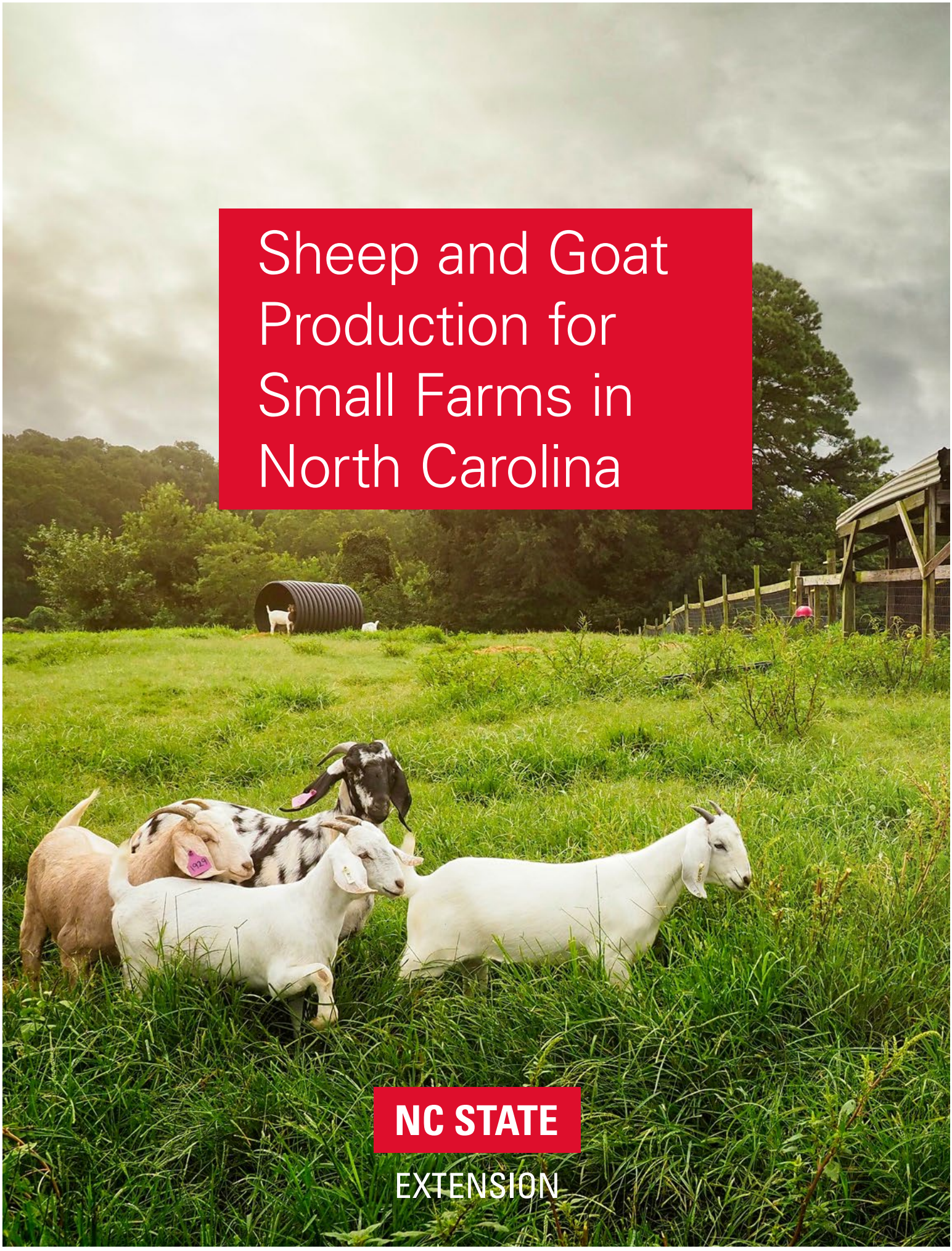

Sheep and Goat Production for Small Farms in North Carolina

NC STATE EXTENSION

This guide provides an overview of sheep and goat production for small and beginning farmers in North Carolina, emphasizing planning considerations for a successful small ruminant enterprise. This publication is a starting reference for anyone interested in raising sheep and goats on small farms. Additional information is available via the internet resources presented in the publication, the North Carolina Farm School (**https://ncfarmschool.ces.ncsu.edu/**), and N.C. Cooperative Extension centers.

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Introduction

Production of sheep and goats is appealing for small farms. Compared to larger ruminants like cattle, more meat can be produced with less forage and pasture space. There are also possible marketing advantages for locally produced lamb and chevon (goat meat). With heavy dependence on imports to meet domestic demand for lamb and chevon, consumers interested in locally sourced options may be willing to pay the prices needed for profitable sheep and goat meat production.

Per capita consumption of lamb is about 1 pound per person per year, according to the U.S. Department of Agriculture (USDA). Goat meat consumption is increasing but still less than ¼ pound per person per year.

Reliance on sheep and goat meat imports is due to several production and marketing obstacles face by U.S. farmers, both large and small. Predators and animal health, particularly internal parasites, create challenges for sheep and goat farms of all sizes in the eastern U.S. Processing and packaging sheep and goat meat for local sale can also be a challenge, as meat processors usually have more experience with cattle and hogs than small ruminants.

This publication contains terminology about sheep and goats; a description of the major breeds and types of sheep and goats; a discussion of management issues including husbandry, animal health, nutrition, and care; advice about marketing and processing; and sample budgets and economic estimates for small-scale sheep and goat production in North Carolina.

Table 1. Basic Sheep and Goat Terminology Applicable to Pastured Production.

Term	Definition
buck (billy)	Intact male goat used for breeding.
buckling	Immature buck.
cull	Breeding animal that is taken out of production and sold.
dewormer	A commercial animal health product administered to control internal parasites.
doe (nanny)	Female goat.
doeling	Immature doe.
ewe	Female sheep.
feeder	A young lamb or goat weaned from its mother but still a kid (needs to grow to the desired size to be ready for harvest/market).
kid	Newborn or young goat.
lamb	Sheep that is newborn to 1 year old; meat from a lamb; the act of a ewe giving birth.
market goat	A goat ready for sale as meat.
market lamb	A lamb ready for sale as meat.
ram	An intact male sheep.
wean	To remove a lamb or kid from feeding on its mother's milk.
wether	A castrated (neutered) lamb or buck.
yearling	A sheep or goat at least 12 months old but younger than 24 months.

Sheep and Goat Basics: Terms, Stock Selection, and Breeds

This section contains information about terminology, breeds, predator control, and infrastructure. Following are some basic terms applicable to sheep and goat production. Other helpful publications for understanding production terminology are referenced throughout this publication, with an Additional Resources section at the end. Table 1 provides a guide to common terms used in pastured sheep and goat production.

Selecting Stock

A primary consideration when selecting sheep and goats for small-scale production is the market for the animals. There are multiple market channels for lamb and goat meat. Identify the best potential nearby markets and the desired final product (size and type of animal) before you start seeking sources of stock (see Section 3 for marketing information).

Whether selecting animals for market or breeding purposes, purchasing healthy animals is essential. Feeder animals purchased after weaning should show good health and be disease-free. Sheep or goats chosen for breeding should also be disease-free and purchased from reputable breeders. An experienced farmer may help you evaluate the health and breeding soundness of higher-priced breeding stock.

Sheep and Goat Types and Breeds

The American Sheep Industry Association (sheepusa.org) lists more than 60 breeds of sheep raised in the U.S., and the American Goat Federation lists about 20 major goat breeds in the U.S. grown for meat, milk, and fiber. There are also many more breeds of sheep and goats worldwide, as shown by more than 150 breeds of sheep and goats listed at the Oklahoma State University livestock breeds website (**afs.okstate.edu/breeds**).

Tables 2 and 3 list examples of U.S. goat and sheep breeds, their uses, and characteristics.

Most sheep breeds are raised for meat and wool. Some sheep breeds are called "dual purpose" because they produce both a desirable fleece and carcass. In the U.S., only two sheep breeds, the East Friesian and Lacaune, are commonly used for milking.

Meat sheep breeds include both wool and hair sheep. Hair sheep naturally shed and do not need shearing. The Katahdin and Dorper breeds are major hair sheep breeds used for meat production in the U.S.

All breeds of wool sheep can be utilized for meat. Crossbreeding is used to produce sheep for meat production. Farm flocks may have one or more lines of purebred ewes from breeds with more desirable maternal characteristics. Mating those ewes with a ram from a breed with more desirable carcass characteristics will produce the most desirable market lambs while maintaining a productive ewe flock.

