Introduction

Facilities for goats and sheep are an important aspect of small ruminant production. While shelters and fences are primary components of facilities, there are apparatuses to consider such as feeders, water vessels, working stations, and other equipment. Basic factors to consider include the following:

- Number of animals to be housed in each location with adequate space
- Ability for goats and sheep to move about within areas
- Animal, human, and equipment accessibility to and from pastures including pasture rotation
- Ease of providing feed, water, and hay
- Vermin free and dry storage of hay and feed
- Ability to isolate or separate animals as necessary, including pens for birthing and nursing
- Ability to house animals based on gender, age, attitudes, and aggressiveness
- Protection from wind, precipitation, and continuous sun exposure.
- Owner’s ability to maintain sanitary conditions

These best management practices are easier accomplished by drafting a comprehensive management plan on paper or computer that includes diagrams of housing, grazing paddocks, gates, etc.

Facilities Site & Design

It’s important to consider structural costs, materials, accessibility (for people and animals), affordability, and functionality when designing, developing, or contracting a facility. Fencing and shelter should be your primary concerns when determining appropriate facilities for goat production. Feeders, water vessels, and service equipment will be secondary. However, as you develop these plans it is important to assess the overall needs of your animals, including the ability to maintain and effectively sanitize structures, flooring, and accessories as needed is important to ensure herd safety and health. Therefore, your selection of proper facilities will be based on herd management strategies, needs, and material and financial resources.

Mixed herd of sheep and goats on the same pasture

Former poultry house converted into facility to house goats. Note kidding pens on left. Courtesy of Alabama Cooperative Extension System
Prior to establishing fencing, barns, and shelters you should acquire an aerial map of their property and draft plans on paper or computer that account for topography of land, movement of water (streams and heavy rains), strategic placement for gate access and ease of movement for animals, equipment, and future fencing. The state office of the United States Department of Agriculture’s Natural Resource and Conservation Service can provide assistance in the development of this plan. Determination and prevention of water drainage and run-off is essential to minimizing potential flooding, erosion control, animal health, and prevention of contamination to local waterways.

A facility design should include plans and establishment of readily accessible buildings, fences, catch pens, optional working chute, and secured storage areas for grain-based feeds, hay, medicines, and working equipment. The design should be affordable, practical, energy efficient, and reduce stress on owner and animals.

Shelters or housing for goats can be as basic or elaborate as the designer intends. Some farmers have been able to modify former poultry houses or hog parlors into facilities for goats and sheep. A semi-enclosed structure may be more practical in areas where climates are mild to semi-tropical. A well-enclosed structure will be necessary in colder climates. However, keep in mind that the primary purpose of shelter is to minimize stress from extreme environmental conditions such as excessive precipitation, high or low temperatures, strong winds, and direct sunlight. Shelters also function as protection from predators, a nursery during kidding season, and storage for other relevant items such as hay, feed, medicines, and tools. Barn size will vary depending on needs and material and financial resources. Keep plans practical and design for future expansion.

Structure materials will vary depending on the designer, facility needs, and your budget. Designs often utilize a combination of wood, metal, and plastic, which are readily accessible, affordable, practical, and easy to maintain. For safety purposes, protruding glass and metal should be avoided and acted upon accordingly. Be careful not to compromise quality or needs. When designing housing, the enclosure should provide moderate ventilation. Modest air movement reduces build-up of heat and facilitates evaporation of ammonia that can otherwise lead to heat or respiratory distress. Stagnate air flow allows moisture to build up, while dusty conditions cause respiratory problems or other airborne diseases. By the same token, it is important to prevent excessive drafts, particularly where newborns are housed since they are incapable of generating sufficient body heat. Creativity and financial constraints tend to be limiting factors.

Goats tend to prefer access to minimal shelter in case of inclement weather conditions. Like humans, they have the potential to contract various illnesses resulting from extreme weather exposure, including extended exposure to direct sun that can lead to heat stress. Goats and sheep have hollow hair shafts that function as an insulator and allow them to withstand moderate cold and heat. Although they originated from the wild, small ruminants have an instinct to seek shelter during inclement weather conditions. However, as domesticated animals they tend to lose some of their survival ability and cannot
tolerate extended inclement weather conditions or extreme sun exposure.

