



SUSTAINABLE SHEEP PRODUCTION

LIVESTOCK PRODUCTION GUIDE

ATTRA is the national sustainable agriculture information center funded by the USDA's Rural Business -- Cooperative Service.

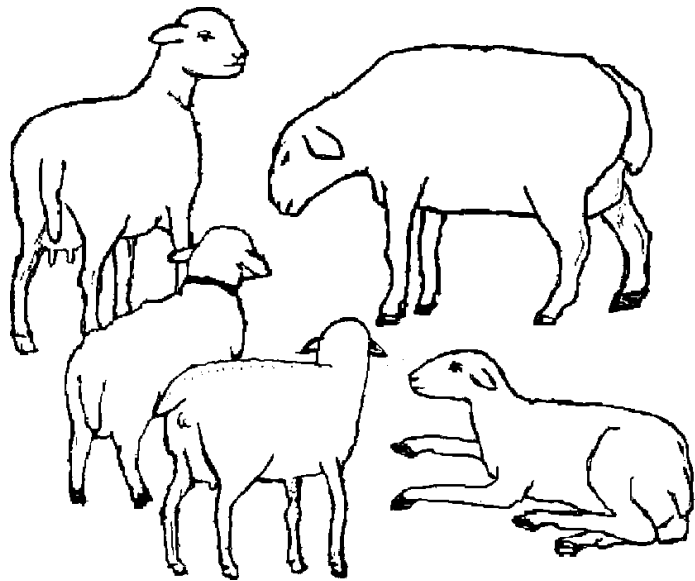
Abstract: *This publication introduces concerns and practices specifically related to sustainable sheep production. Topics covered include breed selection, controlled grazing, pasture lambing, alternative health management, and innovative marketing of meat and wool products. Four enclosures and a list of further resources are also included.*

By Ann Wells, Lance E. Gegner, and Richard Earles
 NCAT Agriculture Specialists
 May 2000

Introduction

Integrating sheep into a farming operation can contribute to the economic and environmental sustainability of the whole farm. Sheep will enhance the farm's biological diversity, and may fit economic and biological niches that would otherwise go unfilled. The relatively small investment required, and the gradually increasing size of the flock, make sheep production a good choice for the beginning small-scale or part-time farmer. For the established farmer seeking to diversify, sheep offer a number of benefits.

General production information on sheep—such as feeding, breeding, and health management guidelines—is available through local or state Cooperative Extension Service and in many



publications. It is important to learn as much as you can before beginning a sheep enterprise. The **Resources** section at the end of this document provides further sources of information, including books, magazines, websites, and organizations. We strongly encourage you to supplement your reading on the subject by contacting and visiting with sheep producers in your area.

Soil loss associated with erodible land used for row crops declines when such land is converted to well-managed pasture. Rotating row crops and pasture every three or four years offers both fertility and pest control advantages, so long as the pasture is not over-grazed. Sheep waste can replace some purchased fertilizers, and the rotation can help interrupt various weed and

Contents:

Introduction	1
Breeds.....	2
Nutrition.....	2
Alternative Health Strategies.....	4
Marketing.....	6
Conclusion	8
References	8
Enclosures	8
Resources.....	9

parasite life cycles. Sheep can be incorporated into existing grazing operations with goats or cattle. In fact, multi-species grazing with sheep, cattle, and goats is useful in increasing pasture efficiency. It has been demonstrated that grazing sheep with cattle can increase meat production by 24% compared to cattle alone, and by 9% compared to sheep alone (1). ATTRA has more information on multi-species grazing available on request.

Forage from brush, pasture, and range can be maximized as low-cost feeds. Sheep, as ruminants, convert forage that would otherwise be unusable to humans into high-quality fiber, meat, and milk. Like cattle, sheep are grazers; like goats, they also consume woody browse (tree forage and shrubs) and forbs (herbaceous plants). Sheep are less dependent on harvested grains than are cattle, swine, and poultry. Of all domestic livestock, sheep raised on forage require the least use of fossil fuel (2).