There are many breeds of wool sheep, which are classified by the type of fleece produced. "Fine" wools, those with the smallest diameter fibers, are used to produce the lightest-weight fabrics. Many breeds with desirable meat traits produce "medium" wool, with higher diameter fibers. "Long" wool breeds have the widest fiber diameter but tend to have the longest staple (fiber) length.

Most goat breeds are grown for either meat or dairy goats, but two breeds, Angora and Cashmere, are raised for fiber. The common dairy goat breeds in the U.S. are Alpine, LaMancha, Nubian, Oberhasli, Saanen, and Toggenburg.

Meat goat breeds are the typical focus of small farm production. Many meat goats are crossbred, meaning two or more pure breeds are used to produce animals with desirable traits from both breeds. The major meat goat breeds in the U.S. are Spanish, Boer, Kiko, Myotonic, and Savanna.

For more information about goat breeds, see the NC State Extension publication *Breeds and Production Traits of Meat Goats* (**content.ces.ncsu.edu/breeds-and-production-traits-of-meat-goats**)

Facilities, Infrastructure, and Predator Control

Land Requirements for Sheep and Goats

An important first question for the prospective sheep or goat producer to ask is: How many goats or sheep can my farm handle? The answer is usually tied to how much land is available and how much labor is available to care for animals.

Table 2. Major Goat Breeds in the U.S.

Purpose/Category	Breed/Type	Characteristics
Meat	Boer	The most common; rapid growth; excellent carcass quality.
	Kiko	Good parasite resistance; good mothering ability.
	Myotonic	Also called "Tennessee Fainting Goats."
	Savanna	Very hardy disease resistance; little hoof problems.
	Spanish	"Spanish" is a general term used in the goat industry to refer to a wide variety of crossbred goats.
Dairy	Alpine	Excellent milker; hardy animals that thrive in any climate.
	LaMancha	Produce quality milk with high butterfat and protein over long period of time.
	Saanen	Heavy milk producer with 3% – 4% butterfat.
	Toggenburg	Medium size; one of oldest goat breeds; moderate milk production and low butterfat content.
	Nigerian Dwarf*	Smallest of dairy breeds; up to ½ gallon milk per day with high butterfat.
	Sable*	High milk production; calm temperament.
Fiber	Angora	Small animals with up to 5.3 pounds of mohair.
	Cashmere	Are a type, not a breed; cashmere fibers are very fine, produced from goats specifically bred for high quality fiber.
Dual Purpose	Nubian	Can live in hot climate; milk production is low, with high butterfat content.

*Lesson common breeds.
Source: American Goat Federation (**americangoatfederation.org)**. Additional information can be found in the Oklahoma State University Livestock Breeds Database (**afs.okstate.edu/breeds/goats**).

Land requirements for sheep and goats vary by the type of land and quality of forage, as well as the desired grazing program. For example, high-quality, high-protein pastures may be periodically rotated with a certain number of animals. Lower quality pastureland—or in some situations, brush—will not sustain as many animals for as long a period. Making it more difficult to estimate is that goats are sometimes used to "shock-graze" brush or pastureland that is being transitioned or reseeded.

Table 4 provides a guideline for the number of sheep and goats that can be grazed on the amount of pasture that one cow animal unit would use.

Table 4. Stocking Rate, # Head Sheep and Goats Equivalent Per Cow

Pasture Type/Quality	Goats # of Head	Sheep # of Head
Good quality pasture system	6 – 8	5 – 6
Good brush/browse system	9 – 11	6 – 7

Source: *Forage Needs and Grazing Management for Meat Goats in the Humid Southeast*, NC State Extension, **content.ces.ncsu.edu/forage-needs-and-grazing-management-for-meat-goats-in-the-humid-southeast**

Goats can generally be stocked at a slightly higher density than sheep. Under good pasture conditions,

Table 3. Major Sheep Breeds in the U.S.

Purpose/Category	Breed/Type	Characteristics
Meat	Cheviot	Small, compact, hardy animal producing well-muscled carcasses.
	Dorset	Known for their lambing ability.
	Hampshire	Lambs are fast growing with a heavy boned, lean carcass.
Fiber, Longwool	Blueface Leicester	Fleece is heavy and curly, weighing up to 20 pounds.
	Border Leicester	Wool known for brilliance and sheen.
	Lincoln	Referred to as largest wool breed.
Fiber, Fine Wool	Rambouillet	Rembouillet and Targhee are common wool breeds in U.S. sheep industry.
	Targhee	
	Merino	Known for producing most desirable quality of fleeces.
Fiber, Hair Breeds	St. Croix	Superior parasite resistance but poor carcass quality; on some threatened lists.
	Dorper	Lack parasite resistance observed in other hair sheep; good terminal sire hair sheep breed.
	Katahdin	Composite breed that has been crossbred to achieve certain desirable characteristics of the parent breeds; developed with increased parasite resistance and maternal characteristics; crossbreeding improves carcass quality.
Dual Purpose	Cheviot	Desirable for both meat quality and maternal characteristics; produce desirable meat lambs; wool sold to wool crafters and sometimes for cottage industry spinning and knitting.
	Columbia	
	Corriedale	
	Dorset	
	Montadale	
	Polypay	
Terminal Sire	Suffolk	Improved growth and carcass; often used for crossbreeding to produce meat lambs; may also be raised as purebred flocks as dual purpose.
	Hampshire	
	Oxford	
	Shropshire	
	Southdown	
	Texel	
Maternal	Finnsheep	Increased lambing rates; produce ewes with desirable mothering traits.
	Romanov	

Source: American Sheep Industry Association (**sheepusa.org/resources-materials-breeddirectory**) and The Livestock Conservancy (**livestockconservancy.org**).

including the absence of wet soils, both goats and sheep could be stocked with cattle. For example, one to two goats or one sheep may be added per cow with no pasture productivity loss. The reason for this is that goats and sheep will eat some plants that cattle may not prefer. Goats and sheep also have smaller mouths and are able to more selectively graze different plants and parts of plants than cattle. For more information, see the NC State Extension publication *Co-Grazing Meat Goats and Beef Cattle Has Many Advantages* (**content.ces.ncsu.edu/co-grazing-meat-goats-and-beef-cattle-has-many-advantages**).

Fencing

Proper fencing is essential to a successful sheep or goat enterprise. Good fencing is as important for keeping predators out as it is for keeping sheep and goats in.

Sheep and goat pastures usually require two types of fences — perimeter fences and interior fences. Perimeter fences, vital to preventing predators, are often permanent and surround the entire grazing area. Perimeter fences may be woven wire or electric. Small sheep and goat farms have increased their use of high-tensile wire fencing, in which an individual strand of wire may be electrified.

Interior fences, which are placed inside the perimeter, divide the pasture into different areas called paddocks. Interior fences can be temporary or semipermanent. Polytape and polywire, which combine metal and plastic, are often used to divide pastures. These can be electrified, and some polywire fences may provide effective predator control.

Different fence types have advantages and disadvantages. Well-built, permanent, woven wire fences with barbed wire are more expensive per foot but may require less regular management and upkeep requirements than electric systems. New sheep and goat farmers often prefer electric fences because of the substantially lower purchase and establishment costs. Portable electric systems also offer potential advantages because they may be lower cost and easier to move as farms change to smaller farms, though these systems may require more repairs and maintenance.

Shelter, Buildings, and Working Equipment

Healthy sheep and goats are able to thrive in a variety of weather conditions, but some shelter is required. Some main determining factors for sheep and goat shelters include:

Animal size: Younger animals are less cold-hardy.

Weather: Sheep and goats benefit from shelter from rain, as well as from extreme cold and wind. Sheep and goats should stay dry during cold, wet weather.

Animal purpose: Dairy sheep and goats generally require more shelter than those raised for meat. They also require milking facilities. Farms focused on fiber production also often provide more buildings for sheltering animals.

Lambing and kidding pens: Ewes and nannies greatly benefit from being placed in small, sheltered pens at lambing and kidding time. Besides providing protection during cold weather, sheltered pens facilitate bonding between the mother and lamb or kid. Pens also make it easier to address any animal health concerns at birth. Lambing pens are usually about 16 square feet; goat kidding pens (or "jugs") are about 4 feet by 5 feet.

