

# Foundational Small Ruminant Management and Husbandry<sup>1</sup>

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## Abstract

This article is meant to serve as an overview of small ruminant husbandry practices, which include basic nutrition, health, and preventative management concepts. These are topics of importance for producers to keep in mind before obtaining sheep or goats and while maintaining them. Producers should also remember the importance of establishing and maintaining a relationship with their local veterinarian.

## Introduction

Small ruminant, i.e., sheep and goat, production in Florida is rapidly expanding. Small ruminants provide an opportunity for landowners to raise livestock on less acreage than what is required by large animals and provide diverse income sources such as fiber, meat, milk, agritourism, and brush control. There are numerous factors to consider prior to obtaining livestock. Sheep and goats have specific health and husbandry needs that are different from those of other species. They should not be treated as small bovines. This article provides an overview of small ruminant husbandry practices, which include basic nutrition, health, and preventative management concepts. These are important for producers to keep in mind prior to obtaining sheep or goats, as well as while they are maintaining the animals.

## Terminology

It is important to know the proper terminology to use when discussing small ruminants. Utilizing this terminology (Table 1) will be helpful when communicating with veterinarians, other producers, and those within the industry.

## Basic Needs

Sheep and goats are considered ruminants because they have a unique digestive system that is made up of 4 compartments to their stomach. Each compartment conducts a specific task for the digestion of various feedstuffs and forage. With this unique digestive system, it is necessary to provide these animals with access to forage, via pasture or another source, such as hay. In Florida, many small ruminants are housed on pasture. It is also necessary to provide a shelter structure for these animals to get out of the sun, rain, and adverse weather conditions. The structures should be open southward with the rear eaves between 4 and 6 feet high and the front eaves between 6 and 8 feet. Recommended feeding bunk space in standard conditions is 12–16 inches per animal. The feed bunk can be utilized for both hay and grain consumption.

Working facilities of some type should be considered. These facilities may be used for ear tagging, administration of vaccinations or medication, hoof trimming, etc. The facilities can be simple but must be practical and safe. The

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size and design of the working facility will depend on the size of your herd or flock. Ideally, this facility should include a crowd area or pen, a working chute, squeeze chute, or head gate, and a way to sort animals, especially for larger operations. A working chute should be about 10 feet long, 5–6 feet high, and 12–15 inches wide. Working chutes are ideally adjustable or able to accommodate both large (mature) and small animals. These types of facilities can be purchased through commercial distributors; homemade systems will also suffice. The decision regarding which system will best serve an operation is often based on producer needs and budget. Additional resources for small ruminant handling facilities can be found at <https://www.nrcs.usda.gov/sites/default/files/2022-09/Sheep-Goat-Handling-Facilities-Options.pdf>.

Working or moving livestock should always be done quietly and slowly. Fast movements and loud noises can cause agitation and create a more chaotic experience. These chaotic experiences can increase the stress on the animals, and severely chaotic experiences can potentially reduce production.

## Nutrition

Grazing systems for small ruminants are very common in Florida. The pastures may be a combination of both browsing (brush and weed control) and grazing. Traditionally, goats tend to browse more than graze on improved forages, whereas sheep favor grazing over browsing. When animals are out on pasture, it is always recommended to provide a free-choice, species-specific complete mineral for those animals. When selecting feed and minerals, be mindful of copper levels to avoid causing toxicity to sheep, as their threshold for tolerance of copper is much lower.

Ensure your pastures are not overstocked. Overstocking can lead to bare spots, reduced forage availability, and exposure of animals to parasites. The recommended stocking rate for a traditional improved pasture in Florida is an average of 5 sheep or goats per acre, but this average is dependent on soil health, forage or browse species, shade management, and multiple other factors. Ensure there is sufficient forage for the animals. If there is a shortage, destocking or supplementing will be necessary. Once the stocking rate is adjusted and the forage supply is larger than demand, rotational grazing can help to manage stocking density and pasture health. Through this system, pastures are subdivided, and animals have access to one section at a time. Animals are moved when the leaf height is at the lowest acceptable level for that forage (generally, not shorter than 4 inches for bermudagrass and bahiagrass). Remember

that close grazing will reduce forage growth and expose animals to parasites. Once animals are moved, the pasture is set to rest until the next grazing cycle, normally between 20 and 35 days, depending on the forage and management. This allows forages time for regrowth and allows for a break in the gastrointestinal parasite burden on your pastures. If multiple livestock species (or equids) are available, co-grazing animals together can be done successfully, provided the stocking rate and the forage height are monitored closely and maintained.