Breeds

Breed selection is based on the market being targeted by the producer, and on local climatic conditions. The breeds are divided into six basic groups: fine wool, medium wool, long wool, meat breeds, dairy breeds, and hair breeds (3). While over 40 different sheep breeds have been identified in the U.S., current economic considerations dictate the use of only a few breeds that produce sheep with high production traits and uniformity. According to Dr. Don Bixby, executive director of the American Livestock Breeds Conservancy, only four breeds make up two-thirds of the sheep population in the U.S. — the Suffolk, the Hampshire, the Rambouillet and the Dorset (4). However, many of the other 40 breeds' genetic differences need to be preserved, because each breed may have genes that will be valuable in the future, for resistance to disease or for sheep products not yet anticipated. If you are interested in helping conserve heritage breeds and genetic diversity in sheep or other livestock, contact the American Livestock Breeds Conservancy (see **Resources**). What breed you choose to work with will depend on your needs and interests. If possible, buy sheep raised in your area. Locally raised animals

will be adapted to the climatic and forage conditions of your region. Sheep coming in from a distance will be less productive and may require a year to adapt. For information on the various breeds, contact the American Sheep Industry Association (ASI), or visit the Oklahoma State University livestock breeds Web page (both are listed under **Resources**).

Nutrition

Pasture Grazing

Improving pasture and extending the grazing season are important in a forage-based sheep operation. Depending on the climate, it may be possible to improve pastures with cool season perennials (tall fescue, orchardgrass), warm season annuals (crabgrass), cool season annuals (annual ryegrass, oats, wheat), and a few warm season perennials (bahiagrass, bermudagrass) to provide year-round forage. The addition of legumes (alfalfa, clover) to a pasture provides high-quality protein, and reduces the need for nitrogen fertilizer. Sheep may also be pastured on small grains or root crops. Feeding harvested products such as hay and concentrates is a higher-cost practice. The term “grass-farming” reflects the understanding that the livestock grazer's primary product is high-quality pasture, the prerequisite for healthy animals and healthy profits. *The Stockman Grass Farmer* is an important source of information on innovative grazing and forage production practices (see **Resources** for subscription information).

The best grazing system for efficiently utilizing pasture is controlled grazing, or management-intensive rotational grazing. In controlled grazing, pastures are divided into smaller units called paddocks. The stock are kept in a paddock until they have grazed the forage down to a predetermined height, and then are rotated to the next paddock. They are not returned to a paddock until the plants have re-grown to the height needed for availability and quality. Sheep prefer to eat forage no taller than 6 inches; forage should be grazed no lower than 2 inches. Controlled grazing reduces both selectivity and repeated grazing pressure — letting plants develop more foliage before being grazed

again – while increasing pasture diversity. While rotational systems require initial expenditures for electric fencing and watering facilities, many producers report increased profitability based on lower input and feed costs, less dependence on machinery, and improvement and better utilization of pasture.

In high rainfall areas, rotational grazing can be carried out with as few as 5–10 permanent subdivisions plus the use of temporary fences. In arid areas, irrigated pasture can support such a system. On large expanses of dry rangeland, a less intensive, slower rotation – which allows more re-growth time – can be used to increase plant diversity and ration existing forage.

A three-strand electric fence is suggested for sheep in the enclosed "Pasture-Based Sheep Production" from the 1999 *Missouri Grazing Manual*. ATTRA has several publications on grazing topics that should be read in conjunction with the present document (see **Resources** for a full listing).

Low-input sheep production makes use, as much as possible, of year-round grazing even in very cold climates. At the 1994 North American Grazing Conference (sponsored by *The Stockman Grass Farmer*) speaker Janet McNally explained that sheep need to be in good condition going into winter grazing in Minnesota. No housing is provided in her system – only sheltered areas. Sheep are able to graze stockpiled forage even with 12 inches of snow on the ground, with hay bales provided as supplementary feed. Grain is fed the last five weeks of pregnancy. Since ewe lambs are still growing, they are not winter-grazed. Graziers in southern climates will have fewer days of very cold temperatures to worry about, but protection from wind and rain will be necessary. (The enclosed *Fiberfest* magazine article "Wintering Sheep Outdoors" provides ideas and suggestions for producers interested in this practice.)

Range grazing

About 40% of sheep produced in the U.S. are raised on western public rangelands, where the sheep are required to be under herder

supervision. Another 40% of sheep are produced in fenced pastures in semi-arid rangelands with no supervision. The remaining 20% are produced in pastures in the Midwest and East (5).

While public concern exists about the agricultural use of rangelands, rangeland health can be a difficult topic to define, and the term "rangelands" covers a broad number of different land types. Rangeland conditions have been improving since the 1930s as a result of better grazing systems, brush control techniques, and reseeded. It is important to note that grazing by animals is a natural process on rangeland, and properly managed grazing of livestock can be beneficial to the ecology of these unique Western landscapes (6).