Shelters for sheep and goats can be purchased or constructed from locally available materials. For meat animals, a three-sided shelter with the open side facing south is often recommended. Housing recommendations suggest that the rear of the building can be 4 to 6 feet high, with front eaves at 6 to 8 feet high. Required space per animal can vary according to the animal's size; providing 8 to 10 square feet per animal is a good rule of thumb for market animals; 20 square feet per pair (mother and offspring) should be provided for breeding animals.

Working facilities are needed to perform basic animal husbandry tasks and for "handling" the animals when transport is needed. Meat animals may need to be herded and handled for basic health maintenance, such as deworming and foot trimming. Portable corrals and chutes that are specially constructed for herding and working (for example, giving vaccinations and deworming) animals are available for purchase. A farm building or shed could also be modified to allow for herding and handling of sheep and goats. If modifying an existing building, design the modifications to accommodate the herding habits of sheep or goats and use proper fencing heights recommended for each species.

Some type of setup that allows unloading and loading animals from a truck or trailer is also needed. A loading area is often surrounded by permanent or semipermanent fencing and gates that allow the farmer to more easily sort and separate animals.

Sheep and goats intended for other uses, like breeding and milking, usually require more square footage of shelter. Producers interested in those enterprises should

develop a list of space and equipment requirements and costs to determine potential profitability.

Feeders and Waterers

Goats and sheep will likely need some supplemental feeding. Feeders for hay and grain may be constructed or purchased. They should allow ample room for each animal. Fresh, clean water should be available at all times to animals. Very small flocks could use watering troughs or other containers. Larger pastures often have water lines flowing to a central point at which an automatic waterer is installed. Although buying and installing pasture waterers may cost more than using containers, they can save labor over the long haul.

Feeders and waterers must be kept clean. Whether purchasing equipment or building it yourself, choose materials that can be easily cleaned and sanitized.

Predator Control

Predators of sheep and goats in North Carolina include coyotes as well as wild or unleashed domesticated dogs. Even when strong fences prevent intrusion, both wild and domesticated animals can also create stress in a flock by "running" sheep and goats along fence lines.

Effective perimeter fences are some of the best predator controls for sheep and goats. Allowing a flock access to secure buildings during the night can also be a deterrent. Wild and domesticated dogs may also be deterred when animals are housed in barns near human activity. Small farms that have outbuildings near a house could use those locations to advantage.

There is a long tradition of using working dogs and guard animals to help protect sheep and goat flocks. Guard dogs that live with the sheep flock, like the Great Pyrenees and Anatolian Shepherd breeds, can effectively deter dogs and wildlife. Larger guard animals, like donkeys and llamas, can also deter predators.

Purchasing and feeding guard animals and working dogs add expense to the market lamb or goat enterprise. It is wise to seek advice from experienced shepherds before deciding to make the investment.

For more information on selecting and using livestock guardian dogs, see the Texas A&M AgriLife Extension publication *Livestock Guardian Dogs* (**sanangelo.tamu.edu/files/2013/08/Livestock-Guardian-Dogs1.pdf**).

Sheep and Goat Husbandry, Nutrition, and Health

Animal husbandry refers to the everyday care of animals raised for food, fiber, and other products benefitting humans. This section explores the basics of sheep and goat husbandry, nutrition, and health.

Nutrition

Some producers will provide grain and other feeds to grazing goats and sheep. If a complete ration is being fed to the goats or sheep, like bagged feed from a farm supply store, vitamins and minerals may be added to that feed. A local NC State Extension professional, veterinarian, or experienced producer can help a new producer determine if the goats or sheep are eating what is considered to be a balanced ration. Producers can learn to balance sheep and goat rations based on the quantity and quality of forage and feed available. Several helpful spreadsheets on balancing rations, including free resources, are available at the Maryland Small Ruminant Page (**www.sheepandgoat.com/rationsoftware)**.

Feeding sheep and goats a diet balanced for the animal's nutrient needs is essential for successful, profitable production. Different sizes of livestock will have different nutrient requirements, and different feeds and forages will provide different levels of those requirements. Tables 5 and 6 provide examples of sizes of goats and lambs and their daily nutrient requirements.

Table 5. Daily Nutrient Requirement for Meat Goats

Nutrient	30-lb Goat	60-lb Goat
Dry matter (lb)	2.0	3.0
TDN (%)	68.0	65.0
Protein (%)	14.0	12.0
Calcium (%)	0.6	0.4
Phosphorus (%)	0.3	0.2

Source: *Forage Needs and Grazing Management for Meat Goats in the Humid Southeast*, NC State Extension, **content.ces.ncsu.edu/forage-needs-and-grazing-management-for-meat-goats-in-the-humid-southeast**

Table 6. Daily Nutrient Requirement for Early Weaned Lambs, Moderate Growth Rate

Nutrient	44-lb Lamb	88-lb Lamb
Dry Matter (lb)	2.2	3.3
TDN (%)	81.0	78.0
Protein (%)	0.17	0.13
Calcium (%)	0.5	0.5
Phosphorus (%)	0.3	0.3

Source: Oregon State University Extension Service Nutrient Requirements of Sheep (**extension.oregonstate.edu/educational-document/nutrient-requirements-sheep**)

Energy is the most variable and probably most important part of the sheep and goat diet. The measure of energy available to small ruminants is called total digestible nutrients (TDN). TDN is calculated by evaluating the type and quality of forage and grain being fed.

Fiber, or roughage, is another vital nutrient need. Small ruminants need the proper amounts and quality of fiber to keep their digestive processes functioning. This is often measured in a percentage of "crude fiber" in the diet.

Protein is usually the most expensive component of the animals' diet. Protein requirements decrease as the animals grow. Young sheep (less than 40 pounds) and young goats (less than 30 pounds) will need substantially higher percentages of crude protein in their diet than heavier animals. Balancing energy requirements with the necessary percentage of protein in the diet is a big part of creating a balanced ration.

Vitamins and minerals are very important and are usually supplemented in whatever diets are fed to sheep and goats. For grazing animals, these are usually provided in a trace mineralized salt ("salt and minerals"). Be sure that the products used are species-appropriate; for example, goats have a higher copper requirement than sheep.

Clean water is a vital nutrient in livestock diets. Unlimited, or free choice, water should always be available for sheep and goats.

Salt and mineral supplements are usually designed for ruminants on pasture. However, regardless of housing system (pasture or barn), free choice minerals should be provided.

Reproductive Management

Females

Small ruminants are generally seasonal breeders; they typically begin cycling and can be bred during the late summer and winter months. This seasonal cycle is controlled by day length and is most active during the shortest days in November and December. The estrus cycle for ewes is 17 days and for does is 21 days. Average gestation duration for sheep and goats is 145 to 150 days. To maximize number of lambs or kids born, breeding should take place in the fall (late August to December), with lambing and kidding occurring during the springtime.

Some breeds such as Dorset, Polypay, and Katahdin are less seasonal and can be bred any time of the year. Frequently, spring breeding for fall lambing is used to generate meat lambs that will be available for specialty markets during the springtime. These lambs generally bring a premium at market.

Males

Control of the breeding season is managed with timed exposure of ewes to rams and bucks. It is important to remove rams and bucks at the end of the breeding season to limit producer fatigue during lambing/kidding season and have a more consistent product to market. Ewes and does that do not conceive should be marketed as cull animals.

Breeding season should last two to three cycles (34 to 51 days for sheep and 42 to 63 days for goats). A marking harness can be used to identify when animals get bred, or a ewe or doe's back can be marked with crayon or paint. These marks can be used to identify due dates and evaluate fertility. Once a ewe or doe gets marked, she should be observed for another 17 to 21 days to see if she is "re-marked." A re-mark indicates she was not bred the first time. No re-mark indicates she is likely pregnant. If ALL ewes or does re-mark, the ram or buck is likely infertile and a replacement should be found.

A veterinarian can diagnose pregnancy by performing an ultrasound 30 to 45 days after the breeding season. This is not always necessary but can be used as a management tool to ensure ewes or does are pregnant.

Health

Sheep and goats can develop many different kinds of health problems. Some of these, particularly parasites, are related to pasture management and other factors in the sheep and goat environment.

Following are some general strategies for small ruminant health.

- Develop a good pasture rotation system.
- Restrict animals from very wet pastures and other soggy conditions.
- Practice basic biosecurity, like limiting access to other flocks and herds.
- Learn about preventive practices.
- Gain basic skills for maintaining animal health.
- Prevent disease spread by providing an isolation (quarantine) pen, pasture, or barn in which contagious animals may be housed while they recover.
- Develop a relationship (veterinarian-client-patient relationship or VCPR) with a local veterinarian who may be called during emergencies.