There are times when supplemental nutrition may be necessary. This will vary with the individual's life stage and production phase. Supplementation is recommended at least 2–3 weeks before the start of the breeding season to increase ovulation rates. This practice is referred to as nutritional flushing. The supplementation rate is typically proposed at a rate of 0.5 pounds/head/day of additional concentrates in the diet. During late gestation, it is recommended to supplement 1.0–2.5 pounds/head/day of a 16%–18% crude protein concentrate feed or legume-based forage.

The development of urinary calculi (stones) is a common health concern in small ruminants that commonly affects both intact and castrated males. Properly meeting dietary needs can help prevent this issue in small ruminants. The animal's diet should have a calcium to phosphorus ratio of 2:1 with magnesium levels ranging below 0.4%–0.6%. Feeding adequate forage and minimizing grain consumption are critically important for prevention. The addition of ammonium chloride to the diet to acidify the urine is an option, but this should not be done without prior veterinary consultation. Inappropriate use of ammonium chloride can result in adverse effects due to challenges with palatability and may predispose the animal to potential renal or liver disease. It is not recommended to use feeds and minerals with ammonium chloride already included. Proper administration of this product typically includes pulse feeding, rather than continuous exposure; specific recommendations should come from the herd veterinarian. To improve water consumption, it may be suggested to slowly add salt to the diet of feedlot animals (up to 4%–5%) while being sure to not affect feed intake.

Body condition scoring (BCS) is one way to ensure your herd or flock is in good nutritional status. Body condition scoring is a subjective measurement. The ideal body condition score range will depend on the life stage and nutritional status of the animal. Throughout breeding season and gestation, ewes and does should maintain a BCS of 3.0–3.5. During early lactation, BCS loss should be

limited to a score of less than 0.5. Rams and bucks utilized for breeding should maintain a BCS of 3.5–4.0 at the start of the breeding season and ideally should not be below a 3.0 throughout the breeding season. Wethers should always maintain a BCS of 2.5–3.0.

## Health

Routine herd health practices should be used to prevent disease and maintain health. Disease can be defined as the departure from normal health. Producers should observe animals and become familiar with the animals' normal behavior so they can recognize abnormalities. During a physical examination, vital signs should be checked, including rectal temperature, pulse, respiration, and rumen contractions. These parameters are routinely assessed by a veterinarian when evaluating an individual animal. Producers can also evaluate these parameters and share this information with their veterinarian to aid in a diagnosis prior to the veterinarian's arrival at the farm or ranch. When suspecting an abnormal health condition, the producer should always consult with their veterinarian prior to treatment initiation.

## Endoparasites

Gastrointestinal parasite control is a major management challenge for sheep and goat producers. Internal nematode parasitism is the primary production-limiting challenge for small ruminants worldwide. The most common nematode parasites in small ruminants are referred to as the “HOT” complex. This acronym stands for *Haemonchus*, *Ostertagia*, and *Trichostrongylus*.

Clinical signs of GI parasitism in small ruminants include anemia (mostly associated with *Haemonchus contortus*, otherwise known as the barber pole worm), poor doers, weight loss or reduced weight gain, weakness, lethargy, and in some cases, death. A diagnosis of the GI parasite burden can be made through assessment of clinical signs, a McMaster's fecal egg count (FEC), or a necropsy. Another tool commonly utilized to evaluate the barber pole worm burden, specifically, is the FAMACHA® scoring system. The sheep's or goat's conjunctiva is evaluated to assess the level of anemia based on a 1–5 scoring system (1 being red and normal, 5 being pale and severely anemic) and to identify individual animals that should be dewormed. Producers must go through a FAMACHA® certification training to receive the scoring card.

An additional parasite of concern in small ruminants is *Coccidia*. It is responsible for causing severe diarrhea and

malabsorption of nutrients in young animals, as well as in older or immunocompromised individuals. *Coccidia* should be diagnosed through the identification of the parasite via fecal analysis and clinical history. Treatment requires extra-label drug use in small ruminants and therefore must come from your veterinarian.

## Hoof Care

Hoof care is an important management practice in small ruminant production to prevent foot diseases. Maintaining healthy hooves can aid in animal comfort, health, and performance. Hoof trimming should be part of the herd health routine. Frequency depends on terrain, age, activity level, nutrition, and genetics, but hoof trimming should be done one to two times per year at minimum.

