



Sheep: Sustainable and Organic Production

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Contents

Introduction.....	1
Breed selection.....	1
Feeding ruminants.....	3
Reproduction.....	8
Health.....	9
Facilities.....	12
Marketing.....	13
Organic production.....	17
Economics.....	20
Conclusion.....	22
References.....	22
Further resources.....	22

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. A list of further resources is also included.

Introduction

For the established farmer seeking to diversify, sheep offer a number of benefits. Sheep can easily be integrated into an established farm and are a good complement to cattle. Integrating sheep into a farming operation can also contribute to the economic and environmental sustainability of the whole farm. Sheep will enhance a 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, also make sheep production a good choice for beginning, small-scale, or part-time farmers.

It is important to learn as much as you can before beginning a sheep enterprise. General sheep production information — such as feeding, breeding, and health management — is available in local or state Cooperative Extension Service publications. The **Resources** section at the end of this publication provides further sources of information, including books, magazines, websites, and organizations. We strongly encourage you to supplement your reading by contacting and visiting sheep producers in your area.

Sheep can be incorporated into existing grazing operations with goats, cattle, or horses. In fact, multi-species grazing is useful in increasing pasture efficiency. It has been demonstrated that grazing sheep with cattle can increase total meat production by 24% compared to raising cattle alone, and by 9% compared to raising sheep alone.



Sheep production is a good choice for beginning, small-scale, or part-time farmers. Photo by Linda Coffey, NCAT.

(Walker, 1994) See the ATTRA publication *Multispecies Grazing* for more information.

Breed selection

Breed selection is based on the intended market(s), on local climate, and personal preference. Breeds can be divided into eight categories.

What breed(s) you choose to work with will depend on your needs and interests. Common breeds are Suffolk, Hampshire, Rambouillet, and Dorset. Hair sheep breeds include Katahdin, St. Croix, Dorper, and Barbados Blackbelly. All breeds have advantages and disadvantages. Crossbreeding is very common



Related ATTRA Publications

Small Ruminant Sustainability Checksheet

An Illustrated Guide to Sheep and Goat Production

Dairy Sheep

Breed Category	Description	Example
General purpose	Good balance between sire and dam traits	Dorset, North County Cheviot, Montadale
Maternal	Good adaptability to more difficult environments; above-average fleece; primarily found in range areas	Merino, Rambouillet, Targhee, Columbia, Polypay
Prolific maternal	Very large numbers of lambs (average three or more per ewe); excellent newborn vigor	Finnsheep, Romanov
Sire	Large mature size; rapid growth; superior muscling; lower carcass fat	Suffolk, Hampshire, Oxford, Shropshire, Texel, Southdown
Dairy	Specialized for milk production	East Friesian, Lacaune
Hair (meat)	Don't have wool; adapted to hot, humid climates; parasite tolerant	Katahdin, Dorper, St. Croix, Barbados Blackbelly
Specialized or long wool	Produce colored fleeces or fleeces with other unique characteristics; desired by fiber artists	Shetland, Icelandic, Lincoln, Border Leicester, Romney
Hobby or rare	Not typically used for commercial production; may be raised for exhibition, breeding stock, or to preserve the breed; may possess traits of importance to production in the future	Jacob, Cotswold, Navajo-Churro, Gulf Coast Native

Table adapted from "Changes in the Sheep Industry in the United States." 2008. National Research Council. Chapter 2.

and allows for lambs to have desirable characteristics of more than one breed. Your farm goals should dictate what breed(s) of sheep you choose and whether or not you crossbreed. It is also important to remember that there is just as much variation among animals of the same breed as there is among animals of different breeds.

For more information on the various breeds, contact the American Sheep Industry Association (www.sheepusa.org) or visit the Oklahoma State University livestock breeds web page (www.ansi.okstate.edu/breeds/sheep). The book *Storey's Illustrated Breed Guide to Sheep, Goats, Cattle, and Pigs*, by Carol Ekarius, is another good source of breed information. The American Livestock Breeds

Conservancy (www.albc-usa.org) has information on rare and heritage breeds. For more information and research on hair sheep breeds, see the proceedings of the Hair Sheep Workshop (www.sheepandgoat.com/HairSheepWorkshop).

When selecting animals for your flock, you must first decide what traits are important to you and what the animals will be used for. Find producers with the types of animals that you are interested in. You can locate producers by contacting your local extension agent, searching classified ads in sheep publications, viewing online directories, contacting sheep clubs or associations, or by attending meetings or seminars for sheep producers. Once you have found a producer with sheep for sale, visit the farm to observe the flock and the management. The animals will adapt more easily to your farm if their prior management and environment are similar to yours.

To develop a productive flock, it is imperative that you select healthy animals. Never build your flock with animals from a sale barn. These are often animals that have been culled by another producer. There is a reason why they were culled, and you do not want

Wooled Sheep Considerations	Hair Sheep Considerations
Growth and carcass characteristics Accepted in the traditional markets Produce marketable wool Widely available	Less seasonal than woolled sheep Higher lambing percentages than many woolled breeds Some breeds show resistance to internal parasites Heat tolerant No wool to shear or market Don't have to dock tails

to bring those problems to your flock. Don't purchase animals that are limping, look sick, or are lagging behind the others. Always purchase animals that are lively and look alert. Select animals that have sound feet and legs and a proper bite (not over-shot or under-shot). It is helpful to bring an experienced sheep producer to assist you in selecting animals that are likely to be healthy and productive.

Listed below are some of the signs of a healthy animal.

- Lively manner
- Easy movement (no limping, swollen joints, or misshaped or hard udders)
- Proper conditioning (not overly fat or excessively thin)
- Well-shaped udder and teats

Question the producer about the flock. For example, ask what diseases have been problems in the flock, what the vaccination and deworming protocol is, and what criteria are used for selection and culling. Also ask your veterinarian about diseases that could be a problem in your area.

To run an efficient operation, it is necessary to identify animals (usually by tattoos or eartags) and keep records. Breeding, reproduction, health, and production records are helpful in identifying which animals are most productive and which should be culled. Sample record-keeping forms can be found at www.sheepandgoat.com.

Feeding ruminants

Sheep will typically consume two to four percent of their body weight (on a dry matter

basis) each day in feed. Animal size, stage and level of production, animal activity, and environmental conditions all influence an animal's nutritional requirements. A variety of feedstuffs can be used to meet your animals' nutritional needs.

Forage from brush, pasture, and range can be maximized as low-cost feeds. Sheep, as ruminants, convert forage that would otherwise be unusable 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 dairy cattle, swine, and poultry.

Sheep are ruminants, named for the rumen — the largest compartment of the stomach. The health and productivity of sheep, as with all ruminants, depends on healthy rumen function. Microorganisms in the rumen digest fiber, carbohydrates, and protein to supply the animal with nutrients. It is essential that the animals be fed appropriately so that these organisms stay healthy.

The rumen organisms require fiber, nitrogen (protein), and energy (carbohydrates). The microorganisms prefer a pH range of 6 to 6.8. The digestion of grain (especially finely ground grains) lowers the rumen pH. If sheep eat too much grain, their ruminal pH can drop too low and make them very sick. The rumen microorganisms are healthiest when sheep are eating high-quality forages such as vegetative pasture. When grain (or more grain) is added to the ration, the rumen needs time to adjust. For more information, see ATTRA's *Ruminant Nutrition for Graziers*.

Lambing						
Animal ID	Bred	Due	Lambled	No. in litter	Sire	Comments

An example breeding record form.

Related ATTRA Publications

Pastures: Sustainable Management

Pasture, Rangeland, and Grazing Management

Ruminant Nutrition for Graziers

Rotational Grazing

Paddock Design, Fencing, and Water Systems for Controlled Grazing

Managed Grazing in Riparian Areas

Pasture grazing

Improving pasture and extending the grazing season are important in forage-based sheep operations. Depending on the climate, it may be possible to improve pastures with cool season perennials (tall fescue, orchardgrass), warm season annuals (crabgrass, dwarf pearl millet), 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, lespedeza, birdsfoot trefoil) 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 (brassicas). Feeding harvested products such as hay and concentrates (grain) is usually 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. For more information on pastures, see ATTRA’s *Pastures: Sustainable Management*.