Internal Parasites

Parasites can be both internal and external. Internal parasites are by far the greatest health challenge in sheep and goat management. Internal parasites can develop resistance to dewormers; to prevent this, sheep and goat producers must carefully follow recommended practices for deworming.

Barber's pole worm (*Haemonchus contortus*), also called stomach worm, is a major internal parasite in sheep and goats. Producers can learn how to monitor the presence of this parasite by learning the FAMACHA® system of diagnosis. Producers can learn to use this system to evaluate different coloration in sheep and goat eyes, an indicator of barber's pole worms, then treat only the animals that are potentially infected. By treating only infected animals, the possibility of resistance to dewormers is reduced.

Some sheep are more genetically resistant to internal parasites than others. If parasite infection is a major concern, selection of sheep that are more resistant can be a management tool. In general, St. Croix and Katahdin hair sheep are more resistant to parasites than wool breeds. Contact your local Extension agent for more information on selection for parasite resistance.

Sheep and goats are also impacted by internal parasites such as intestinal worms and tapeworms. Internal parasite prevention depends on many aspects of production, including pasture management and rotation. Because of the threat of internal parasites, producers should develop a management strategy before bringing animals to the farm.

External Parasites

Lice are the most common external parasites of goats and sheep in North Carolina. Sucking lice puncture the skin and remove blood, causing anemia in severely infested sheep and goats. Chewing lice feed on hair and skin, causing discomfort to the animal. Infected animals will rub and scratch, often to excess. There are several approved medications for lice control in goats and sheep. For more information, see the NC State Extension publication *Lice: What They Are and How to Control Them* (**content.ces.ncsu.edu/lice-what-they-are-and-how-to-control-them**).

Other external parasites affecting small ruminants include wingless flies (called keds), mites (causing scabies), and wool maggots (fly larvae) that cause fly strike.

Foot and Hoof Diseases

Diseases of the feet and hooves are common in sheep and goats and can severely affect flock health. Three major hoof diseases of small ruminants in North Carolina are foot rot, foot scald, and laminitis (also called founder).

Foot diseases can be discouraged by providing clean, dry areas for goats and sheep. Proper hoof care is also a good prevention strategy. Producers should have facilities or holding areas in which sheep and goats can be handled for hoof trimming. Some diseases, like foot rot, can be treated through foot baths and other medicated treatments.

Foot rot is caused by two bacteria that infect the hooves of goats and sheep. The disease causes animals to limp and become lame. Infected hooves have a putrid smell. One of the bacteria is common to wet, muddy environments that increase likelihood of infection. For more information, see the NC State Extension publication *Foot Rot: Meat Goat Notes* (**content.ces.ncsu.edu/foot-rot)**.

Foot scald is inflammation between the toes (or claws) caused by a different microorganism than foot rot. The symptoms are similar to foot rot, except for the lack of bad smell. Products may be applied to treat foot scald, and foot baths may be used. For more information, see the NC State Extension publication *Foot Scald: Meat Goat Notes* (**content.ces.ncsu.edu/foot-scald)**.

Laminitis, or founder, is a foot disease in goats whose causes are not fully understood. The condition is characterized by inflammation of soft tissue in the foot. Feeding an excess of grain and abruptly changing the goat diet are linked to laminitis. For information about oral medications available for

treating laminitis, see the NC State Extension publication *Laminitis or Founder: Meat Goat Notes* (**content.ces.ncsu.edu/laminitis-or-founder)**. See Additional Resources for related health information.

Sheep and Goat Diseases

Pink eye is an eye infection that may be caused by many different kinds of organisms and minor eye injuries. Pinkeye is contagious; small ruminants that appear to have pinkeye should be isolated from other animals. For information, see the NC State Extension publication *Pink Eye or Keratoconjunctivitis: Meat Goat Notes* (**content.ces.ncsu.edu/pink-eye**)**.**

Listeriosis is a serious disease of goats and sheep caused by bacteria called *Listeria* that may be present in the environment, especially in places like rotting hay, dirty feeders, manure, and goat milk. Listeriosis can cause death and abortion in adult goats. The disease is especially concerning because *Listeria* can be transferred to humans and have adverse health effects. For more information, see the NC State Extension publication *Listeriosis in Your Herd: Meat Goat Notes* (**content.ces.ncsu.edu/listeriosis-in-your-herd)**.

Coccidiosis is the most common cause of diarrhea in young sheep and goats. The disease is caused by microscopic protozoa in the goat's intestinal tract. Young animals that are stressed, such as after being separated from the mother (dam), are more susceptible. Good management practices, like keeping waterers and feeders clean, help prevent infection. For more information, see the NC State Extension publication *Coccidiosis, the Most Common Cause of Diarrhea in Young Goats: Animal Science Facts* (**content.ces.ncsu.edu/coccidiosis-the-most-common-cause-of-diarrhea-in-young-goats).**

Enterotoxemia and Tetanus

Preventing diseases through vaccination can be much less costly than treating an infected herd, and some health problems cannot be treated. Vaccination prevents enterotoxemia (overeating disease) and tetanus in sheep and goats. Most recommendations for sheep and goat producers advise such vaccinations, as they prevent costly diseases that can result in animal mortality. To help guide decisions about vaccination, see the NC State Extension publication *Vaccinating Goats Against Enterotoxemia and Tetanus: Is it Necessary: Animal Science Facts* (**content.ces.ncsu.edu/vaccinating-goats-against-enterotoxemia-and-tetanus-is-it-necessary).**

Pasture Management

Managing pastures is very important for sheep and goat health and nutrition. See Additional Resources for some NC State Extension publications that address specific aspects of pasture management.

Major Pasture Types

Beginning sheep and goat producers should plan how to manage pastures in advance, otherwise established pastures and other grazing areas may be quickly used up. Understanding major types of pasture plantings in North Carolina can help a producer design pastures filled with diverse forages across seasons.

Cool-season forages develop most of their growth during the spring and autumn. Tall fescue is a prominent cool-season grass; orchard-grass and white clover are also common cool-season forages. With proper management, pastures with these grasses can be used from early spring through the start of summer and then again in the fall. Many producers use a practice called stockpiling, or letting cool-season grasses grow for grazing in the late fall and even early winter. If stockpiling is planned, be sure to consider possible associated animal health issues; stock-piled forages could be less nutritious and, in some cases, present toxicity issues for different species. Pastures composed primarily of cool-season grasses may be seeded with legumes, like red clover and alfalfa, that provide potential grazing and nutrition during hotter months.

Warm-season perennial grasses like bermudagrass are common in North Carolina and nearby states. These grasses grow the most during hotter months. With adequate moisture and management for animal health, warm-season grasses can provide substantial nutrition. Some producers with larger cool-season pastures plant separate paddocks with warm-season annual grasses (sudangrass, sorghum-sudangrass, and pearl millet) so that grazing needs may be met during the hotter months when cool-season grasses are growing slowly.

Winter annuals may be seeded into existing pastures, usually using no-till techniques. These include brassicas (kale, rape, and turnip), cereals (wheat, rye, and oats) and winter annual legumes (hairy vetch).

Note: Some crops, including annual grasses in the sorghum family, may present potential health issues for different species, such as being toxic soon after a frost; consult an animal nutritionist or veterinarian about new seedings. See Additional Resources for information about grass poisoning in sheep and goats.

Supplementing Pastures

Many sheep and goat producers are interested in feeding their animals as much forage (grasses, legumes, and woodland browse) as possible. In most cases, especially on very small farms, it will be necessary to supplement pastures by feeding hay and other feedstuffs.

Understanding the quantity and quality of the forage in a farm's pasture is important for determining additional forage needs. Some important questions to answer include:

- How much pasture is available, in terms of acreage?
- What is the composition of the forage species available?
- Do cool-season and warm-season grasses both exist in the farm's pastures?
- What is the cost to renovate old pastures or establish new pastures with suitable forage species?
- What poisonous plants are present, if any, and how will these be eradicated?

To determine the best pasture management strategy for a small farm, beginning sheep and goat producers should consult experts such as NC State Extension specialists or experienced sheep and goat producers.

Marketing and Processing Sheep and Goats

Marketing is central to profitably raising sheep and goats on small farms. This section describes important considerations for marketing and processing sheep and goats.