One of the most common lesions of the foot in small ruminants is footrot. Footrot is a severe and contagious disease of sheep and goats that can lead to significant economic losses due to weight loss, decreased reproductive efficiency, low fleece weight, decreased milk production, and additional labor and treatment costs. Footrot is caused by two bacteria in small ruminants, *Dichelobacter nodosus* (*Bacteroides nodosus*) and *Fusobacterium necrophorum*. This disease occurs worldwide when periods of warmth and prolonged wetness occur. Florida's warm climate and wet soil conditions are an ideal environment for the bacteria to thrive.

Footrot may affect both claws in multiple feet. Signs of footrot include lameness, lying down for extended periods, grazing on their knees, foul smell around the hoof, discomfort, and inflamed tissue between the toes. In severe cases, the entire horn may separate from the underlying tissue. Footrot in goats is generally less severe than in sheep.

If footrot is encountered, separate infected animals from your flock and consult with your veterinarian regarding treatment immediately. Hoof trimming can be useful, but over-trimming can cause more severe problems. Topical treatments such as antibacterial agents and antiseptics may be useful. Your veterinarian can determine whether systemic antibiotic therapy is warranted.

Management practices for preventing footrot include regular hoof trimming to avoid overgrowth, and routine foot baths (copper sulfate: 5% solution, zinc sulfate: 10% solution, or formalin: 5% solution). Remember that any new animal brought to the flock or herd should be quarantined for a minimum of 30 days before being allowed to join the rest of the flock or herd. During that time, the

animal should be evaluated closely to ensure contagious diseases such as footrot are not present. When using foot trimmers, be sure to properly sanitize the foot trimmers between uses on individual animals. All severely affected animals and those not responding to treatment should be culled from the herd or flock because they serve as carriers of the disease.

## Vaccination and Injections

There are numerous diseases sheep and goats can be vaccinated against. Vaccine recommendations vary based on region and previous herd or flock history. The basic, core vaccine recommended for all sheep and goats regardless of location and previous exposure is CD&T. The CD&T vaccine prevents against disease from *Clostridium perfringens* types C and D and *Clostridium tetani*. Individual animals should receive their first series of CD&T vaccines as an initial vaccine and then as a booster 3–4 weeks after the initial vaccine. After that time, the vaccine should be administered annually to maintain protection against these agents.

The effectiveness of vaccines and other products depends on proper handling, storage, administration, and dosage. Always read the label and consult with your veterinarian prior to the administration of products. Routes for administration are based on the label directions and may include subcutaneous (SQ), intramuscular (IM), or intravenous (IV) injection routes.

## Select Diseases of Importance

Bluetongue virus (BTV) is a noncontagious, insect-borne virus that is spread by biting midges. This disease can occur at any time of the year but is most prevalent in the southeastern U.S. in the late summer and early fall. Sheep are typically more susceptible to bluetongue compared to goats. Clinical signs of bluetongue include fever, edema, hemorrhage, erosions or ulceration of the mucosae throughout the body, nasal discharge, and sudden death. Infection with this disease in a pregnant ewe or doe may result in abortion or the birth of abnormal lambs or kids. Supportive care is the only treatment for BTV. If you suspect BTV in your herd or flock, contact your veterinarian immediately. The prognosis is poor in lambs and naive adults. Rams infected before the breeding season may not recover body condition and fertility, and thus may become unable to serve as a herd sire. To prevent bluetongue virus, mitigate insects and consider housing ruminants indoors during the evening hours and at night to prevent contact with biting insects.

Caseous lymphadenitis (CL) is a chronic, contagious disease that can occur in sheep and goats, causing internal and/or external abscesses in the lymph nodes and lymphatic system. It is caused by the bacteria *Corynebacterium pseudotuberculosis*. External lymph node enlargement may be commonly seen under the jaw and at the shoulder. Indications of the disease may include enlargement of external lymph nodes and abscesses developing 2–6 months after exposure. Chronic weight loss, coughing and respiratory symptoms, and chronic bloat may be commonly observed clinical signs of CL. Working with your veterinarian for diagnosis is imperative. This disease is recurrent; infected animals should be culled from the herd or flock. Currently, there is no cure. Biosecurity and routine testing are crucial to prevention of CL and maintenance of a CL-free herd or flock.

Caprine arthritis encephalitis (CAE) is a contagious viral disease in goats, usually transmitted from an infected dam to the kid via infected colostrum and milk. CAE produces 4 clinical syndromes: encephalomyelitis (observed in kids 2–4 months old), arthritis (observed in sexually mature goats), interstitial pneumonia (observed in adult goats), and indurative mastitis (observed in adult goats). Some goats may suffer from a chronic wasting disorder resulting in poor body condition score (BCS) and a rough hair coat. This disease is lifelong with no treatment options. Discuss testing options with your veterinarian and consider culling goats from your herd that are positive for CAE. Purchasing test-negative animals or maintaining a closed herd to prevent CAE from entering the herd is advised.