The best grazing system for efficient use of pasture is controlled grazing, or management-intensive rotational grazing. In controlled grazing, pastures are divided into smaller units called paddocks. The sheep are kept in

a paddock until they have grazed the forage down to a predetermined height, and then rotated to the next paddock. They are not returned to a paddock until the plants have regrown to the height needed for availability and quality. Sheep prefer to eat forage no taller than six inches; forage should be grazed no lower than three inches. Controlled grazing reduces both selectivity and repeated grazing pressure — letting plants develop more foliage before being grazed again — while increasing pasture diversity. Although rotational systems require initial expenditures for fencing and water facilities, many producers report increased profitability based on lower input and feed costs, less dependence on machinery, and improvement and better use of pasture.

When grazing sheep, farmers must protect their pastures from being overgrazed. There are several reasons for this. Overgrazing forages:

- Eventually kills the plants
- Reduces the longevity of the stand and exposes more soil to erosion
- Means the animals don’t get enough food
- Increases the chance of sheep ingesting infective internal parasite larvae

Environmental impacts and sustainable sheep production

There are substantial environmental benefits associated with sustainable sheep production. These include low embodied energy in feed — all the energy used during feed production — and low releases of emissions such as carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄).

Generally, sustainable sheep production is pasture-based and requires little or no supplemental feed. Producing forage on-site and without the use of energy-intensive inputs including fertilizers, herbicides, and fuels to dry and store feed, generally lowers the embodied energy in sheep feed. When feeding native hay and grains that are produced locally, the energy required

for transportation is reduced further due to shorter distances between the feed source and the sheep. Since fossil fuels are primary sources of greenhouse gas emissions such as CO₂, using fewer energy inputs usually reduces emissions as well.

Providing sheep with access to pasture forage improves the ecological balance between forage and livestock. Pastured sheep efficiently close the loop between harvesting forage and returning nutrients to the soil, and with less energy than if forage were harvested and hauled from the pasture and manure was then hauled back out onto the pasture. Distributing manure and urine on the pasture

also reduces methane emissions from manure slurry.

Proper soil and pasture management can also mitigate the release of emissions. Under certain soil conditions, N₂O emissions are released from the soil through a process called denitrification. An excessive buildup of manure and urine (nitrogen, ammonium) in water-saturated soils can lead to denitrification and the release of N₂O, a greenhouse gas 310 times more powerful than CO₂. Rotating animals through pastures and moving feeding, watering, and shade areas will help spread the manure and urine out more uniformly and may help decrease N₂O emissions from pasture soils.

- Creates bare spots, creating opportunities for undesirable weeds and erosion.

The end result of overgrazing is reduced performance of both the pasture and the animals, as well as health problems for the animals. To prevent overgrazing, farmers should be careful to understock rather than overstock land and always remove animals from a pasture when the pasture is grazed down to about three to four inches.

Fresh, clean water must always be available. Adult sheep require approximately one gallon of water per day. In a rotational grazing system, the animals either have access to a central water source available to every subdivision, or water is provided separately to each of the pasture's subdivisions. This can be a challenge and an additional capital expense. For more information, see ATTRA's *Pasture, Rangeland, and Grazing Management*.

Predation

Sheep are animals of prey due to their size and nature, so they are susceptible to predation. Predators range from coyotes and mountain lions to neighborhood dogs. The first line of defense should be strong, adequate fencing. But most of the time fencing is not enough. Livestock can be protected by guardian animals, including donkeys, llamas, and most commonly, guardian dogs. The most widely used livestock guardian breeds are Great Pyrenees, Anatolian Shepherds, Komondors, and Kuvaszes. For more information on how to control predators, see the ATTRA publication *Predator Control for Sustainable and Organic Livestock Production*.

Range grazing

Rangeland is land historically dominated by grasses, forbs, or shrubs. Rangeland also includes land revegetated and managed like native vegetation. Some rangeland types are natural grasslands, savannas, moist deserts, tundra, alpine plant communities, coastal and freshwater marshes, and wet meadows. (USDA, 2003) The natural diversity, topography, climate, and extent of rangelands in the U.S. make rangelands well-

Fencing

When raising sheep on pasture, adequate fencing is essential. Good fencing allows you to control grazing, helps save you the frustration of having to chase sheep back into the pasture, and helps protect against predators. Fencing will also be the greatest expense, other than the initial cost of the animals. Traditional sheep fencing is a four-foot woven wire with barbed wire along the top. Four or more strands of high-tensile electric wire is a more economical fencing choice. Strands of polywire can be used for temporary paddocks. Sheep may have to be trained to electric fences by placing them in a small paddock to "test" the wire. Electric netting is also an option for temporary fencing in controlled grazing systems. Regular checking and testing of fences is necessary, and any problems must be fixed promptly, or sheep will escape. Sheep will respect electric fencing better if it is hot (>3000 volts).

These animals are hardest to fence:

- Rams
- Lambs at weaning
- Hungry sheep (not enough forage in their pasture)
- Sheep in full fleece



Photo courtesy of Susan Schoenian, University of Maryland

suited to sheep grazing. However, rangelands have historically been over-exploited to the detriment of many range sites, especially in the western U.S. Nowadays, range managers and researchers are making significant inroads toward the development of sustainable rangeland grazing systems that are naturally regenerative; allowing for the production of livestock while restoring sensitive rangeland.

About 48% of sheep produced in the U.S. are raised in 10 western rangeland states. (NASS, 2010) Sheep are well adapted to



A Great Pyrenees guards his flock. Photo by Susan Schoenian, University of Maryland.



Sheep are well adapted to rangeland grazing. Photo by Susan Shoenian, University of Maryland.

Copper

Sheep are very sensitive to copper. They require lower levels than other livestock. Be sure to feed mineral mixes and other feed products that have been specifically formulated for sheep.

rangeland grazing because of their body size relative to cattle, their grazing and browsing behavior that relies on a more diverse diet than cattle, and, especially, their ability to graze weedy plants such as leafy spurge and spotted knapweed.

Range managers have known for years that grazing can damage rangeland health for decades. Through observation of rangeland ecology and grazing animal behavior, successful grazing managers realize that animal impact can have a positive influence on rangeland health as well.

A good example of management to positively affect rangeland health is called targeted grazing. According to Launchbaugh and Walker (2006), targeted grazing is the application of a specific kind of livestock at a determined season, duration, and intensity to accomplish defined vegetation or landscape goals. As opposed to good grazing management, which range managers are becoming quite good at, targeted grazing refocuses the results of grazing from livestock production to vegetation and landscape enhancement. (Launchbaugh and Walker, 2006)

For more information on targeted grazing and using sheep to control weeds, see the publication *Targeted Grazing: A Natural Approach to Vegetation Management and Landscape Enhancement* (www.cnr.uidaho.edu/rx-grazing/Handbook.htm).

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 meal is used to provide protein. 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.

Trace-mineralized salt or other mineral supplements are also needed. It is best to feed calcium, phosphorous, and trace minerals in the grain or in a salt mixture to ensure that the animals actually eat them. Test your

forages to determine their mineral content, and adjust mineral supplementation as needed. Your local Extension agent can have your forage analyzed. Mineral content of forage is quite variable across the country, and the type, stage, and level of production of the animal influences mineral requirements. Therefore, no one mineral supplement formula is right for all locations or situations. It is very important that you consistently offer mineral mix (preferably in a loose form), monitor its consumption, and ensure that all the sheep are in fact eating adequate amounts of the mineral supplements. The website www.sheepandgoat.com has additional resources on proper nutrition and feeding of sheep.

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 References) and their chart of the nutrient make-up of various feedstuffs, a producer can determine the amounts of nutrients their 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. Montana State University has a website for balancing sheep rations, www.msusheepnutrition.montana.edu.

Body condition scoring

Your goal in feeding your animals is to meet their nutritional requirements (economically) and to keep them in a productive condition. One way to monitor the animals' condition is to assign body condition scores (BCS). Body condition scoring evaluates the body fat reserves of your sheep and is an easy method to evaluate the effectiveness of your feeding program. To do this with sheep, you must use your hands to feel the animal — wool and hair make it impossible to see accurately.