Sheep have been used as an alternative to herbicides for rangeland weed control. Since sheep eat more forbs than cattle, sheep have been useful in control of leafy spurge, spotted knapweed, tall larkspur, and tansy ragwort. In one study, leafy spurge made up 50% of the sheep diet. A 90% reduction of leafy spurge has been obtained by continuous grazing of sheep through four growing seasons in Montana (7).

Sheep have been used in western forests as well, as an alternative to herbicides for suppressing weeds and encouraging young tree growth. Grazing also provides nutrients to trees in the form of manure (8). Forest grazing is a form of agroforestry, a practice that combines trees with livestock and crop production. For more information request the ATTRA publication *Agroforestry Overview*.

Riparian Zones

Proper grazing management of riparian areas – ecological zones around streams and lakes – within pastures and range is very important for environmental protection. Prolonged grazing of riparian areas in the growing season can do significant damage, though total exclusion of livestock can also be detrimental. Grazing of sheep can be timed to enhance regeneration of vegetation important for shade, habitat, and erosion control. Late-season or dormant periods are optimal for grazing of riparian areas (5).

Treating the riparian area as a separate paddock is perhaps the best way to prevent overgrazing or other damage.

Supplemental Feeding

Wintertime or dry-period feeding may include supplements in addition to hay. Grain (corn, barley, oats) is used as a supplement to provide energy. Soybean or cottonseed meals are used to provide protein. Trace-mineralized salt or other mineral supplements are also needed. Other potential feedstuffs include crop residues such as cornstalks, crops spoiled by wet weather, cull vegetables, and by-products from cereal milling, wheat milling, and food processing.

Ration-balancing ensures that animals receive the necessary amounts of nutrients (energy, protein, vitamins, and minerals). By using the National Research Council's *The Nutrient Requirements of Sheep* (see **Resources**) and their chart of the nutrient make-up of various feedstuffs, the producer can determine the amount of nutrients the sheep should receive. If laboratory feed analysis is available, it should be used instead. Advice from a local Extension agent can be helpful in balancing least-cost rations.

Pasture lambing

Many sheep producers lamb in sheds, but pasture lambing, which reduces investments in buildings and equipment, may be more appropriate for the sustainable low-input producer. Lambing should coincide with the spring flush of growth in the pasture. The lambs should be born about two weeks before forage production reaches its peak, in order for the ewes to be at full milk production when the lambs can utilize these quantities of milk. This is especially important for ewes to successfully raise twins or triplets. By changing the lambing dates to coincide with pasture production, the amount of feed purchased for the ewes can be drastically reduced.

Pasture lambing may be done on nearby enclosed pastures with some assistance from the shepherd, or on the range without any assistance. Tents or similar makeshift shelters can be used to protect

ewes and lambs when the weather turns cold and wet (9). Again, southern flocks will have less difficulty with inclement weather than those in colder climates. Disease occurrence is usually lower with pasture lambing than with shed lambing, because disease agents are not concentrated as they are in confinement. Disadvantages of pasture lambing include greater risk of losses from bad weather and predators. Conventional lambing likewise has its disadvantages. The enclosed article *Pasture Lambing – A Viable Alternative For Michigan Producers?* discusses the pros and cons of these two management options.

Some New Zealanders have developed flocks of easy-lambing ewes by going on vacation during lambing season. This extreme is not recommended, but culling of ewes that require assistance when lambing is suggested. Culling allows genetic selection that reduces lambing difficulties. After several generations of culling, the New Zealand flocks had reduced lambing difficulties by 90% (10).

Alternative Health Strategies

Preventative health care includes good nutrition, vaccination programs, and the isolation of sick animals. See the **Resources** section for information on the American Holistic Veterinary Medical Association, a referral service for veterinarians who practice alternative and complementary medicine, and *The Complete Herbal Handbook for Farm and Stable*, which discusses herbal remedies for livestock.

Most sheep will avoid most toxic plants unless there is nothing else to eat. Still, browse containing toxins can be problematic, and producers should be aware of toxic plants in their pastures. Local Extension agents or veterinarians can provide information on toxic plants for a particular region.

Management is the key to improving and maintaining the health of sheep. The nutritional and behavioral effects of controlled grazing serve to minimize stress on the animals, and low stress keeps their immune systems functioning at a high level. Intensively managed livestock

become calmer and tamer, making them easier to work with when tasks such as loading and vaccinating need to be done.