Scrapie is a uniformly fatal, progressive neurodegenerative disease of sheep and, less frequently, goats. This is a reportable disease with an eradication program in place in the United States. The National Scrapie Eradication Program is coordinated by the U.S. Department of Agriculture (USDA) and the Animal and Plant Health Inspection Service (APHIS). This program provides official scrapie-identifying ear tags to producers that aid in the traceability of livestock between interstate travel and changes in ownership. Genetic selection is commonly utilized for the prevention of scrapie in sheep. For more information regarding scrapie requirements and identification in the state of Florida, visit <https://www.fdacs.gov/Consumer-Resources/Animals/Animal-Diseases/Scrapie-FAQ>.

## Reproduction

Puberty is reached when the female exhibits the first estrus followed by ovulation and when the male's spermatozoa found in the ejaculate can produce a pregnancy. The time



frame as to when females reach puberty is influenced by age, nutritional status, season, breed, and exposure to the male. The timing of puberty can vary significantly by breed. In sheep, puberty is generally reached by 5–7 months of age for ewes and 4–6 months of age for rams. Goats tend to reach puberty at 5–7 months of age in does and around 6 months of age for bucks. Some breeds can achieve puberty at a very young age; for example, pygmy goats can reach puberty as early as 2–3 months of age.

Small ruminants are seasonally polyestrous, meaning they have more than one estrous cycle within a certain season. They are considered short-day breeders, cycling during the fall and winter seasons. The breeding season is generally August to March, with the peak being from October to December. The average gestation length is generally 148 days for ewes and 150 days for does but can vary depending on the number of fetuses. A fall breeding season results in lambs or kids being born in the spring. Ideally, the ewe or doe will conceive multiple offspring. Nutritional flushing may be utilized to enhance ovulation rates, in an attempt to optimize twin and triplet pregnancies. This is done by providing supplemental feed (0.5 pounds/head/day of grain concentrates) two to three weeks prior to the start of the breeding season and continuing this practice through the breeding season.

## Lamb and Kid Care

Consumption of colostrum immediately after birth allows for the transfer of antibodies from the dam to the newborn. The dam's colostrum contains high levels of nutrients and antibodies to protect against diseases. Lambs and kids should nurse within 30 minutes after birth. The newborn should receive 10%–20% of its body weight over 2–3 feedings in the first 12 hours of life. For instances where the lamb or kid cannot receive colostrum from its dam, a supply of colostrum should be kept on hand, ideally from ewes or does in the flock. Frozen colostrum can be good for a year; however, if unavailable, a colostrum replacer can be used. Failure of passive transfer of immunity will impact the survival and growth of newborn lambs and kids.

## General Husbandry for Lambs or Kids

Consult with your veterinarian prior to performing procedures on lambs or kids. Tail docking lambs (wool breeds) prevents manure buildup in the perineal area and reduces fly strike. Best practice is to dock tails when lambs are between 24 hours and 7 days of age. The tail length should cover the vulva (ewes) or anus (rams) and should

not be shorter than the end of the caudal tail fold. If tails are docked too short, complications such as rectal prolapse may occur. The most common method of tail docking is to band the tail using an elastrator band, which will cut off the blood supply. Typically, the tail will fall off 7–10 days after application. Be sure the lamb is protected against tetanus when using this method.

Disbudding in goat kids should be accomplished by 4–7 days of age. The animal should be restrained, and a local nerve block should be administered. A disbudding iron can be used to destroy the horn cells and prevent the growth of horns. Proper pain medication should be utilized because the procedure is painful. Application of the hot iron for extended periods can result in complications such as permanent brain damage. A veterinarian should be consulted prior to performing this procedure.

Vaccination of lambs and kids against common pathogens is advised. At minimum, a clostridial vaccination program should be in place to protect against CD&T — *Clostridium perfringens* types C and D (enterotoxemia) and *Clostridium tetani* (tetanus). If the dam was vaccinated while the lambs or kids were in utero, 4–6 weeks prior to birth, lambs or kids may receive their initial vaccine at 1–2 months of age and their booster 3–4 weeks later. If the dam was not vaccinated and/or no colostrum was ingested, it is recommended to vaccinate lambs or kids at 1–3 weeks of age and to administer a series of two boosters at 3- to 4-week intervals. An annual booster will be required for continued protection.