Body condition scoring is based on the amount of muscling and fat deposition over and around the vertebrae in the loin region. Scores range from 1 to 5, with 1 being emaciated and 5 being obese. For most of the life cycle of the sheep, the goal is to keep them in moderate condition (3). When ewes are nursing twins some weight loss is expected. Even with good feed, body condition may be a 2.

It is a good idea to monitor the body condition of your flock before breeding, before lambing, after lambing (while nursing), and at weaning. You should adjust your feeding program to allow most of your flock to maintain moderate condition. Body condition scoring can also be used to determine market readiness.

Body Condition Scores	
Score 1	Sheep is extremely thin, unthrifty but agile. Skeletal features are prominent with no fat cover. No apparent muscle tissue degeneration. Has strength to remain with the flock.
Score 2	Sheep is thin but strong and thrifty with no apparent muscle structure wasting. No evident fat cover over the backbone, rump, and ribs, but skeletal features do not protrude.
Score 3	Sheep are thrifty with evidence of limited fat deposits in fore rib, over top of shoulder, backbone, and tail head. Hipbone remains visible.
Score 4	Moderate fat deposits give the sheep a smooth external appearance over the shoulder, back, rump, and fore rib. Hip bone is not visible. Firm fat deposition is evident in brisket and around the tail head.
Score 5	Sheep are extremely fat with the excess detectable over the shoulder, backbone, rump, and fore rib. Excess fat deposits in brisket, flank, and tail head regions lack firmness. Sheep appear uncomfortable and reluctant to move about.
Table adapted from the "Sheep Production Handbook." 2006.	

How many rams do you need?

You should have one mature ram for every 35 to 50 ewes. Ram lambs (7 to 12 months) can service 15 to 30 ewes.

Reproduction

Breeding

Female sheep (ewes) reach puberty between 5 and 12 months of age, depending on the breed and nutrition of the ewe, and should be at least 70% of their mature weight at breeding. Most sheep are seasonal breeders, reacting to shorter days as a cue for breeding. The presence of a ram stimulates the reproductive cycle (estrus). The typical peak time for breeding is the fall (October-November), and ewes come into heat every 16 to 17 days. Gestation is about 150 days.

Breeding and lambing should be planned based on many factors including the following.

- Market demands (What type and size of animal will you market and when?)
- Available forage
- Timing (Do you want to lamb in January or March?)
- Production system (Do your animals breed out of season; do you want multiple lamb crops in a year; are you lambing on pasture or in a barn?)
- Climate (Is shelter available?)



Optimum lambing time varies depending on the production and marketing situation. Photo by Linda Coffey, NCAT.

While the ram is often overlooked, he is the most important member of the flock. Your ram influences every lamb in your flock. Having a quality ram, with the traits you want, is important to building a productive flock.

Rams reach puberty between five and seven months, at approximately 50% of their mature weight. It is wise to have a breeding soundness exam (BSE) performed on your ram. A BSE can be conducted by your veterinarian or other trained professional. The exam consists of a physical evaluation of the ram (lameness, body condition, general health, scrotal circumference) and semen evaluation (sperm count, motility, and morphology). It is also important to observe rams for breeding behavior. A breeding soundness exam will not indicate libido. You can use a marking harness to assess breeding behavior and effectiveness. Exposure to high temperatures can cause a ram to be temporarily sterile (up to 10 weeks). Shade and shearing can help keep rams cool.

Males of breeding age are unpredictable and may be aggressive. Rams should never be trusted, even if they were hand raised. In fact, hand-raised rams can be more dangerous because they lack fear or respect for humans. Behaviors that were fine when they were small (butting, rubbing) can be dangerous in a full grown ram. Never turn your back on a ram. If you are raising rams, don't touch their heads, and don't try to make them pets.

Lambing

In general, ewes will lamb with no assistance and with no problems. Good nutrition and plenty of exercise will prevent many birthing problems.

Lambing can be done in sheds or barns or on pasture. Pasture lambing reduces the need to invest in buildings and equipment and is more appropriate for low-input systems. Southern flocks will have less difficulty with inclement weather than those in colder climates. Disease occurrence may be 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 risks of parasites and losses from bad weather and predators.

Optimum lambing time varies depending on the production and marketing situation. By timing lambs to be born around the same time as the spring flush of growth in the pasture, ewes can have adequate forage during their peak period of lactation. This will also cut down on the supplemental feed ewes need. However, some producers have noted that lambs born later in the spring do not grow as well as lambs born earlier, which may be due to parasites. Lambs born later are just starting to graze as parasite numbers on pasture are increasing. Earlier lambs have a chance to grow and develop their immune systems before they have the parasite pressure of spring and summer grazing. If lambing occurs early in the year (January to early March), ewes will need high quality hay and possibly other supplements to meet the needs of lactation. Evaluating your costs may help you decide on the best lambing season for your farm.

Lamb management

It is crucial that newborn lambs receive colostrum (first milk) as soon as possible (ideally, in their first 12 hours). Monitor lambs to make sure they are nursing and have bonded with the ewe. It may be necessary to remove a lamb(s) from the ewe if she does not have enough milk for her lambs. Ewes should have enough milk for twins, but some ewes might not be able to raise triplets or quadruplets. Lambs that have had enough milk feel heavy when you lift them, with slightly rounded bellies. They will seem content after nursing and strong, lively, and playful. Lethargic lambs or crying lambs may be a sign they are not nursing or are not getting enough milk. Starvation is a leading cause of death in the first two days of a lamb's life.

It is important to monitor lambs for health issues such as coccidiosis and internal parasites. For information on castration and tail docking, see ATTRA's *Illustrated Guide to Sheep and Goat Production*. Growing lambs

need high quality forage. In a rotational grazing system, let weaned lambs graze a pasture first. This will ensure they are getting quality forage and also grazing pastures with lower parasite numbers.

Health

Starting with healthy sheep and properly maintaining them with adequate nutrition and clean living conditions will prevent most health problems. In addition, vaccinations and low stress handling will assist in keeping a flock healthy. Observe your animals and respond quickly to any health problems — isolate animals at the first sign of illness. Indications of a sick sheep include lethargy, isolation from the flock, loss in body condition, abnormal manure, runny nose, and huddled posture. It is important to have a working relationship with a veterinarian. A veterinarian can help with preventative care and proper treatment of disease. To locate a veterinarian who works with sheep, contact the American Association of Small Ruminant Practitioners: (334) 517-1233, www.aasrp.org.

Even with proper management, sheep will sometimes have health problems. Keeping health records will help you to identify animals that have repeated health problems. Culling those animals will result in a stronger flock. The following is an overview of some common health problems that affect sheep.

Internal parasites

For many sheep producers, especially those in humid climates, internal parasites will be the primary health concern. Animals with severe internal parasite loads will be unthrifty, won't gain weight, are often anemic, and may die. Due to overuse of dewormers and parasites' increasing anthelmintic resistance, management of internal parasites is a complex problem. Sheep producers must be knowledgeable about internal parasites, and they must have a plan to prevent and manage parasite infections. Because of the complex nature of internal parasites, managing them will take an integrated approach. A combination of treatment and management

Related ATTRA Publications

Managing Internal Parasites in Small Ruminants

Tools for Managing Internal Parasites in Sheep and Goats: Copper Wire

Tools for Managing Internal Parasites in Sheep and Goats: Sericea Lespedeza

Integrated Parasite Management for Livestock

is necessary to control parasitism so that it will not cause economic loss to the producer.

Parasite management tools may include the following:

- Pasture management
 - * Use pasture rotation with adequate rest periods.
 - * Employ multi-species grazing.
 - * Provide taller forages and browse.
 - * Put susceptible animals (lambs) on pasture before mature animals.
- Animal selection
 - * Use breeds and animals that show resistance to parasitism (pay special attention to rams).
 - * Cull animals that are frequently “wormy.”
- Selective deworming (only treating animals that need it)
 - * Use FAMACHA® to identify wormy animals. FAMACHA® is a system for classifying animals into categories based upon levels of anemia (a sign of *H. Contortus* infection).
 - * Be alert to other physical signs of parasitism and deworm as needed.