Identify Markets

Meat is the main product marketed by sheep and goat producers in North Carolina. Demand for goat and lamb tends to be heightened during particular cultural and religious celebrations. The main religions seeking local goat and lamb products are Islam, Judaism, and Christianity. Ethnic groups, especially those of Hispanic and Caribbean descent, also often seek goat and lamb for cultural holidays or other celebrations. Table 7 provides a list of holidays, the dates on which they typically fall, and the meat preferences for celebrations.

There is also consumer demand for goat and lamb meat raised locally or in accordance with certain husbandry practices, like access to pasture. Identifying multiple markets and consumer types, and catering to each one according to its specific preferences, may strengthen the small farm's sheep and goat marketing plan. Potential growers should identify markets before acquiring animals. Markets will determine breed selection as well as nutritional and reproductive management.

Understand Customer Preferences

Customers seeking goat and lamb for religious and cultural celebrations have different preferences. The most obvious preference, in the case of religious and cultural holidays, is the time of year when animals are required. Since sheep and goats usually give birth in the late winter or spring months, animals may not be at the preferred size at the time of the holiday. The observance dates of some religious holidays, such as the various Muslim feast days, may vary significantly from year to year. Producers wishing to cater to various holiday markets should consult a reliable holiday calendar to gauge how marketing may need to be adjusted. Breeding for lambs born in fall months is one alternative to meet the spring markets.

Buyer preferences can range widely for sheep and goats, especially for animals bought for religious celebrations. Preferences may include the size of the lamb or kid, whether the animal is male or female, and even physical characteristics such as coloration and horns. Buyers may also have certain preferences about where and how the animal is butchered or processed. Producers should understand these preferences and determine if they are able to meet buyer preferences at the farm's location.

Know Production Costs

Economists define *demand* as the amount that consumers are willing to pay for particular goods or services. It is not in the farm's best economic interests to produce sheep and goats if customers will not pay more than the cost of raising and marketing the animals.

Producers should estimate all costs associated with an enterprise before starting production. The North Carolina Farm School (**ncfarmschool.ces.ncsu.edu**) budget template can provide a good start for these estimates, and other templates are available from Extension programs in nearby states.

Understand Direct Market Channels

Successful sheep and goat production in North Carolina will likely involve niche or specialty markets, especially markets that allow the customer to connect directly with the producer. These include:

- Farmers markets
- Community supported agriculture (CSA)
- Direct delivery from the farm or processor
- On-farm sales

Table 7. Examples of Religious and Ethnic Markets for Sheep and Goats

Religion/ Tradition	Holiday	Date(s) (2020)	Lamb/Goat Weight/Condition Preferences [1]
Christianity	Western Easter	April 12	30 – 45 lb lamb; milk-fed and fat
			20 – 50 lb kid; 3 months or younger (avg. 30 lb)
	Eastern Orthodox Easter ("Greek Easter")	April 19	40 – 55 lb lamb; milk-fed and fat
			20 – 50 lb kid (avg. 35 lb)
	Christmas	December 25 — January 1	Milk-fed kids and lambs
			Larger adult animals for stew and curry
Hinduism	Navadurga/Navaratri/ Dussehra/Dashain	October 17 – 30	Male goats; size of carcass depends on number of people to be fed; relatively tender
	Diwali (Festival of Lights; also celebrated by Sikhs, Jains, and Buddhists)	October/ November	Information not available
Islam	Start of Ramadan	April 24	60 – 80 lb weaned market lamb
			60 – lb weaned kids with all milk teeth, not older than 1 year
	Eid al-Fitr (End of Ramadan)	May 24	60 – 80 lb weaned market lamb
			60-lb weaned kids with all milk teeth; not older than 1 year
	Eid al-Adha (Eid, Festival of Sacrifice)	July 31	60 – 80 lb lamb; blemish-free animals
	Muharram (Islamic New Year)		Information not available
Judaism	Passover	April 8 – 16	30 – 55 lb lambs; milk-fed and fat
	Rosh Hashanah	September 18 – 20	60 – 110 lb weaned lamb; forequarters
Ethnic Holidays	Cinco de Mayo (Mexican)	May 5	15 – 30 lb (live weight); suckling kids (for cabrito)
			Large, weaned market kids (seco de chivo, barbecue)
	Independence Day (American)	July 4	Animal size depends on size party, barbecue
	Caribbean (Carnival, Carifest, Jamaican Independence Day, etc.)	August	60 – 80 lb young buck; smelly
	Chinese New Year	January/ February	60 – 80 lb (live weight) goats

[1]Buyer-specific and subject to change.
Source: Adapted from Sheep and Goat Marketing Calendar, Cornell University (**sheepgoatmarketing.info/calendar.php**)

Lambs and goats may also be sold directly to customers more accustomed to purchasing meat from wholesalers or food brokers. These customers include:

- Foodservice (chefs and restaurants)
- Grocery stores
- Specialty food retailers (including caterers and farmers market vendors)

An overview of direct marketing may be found in *Choosing Direct Marketing Channels for Agricultural Products* (**extension.tennessee.edu/publications/Documents/PB1796.pdf** [PDF, 4 MB]).

Processing

Harvesting and processing the animal into marketable cuts of meat are among the largest production costs for sheep and lamb producers. For this reason, producers may decide to sell live animals at a premium directly to the customer, who then arranges processing with a local meat locker or processor. Processing regulations and the availability of nearby processing often determine a producer's decisions about marketing meat.

Processing Regulations

In North Carolina, meat for sale may be processed by state-inspected (N.C. Department of Agriculture & Consumer Services [NCDA&CS]) and federally inspected UDSA facilities. Meat processed by a state-inspected facility may be sold only in North Carolina. Meat processed by a USDA-inspected facility may be sold across state lines. Meat sold in North Carolina must be packaged and labeled in accordance with state regulations. Packaging and labeling guidelines can be found at the NCDA&CS Meat and Poultry Inspection Division website (**www.ncagr.gov/MeatPoultry/labels.htm**).

Any farmer who receives, stores, transports, or sells state or federally inspected meat must be registered with the NCDA&CS as a meat and poultry handler. Instructions for how to register as a meat and poultry handler in North Carolina are found at the Meat and Poultry Inspection Division website (**www.ncagr.gov/MeatPoultry/meathandlers.htm**).

Availability of Processors

The NCDA&CS maintains a directory of state and federally inspected plants in North Carolina at **www.ncagr.gov/meatpoultry/index.htm**.

Once a producer has located the nearest processors, the producer should conduct a survey of local meat processing options, including the costs of processing and the processor's experience. Some questions to ask prospective processors include:

- Do you slaughter and process sheep or goats?
- How far in advance must I schedule processing?
- Do you require a minimum number of animals to be processed at a time?
- What are your costs for processing?

For examples of other questions to ask a prospective processor, see the NCDA&CS publication *FAQ Sheet for Beginning Niche Meat Producers* (**cefs.ncsu.edu/wp-content/uploads/FAQ-Beginning-Niche-Meat-Producers-Condensed-1.pdf** [PDF, 3.8 MB]).

Producers need to know how much they should charge for their animals or the cuts of meat being sold. The NCDA&CS publishes a monthly report of retail prices for different cuts of pastured lambs in North Carolina (**www.ncagr.gov/markets/mktnews/local.htm**).

How much meat will come from lambs and goats? Table 8 provides predictions of the cutout (amount of usable or salable meat from a carcass) for goat. Table 9 provides similar information for lamb. The ways that goat and lamb carcasses are cut will vary according to the processor and the customer preference. Carcass size and yield grade (related to the fat content and carcass quality) will also affect the salable yield.

Table 8. Size of Various Primal Cuts Relative to Carcass Weights (Goats

Carcass Weight (lb)	Relative Size by Primal Cut (lb)				
	Foresaddle	Shoulder	Ribs	Leg	Loin
15 or less	4 or less	7 or less	5 or less	5 or less	2 or less
15 – 30	4 – 6	7 – 10	5 – 10	5 – 8	2 – 4
30 – 40	6 or more	10 or more	10 or more	8 or more	4 or more

Source: Institutional Meat Purchase Specifications for Fresh Goat (USDA, 2001)

Table 9. Size of Various Primal Cuts Relative to Carcass Weights (Lamb)

Carcass Weight (lb)	Relative Size by Primal Cut (lb)						
	Foresaddle	Hindsaddle	Leg	Loin	Rack	Shoulder	Back
41 – 55	21 – 25	24 – 30	9 – 11	3 – 4	6 – 7	14 – 18	12 – 14
55 – 65	25 – 35	30 – 34	11 – 12.5	4 – 6	7 – 8	18 – 22	14 – 16
65 – 75	35 – 40	34 – 38	12.5 – 14	6 – 8	8 – 9	22 – 26	16 –18

Source: Institutional Meat Purchase Specifications (USDA, November 2014)

The information in Tables 10-1, 10-2, 11-1, and 11-2 underscores how there may be financial advantages in selling lambs and goats on a live weight per-pound or per-animal cost. Local and ethnic markets often favor this method of sale. If cuts for retail sale are desired, the producer should visit with the meat processor to find out the likely cutout to determine profitable prices per pound. Washington State University Extension developed a downloadable app (**extension.wsu.edu/animalag/content/wsu-livestock-carcass-grade-cutability-calculator**) that allows quick calculation of retail cuts for lambs, based on live weight and yield grade.