Parasites

Internal parasites of sheep include roundworms, lungworms, tapeworms, and flukes. Coccidia, which live within the lining of the intestinal tract and cause damage to the tract, are especially problematic in younger animals. Lice and keds are external parasites that affect the quality of the fleece. Knowing the life cycle of parasites is essential to their control.

Sheep graze close to the ground and so tend to be more susceptible to internal parasites than other farm animals, for many parasite larvae do not climb higher than five inches from the ground. Taking fecal samples to a veterinarian can give an idea of the parasite load on the animals. Fecal samples taken before and after treatments indicate whether or not a treatment is effective.

Clean pasture management and sanitation can aid in parasite control. "Clean" pasture is pasture that has not been grazed by the host animal for 12 months. It may also be hayed pasture, new pasture, or pasture grazed by livestock such as cattle or horses that generally do not share the same parasites with sheep (sheep and goats do share parasites). During the winter, some die-off of parasites on pasture occurs due to freezing and thawing; however, snow cover insulates the larvae.

In the heat of the day in summertime, it may be too hot and dry for larvae to move around on the pasture, so transmission will be lower. Internal parasites are not as much of a problem in arid areas as they are in areas with high humidity and heat, because the larvae dry out. Rotational grazing systems can be useful in controlling parasites, but the normal period between rotations may not be long enough to have an effect. Better nutrition from rotational grazing may aid in reducing the effect of parasites.

Knowledge of parasite control is very incomplete, especially in sheep. At this point, the best thing producers can do is to be very

diligent in their management. Running cattle in pastures that have had sheep grazing on them helps break up the life cycle of the sheep parasites, since sheep and cattle do not have the same species of worms infesting them. Flip-flopping sections – dividing the farm in half and allowing sheep to graze only one section – will do the same thing, giving large areas of the farm a chance to rest for up to 12 months. This will allow die-off of parasite larvae.

Strategic deworming several times a year may be necessary. However, worm resistance is sometimes so high that a dewormer may not be very effective (only about 50 percent kill). Induced resistance to many deworming medications is a serious problem for the sheep industry. Reducing the amount and the number of times medication is given will slow down the buildup of resistant worms on the farm. The enclosed article, "Economics of Parasite Control; More Isn't Necessarily Better," discusses alternative parasite control methods and worming options.

All livestock develop some resistance to internal parasites, although it is not as complete as that developed against viruses and bacteria. Resistance does not eliminate the presence of adult worms, but does prevent them from producing as many eggs as they normally would. Allowing an adult animal to have a small number of worms is a management technique that can cut down on the amount of worming medications used. For more information on parasite control, refer to the ATTRA publication *Integrated Parasite Management for Livestock*.

Sheep brought from the western U.S. have little or no resistance to internal parasites and have to go through a period of time before resistance develops. This causes a great deal of stress on the new animals, and owners must be aware that a smaller amount of worms will, for a time, cause more problems in the new sheep than they may have noticed in their farm-raised sheep. Breeds with relatively high resistance to parasites include the Caribbean types (Barbados Blackbelly sheep), which are "hair sheep" and do not produce wool. For more information on hair sheep, please contact ATTRA.

Diseases

Before buying a sheep, learn as much as possible about sheep and sheep diseases. It is important to know what can or cannot be treated and the consequences of bringing diseases into a flock. Take a look at the seller's flock and ask questions, in order to learn about diseases that may be present. Decide carefully what diseases or other problems you can or cannot live with, or are willing to treat or vaccinate for.

Major diseases of sheep are discussed in several books listed regularly in the *Sheep! Magazine* book specials, as well as in the *ASI Sheep Production Handbook* (see **Resources**, under American Sheep Industry Association). Find a local veterinarian who is willing to work with you and your sheep. The veterinarian can recommend a vaccination and health maintenance schedule for your flock. ATTRA has information, available by request, on some of the major diseases of sheep, such as ovine progressive pneumonia and scrapie.

Footrot

While contagious footrot is a major economic problem for many sheep producers, it is also one disease that is totally preventable. Diligent examination of potential stock additions and quarantining of new animals brought onto the farm will prevent the contamination of pastures and barns. For a footrot infection to occur, two distinct types of bacteria must be present. One is a common environmental organism found in all soils, and does not cause disease by itself. But the other bacterium, *Bacteroides nodosus*, lives only on animals and does not survive in the soil for more than a few days. For this reason, if footrot does occur, resting an area for a couple of weeks will kill out the second bacterium, and then the pasture can be considered footrot-free. This resting, coupled with treatment of infected animals, should get rid of the disease on a farm. However, some animals are chronic carriers of *Bacteroides nodosus*, and even with prolonged and repeated treatment, these animals will continue to infect pastures and other sheep. The only way to deal with these chronic carriers is to cull them from the flock.