- Strategic deworming
 - * Deworm ewes at lambing time.
 - * Treat lambs because they have little resistance.
 - * Deworm all new animals.
- Effective use of dewormers
 - * Use the Smart Drenching technique. (www.scsrpc.org/SCSRPC/Files/Files/Misc/DRENSHIN.PDF)
- Novel treatments
 - * Treat animals with copper wire boluses.
 - * Provide forages containing condensed tannins (*sericea lespedeza*).

For more information on managing internal parasites, see ATTRA’s *Managing Internal Parasites in Small Ruminants* and visit The Southern Consortium for Small Ruminant Parasite Control website: www.scsrpc.org.

Foot rot

Foot rot is a contagious disease caused by bacteria that affect the horny hoof tissue. Once foot rot is introduced into a flock, it is very difficult to eradicate. Foot rot is spread from an infected sheep to the ground and bedding, where it is picked up by uninfected sheep. Foot rot is characterized by limping animals and pockets of foul-smelling infection in the hoof. Other things can cause limping; have your veterinarian examine the animals if you are unsure of the cause of limping.

Foot rot can easily be prevented by not introducing it to your flock. Never buy a limping animal or one from a flock with any limping animals. Don’t purchase sheep from sale barns. Practice good biosecurity; isolate new purchases for 30 days and examine their feet during that time; wear boot covers when visiting other sheep producers and have them do the same. Cull animals with repeated foot rot problems.

Hoof trimming and foot baths are common treatments for foot rot. All affected hoof tissue should be trimmed away. Remember to disinfect the trimming tools between animals



Animals will pick up more parasite larvae when they graze forages shorter than four inches. Photo by Linda Coffey, NCAT

to prevent spreading the infection. Foot baths of zinc sulfate or copper sulfate solutions can be used to treat foot rot. For help with hoof trimming and foot bath solutions, contact your veterinarian. There is a foot rot vaccination that has shown some success in prevention and treatment, but it is not 100% effective.

Scrapie

Scrapie is a fatal, degenerative disease affecting the central nervous system of sheep and goats. It is among a number of diseases classified as transmissible spongiform encephalopathies (TSE). Signs of scrapie include weight loss despite retention of appetite, itching and rubbing, loss of coordination, and death. In the U.S., scrapie has been diagnosed mostly in Suffolk sheep and their crosses.

The U.S. has had some form of a scrapie eradication or control program in place for many years. As part of the National Scrapie Eradication Program (www.aphis.usda.gov/animal_health/animal_diseases/scrapie), all states require most sheep and goats to be officially identified on change of ownership. And, while many states have requirements identical to the USDA interstate requirements, other states have additional requirements regarding intrastate movement and/or interstate movement. Some states exempt certain classes of sheep and/or goats. For information on your state's scrapie identification requirements, see www.eradicatescrapie.org/State%20ID%20Requirements.html.

OPP

Ovine progressive pneumonia (OPP) is a virus that generally affects only sheep over the age of two. OPP is spread through the ingestion of infected colostrum and milk. Signs of the disease are primarily seen in mature sheep. Early signs of OPP are weight loss while maintaining a normal appetite and intolerance to exercise. Other signs are labored breathing, hard udder, and lameness. OPP can be diagnosed through a blood test. There is no treatment for OPP. Animals testing positive should be culled from your flock. For more information, see www.oppociety.org.

Contagious Ecthyma

Contagious ecthyma (commonly called sore-mouth or orf) is caused by a virus. Infected animals will develop sores and scabs on their lips and mouths and occasionally on the udders and teats. The virus can remain infectious in the scabs for long periods. Once an animal has been infected, it is generally immune to further infections. Because soremouth is a virus, antibiotics are ineffective; you have to let the virus run its course. This virus can be passed to humans; always wear gloves if you handle animals with soremouth. There is a vaccine, but if you have not had soremouth in your flock, it is better not to vaccinate because the vaccine contains a live virus. For more information, see www.sheepandgoat.com/articles/soremouth.html.

Caseous Lymphadenitis (CL)

Caseous lymphadenitis (CL) is caused by a bacteria that causes abscesses on the lymph nodes and internal organs. The bacteria are usually introduced through a wound or abrasion. The clinical signs of the disease are one or more abscesses that are often located just beneath the skin, usually around the jaw and neck. However, if organisms enter the bloodstream, abscesses may also develop in internal organs such as the lungs or liver. In this case, external abscesses may not be present, and the only noticeable symptom is a thin, debilitated animal. The abscesses contain a thick, yellow to white pus that has a soft, pasty consistency, much like toothpaste.

CL does not respond to antibiotics because antibiotics cannot penetrate inside the abscess. Abscesses can be surgically drained and flushed with an iodine solution. However, draining the abscess will increase risk of transmission of the organism to other animals if they are exposed to the pus. The discharge that is present in the abscess should be disposed of in such a way as to avoid contamination of the facilities and remaining animal population. In sheep, abscesses are usually not found until shearing. During shearing, the shearer may inadvertently nick the wall of an abscess. If this occurs, shearing should be stopped, and the clippers, blades and general

area should be disinfected as well as possible.

Currently, one company manufactures a vaccine for the prevention of CL. This vaccine is called Case-Bac®, and it is manufactured by Colorado Serum Company. A study published in the Journal of the American Veterinary Medical Association showed a significant reduction in the number of abscesses when sheep were vaccinated. (Washburn et al., 2009)

Mastitis

Mastitis is an inflammation of the mammary gland and may result in reduced production and profitability. It is usually caused by the bacterium staphylococcus or streptococcus, but it can also be caused by other bacteria. Symptoms include pain, heat, redness, swelling, and a hard udder. Ewes will not always show physical symptoms of mastitis. A ewe with mastitis may not let her lambs nurse. Lambs that aren't growing and thriving may be an indication of mastitis in their dam. Streptococcus infections are responsive to antibiotics and are fairly easy to eradicate. Staphylococcus infections do not respond well to antibiotic treatment. Mastitis may also be the result of injury.

Vaccinations

Vaccinations can be important to your flock's health plan. Simple vaccinations can prevent many diseases that affect sheep. The most common sheep vaccinations are those that protect against clostridial diseases. A CD-T vaccine protects against enterotoxemia caused by *Clostridium perfringens* types C and D and tetanus caused by *Clostridium tetani*.

There are many other vaccinations available. Contact your local veterinarian to discuss other vaccinations based on your flock's health and local disease problems.

Record keeping

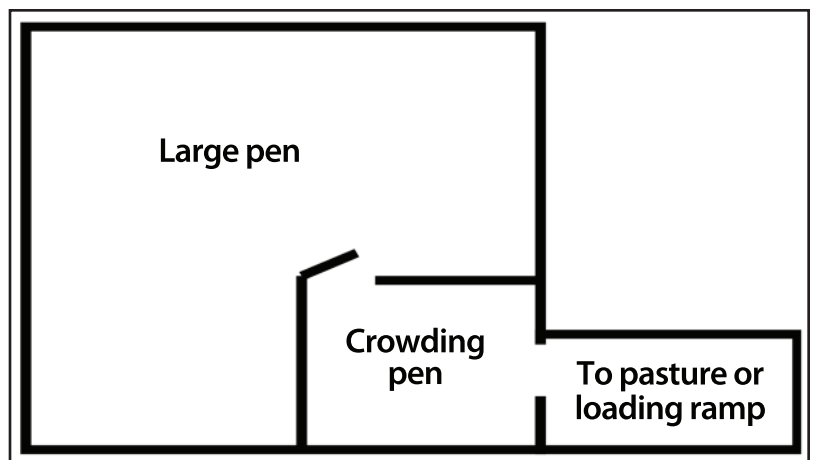
Record keeping is a vital part of your flock's health program. It is important to keep records of sick animals, treatments administered, and note milk and meat withdrawal times. Good records can help you choose animals to cull.