Unless they can be processed at an inspected facility, animals must be sold live to the customer. On-farm slaughter of sheep and goats for sale is not allowed in the state of North Carolina. For frequently asked questions about processing goat and lamb, see the Center for Environmental Farming Systems web resources at **https://cefs.ncsu.edu/wp-content/uploads/FAQ_Marketing_Meats.pdf** (PDF, 692 KB).

Production and Profitability for Sheep and Goat Farming

The production costs in Tables 10-1, 10-2, 11-1, and 11-2 are from the North Carolina Farm School small ruminant budget estimates. These budgets are available as downloadable spreadsheets at the North Carolina Farm School website (**ncfarmschool.ces.ncsu.edu**). These budgets are based upon a set of realistic assumptions for small ruminant production in North Carolina. Studying these budgets, and adapting them to the production assumptions for a specific farm, can help new farmers decide whether sheep or goat production will likely be profitable.

Capital Investment (Fixed Costs)

Capital investments are expenses for items that will be used for more than a single year. This section highlights the most common capital costs for a sheep and goat enterprise in North Carolina.

Stock Purchase

The North Carolina Farm School budget does not include cost for the purchase of breeding animals. It is assumed that the farm has operated for three or more years. Productive ewes or does purchased will vary by purity of breed, proven mothering, and location of purchase (sale barn or reputable breeder). Cost varies widely, but $180 to $400 for a breeding animal is a likely range.

Table 10-1. Annual Goat Budgeting Assumptions for Table 10-2.

Variable	Value
Stocking Rate (Animals per Acre)	7.00
Weight lb/per bale of hay	500
% Body Weight Hay Consumption Avg.	3.0%
# of Days on Hay	60
Doe Replacement Rate	20%
Average Buck Body Weight	160
Carcass Weight, % of Live Weight	50%
Number of Bucks	1
Number of Does	30
Kid Loss	10.00%
Kidding Rate	1.7
Weight of Kids to Market	70
Average Doe Body Weight	120

Table 11-1. Annual Lamb Budgeting Assumptions for Table 11-2.

Variable	Value
Stocking Rate (Animals per Acre)	6.00
Weight lb/per Bale of Hay	500
% Body Weight Hay Consumption	2.5%
# of Days on Hay, Wintering	60
Ewe Replacement Rate	20%
Average Ram Body Weight	175
Number of Rams	1
Number of Ewes	30
Lamb Loss	10.00%
Lambing Rate	1.7
Weight of Lambs to Market	80
Average Ewe Bodyweight	140

Truck, Trailer, and Machinery

The largest capital investment will likely be for the truck and livestock trailer required to transport sheep and goats to and from the farm. The truck could also be used for delivery of processed cuts to customers or outfitted with coolers for direct marketing at farmers markets.

A small (40 to 55 horsepower) tractor will likely be necessary for pasture maintenance and feeding hay. A bush hog (rotary mower) that attaches to the tractor is also useful for pasture maintenance.

Table 10-2. Goat Spring Kidding Budget

Budget Category	Budget Item	Unit	Quantity	Price Per Unit	$/Kid Sold	Total
Income	Kids Sold [1]	total lb carcass	1,295.0	$5.69	$200.23	$7,368.55
	Cull Does [2]	total cull does CWT	7.2	$100.00	$19.46	$720.00
	Gross Income				**$219.69**	**$8,088.55**
Variable Cost	Pasture Fertilization, 10-10-10	lb per acre	500.00	$0.30	$20.27	$750.00
	Overseeding, Forage Chicory and Birdsfoot Trefoil	Acres / $ per Acre	0.00	$40.00	$0.00	$0.00
	Overseeding, Red Clover	Acres / $ per Acre	0.00	$40.00	$0.00	$0.00
	Weed Management, 2,4-D	$ per pint	0.00	$3.00	$0.00	$0.00
	Hay Feed Cost	$ per bale	14	$30.00	$11.35	$420.00
	Grain Supplement Feed Cost	lb	1000	$0.50	$13.51	$500.00
	Salt and Mineral [3]	Total lb / $ lb	984	$0.50	$13.30	$492.00
	Medication, Deworming	cost/doses	164	$1.00	$4.43	$164.00
	Medication, Vaccination	cost/doses	164	$0.50	$2.22	$82.00
	Electricity	month	12	$0.00	$0.00	$0.00
	Straw Bedding	tons/bedding used	1.0	$60.00	$1.62	$60.00
	Dog Food	per month	12	$40.00	$12.97	$480.00
	Mach. and Equip. Variable Cost	from cap. exp.	1.00		$40.99	$1,516.55
	Kill Fee	Per head	$0.00	$0.00	$0.00	$0.00
	Processing	Per carcass	$0.00	$0.00	$0.00	$0.00
	Marketing Cost	% of Gross	5%	$8,088.55	$10.93	$404.43
	Total Variable Cost				**$131.59**	**$4,868.98**
Returns Above Variable Cost					**$88.10**	**$3,219.57**
Fixed Costs	Capital Fixed Cost	from cap. exp.	1		$33.42	$1,537.19
	Total Fixed Costs				**$33.42**	**$1,537.19**
Total Costs					**$165.01**	**$6,406.17**
Returns to Land, Capital, and Unpaid Labor					**$54.68**	**$1,682.38**
Kids Birthed						**51**
Kids Weaned						**46**
Kids to Market						**37**
Returns/Market Kid, excluding cull does						**$35.22**
Breakeven Cost per lb Carcass, excluding cull does						**$4.95**
Breakeven Cost per Carcass, excluding cull does						**$153.68**

[1] The number of kids sold = number of kids weaned the animals kept for herd replacement (Doe replacement rate number of does). Information about growth, development, body weight, and cut and wrap of Kiko goats: **ucanr.edu/sites/placernevadasmallfarms/files/197802.pdf** (PDF, 258 KB).

[2] NC Animal Auction Price Report: **www.ncagr.gov/markets/mktnews/RA_LS142.TXT**

[3] We assume 12 lb per average head, including lambs, of salt and mineral on average annually.

This budget was assembled by Derek Washburn, North Carolina Farm School program, NC State Extension, in collaboration with Gary Bullen, N.C. Cooperative Extension agents across the state of North Carolina, and small farms in North Carolina. For more detail regarding this budget, visit **ncfarmschool.ces.ncsu.edu**.

Table 11-2. Sheep Spring Lambing Budget.

Budget Category	Budget Item	Unit	Quantity	Price per Unit	$/Lamb Sold	Total
Income	Lambs Sold [1]	Total lb cuts sold	1,185.2	$13.57	$434.72	$16,084.64
	Cull Ewes [2]	Total Ewes CWT	8.4	$100.00	$22.70	$840.00
	Gross Income				**$457.42**	**$16,924.64**
Variable Costs	Pasture Fertilization, 10-10-10	Lb per acre	500.00	$0.30	$24.32	$900.00
	Overseeding, clover	Acres / $ per Acre	0.00	$32.00	$0.00	$0.00
	Overseeding, crabgrass	Acres / $ per Acre	0.00	$25.00	$0.00	$0.00
	Weed Management, 2,4-D	$ per pint	2.00	$3.00	$0.16	$6.00
	Hay Feed Cost	$ per bale	14	$35.00	$13.24	$490.00
	Grain Supplement Feed Cost	lb	500	$0.50	$6.76	$250.00
	Salt and Mineral [3]	Total lb / $ lb	984	$0.48	$12.77	$472.32
	Medication, Deworming	cost / doses	164	$1.00	$4.43	$164.00
	Medication, Vaccination	cost / doses	164	$0.50	$2.22	$82.00
	Electricity	month	12	$25.00	$8.11	$300.00
	Straw Bedding	tons of bedding used	1	$60.00	$1.62	$60.00
	Dog Food	lb of dog food	1,095	$1.00	$29.59	$1,095.00
	Mach. and Equip. Variable Cost	from cap. exp.	1.00		$41.53	$1,536.57
	Kill Fee	Per head	$25.00	$925.00	$25.00	$925.00
	Processing	Per lb	$2.00	$2,370.37	$64.06	$2,370.37
	Marketing Cost	% of Gross	8%	$16,924.64	$36.59	$1,353.97
	Total Variable Cost				**$270.41**	**$10,005.23**
Returns Above Variable Cost					**$187.01**	**$6,919.41**
Fixed Costs	Capital Fixed Cost	from cap. exp.	1		$46.50	$1,720.51
Total Costs			**Per Lamb**		**$316.91**	**$11,725.73**
Returns to Land, Capital, and Unpaid Labor					**$140.51**	**$5,198.91**
Break-even Lambs Birthed						51
Break-even Lambs Weaned						46
Break-even Lambs to Market						37
Returns/Market Lamb, excluding cull ewes						$117.81
Breakeven Cost per lb of Cuts, excluding cull ewes						$9.89
Breakeven Cost per lb Carcass, no cuts, excluding cull ewes [4]						$6.08