**Adequate Space**

A facility design should ensure structure integrity, adequate space, and easy access. Whether it is boredom or aggressiveness, an animal will occasionally decide to test the sturdiness of a structure and begin to head-butt walls and posts that may result in structural damage. This situation can also occur when two animals decide to test each other for dominance and have an “encounter” whereby one animal knocks another into the wall and damages the structure. If a structure is damaged, it should be repaired in a timely manner. In addition, it’s important to design a building that can be easily accessed by powered equipment and workers with the intent of moving working equipment or clearing floor space of manure and debris on a regular basis.

Another factor to consider when designing goat facilities is the provision of adequate space for animals. Adequate space is important to minimize infighting among animals. While head-butting is a common method of establishing dominance among goats, infighting may result in blows to the abdomen or back of pregnant does, resulting in injuries to the fetus, abortions, or miscarriages. Other cases of fighting may result in various forms of bodily or internal injuries such as broken legs.

Each adult animal needs 15 to 30 sq ft to move about at leisure, less for younger animals. Confinement and overcrowding causes stress, and goats vent their frustration by taking it out on one another or on structures that causes damage to animals and housing structures. Feeding space should allow for 12 to 18 linear inches of head and body space per animal.

**Shelter Types**

Shelter types will vary by intent and design, i.e., prefabricated, makeshift, portable, or permanent. All shelters should be durable and functional. Not everyone has the financial resources to build a state-of-the-art goat containment facility, nor is it necessary. However, housing structures must be practical, affordable, sturdy, and suitable for each situation. In some situations, the herd may be brought in together at night to protect them from predators, nuisance animals, or during inclement weather. Therefore, there should be some flexibility in design and utility.

Pre-manufactured shelters come in various forms, including small or large calf or goat hutches that can be readily purchased. Small pre-manufactured shelters have enough space to house only a few goats and function more like portable goat pens. Larger hutches have the capacity to hold about ten adult goats and come with side feeder doors, a top air vent, a front feeder, a water holder, and other features. Any of these hutches are convenient because a livestock panel or some type of lightweight gate can be attached to one end to help contain the goats.
Lengths of metal culvert with sufficient height (3 to 4 ft or more), such as those used in large drainage ditches, can be positioned to serve as housing. Minimal modifications are necessary other than securing them in place. There are other objects such as large commercial fertilizer or chemical vats, that once sanitized, can be converted into housing. Some modification may be required such as inverting the container, cutting in doors and windows (for ventilation), and installing lights. While it is important that all these items are sanitized sufficiently to ensure a healthy living environment, sometimes they can be acquired for a nominal investment.

Portable shelters should always be considered a viable option, especially when a farm utilizes small paddocks for rotational grazing that have the capability to move from one location to another. This type of structure may be built on skids to make it more convenient to relocate. These shelters also vary in size depending upon availability and ability of equipment to move structures as needed.

Permanent shelters are every farmer’s dream; however, budget constraints may place limitations on those dreams. Temporary or make-shift structures are often very practical in certain situations. With the right design, they can be low cost to build, readily disassembled, and easily moved and reassembled at another site. Keep in mind that no matter what type of shelter is built, the structure should have sufficient space, ease of movement, durability, and adequate protection from the elements.

At times males, females, expectant or new mothers, young, or sick animals may require separate housing. Males may need separate paddocks and housing for isolation from mature and young females during the non-breeding season. Such areas and facilities should be situated at least several hundred yards away from areas where females are housed. Housing and fencing should also be properly designed, built, and maintained to contain bucks that tend to try to escape. Experienced producers are well aware of the challenges associated with containing an eager herd sire.

Expectant and new mothers with newborns may also have special needs, such as unique nutritional requirements and protection from aggressive or annoying animals. New mothers need space to clean and tend to newborns without distractions. They may need a nursery area where the new family can have private space to bond without disruptions. Mothers and
newborns need quiet space to take in the first colostrum and milk on a regular basis.

Newborns may require a location with a heat lamp during cold times of the year in their first few days following birth. Make sure these areas with heat lamps are safe from fire hazards. It is a good idea to have a protected space where active young can get away from dominant adults and older kids. And it is always a good idea to have a protected area for young just learning to eat. This is known as a creep feeder, where the young can access supplemental hay and rations that allow them to consume adequate nutrition without competition or bullying by older animals.