Marketing

In conventional marketing, the producer (whether large-scale or small) has to accept whatever price the market is paying at the time for the product. Direct and niche marketing – to restaurants, private customers, or small meat retailing stores – allows the producer some ability to set the price for products. Direct or niche marketing is not for everyone, but it may be useful in selling sheep products from some sustainable operations because consumers may take a special interest if animals have been raised with few chemical inputs. In addition to meat and fiber, a growing market exists for sheep's milk cheese. If you would like information on sheep dairying, call ATTRA.

The ASI publication *Marketing Out of the Mainstream* (contact ASI for availability and ordering information), explains many aspects of direct and niche marketing of lamb and wool. Another valuable resource is *The Legal Guide for Direct Farm Marketing* by Neil Hamilton (see **Resources**). Before beginning a direct or niche marketing enterprise, be sure to consult local, county, and state authorities about regulations governing the marketing of food or fiber products.

Regulatory considerations include USDA inspection, health permits, licenses, sales taxes, weight and measurement requirements, sanitary requirements, zoning and right-of-way. Regulations can vary for the type of product you want to market. For example, when selling frozen lamb products direct to the general public, some general rules are: the lambs have to be butchered at a USDA inspected facility; the lamb has to be weighed, wrapped and labeled in secure federally-approved packages; and the meat has to be kept hard-frozen (11). Be well acquainted with all the relevant regulations before planning your marketing strategy. Approval of your plans may take six months to a year or more (12).

Producers who wish to develop direct markets will need to hone their public relations skills. Repeat, satisfied customers are key to developing

and sustaining direct markets. As the authors of an article in *National Lamb & Wool Grower* put it,

There are some basic rules when it comes to direct and niche marketing, and first and foremost is “The customer is always king.” If you can’t adhere to this motto, you best consider another career. Rule No. 2: If you learn the basic P’s of marketing – product, price, place and and promotion – you have a definite advantage over lesser informed. Rule No. 3: If you aren’t on the treadmill, then you are moving backward. Moving forward involves being open to change – such as producing products for nontraditional markets – which increases your chances of financial success (13).

Certified organic lamb is an option to consider for niche marketing. Organic certifying organizations will provide certification, for a fee, to operations that meet their strict standards. These usually include raising sheep on organic range or pasture (no synthetic chemicals applied within the last three years), giving them only organically grown feeds, and not treating them with synthetic parasiticides. The ATTRA publication *Organic Certification* provides an overview of the certification process, including the federal organic standards that are currently being established, and a list of certifying organizations.

Grass-finished lamb fits well into a niche market that values raising meat animals in a natural environment and limiting routine medication. Grass-finished lamb may aid in producing a leaner product (less external seam fat and less internal marbling) than grain-finished lamb. However, markets may need to be developed by the producer. Many sheep magazines publish articles that describe how sheep producers market lamb and fiber directly to consumers. The best markets for lamb have traditionally been in large metropolitan areas.

Another niche marketing option that you may want to consider is a marketing cooperative. Cooperatives are businesses owned and controlled by the people who use them (members). Cooperatives operate for the benefit of their members by reducing costs or providing services that might otherwise be unavailable. A marketing cooperative may engage in many

activities on behalf of members – including bargaining, grading, transportation, processing, distribution, research, and new product development. If a marketing cooperative is an option being considered, contact the Rural Business-Cooperative Service for additional information (see **Resources**).

Although wool prices have been improving in the past several years, wool production is of less economic importance than meat production in the U.S. Chemically sensitive individuals might constitute a niche clientele for wool products that have been raised organically and processed without detergents, dyes, and other irritating substances. The Green Mountain Spinnery (see **Resources**) provides custom processing services for wool producers, including non-chemical cleaning or scouring (using a vegetable oil based soap), carding, roving, and spinning. Contact ATTRA for information on natural dyes.

Producing natural colored wool is a means of developing specialized wool markets. Not only do sheep produce white and black wool; they also produce blond, red, beige, brown, silver, and gray wool. Some breeders of colored wool sheep belong to the Natural Colored Wool Growers Association (see **Resources**). Specialty wools such as colored wool or wool from minor breeds of sheep are often valued by handspinners. Colored wool may be promoted as a natural product that does not need dye and is environmentally friendly. And in general, wool can be promoted as a natural fiber alternative to synthetic fibers often used for clothing.