Castration of ram lambs and buck kids can be performed using various techniques. Castration by banding is a bloodless technique, which typically is best if performed at less than 1 week of age. An elastrator band should be placed around the scrotum with both testicles below the band. The tissue typically sloughs off in 7–10 days. Surgical castration can be performed at any age; however, risks of complications rise for older animals. This technique involves the use of a scalpel to remove the bottom one-third of the scrotal sac and surgically remove the testicles. The wound remains open to drain and heal. An antiseptic should be used with surgical castration. With any castration technique, consult with your veterinarian about pain management options. All ram lambs and buck kids should be vaccinated against tetanus prior to being castrated.

## Predator Control

Predation is a serious constraint to small ruminant production systems. Attacks are commonly fatal and occur in young animals. In the U.S., the primary predator varies by region, but it is typically coyotes or domestic dogs. Implementing multiple prevention techniques can help to mitigate predation. Killing the predators may provide temporary control but may create an environmental imbalance. Electric fencing can provide an additional barrier to act as a deterrent to predators. Utilizing multi-strand wire with both the top and bottom electrified has been shown to help control predation. It may also be helpful to bring livestock inside to shelter at night, because many predator attacks occur during this time. Make sure that the predators cannot enter the shelter. The practice would be counterproductive if the animals had nowhere to escape from the predator in an enclosure.

Livestock guardian animals such as guardian dogs, donkeys, and llamas can be used to provide protection against predators. Livestock guardian dogs are the most popular guardian animals; however, they tend to be the most expensive. Common guard dog breeds include Great Pyrenees, Anatolian Shepherd, Akbash, Komondor, Maremma, and the Sharr dog. The guardian puppy should be raised with sheep or goats from a young age, with minimal human contact, because they need to bond with livestock and not humans. Guardian dogs generally work best in pairs. Donkeys and llamas both dislike canines and provide good protection to the flock or herd. Intact male donkeys may not be a suitable guardian, as they may become aggressive with the sheep and goats. Guardian male llamas must be castrated. Regardless of the predator prevention technique used, it is recommended to increase the level of surveillance during lambing or kidding season.

## Conclusion

Small ruminant production in Florida offers a versatile and expanding opportunity for livestock producers. With proper management, producers can maintain healthy and productive herds. This publication has introduced some of the key areas of small ruminant production, management, and husbandry. Producers should consult with their veterinarian when animal health is in question or management inquiries arise. Note that this article is not an all-inclusive list, but merely an overview of foundational topics for small ruminants.

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Table 1. Small ruminant terminology.

|                       | Goats            | Sheep             |
|-----------------------|------------------|-------------------|
| <b>Female</b>         | Doe              | Ewe               |
| <b>Intact Male</b>    | Buck             | Ram               |
| <b>Castrated Male</b> | Wether           | Wether            |
| <b>Birth</b>          | Kidding          | Lambing           |
| <b>Offspring</b>      | Kid              | Lamb              |
| <b>Young Stock</b>    | Doeling/Buckling | Ewe lamb/Ram lamb |

Table 2. Normal vital parameters for small ruminants.

|   | Sheep     | Goats       |
|---|-----------|-------------|
| <b>Rectal Temperature (°F)</b>          | 102–103.5 | 100.5–103.5 |
| <b>Pulse (beats per minute)</b>         | 70–80     | 70–90       |
| <b>Respiration (breaths per minute)</b> | 12–20     | 15–30       |
| <b>Rumen Contractions (per minute)</b>  | 1–2       | 1–2         |

\*Neonate values are routinely higher than those of adults.

Source: <https://extension.psu.edu/so-you-want-to-raise-sheep-or-goats>

Table 3. Small ruminant injection routes.

| Route              | Location   | Details  | Needle Size/Length  |
|--------------------|--|--|---|
| Subcutaneous (SQ)  | Under the skin in the neck or behind the elbow<br>(NOTE: Elbow pocket is not for large volumes.) | Insert needle at angle of 35°–45° to the surface of the body | 18–20 gauge<br>Lambs/Kids: ½"<br>Adults: ¾" or 5⁄8"                   |
| Intramuscular (IM) | In the muscle in the neck  | Insert needle at a 90° angle to the surface of the body      | 18–20 gauge<br>Lambs/Kids: ¾" or 5⁄8"<br>Adults: 1"                   |
| Intravenous (IV)   | In the vein  | Jugular vein (neck)  | 18 gauge (for adults) and 20 gauge (for lambs/kids)<br>1"–1.5" length |