[1] The number of lambs sold = number of lambs weaned the animals kept for herd replacement (ewe replacement rate number of ewes).

[2] NC Animal Auction Price Report: **www.ncagr.gov/markets/mktnews/RA_LS142.TXT**

[3] We assume 12 lb per average head, including lambs, of salt and mineral on average annually.

[4] Break-even cost per pound of carcass or "at hanging weight" includes a discount of a processing fee that will not exist if the butcher does not create final cuts and includes a discount against total cost that ewes provide annually.

This budget was assembled by Derek Washburn, NC Farm School, NC State University, in collaboration with Gary Bullen, N.C. Cooperative Extension agents across North Carolina, and small farms in North Carolina. For more detail regarding this budget, visit **ncfarmschool.ces.ncsu.edu**.

Many small farms also use a farm utility vehicle or golf cart. These are used to carry feedstuffs, portable electric fences, and fencing tools, and to facilitate other chores in the pasture. This equipment, as with a truck, tractor, and the other machinery and equipment mentioned here, will be best used for more than one enterprise (such as goats, sheep, and cattle).

The North Carolina Farm School budget for a sheep or goat enterprise estimates a start-up capital investment of $30,000 to $35,000 for the truck, trailer, machinery, and working facilities. This upfront cost translates to $1,050 to $1,075 in annual fixed costs, which include depreciation, interest, insurance, and taxes.

Fencing and Guard Animals

Costs will vary greatly depending on the type of fences needed. Farms with established fencing may need to spend money only for repair or installing electric fence lines. Farms without existing fences will need to establish perimeter and interior fences, and the cost can be substantial.

Fencing the perimeter of a 5-acre pasture will require about 1,800 feet of fencing, assuming that the area is square. Pastures needing more fence corners, or to trace the lay of the land, will require a longer fence. Interior fences will add additional expense.

Fencing costs can range from $1 to $1.50 per foot for electric high-tensile fence to more than $3 per foot for woven wire fencing. These figures do not include the labor for installation.

Sheep and goat producers also frequently use companion animals (for example, dogs, llamas, or donkeys) to discourage approaching predators and to warn farmers of possible danger.

The fencing in the North Carolina Farm School budgets includes units of cost for 5 acres of fencing. Each 5-acre unit assumes an initial investment of $4,600, which includes perimeter fencing, interior fencing, grazing fence, gates, corner bracing, water trough, and fence charger. Annualized fixed cost for each 5-acre unit of investment is $217 (annualized fixed cost is the total fixed cost divided by useful life, or how long the capital will last.)

Waterers

Sheep and goats may drink from water troughs or automatic waterers installed in or near pastures. Like fencing, expenses for water provision will vary according to the existing infrastructure. Hand watering may be possible for very small numbers of animals, but production at profitable levels will likely require some type of automatic waterers.

The North Carolina Farm School sheep budget assumes a $100 expense to acquire a water trough that can be moved as animals are rotated on pasture.

Feeders

Feeders are necessary for feeding nutritional supplements such as minerals, hay, and other feeds. Sheep and goat feeders can be constructed at modest costs.

Shelters

Shelters are necessary to protect sheep and goats from the elements and also can be constructed for a minimal investment. Investment for shelters and feeders is estimated at $550 each. Do-it-yourself feeder designs are available from Premier 1 Supplies at **www.premier1supplies.com/sheep-guide/wp-content/uploads/2012/10/BYO-Feeders-2012.pdf** (PDF, 77.9 MB).

Sheep and Goat Sorting and Handling

Sheep and goats will need to be sorted and handled for health maintenance (for example, deworming and hoof trimming) and transportation. The North Carolina Farm School lamb budget assumes a $1,000 purchase price for a small head gate, which allows the producer to keep the animal still and safe while trimming hooves and administering medication. There are some differences in sheep and goat handling equipment; consult with existing producers or Extension specialists to determine the specific needs.

The addition of a mobile chute for moving animals and a loading ramp for transporting animals may or may not be needed, depending on the pasture and shelter setup. Many producers may be able to easily work, sort, and move animals with minimal equipment. The North Carolina Farm School budget includes a chute and loading ramp for a total cost of $750.

Marketing

Marketing costs are often underestimated in planning the sheep and goat enterprise. Capital marketing costs for sheep and goat farms are more likely to apply to farms doing direct marketing at an off-farm location, as that will involve freezers and coolers for safe food handling. Expenses can range from a few hundred dollars to several thousand dollars, depending on the amount of meat and storage duration.

Marketing costs in the North Carolina Farm School example budgets are based on a percentage of the gross income of the farm, supplying a simple and adjustable percentage for estimating marketing expenses. Often producers offer percentage discounts on wholesale purchases. Using a percentage adjustment allows producers to evaluate the cost and effort of selling direct at farmers markets compared to selling larger amounts of products directly from the farm.

The sheep budget includes an 8 percent marketing cost of about $1,300 for farmers market offerings of meat sold in cuts. The goat budget assumes a whole carcass is being picked up directly from the processor, representing a 5 percent marketing cost, or $480.

Insurance

Fixed insurance costs apply to farm property and liability coverage. Costs of property insurance will vary according to the value of the property insured. Liability insurance costs may vary considerably, depending on the method of marketing. For example, different liability insurance may be required for farms selling meat directly to consumers than those selling live animals directly. It is wise to review the nature of the farm operation with an insurance professional with expertise in that type of assessment. Fixed costs for insurance are included in the budget's capital expense sheet as 1 percent of the total value of the purchase of the operation in annualized cost.

Summary of Fixed Costs

Fixed costs do not change with the number of animals produced or sold. Sheep and goat operations will likely require substantial fixed costs, especially for equipment, fencing, and other infrastructure. The North Carolina Farm School lamb and goat budgets can help prospective sheep and goat producers pinpoint fixed costs.

Sheep and goat enterprises may be able to use some assets, such as a pick-up truck or trailer, for other farm operations. In addition, small farms that already own some of these assets may be able to minimize capital costs and generate farm returns to help maintain and replace equipment.

Sheep and goat infrastructure will require a significant investment. For example, the fixed start-up costs for a suite of equipment needed for a 10-acre sheep enterprise approached $80,000 on the low end and $100,000 on the high end. This figure does not include the cost of the animals. The budget estimates $1,800 to $2,000 in annualized fixed costs, which include depreciation, insurance, interest, and taxes.

Capital Variable Costs

The variable costs of capital are the costs of using and maintaining the capital assets. These costs include items like fuel for farm equipment and the vehicle used to deliver animals and meat to market.

Other variable costs associated with capital expenses in a sheep and goat enterprise include repairs and maintenance of equipment. It is important to factor these costs into the enterprise budget to ensure that the operation is generating enough in returns to service the assets.

Feed, Supplements, and Medication

Feed, supplements, and medication are major expenses for lamb and goat production. The amount and quality of pasture available will dictate the needs for feed purchases. Feed costs should also incorporate the expense of nutritional supplements like salt and minerals. The cost of preventive animal healthcare, like deworming for internal parasite control, also needs to be budgeted.

It may be helpful to develop a separate feed cost estimate and then assign those costs within the sheep or goat production budget. This calculation is especially useful when comparing the costs of different feedstuffs, kinds of hay, and combinations of pasture and grain rations.