Facilities

Sheep don't require extensive housing or facilities. You should provide shelter from cold, rainy weather and shade in the summer. Buildings used for shelter may be minimal, but they should be well-ventilated and clean. Barns and sheds are not the only options. There are portable shelters and moveable shades, and even old hog huts can be used as shelters for your animals.

There are many options for handling facilities. While there are many elaborate systems available, a simple gathering area and chute or alleyway is all that is needed for most small operations. Having a useable handling system makes tasks such as sorting, weighing, vaccinating, or FAMACHA® scoring much easier. A scale is an important piece of equipment because knowing the weight of your animals aids in marketing, tracking weight gains, and calculating proper medicine and deworming doses.

For more information on shelters, equipment, and fences, see ATTRA's *Illustrated Guide to Sheep and Goat Production*.



An example of a simple handling set-up. Diagram by Susan Schoenian, University of Maryland.

Handling sheep

Sheep raised in close contact with people experience less stress when being handled.

Tips for proper handling:

- Be calm and patient
- Do not probe or force livestock.
- Move slowly and deliberately.
- Talk softly and in a low tone.
- To restrain sheep, hold them under the chin, with a halter, against a fence or gate, or straddling them.
- Be careful of horns and sudden movements.

List adapted from a presentation by Susan Schoenian, University of Maryland (www.sheepandgoat.com).

interest in acquiring your business. If he is not, choose another auction.

- Ask if you can bring your animals the day before and if hay and water are available. Ideally, they will be presented earlier in the auction, but at the least will be acclimated to the environment and look nicer for the sale.
- Find out whether there are any auctions in your area that will allow you to set a floor price.
- Stay for the auction; don't just drop the animals off. An auction is a great place to make connections and find future customers. Talk to the buyers about what they are looking for, and tell them about your operation.
- Try not to restrict your marketing to auctions alone, because they can be very risky.

Marketing

While there are many opportunities for marketing sheep and sheep products, there are also many limitations. Options may be limited by regulations, access to processing, or access to an adequate market. There are many more options than just taking your sheep to the sale barn. How you choose to market your animals will depend on many things, including personal preferences and market demands.

Sale Barn

Taking sheep to a local auction is one of the most common methods used by producers. There are advantages to this method: it is quick, it requires little effort by the producer, and most auctions are bonded, which means you will be paid within 24 hours of sale. The biggest disadvantage is that you have no control over the price. There are a few things producers can do to get the best price for their animals at an auction.

- Do not just show up; contact the auction manager, describe your flock, and ask him when the best day to come to his auction would be. He should be helpful and show

Pooled sales

There are several ways to cooperate with other producers to sell large volumes of animals and receive a better price than at a traditional sale barn. A pooled sale is where you work with a buyer who wants a large volume (semi-trailer load) of animals. The buyer will tell you what type and size of animals he needs (e.g., 100-pound lambs). You can then work with other producers to complete his order and bring all of the animals to a central location. The benefit of this type of sale is you will usually know what the buyer will pay prior to selling the animals. If the price is not high enough to cover your costs, you can choose not to participate. It is very important to meet the criteria that the buyer sets. If he asks for 100-pound lambs and you bring 75-pound lambs, the buyer won't be happy, you won't receive the set price, and the buyer may not agree to work with you again. Pooled sales do take a great deal of organization, since you will have to find a buyer, determine the needs of the buyer, and coordinate with other producers.



There are many options for marketing sheep and sheep products. Photo by Susan Schoenian, University of Maryland.

Packers, wholesalers, dealers and retailers

A meat packing business generally owns its own processing plant and buys animals to slaughter, process, and resell. A wholesaler buys animals, takes them to a slaughterhouse, and butchers them to sell to a variety of retailers. Retailers (restaurants, grocery stores) sell directly to the end customer. These people are known as “middlemen,” and they do the hard work for you, but you get a lower price for your product.

Direct marketing

Direct marketing is when producers sell their products directly to their customers. This allows the producer to bypass the “middleman” and become a “price-maker” rather than a “price-taker.”

Direct marketing options may be limited by your location and the processing available. If there is not a processor nearby, direct marketing alone is not a viable option for your operation. Direct marketing takes a lot of time, effort, communication, and intensive management. Producers must be willing to wear several hats; along with their livestock management skills, they must become businessmen, marketing agents, and salesmen. If your customers are coming to your farm, your facilities must be presentable. Provide additional information about your facility,

why your lambs are different, what their living conditions are, how they are fed, and why the customer should buy from you. You could provide a handout with information or even samples of smoked or barbecued lamb. For additional direct marketing advice and ideas, see the Direct Marketing Lamb Management Guide at www.kansasruralcenter.org/publications/DMLamb.pdf.

There are many options for selling directly to your customer:

- **On Farm:** If you are selling on farm, your facilities must be clean and presentable. Make sure your pastures are not run down and that all animals are healthy. Keep breeding stock separate from sale animals. You could offer a tour of your farm while explaining what sets it apart from others. If you have animals other than sheep, this is a good opportunity to market them and diversify your sales.
- **Live:** As with selling the whole/half lamb, selling the animal live is a good option. Many producers sell the live animal for \$1 per pound or more. Keep in mind that customers who buy a live animal do so to ensure that it is slaughtered according to their religious beliefs, and they may request a place to slaughter their animal on-site. Check state and local regulations to see whether this is permissible.
- **Whole/Half:** If you have customers who are willing to buy a whole or half lamb, this is the best option because you sell the lamb all at once and do not have to market the less-desirable cuts.
- **Cuts:** Selling cuts of lamb individually is the most time-consuming practice, but it is usually what customers want. You must have the animal processed, packaged, and labeled and have a place to store the meat. You need to determine the price of each cut, and consider making

value-added products from the remainder of the animal.

- **Farmers' markets:** Farmers' markets are great for marketing your product and meeting potential customers. However, they can be very time consuming, and you must know the regulations on bringing meat to the market. Some markets require the producer to furnish a generator and freezer if selling fresh or frozen meat, and some allow only processed meats. Regulations, fees, and licenses vary, so be sure to check with the market director and local health department.
- **Restaurants/Stores:** Restaurant and grocery store sales can be good, reliable sources of income, but these establishments are often very unforgiving. They require a consistent, high-quality, and lean product, often year-round. Be sure to have a good relationship with a quality processor if you sell directly to restaurants or stores.
- **Ethnic/Religious Groups:** Many ethnic and religious groups prefer lamb (and mutton) to other meats. If you live near an area with a diverse population, this may be a strong customer base. If you are targeting a specific group, it is important to know what type of animal they want and when. Preferences such as age, size, and sex of the animal can vary depending on the group and the holiday. For more information on marketing to ethnic and religious groups, see the following resources.
 - * Producing and Selling Sheep to Ethnic/Religious Markets, www.westernmaryland.umd.edu/ethnic-marketing.htm
 - * Ethnic Holiday Calendar 2009-2013, www.sheepandgoat.com/articles/ethniccalendar.html
 - * Direct Marketing Lamb to Niche and Ethnic Markets, <http://web.extension.uiuc.edu/iidea/PDF/lambfactsheet.pdf>

Processing	
There are different levels of processing, and access to them will affect how you can market your animals.	
Federal or USDA Inspected Plants	Federal plants can process meat for nationwide sale.
State Inspected Plants	Only about half of the states have a State Inspection program. State inspected plants can process any meat, but it is stamped for sale only within that state.
Custom Exempt Plants	A custom plant processes for individual use. The meat must be stamped "not for sale."
On-farm slaughter (exempt from inspection)	Animals are processed by the owner for individual use (regulations vary by state).

- **Buyers Clubs:** With a buyers club, you will pre-sell your lamb, usually a whole or half animal. You will work with the processor to meet the customer's cut preferences. You will then deliver the cut and wrapped lamb to the customer. This set-up works well if you have customers who want lamb on a regular basis.
- **Internet Sales:** The Internet is both a vast source of information and a very useful tool that costs very little. Shipping meat can be complicated and expensive, and it is often not worth the trouble. However, many people don't realize that Internet advertising can increase local sales. Whether you have your own website, advertise on a local website, or just add your business to Internet directories, such as www.localharvest.org, web advertising can be very beneficial with little or no cost to the producer. The Internet can also be a means by which current customers can invite their friends to look into your product.