**Shelter Flooring**

Concrete, soil, and gravel serve as practical types of flooring, but function, needs, and affordability will be the determining factors for each structure. Concrete may be desirable and easy to clean with the proper equipment, but the initial cost may be prohibitive. Concrete flooring also requires slightly slopped flooring to allow for drainage of urine and excess water. Soil and gravel-type flooring are affordable, practical, and will generally facilitate drainage at a moderate pace (when built elevated above the surrounding area). The only time a dirt or gravel flooring is impractical is when the stocking rate of animals is excessive and adequate drainage is nonexistent.

Slotted flooring and wood are impractical and unsanitary. If the slots are too far apart an animal’s foot can become trapped and there is the risk of breaking a leg. Wood is porous and holds bacteria and fungi that can lead to health complications. Whether utilizing concrete, soil, or gravel flooring, be sure to clean and remove manure and debris and other waste using power equipment or manpower. Choice of flooring will rely upon a farm’s situation and budget.

**Fencing**

There are a variety of fencing systems and options, including woven and electric wire, portable and fixed, livestock panels, various posts (including wooden, metal, and plastic posts), and any combination of the aforementioned. Perimeter fencing is the most important as it should contain your farm animals and serves as a barrier to other livestock, predators, and nuisance animals (neighborhood or stray dogs). The best fencing plan includes a combination of woven wire in conjunction with electric wire that is strategically placed along the interior, exterior, and top. These features will keep your animals away from inside fencing where they may rub along fence, scratch their sides and back, and stretch. This combination of fencing will also deter predators or nuisance animals from trying to crawl, climb over, or dig under a fence. Each farmer will need to evaluate their resources and plans to see what works best for them.
ease of use are the primary considerations when determining what type of feeder to use. Whatever feeder is used, it’s important that it is easy to maintain and to sanitize. Prefabricated bunk feeders and hay racks can be purchased from any commercial feed store or equipment vendor. Given the opportunity, small ruminants will consume approximately 2 to 4% of their body weight in feed, forages, and hay. Keep this in mind when selecting appropriate sized feeders and hay racks.

Fence design and materials, electric or solar chargers, and grounding systems are the determining factors in effectiveness. A fence charger that provides five to six joules of shock is essential to gaining the attention of goats and sheep. Three ground rods, 10 ft apart and 6 ft deep, are essential to insuring sufficient ground during times of drought. Fixed interior fencing or cross-fencing to facilitate rotational grazing and to separate animals are long-term practices that offer a few options such as the use of woven and fixed knot metal wire, poly wire, and high-tensile wire. Portable electric fencing (net, poly, or wire) will serve the same purpose and can be more affordable and convenient to move.

Wire placement and spacing are factors in containing livestock and excluding predatory or nuisance animals. Refer to the diagram on page 5 to consider potential options.

Goats and sheep are more likely to try and escape than cattle or horses. If being pursued by predators, nuisance animals, and people, goats and sheep will try and go through or over fences that can result in injury or death. When it comes to fencing situations, animal safety, land and water factors, resources, and abilities will vary. Farmers should plan and modify fencing accordingly.

Equipment

Feeders come in variety of shapes, sizes, designs, and materials. Some feeders are manufactured or constructed on-site. Materials, affordability, and

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*High quality fence charger (6 joules) ideal for goats and sheep. Courtesy of Small Ruminant Outreach Center*

*Feeder made on the farm from a 15 gallon plastic barrel cut in half. Practical, affordable, and easy to clean. Courtesy of Sydne and Robert Spencer/Spencer’s Farm*

*A farmer may choose to construct his or her own feeder based on needs and facilities. A feed trough or insert made with plastic or PVC is generally practical and easy to clean. Feeders made out of wood are impractical since wood is porous, insanitary, and holds bacteria that cause disease. Never leave grain-based feeds on the ground since this practice may cause animals to ingest gastrointestinal parasites. Feed and water vessels that become contaminated with feces will also expose animals to similar problems. Hay racks should be designed to keep hay off the ground. Hay that has been trampled, urinated, and defecated on exposes animals to disease and will eventually become waste.*

*PVC pipe cut in half, held in place with wood, and attached to a metal stand makes an affordable and practical two-sided feeder. Courtesy of Sydne and Robert Spencer/Spencer’s Farm*
Water vessels come in metal, plastic, or rubber. While they are practical, they do require regular cleaning for sanitation purposes. The size of the water vessel will depend on the number of animals drinking from it, and each animal will readily consume 2 to 4% percent of its body weight in water. You want the vessel to be accessible to adult and young but not where the young can easily climb into and drown because they are unable to escape. Depending on the time of year and other farm concerns, cleaning vessels on a regular basis is essential to provide clean water. An accessory such as an automatic float valve attached to a running hose or pipe will ensure an ever-present supply of water. Creeks, streams, and ponds may offer water resources but small ruminants have preference for fresh contained water. After all, freshwater is one component of essential nutrition for any animal.