If you plan to sell products from the sheep you raise, you might consider establishing a trademark, both to identify your products for the consumer and to prevent other producers from copying the look or name of your products.

There are state as well as federal trademark registrations. Getting a trademark can take from several months to over a year and cost several hundred dollars, even if there are no problems. But it may be worth the trouble to make sure the trademark belongs to you. As an article in *The Stockman Grass Farmer* advises, “If you choose not to register your products, at least add the ™ symbol

to the name on all of your goods, to provide yourself some common law protection" (14).

Conclusion

A sustainable approach to farming seeks to strengthen family farms, protect community values, provide good profits to the farmer, and enhance rather than simply exploit the environment, renewing our natural and economic resources for the generations to come. With these goals in mind, sustainable sheep production combines low-cost feeding and housing, controlled grazing, creation of high-quality pastures, and integrated management of diseases and parasites. Many small-scale producers will increase their economic sustainability by pursuing alternative marketing strategies, including the cultivation of local or regional direct markets. Once you have done the research and come up with a detailed plan for your enterprise, there will be a lot of room for creativity and experimentation. The information and resources in this publication will get you started, but experience in the field is the real basis of sustainability.

References:

- 1) Walker, John W. 1994. Multispecies grazing: The ecological advantage. *Sheep Research Journal*, Special Issue: 1994. p. 52-64.
- 2) Ely, Donald G. 1994. The role of grazing sheep in sustainable agriculture. *Sheep Research Journal*, Special Issue: 1994. p. 37-51.
- 3) Phillips, R. L. et al. 1985. A Handbook for Raising Small Numbers of Sheep. Leaflet 1389. University of California Cooperative Extension Service, Berkeley, CA. p. 4-8.
- 4) Yaguchi, Hiroshi. 1996. ALBC teaches ABC's of livestock conservancy. *National Lamb & Wool Grower*. April. p. 28-29.
- 5) Glimp, Hudson A. and Sherman R. Swanson. 1994. Sheep grazing and riparian and watershed management. *Sheep Research Journal*, Special Issue: 1994. p. 65-71.

- 6) Havstad, K. M. 1994. Sheep grazing as a range improvement tool. *Sheep Research Journal*, Special Issue: 1994. p. 72-78.
- 7) Olson, B. E. and J. R. Lacey. 1994. Sheep: A method for controlling rangeland weeds. *Sheep Research Journal*, Special Issue: 1994. p. 105-112.
- 8) Sharrow, Steven H. 1994. Sheep as a silvicultural management tool in temperate conifer forest. *Sheep Research Journal*, Special Issue: 1994. p. 97-104.
- 9) McNally, Janet. 1995. Dialogue—pasture lambing idea. *Sheep! Magazine*. April-May. p. 3-4.
- 10) Fichtner, John. 1993. Sustainable sheep production. *The Stockman Grass Farmer*. June. p. 15.
- 11) Evangelista, Anita. 1992. Couple opens meat market; nets \$60 profit for each lamb sold. *Sheep! Magazine*. November. p. 24-25.
- 12) Anon. 1995. The marketing edge. *Acres U.S.A.* November. p. 36-37.
- 13) Grauberger, Janice and Laura Gerhard. 1996. Sheep producers flock to direct, niche marketing conference. *National Lamb & Wool Grower*. November. p. 7-11.
- 14) Evans Jr., Lawrence E. 1997. Have you neglected corporate™ trademarks®? *Small Farm Today*. February. p. 40-41.

Enclosures:

Bowen, Joan S. 1994. Economics of parasite control; more isn't necessarily better. *Sheep! Magazine*. December. p. 15.

Gerrish, James R. 1999. Pasture-based sheep production. In: *Missouri Grazing Manual*, University of Missouri, Forage Systems Research Center. Manual 157. p. 129-133.

Kruesi, William K. 1994. Wintering sheep outdoors. *The Fiberfest Magazine*. Winter. p. 16-17.

Rook, J. S., M. Kopcha, & B. Bartlett. 1996. Pasture lambing—A viable alternative for Michigan producers. In: *Great Lakes Grazing Conference*, February 19-20, Battle Creek, MI. 10 p.

Resources:

ATTRA publications

Integrated Parasite Management for Livestock

A systems approach to assess and manage the soil, forages, and animals to decrease internal parasites and their effects.

Rotational Grazing

How to manage pastures and grazing animals to more profitably utilize the farm's resources.

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

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.