Before you begin marketing, consult your local and state authorities about the regulations governing the marketing of meat products. You may need USDA inspection, permits, or licenses. There might be requirements regarding sales tax, weight, measurement, sanitation, zoning, and right-of-way. All of these regulations vary depending on the type of product you want to market (fresh, frozen, processed) and where (interstate, intrastate) you want to market it.

Sierra Farms, California, Mel and Mary Thompson

Mel Thompson and his wife, Mary, have been producing sheep in northern California for 12 years. Their family-owned operation, Sierra Farms, currently has about 350 polypay/white dorper cross ewes and 500 lambs. Both Mel and Mary have a passion for farming and have raised sheep since they were children. When they began Sierra Farms, they were selling their lambs in traditional auctions or directly to a processor. Recently, however, they have begun to find innovative ways to market their lambs directly to the public, “to avoid the middleman,” and have found other, surprising benefits in the process.

Mary has created a website, www.lambeatersconnection.com, that is a directory connecting lamb producers with consumers. The goal of Lamb Eaters Connection Directory is to provide the public with local connections to fine lamb through chefs, caterers, restaurants, wineries, producers, and retail outlets. Mary began the website in 2008, and it has picked up speed since, with people all across the country adding listings. Included in the directory are home dining recipes, buying and cooking tips, names of breeders, sources for wool fiber, and many sheep related products and activities. Mary always welcomes comments or questions about the directory.

In 2006, Mel, with a group of lamb producers, received a USDA Value-Added Producer Grant (VAPG) to develop a feasibility study and business plan for directly marketing lamb. The study and business plan identified a marketing niche that included regularly scheduled sales and deliveries to individuals in the San Francisco Bay area. After a year of ground work, sales have reached 25 to 30 lambs each month. Mel works with his processor, Superior Farms, to have the lamb processed, vacuum sealed, and boxed.

Mel spends up to four hours per day marketing, using e-mail and making phone calls. He has begun using a blog, www.sierrafarmslamb.blogspot.com, to improve information flow. His blog posts remind customers that “sustainability is a two-way street; you’re helping us, we’re helping you.” He highlights the benefits of local, pasture-raised lamb, champions direct food access and local economies and promotes source identification and lamb-husbandry education.

Mel and Mary have found direct marketing to be extremely satisfying, both for themselves and their customers. Mel has been surprised by the response from customers — their gratefulness for this direct marketing experience and for the quality of lamb they are now able to purchase.

“I come from a long line of farmers,” Mel says, “but I think I may be hearing for the first time in that history people thanking a farmer for what he is doing. It’s a stunning and humbling thing to hear.”

“I think the important message is that consumers are increasingly looking for ‘social attachment’ or definition in the common activities of their lives. The act of eating is being rediscovered or redefined, along with expectations of quality and welfare assurances. Direct marketing is the perfect opportunity to make this attachment, and a single producer should not minimize his or her individual capability to make it happen.”

By managing the farm the same way they always have (maximizing pasture efficiency by rotational grazing, reducing supplementation, providing a healthy livestock environment, and reducing stress) but changing their marketing plan, Mel and Mary are now selling high quality products to socially-conscious buyers and receiving a premium price, while furthering farm-to-plate education and awareness. Both producers and consumers are benefiting from this.

Processing

There are three levels of meat inspection: federal, state, and uninspected or custom-slaughter plants. State inspected meat cannot be sold outside of that state, and uninspected meat must be for the owner’s use only and labeled “not for sale.” Federally inspected processing plants that are willing to take a small number of animals, or even keep your meat separate, are very hard to find. You might have to base your marketing on using state-inspected facilities or make arrangements with custom processors. A good option (if your customer wants an entire animal) is to sell the animal live, transport it to the butcher for your client, and have the client pick it up and pay processing fees. Check with your state department of agriculture for your state’s regulations on processing, selling, and on-farm slaughter. Call the USDA Food Safety and Inspection Service hotline at 1-800-535-4555 with any questions about federal regulations. The Niche Meat Processor Assistance Network (www.nichemeat-processing.org) also offers information and resources about meat processing regulations and contacts for locating a processor.

Labeling

There are laws that require your labels to be reviewed by state and federal authorities before they are used in advertising. If your product is a single meat product with no added ingredients, the labeling process should be fairly easy. The USDA Meat and Poultry Labeling Terms can be found at www.fsis.usda.gov/PDF/Meat_and_Poultry_Labeling_Terms.pdf or by calling the USDA Meat and Poultry Hotline, 1-888-674-6854.

Records

No matter how you sell your animals, be sure to obtain a copy of an invoice for your farm records. This is particularly important if you are directly marketing your animals. You should create an invoice that includes the seller’s name, buyer’s name, number of animals (or pounds of meat), price per unit, total price, and date picked up or delivered. Whenever possible, have the buyer sign the invoice.

Value-added products

There are many other products from sheep besides fresh or frozen meat that can provide additional income. The “trimmings” from meat can be used to make sausage, bratwurst, and jerky. Pet foods are also a growing market for lamb producers; you can market organ meat, ground lamb, bones, and other low-end cuts to pet food producers as high-quality, allergen-free ingredients.

Fiber can become a value-added product; you can sell your animals’ wool to make blankets, yarn, or clothing. Some breeds have hides that make beautiful rugs. If you are directly marketing from your farm, you could learn to make these products and sell them on your farm. You can also work with other businesses to get products made from your fiber.

Grazing services

Another enterprise is to offer “grazing services” for forage management. Both parties benefit in this transaction. The producer gets paid to graze his or her animals on another’s property, and the customer gets vegetation managed and fertilized “naturally” by land-scaping livestock. Of course, the producer usually provides transportation and a means of containing the animals, closely monitoring that they do not overgraze the land. For more information on grazing services, see *Target Grazing: A Natural Approach to Vegetation Management and Landscape Enhancement* (www.cnr.uidaho.edu/lrx-grazing/Handbook.htm) and *www.livestockforlandscapes.com*.

Breeding stock

If you maintain high-quality, healthy animals, you may have the opportunity to sell breeding stock. These animals will fetch a higher price than animals sold for meat or at a sale barn. Breeding stock can be purebred or crossbred animals. Buyers who are interested in registered animals or show animals are probably more interested in purebred stock, and those who have a commercial flock may want to purchase quality crossbred animals. Keeping detailed production and health records is very important if



Sheep can be used to graze power line right-of-ways. Photo by Susan Schoenian, University of Maryland.

you are selling breeding stock. It may take some time and money to develop a market for your breeding stock. You must sell only healthy, productive animals as breeding stock, because you will have a reputation to uphold.

However you decide to market your animals, always be fair to your customers. A good reputation is the best way to grow your business. For more information on marketing sheep, see www.sheepgoatmarketing.info, www.sheepandgoat.com/market.html, and *Marketing Out of the Mainstream* (www.sheepusa.org/publications).

Organic production

If you are interested in alternative production and marketing methods, you may want to consider organic. “Organic” means, among other things, raising crops or livestock in a way that builds the soil and enhances biodiversity and ecological balance. The term “organic” may not be used except under a production system that meets all the requirements of the National Organic Program Regulations, as defined in 7 CFR Part 205 (see www.ams.usda.gov/AMSv1.0/nop).

Related ATTRA Publications

NCAT's Organic Livestock Workbook

Organic Certification Process

Organic Farm Certification and the National Organic Program

Organic Livestock Documentation Forms

Organic Standards for All Organic Operations

Organic Standards for Livestock Production

Organic System Plans: Livestock Production

Some producers choose to farm organically because they believe in the principles of organic agriculture, that organic systems build the health of soils, plants, animals, and people. Others do so because they want to sell products for a premium price to people who support organic principles and believe organic food is better for their health.

Depending on your production and marketing methods and customers, it may be to your advantage to raise and sell organic lamb or wool. This section highlights what is involved in producing sheep organically, and it will help you decide whether transitioning to organic is worthwhile for your operation.