Though feed consumption varies throughout the year, the North Carolina Farm School budget assumes the herd will consume 2.5 pounds of minerals a day, on average, at a cost of $0.48 per pound. Consumption will peak just before the annual lamb crop goes to market. Herd size is roughly 150 animals or more during this time of the year. Consumption will be at a low point just after lambs go to market, when there are only 31 animals remaining on the farm. Total annual cost with these assumptions is $437.76.

In the budget, medication has been broken out by the type of treatment and dosage. In general, the type of dose and volume will vary by animal, and we recommend consulting a veterinarian to develop your treatment protocol before estimating cost. The budget assumes that each animal, including the year's lambs, will need two vaccinations and two dewormings per year at a cost of $0.50 and $1.00, respectively. This translates to 150 to 160 doses per year of each type of treatment for the herd. The cost per animal is $1.50 (with farmer doing the treatment), representing a total annual cost of $225 to $250.

Processing

When direct marketing sheep and goats, the producer must pay for processing the animals into a whole carcass or marketable cuts of meat. Processing an animal into a marketable carcass generally incurs a flat rate charge, but the cost will vary according to the size of the animal processed and the desired cuts provided.

The North Carolina Farm School budget assumes a $25 kill fee for sheep and $50 for goats. The difference in cost is related to finishing an animal in cuts versus a whole carcass. It is assumed that providing a finished carcass ready to sell involves more labor than processing an animal into cuts. Processors can and should include this cost with the cost related to finishing an animal in cuts with the per pound cost of cuts processed. Processing a lamb into finished cuts is estimated at $2 per pound, representing a total cost of $67 per animal on average. Be sure that you consider including processing costs even if you have a nonmeat enterprise.

Purchase of Animals

The type of sheep or goat operation will determine whether the sheep and goats are a fixed (capital) expense or a variable expense. For example, purchasing weaned lambs or kids and finishing them to a market weight would be considered a variable expense. Breeding animals would be considered a fixed cost, while animals purchased for resale would be a variable cost.

The North Carolina Farm School budgets assume there is a herd with 30 animals and that a portion of the lamb or kid crop is being retained each year to replace breeding ewes or does that are no longer productive. The cost of gains not realized is considered an "opportunity cost," meaning that the number of animals retained represent no actual cash cost to the enterprise and are not included in the budget.

Bedding

Bedding and costs can vary widely for sheep and goat producers. Bedding, like straw, helps sheep and goats stay dry and warm. The amount of time animals spend in shelters will affect the amount of bedding material needed. Both the sheep and goat budgets estimate that 1 ton of bedding will be needed at a cost of $60 per ton.

Electricity

Electricity needs will vary depending on how electric fences are powered, whether producers are storing meat for sale in freezers or coolers, and whether animal barns are using electricity. A monthly cost of $25 is included with the sheep budget, which assumes the operation of several freezers with metered power and fencing with solar power.

Pasture Maintenance

Fertilizer and seed are common expenses for pasture maintenance. Expenses for mowing and herbicide treatments for weeds are other possible costs.

It may be helpful to develop a separate budget for pasture maintenance costs and assign the variable expense for the specific purposes of any farm. The only cost included in variable pasture expenses in the North Carolina Farm School budget is $750 to $900 for 500 pounds of 10-10-10 fertilizer per acre ($0.30 per pound). The goal of this rate of application is to supply 50 pounds of nitrogen per acre.

Overseeding costs are included as a placeholder and may increase the productivity of a farm by allowing producers to have more animals per acre, but are not included in the budget cost. Equipment costs for mowing and pasture maintenance are included in the budget.

Marketing Costs

While a large part of the expense for marketing meat and other farm products is covered within processing costs, other variable costs can apply. Producers selling at farmers markets may incur fees for registration or membership and stall rental. It is also important to factor in the costs of transporting meat to the market and the amount of labor hours needed for that transport.

Labor Costs

It may be difficult to estimate the amount of labor that is required for the sheep and goat enterprise. Many small sheep and goat producers contribute a large amount of "sweat equity" — the operator's own effort used to build fences, establish shelter and water lines, and provide the daily care for the animals. Farms may also hire labor for these tasks, resulting in a cash expense.

Whether the owner contributes the labor or hires farm helpers, it is important to value the time spent on the sheep and goat enterprise. For example, a sample meat goat enterprise budget might estimate an average of 30 minutes to 1 hour per day (up to 365 hours per year) for a 30-doe meat goat operation on 5 to 6 acres. If a value of $10 per hour were assumed for that labor, $1,825 to $3,650 in returns would be required above costs just to generate a minimal return on the owner's time.

Summary

Sheep and goats are an enterprise well-suited to small acreages. Direct marketing meat from sheep and goats, or selling live animals to the consumer, requires significant planning and management time but, when done well, can result in potential profits. Raising a small number of sheep and goats demands that new farmers acquire skills in animal husbandry, including healthcare management; managing small ruminant nutrition; and pasture management. A thorough understanding of and adherence to regulations surrounding processing and sale of live animals and meat are also key.

Even for a small flock or herd, start-up costs such as sound fences; infrastructure like shelters, waterers, and feeders; and machinery and equipment can be substantial. A thorough cost-benefit analysis is essential.

Profitability from sheep and goats, especially for smaller farms, hinges on obtaining a price premium for the live animals or meat. Though meat production is the main source of potential profits, some producers have developed niche markets for dairy and fiber products from both species. Specialty meat markets for supplying specific ethnic and cultural holidays and celebrations exist, as do markets driven by a "buy local" culture or sustainability emphasis.

Additional Resources

Co-Grazing Meat Goats and Beef Cattle Has Many Advantages (NC State Extension) **content.ces.ncsu.edu/co-grazing-meat-goats-and-beef-cattle-has-many-advantages**

Dairy Goat and Sheep Operations in the Southeast: Production Guide (Alabama Extension) **www.aces.edu/wp-content/uploads/2019/07/ANR-2457_GoatandSheepBook_98pages_040518.pdf**

Feeding Sheep (Virginia Cooperative Extension) **www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/410/410-853/410-853_pdf.pdf**

Fencing Materials for Livestock Systems (Virginia Cooperative Extension) **www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/442/442-131/442-131_pdf.pdf**

Fencing (Sheep 201: A Beginner's Guide to Raising Sheep) **www.sheep101.info/201/fencing.html**

Forage Needs and Grazing Management for Meat Goats in the Humid Southeast: Animal Science Facts (NC State Extension) **content.ces.ncsu.edu/forage-needs-and-grazing-management-for-meat-goats-in-the-humid-southeast**

Goat Health Factsheets (NC State Extension) **smallruminants.ces.ncsu.edu/web-resources**

Goat Production Basics in Nebraska (Nebraska Extension) **extensionpublications.unl.edu/assets/html/g2267/build/g2267.htm**

Housing and Facilities for Meat Goats (NC State Extension) **content.ces.ncsu.edu/housing-and-facilities-for-meat-goats**

Maryland Small Ruminant Page **www.sheepandgoat.com**

Meat Goat Notes: Gastrointestinal Parasite Control (N.C. Cooperative Extension) **meatgoats.ces.ncsu.edu/wp-content/uploads/2013/04/Low-Cost-Fixes-to-Decrease-GIT-Parasites2.pdf**

Nutrient Requirements of Sheep and Goats (Alabama Cooperative Extension System) **www.aces.edu/blog/topics/livestock/nutrient-requirements-of-sheep-and-goats**

Nutritional Feeding Management of Meat Goats: Meat Goat Notes (NC State Extension) **content.ces.ncsu.edu/nutritional-feeding-management-of-meat-goats**

Parasite Control (NC State Extension) **meatgoats.ces.ncsu.edu/parasite-control**

Poisonous Plants to Livestock: Meat Goat Notes (NC State Extension) **content.ces.ncsu.edu/poisonous-plants-to-livestock**

Precautions for Harvesting Forages After a Frost (Ohio State University Extension) **agcrops.osu.edu/newsletter/corn-newsletter/2015-34/precautions-harvesting-forages-after-frost**.

Sheep 201: A Beginner's Guide to Raising Sheep
www.sheep101.info/201

Sheep Grazing Management. (Virginia Cooperative Extension) **www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/410/410-366/410-366_pdf.pdf**

Small Ruminant Program (Virginia Cooperative Extension)
www.ext.vsu.edu/small-ruminants

Small Ruminant Parasite Control (NC State Extension)
meatgoats.ces.ncsu.edu/parasite-control

Small Ruminant Toolbox (ATTRA)
attra.ncat.org/ruminant

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