Sustainable Pasture Management

Managing fertility and pests, grazing systems, conserved forages, maintaining productivity, additional resources.

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.

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.

Introduction to Paddock Design and Fencing-Water Systems for Controlled Grazing

Basics of paddock design, considerations in fencing and water technology, enclosures.

Direct Marketing

Importance of marketing, market research, niche marketing, value-added marketing, pricing, promotion, resources.

Alternative Meat Marketing

Comprehensive introduction to producer marketing of meat products. Pitfalls, producing and packaging for quality and consistency, direct marketing options, value-added products, food safety and labeling, niche markets, resources.

Organic Certification

How it works, legal requirements, types of programs, list of certifying organizations.

World Wide Web

Many electronic resources are available to the sheep producer with internet access. Two of particular interest are "sheep" at listproc@listproc.wsu.edu and "sheep-l" at listserv@listserv.uu.se. To subscribe to either, send a message to the above address that says "subscribe sheep [or sheep-l] your name." A search engine such as Yahoo or Alta Vista can be used to locate other lists on the World Wide Web. The following are some useful websites:

<http://www.ansi.okstate.edu/BREEDS/SHEEP>
Oklahoma State University's livestock breeds page.

<http://www.teleport.com/~bsginc/links.htm>
The Black Sheep Gathering. Links to companies and organizations.

<http://www.anwg.org/resources/links/index.html>
Association of Northwest Weavers' Guilds. Fiber-related links.

http://www.dpie.gov.au/agfor/wool_v1/whome.html

This Australian site keeps track of leading on-line information resources related to wool, including markets, technology, spinning and knitting, conferences, and discussion groups.

<http://www.iplex.com/cgi-bin/var/iplex/adler/wool/wool.html>

Homepage of Bodega Pastures Sheep, producers of organic wool and practitioners of sustainable ranching in California.

<http://www.graigfarm.co.uk/midwales.htm>

Entertaining and informative homepage of Graig Farm in Wales, producers of organic lamb, with discussion of their philosophy and practices, breed selection, descriptions of their products, etc.

<http://www.sheepcheese.com/aboutfarm.htm>

Homepage of Willow Hill Farm in Vermont, producers of organic lamb, fiber, and farmstead sheep's milk cheeses. Includes price list for cuts of lamb.

Organizations

American Sheep Industry Association

6911 South Yosemite Street, Suite 200

Englewood, CO 80112-1414

(303) 771-3500

e-mail: info@sheepusa.org

<http://www.sheepusa.org>

The ASI publishes a comprehensive text outlining production practices for sheep producers, entitled Sheep Production Handbook. Contact ASI for availability and ordering information.

American Livestock Breeds Conservancy

PO Box 477

Pittsboro, NC 27312

(919) 542-5704

e-mail: albc@albc-usa.org

<http://www.albc-usa.org>

The ALBC is a non-profit organization dedicated to the conservation of American livestock breeds. Nearly 100 breeds of livestock and poultry are now threatened with extinction. ALBC serves to promote these

breeds by educating its members and the public about genetic diversity, by research on the status of breed populations, and by supporting the efforts of breeders and breed associations. ALBC publishes an annual Breeder's Directory (contact ALBC for ordering information).

American Holistic Veterinary Medical Association

2218 Old Emmorton Rd.

Bel Air, MD 21015

(410) 569-0795; Fax (410) 569-2346

<http://www.altvetmed.com>

Green Mountain Spinnery

PO Box 568

Putney, VT 05346

(800) 321-9665

<http://www.spinnery.com>

Natural Colored Wool Growers Association

Barbara Kloese, Registrar

429 West U.S. 30

Valparaiso, IN 46385

219-759-9665

e-mail: kloese@gte.net

<http://www.ncwga.org>

USDA Rural Development/Cooperative Services

Stop 3250

Washington, DC 20250-3250

(202) 720-7558

e-mail: coopinfo@rurdev.usda.gov

<http://www.rurdev.usda.gov/rbs/coops/csdir.htm>

Books and Manuals

Small-scale Livestock Farming: A Grass-based Approach for Health, Sustainability, and Profit.

By Carol Ekarius. 1999. Storey Books. 217 p.

Raising Sheep the Modern Way

By Carol Ekarius. 2000. Storey Books.