What are the basic requirements of organic certification? (This is not a complete list.)

- Feed 100% certified organic feed (including pasture).
- Animals must graze on pasture at least 120 days per year, and animals must have a minimum of 30% dry matter intake from grazing pasture during the grazing season.
- Use of most synthetic medicines and/or hormones is prohibited (see the National List for materials and the purposes for which they may be used).
- Maintain organic stock under organic management from at least the last trimester before birth (i.e., ewes must be managed organically for more than 50 days before organic lambs are born).
- Meat must be processed in a certified organic facility and must not be irradiated.

For more information about the requirements for organic livestock production, see ATTRA's *Organic Standards for Livestock Production: Highlights of the USDA's National Organic Program Regulations* (summary of relevant verbatim standards) and NCAT's *Organic Livestock Workbook* (longer workbook format to guide the producer in looking at all components of a production system as they relate to organic standards and practices).

There are also important record-keeping requirements and certification tasks, including the following:

- An organic system (farm) plan approved by a certifying agent
- Up-to-date farm records for at least five years
- Annual inspection of the farm, including records and premises.

For some farms, current production practices are already very close to organic standards. Some farms keep extensive records. But for most, changes will be necessary in both production and record-keeping in order to comply with organic regulations. Will those changes be worth it? Consider the following questions:

- What price do you currently receive for your product?
- Is there local demand for organic products? (If not, you will need to develop a local market or develop one at a distance, and ship your product. Remember, market development costs time, energy, and money.)
- What price could you receive for organic lamb or wool? (Check the Internet for some idea of prices being asked.)
- What do you currently pay for hay or grain to supplement your animals?
- What would you have to pay for organic hay or grain? How dependable is the local supply? Can you offset the increase in the price for organic feed with sales of certified organic animals or products? (Remember, using homegrown feeds, especially pasture, will help greatly.)
- How important is organic certification to your customers? Is it sufficient for them to know you as the producer and understand that you use humane and sustainable practices, or do they need to see verification of organic standards?

Now for the next hurdle — if you are selling meat:

- Is there a certified organic processor in your area? This is necessary if you are selling organic meat.
- If there is not currently an organic processor, can you persuade a local processor to do the paperwork and follow the regulations?
- What extra processing costs will be charged for organic processing?

For information about organic meat processing, see www.extension.org/pages/Certified_organic and www.mosesorganic.org/attachments/broadcaster/livestock14.6meatprocess.html.

If you are selling a live animal:

- Who is your buyer? It's best to have more than one option.
- What is the demand? How many animals can you sell a year, and is it a steady market?

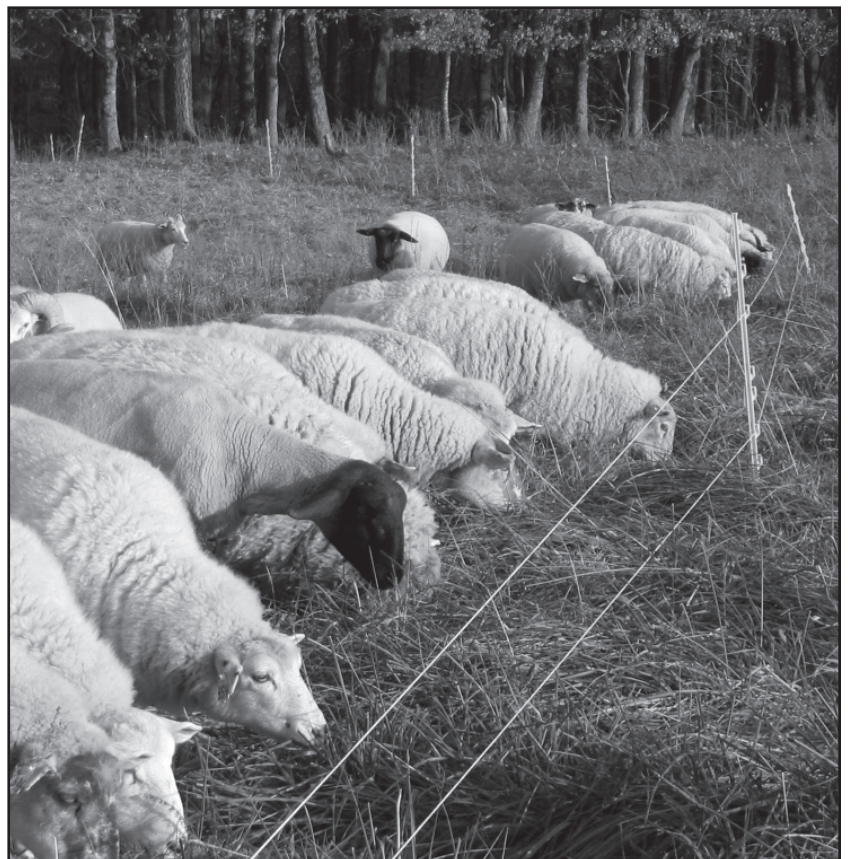
If production costs will be feasible and the market is not a problem, then consider whether you can raise your animals under organic health management practices.

Organic health care is based on prevention of illness through good management.

- Animals adapted to the environment
- Appropriate vaccinations
- Good nutrition
- Low-stress handling
- Good sanitation
- Access to well-managed pasture, fresh air, and sunshine
- Low stocking rates
- Adequate shelter
- Good preventive care (regular foot trimming, for example)

All the above practices should be followed by producers whether they are certified organic or not, as they are simply good management practices. These practices will prevent many illnesses, assuming there is a closed flock. However, when illnesses do arise, you must

remember that conventional treatments such as antibiotics are not approved for organic production. You will have to find alternative treatments. If those are not effective, then you must use the conventional treatment for humane reasons, and remove the treated animal from organic status. In humid climates, sheep may have serious trouble with internal parasites. Internal parasites can be devastating to the health of the animal, causing loss of productivity and sometimes death. Under the National Organic Program regulations, use of chemical dewormers is restricted for breeding and milking stock (they may not be used on lactating ewes or ewes in the last trimester of pregnancy or on any animals routinely) and is prohibited for organic slaughter stock. If infection is severe, you should use the most effective treatment, including chemical dewormers if necessary. Animals treated with chemical dewormers are no longer certified organic and must be removed from the organic flock. Organic production is probably not a viable option for producers



Using forages helps to keep feed costs lower. Photo by Linda Coffey, NCAT.

who raise sheep in climates that are extremely conducive to internal parasite infections.

See *Managing Internal Parasites in Sheep and Goats* for more information about this important topic. See also the *Organic Livestock Workbook* to get a fuller picture of what is involved in organic livestock production. ATTRA has many other publications that deal with organic certification as well.

For additional information on organic sheep production, see *Transitioning to Organic Sheep or Goat Meat Production* (www.moses-organic.org/attachments/productioninfo/fstransgsmeat.html).

Economics

One of the key questions to answer before starting an enterprise is, “Will it be profitable?” The answer is largely dependent on the management and the set of individual circumstances. Many sample budgets have been published, and they are useful in sorting out the various categories of expenses that must be considered.

There are some basic principles to keep in mind that will improve the chances for profit.

- Keep costs low — use forages, feed least-cost rations, maintain healthy animals.
- Pay attention to reproduction — ewes should breed and wean lambs; cull those that don’t.

- Cull animals that aren’t productive — those that don’t breed, don’t wean lambs, or don’t grow as they should.
- Have a consistent market for your product.

The table below illustrates the relationship between cost of production and reproductive performance. Ewe cost is the amount it costs to keep a ewe for a year. This will include feed, veterinary costs, fencing, and any other costs related to keeping your ewes. Lamb crop is the percentage of lambs weaned to ewes exposed to breeding.

Fifteen lambs weaned (marketed) / 10 ewes exposed to ram = 150% lamb crop

So, if it costs you \$50 to keep each ewe, and you had a 150% lamb crop, the lambs would need to bring \$.33 a pound to break even. Clearly, the chances for profitability are far better if costs are kept low and ewes are productive and lambs survive. Note that market weight for this example is 100 pounds. Lighter lambs must bring higher prices.

