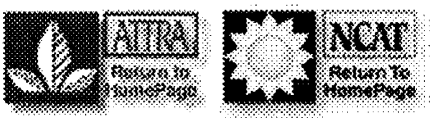
Other people, organizations and agencies who made special contributions to the project are the National Center for Agricultural Law Research and Information, Extension agents and staff of Tuskegee University, Southern University, Kentucky State University, South Carolina State University, Florida A&M University, and target="_blank"Fort Valley State University; members of the American Pastured Poultry Producers Association; and the Joel Salatin family of Swoope, VA.

We thank those individuals who were so generous in sharing photographs and slides they snapped during field days, trainings and activities on their farms. Their work helps greatly to tell the pastured poultry story and appears throughout this booklet.

We are also very appreciative to the four farm families in the "Featured Farmers" chapter of this booklet. We thank them for sharing both the trials and the triumphs they experienced while learning the techniques of raising, processing, and marketing poultry on-farm as a way to supplement their income.

Introduction **Featured Farmers** **Round-Ups** **Appendices**

The ATTRA Project is operated by the National Center for Appropriate Technology under a grant from the Rural Business - Cooperative Service, U.S. Department of Agriculture. These organizations do not recommend or endorse products, companies, or individuals. ATTRA is located in the Ozark Mountains on the University of Arkansas campus in Fayetteville, at PO Box 3657, Fayetteville, Arkansas, 72702. ATTRA staff prefer to receive requests for information about sustainable agriculture via the toll-free number 800-346-9140.



webmaster@attra.org

Small Farm Success Project
Available on www.smallfarmsuccess

A coalition of land grant universities, USDA, and nonprofit organizations in the Mid-Atlantic region is dedicated to helping small and emerging farmers improve their financial success. With funding from the USDA's IFAFS (Initiative for Future Agricultural Food Systems) program, the coalition developed an initiative entitled, The Small Farm Success Project, to help farmers:

1. effectively use consumer research and direct marketing techniques.
2. develop sustainable and profitable crop rotation strategies.
3. adopt financial strategies that enable farmers to remain viable.

The coalition includes Maryland Cooperative Extension, Future Harvest/CASA, Accokeek Foundation, Wallace Center for Agricultural and Environmental Policy at Winrock International, USDA Beltsville Agriculture Research Center, Farm to City, Pennsylvania Association for Sustainable Agriculture, and Penn State Cooperative Extension. Contact information follows:

Maryland Cooperative Extension, University of Maryland

Jim Hanson	jhanson@arec.umd.edu
Dale Johnson	dj9@umail.umd.edu
Susan Schoenian	ss80@umail.umd.edu

Pennsylvania Cooperative Extension, Penn State University

John Berry	jwb15@psu.edu

USDA-Beltsville Agricultural Research Center (BARC)

John Teasdale	teasdale@ba.ars.usda.gov
Mark Davis	davism@ba.ars.usda.gov
Leslie Gilbert	gilbertL@ba.ars.usda.gov

The **Accokeek Foundation** blends history, ecology and economics, educating people of all ages about responsible land management--past, present and future (Accokeek, Maryland).

Skip Kauffman	cskauffman@accokeek.org
Shane LaBrake	ecofarm@accokeek.org

Farm to City connects farmers in southeast Pennsylvania and New Jersey to markets in the Philadelphia area through farmers' markets, services to CSA farms, and its Winter Harvest Program (Philadelphia, Pennsylvania).

Bob Pierson phillymarkets@aol.com

Founded in 1998, **Future Harvest- a Chesapeake Alliance for Sustainable Agriculture (Future Harvest-CASA)** is dedicated to supporting profitable and sustainable food and farming systems in the Chesapeake Bay region (Stevensville, Maryland).

Bruce Mertz bm103@umail.umd.edu

Established in 1992, The **Pennsylvania Association for Sustainable Agriculture (PASA)** promotes profitable farms which produce healthy food for all people while respecting the natural environment (Millheim, Pennsylvania).

Lamonte Garber lgarber@paonline.com
Ruth Sullivan ruth@pasafarming.org

The **Henry A. Wallace Center for Agricultural & Environmental Policy** at Winrock International uses its expertise in research, policy analysis, and development to foster sustainable and equitable agricultural and food systems. Winrock International is a nonprofit organization that works with people in the United States and around the world to increase economic opportunity, sustain natural resources, and protect the environment (Arlington, Virginia).

Lydia Oberholtzer loberholtzer@winrock.org
Kate Clancy kclancy@winrock.org

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