The best book for the basics of raising sheep. Contact the publisher for prices and availability of these two books:

Storey Communications

105 Schoolhouse Rd.

Pownal, VT 05261

(800) 441-5700

www.storeybooks.com

Management Guidelines for Efficient Sheep Production (NCR240)

Cost is \$3.60 per copy, plus \$1.50 s/h
(check payable to Extension Publications)
University of Wisconsin-Madison
Cooperative Extension Publications
630 W. Mifflin Street
Room 170
Madison, WI 53704
(608) 262-3346

Handbook for Raising Small Numbers of Sheep
(Pub. 21389)

Cost is \$5.00 per copy, plus \$2.00 s/h
(check payable to UC Regents; CA residents add sales tax)
University of California
ANR Communication Services
6701 San Pablo Avenue
Oakland, CA 94608-1239
(800) 994-8849
<http://anrcatalog.ucdavis.edu>

Sheep Housing & Equipment Handbook (MWPS-3)

Cost is \$10.00 per copy, plus \$3.50 s/h
(check payable to MWPS)
MidWest Plan Service
122 Davidson Hall
Iowa State University
Ames, IA 50011
(800) 562-3618

Niche Guide for Lamb Cooperatives (Research Report 142)

Cost is \$3.00 (check payable to USDA).
USDA/RBCD/Cooperative Services
Program
Stop 0705
1400 Independence Ave. SW
Washington, DC 20250-0705
(202) 720-6483

*Organic Lamb at Heifer Project International
Overlook Farm*

By Dale Perkins. 1991. HPI.
(Free publication)
Heifer Project International
216 Wachusett St.
Rutland, MA 01543
(508) 886-2221

Nutrient Requirements of Sheep (6th Edition).

By the National Research Council. 1985.
National Academy Press, Washington, DC. 112 p.
Available for \$24.95 plus \$4.00 s/h from:
Fertile Ground Books
P.O. Box 2008
Davis, CA 95617-2008
(800) 540-0170
<http://www.agribooks.com>

The Complete Herbal Handbook for Farm and Stable.

By Juliette de Bairacli Levy. 1991.
Faber and Faber, Winchester, MA. 384 p.
Juliette de Bairacli Levy pioneered herbal veterinary medicine. This book, first published in 1952 and now a classic in its field, has been thoroughly revised and updated, with a considerable amount of new information added. Available by special order from your local bookstore, or on-line from Barnes and Noble for \$17.56 plus shipping and handling:
<http://www.barnesandnoble.com>

The Legal Guide for Direct Farm Marketing

By Neil D. Hamilton. 1999. 235 p.
An up-to-date, well-written primer on all the legal considerations related to direct marketing of agricultural products. Underwritten by a USDA SARE grant. Includes a chapter on marketing of meat. Available for \$20 from:
Drake University Agricultural
Law Center
2507 University Avenue
Des Moines, IA 50311-4505
(515) 271-2065

Magazines:

Sheep! Magazine
Duck Creek Publications, Inc.
P.O. Box 10

Lake Mills, WI 53551
e-mail: comments@sheepmagazine.com
<http://www.sheepmagazine.com>
Subscription rate is \$20.00 per year (10 issues). Many issues have several pages listing books available on general sheep production.

The Stockman Grass Farmer
P.O. Box 2300
Ridgeland, MS 39158-2300
601-853-1861

*Published monthly. Subscription rates:
\$28./1 yr.; \$50./2 yrs.*

Ranch & Rural Living Magazine
P.O. Box 2678-S
San Angelo, TX 76902
(915) 655-4434
e-mail: 2ranch@airmail.net
<http://biz3.iadfw.net/ranchmag>

*Subscription rate is \$24.00 per year (12
issues).*

The Shepherd
5696 Johnston Road
New Washington, OH 44854-9736
(419) 492-2364

Subscription rate is \$20.00 per year (12 issues).

Small Farm Today
3903 W. Ridge Trail Road
Clark, MO 65243-9525
(800) 633-2535

Subscription rate is \$21.00 per year (6 issues)

Spin Off
Interweave Press
201 E. Fourth Street
Loveland, CO 80537-5655
(970) 669-7672
e-mail: spinoff@interweave.com
<http://www.interweave.com>

Subscription rate is \$24.00 per year (4 issues)

The electronic version of **Sustainable Sheep
Production** is located at:
<http://www.attra.org/attra-pub/sheep.html>

**By Ann Wells, Lance E. Gegner, and
Richard Earles
NCAT Agriculture Specialists**

May 2000

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 at the University of Arkansas in Fayetteville at P.O. Box 3657, Fayetteville, AR 72702. ATTRA staff members prefer to receive requests for information about sustainable agriculture via the toll-free number 800-346-9140.