The sample budget on the following page is included to assist the prospective producer in planning and in determining feasibility. Remember that costs are subjective and depend greatly on management and location. Your situation will not correspond exactly to anyone else’s.

For more information on economics, including several example budgets and budgets you can adjust to reflect your farm’s costs, see www.sheepandgoat.com/economic.html.

Break-even lamb price in dollars per pound				
Ewe cost (\$/head/yr)	% lamb crop			
	75%	100%	150%	200%
30	.40	.30	.20	.15
40	.53	.40	.27	.20
50	.67	.50	.33	.25
60	.80	.60	.40	.30
Assumed market weight is 100 lbs.				

Ewe flock, projected budget for lambs sold in 2010

Production description: Flock of 100 ewes and 3 rams with a 140% lamb crop raised;
22 ewe lambs retained as replacements. Purchase rams at \$300 each.

Estimated income/ewe (lamb crop: 140%)	Spring lambing	Your estimate
Lamb sales: 85 lbs. @ \$100/cwt. x 1.18*	\$100.30	\$
Cull ewe sales: 125 lbs. @ \$40/cwt. x 20%	\$10.30	\$

ESTIMATED TOTAL INCOME/EWE **\$110.30** **\$**

Estimated costs/ewe		
Operating costs		
Pasture (\$20/acre rental rate)	\$20.00	\$
Hay (100 lbs. @ \$70/T.)	\$3.50	\$
Grain (30 lbs. @ 7¢/lb.)	\$2.10	\$
Salt and minerals (10 lbs. @ 20¢/lb.)	\$2.00	\$
Dewormer (4 times/year)	\$2.00	\$
Vaccinations	\$0.42	\$
Insecticides	\$0.24	\$
Marketing and hauling	\$6.00	\$
Utilities and machinery costs	\$6.00	\$
Livestock facility and fence repairs	\$3.00	\$
Professional fees (legal, accounting, etc.)	\$0.50	\$
Miscellaneous	\$2.00	\$
Operating interest (1/2 of operating costs @ 7%)	\$1.67	\$
TOTAL OPERATING COSTS (except labor)	\$49.43	\$
Labor & management (3 hours @ \$11.50/hr.)	\$34.50	\$
TOTAL OPERATING COSTS (including labor)	\$83.93	\$
Ownership costs		
Depreciation and interest on livestock facilities	\$6.00	\$
Interest on ewe and ram	\$8.00	\$
Breeding stock purchases	\$5.00	\$
Insurance and taxes on capital items	\$2.00	\$
TOTAL OWNERSHIP COSTS	\$21.00	\$

ESTIMATED TOTAL COSTS/EWE **\$104.93** **\$**

Income over operating costs	\$26.37	\$
Income over total costs	\$5.37	\$

Budget prepared by Ron Plain, Extension Economist, University of Missouri-Columbia.

*100 ewes x 140% lamb crop = 140 lambs; 140 lambs - 22 lambs retained as replacements = 118 lambs to sell.

Conclusion

Sheep are generally easy to incorporate into a farming operation. They are small, relatively inexpensive, and integrate well with other livestock. Sheep do not share internal parasites with other livestock (except goats) and prefer vegetation different from what cattle, goats, and horses typically eat. Sheep are efficient because ewes can wean two or more offspring that weigh as much as or more than the ewe.

You must be careful when selecting sheep. Never buy breeding stock from a sale barn, and only buy healthy animals. Choose a breed that is best for your farm. Keep animals healthy by feeding them properly, giving them access to clean pasture, trimming their hooves as necessary, properly vaccinating, not overcrowding them, and de-worming only when necessary. Properly contain your animals with appropriate fencing, and protect them by providing an effective livestock guardian animal. Keep extensive records of vaccinations, de-worming, and all other medical treatments. To increase efficiency, cull animals that repeatedly have problems. This will avoid spread of disease, save money, and build a stronger, healthier flock.

There are many marketing options available. Sheep can be marketed at a sale barn, in pooled sales, or directly from your farm. Choose the market that is right for you and your operation. You can diversify your sales by offering breeding stock, grazing services, or value-added products. Always be honest and informed; if customers do not trust you, they will not return. You might consider organic production if you have a conducive environment. Remember to familiarize yourself with the regulations, make a plan, and speak to an expert when you begin any enterprise, particularly a certified organic one.

Never take the leap of beginning a business without knowing the economics. Create a business plan. Your venture should be realistically profitable on paper before you buy your first sheep. Keep records and analyze your budget regularly. Keep costs low by using forages and maintaining healthy animals. Have a plan for emergencies, and always be prepared to change your plan as your circumstances change.

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Further resources

For a more extensive list of resources, see ATTRA's *Small Ruminant Resource List*, www.attra.org/attra-pub/small_ruminant_resources.html

ATTRA Publications

An Illustrated Guide to Sheep and Goat Production

This basic and heavily illustrated introduction to sheep and

goat production discusses animal selection, feeding, breeding and young stock, equipment and handling, and marketing.

Small Ruminant Sustainability Checklist

This checklist is designed to stimulate critical thinking when evaluating a farm that produces sheep or goats. The sustainability of a farm depends on many factors involving farm management, use of resources, and quality of life. The questions in the checklist are intended to stimulate awareness rather than to rate management practices. Use this guide to define areas in your farm management that might be improved, as well as to identify areas of strength.

Predator Control for Sustainable and Organic Livestock Production

This publication focuses primarily on the control of coyotes and dogs, which are the main causes of livestock lost to predation, through management practices such as fencing and secure areas, and the use of guard animals

Managing Internal Parasites in Sheep and Goats

This publication discusses new techniques to manage parasites and to prolong the efficacy of dewormers. New management tools that remain under study are also discussed. A list of resources follows the narrative.

Tools for Managing Internal Parasites in Small Ruminants: Copper Wire Particles

The publication contains information on how to make boluses of copper wire oxide particles, and reports results of studies on the effectiveness of this treatment.

Tools for Managing Internal Parasites in Small Ruminants: Sericea Lespedeza

This publication discusses tools that can be used to manage internal parasites of sheep and goats that are becoming resistant to conventional dewormers. One such tool is the forage sericea lespedeza. The publication discusses how it can be used and presents the results of research on how it reduces parasites in small ruminants.

Ruminant Nutrition for Graziers

This publication provides managers with tools and references for considering biological and climatological variables in making decisions that ensure the ecological and economic viability of a grass-based ruminant livestock operation.

Multispecies Grazing

Brief overview of why multispecies grazing is beneficial, as well as considerations for management.

Books

Storey's Guide to Raising Sheep, by Paula Simmons and Carol Ekarius. 4th Edition. 2009. Storey Publishing, LLC., Pownal, VT. 400 p.

This book is a very useful resource, covering many aspects of raising and marketing sheep and their products. It is enjoyable to read and helpful to beginners and experienced producers alike.

More Sheep, More Grass, More Money, by Peter Schroedter. 1997. Ramshead Publishing Ltd. Moosehorn, Manitoba. p.112

Personal experiences of the author, emphasizing the need to make a profit with the sheep enterprise and giving examples of how to cut costs and increase profits. Emphasis on grazing management. Very practical.

Storey's Barn Guide to Sheep. Storey Publishing. 2006. Storey Publishing, LLC. Pownal, VT. 96 p.

This spiral-bound book with large, heavy-duty pages is designed to accompany the farmer to the barn and is complete with step-by-step guides with several straightforward illustrations.

Marketing Out of the Mainstream: A Producer's Guide to Direct Marketing of Lamb and Wool, by Tamra Kirkpatrick and James Bell. Sheep Industry Development Program. 57 p.

Websites

Maryland Small Ruminant Page
www.sheepandgoat.com

American Sheep Industry Association
www.sheepusa.org

National Sheep Improvement Program
www.nsip.org

Sheep and Goat Marketing Program
www.sheepgoatmarketing.info

Southern Consortium for Small Ruminant Parasite Control
www.scsrpc.org

Lamb Eaters Connection
www.lambeatersconnection.com

Sheep: Sustainable and Organic Production

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