Head-catches, workstations, catch pens, and ramps have become popular working equipment to secure small ruminants for maintenance and medical treatment. Whether manufactured or built on-farm they all have their utility and practicality. These facilities can be as complex or simple as deemed necessary since it will depend on personal preference.

Sanitation

When it comes to sanitation there is a lot to be said for water, sunshine, bleach, and apple cider vinegar. The ability to properly and effectively sanitize facilities such as buildings, feeders, water troughs, and hay racks is essential for herd health and for minimizing stress on the farmer. Utilization of water, sunshine, bleach, and apple cider vinegar are ideal to maintain sanitary conditions. In extreme situations or conditions, supplemental use of other chemicals may become necessary to eliminate severe disease outbreaks. Practice regular cleaning of feeders and water troughs as it minimizes potential for disease outbreaks. Apple cider vinegar is a simple solution to minimizing the accumulation of algae in drinking troughs, and it facilitates ease of cleaning them as well. A simple ratio of 4 oz per 10 gal is a good starting point and can be adjusted accordingly. Occasional use of a pressure sprayer with a mild batch of soap or bleach to clean inside walls, etc. is a good practice. The ability to eliminate mold, mildew, and fungi are an important aspect to ensure healthy housing and equipment. Again, wooden floors and feeders are impractical because they are porous and easy to contaminate.

Barn floor sanitation is an important aspect of minimizing odor, disease, and annoying insects. Floor sanitation requires removing manure and wasted hay and feed as needed followed by the spreading of hydrated (powdered) lime on recently cleaned flooring or in between cleanings. Removal and utilization of goat and sheep manure makes for an ideal all-natural fertilizer for gardens, yards, flower beds, and pastures. While manure can be applied directly onto any landscaping or pasture, for sanitary reasons it is better to allow the manure to compost for 2 to 6 months prior to application. The composting process produces adequate heat that will sanitize and further break down the manure. Small ruminant manure contains nitrogen, phosphorus, and potassium that are otherwise expensive in commercial form.

These portable panels can be linked to make pens for isolating animals, lambing/kidding pens, or nurseries that allow mother and newborns time to bond without being disturbed. Courtesy of Small Ruminant Outreach Center
Vector and nuisance animal control is another important aspect of sanitation. Rats, mice, raccoons, opossums, and feral or domesticated cats all have the potential to contaminate feed and hay supplies with disease contracted from feces and urine. (See the Alabama Cooperative Extension System’s publication UNP-0079: Causes of Infectious Abortions in Goats for more information.) Insects including spiders and spider webs can also be annoying. It is a personal decision whether choosing to use an insecticide and/or pressure sprayer on inside walls and rafters. Either practice should reduce the presence of biting and stinging insects that can be an annoyance or a health concern for animals and humans.

Each situation will vary depending upon needs, resources, and the ability to implement when it comes to developing sanitation concerns and strategies. Therefore, each farmer will need to determine an appropriate strategy and implementation plan based on their situation. For more information on biosecurity, see Biosecurity Measures for Meat Goat and Sheep Managers (SSERT) at http://www.aces.edu/extcomm/publications/docs/indexes/MeatGoat1SSERT1eng.pdf

**References**


**Conclusion**

Goats and sheep can live, thrive, and reproduce under a variety of conditions as long as they are not extreme. They will tolerate moderate amounts of inclement weather but have their limits and will seek shelter appropriate to the weather conditions. Facility design and the ability to maintain and clean these facilities greatly impacts herd health. Ease of function, access, and use is important for regular maintenance and sanitation practices.

Animal behavior and reaction should also be considered when designing layouts, access, equipment, and facilities. Animals have a herd mentality and flight instinct. They react as other herd members act and take flight when others are startled. Loud or sudden noises increase stress and likelihood of reaction. Safety for handler and animals should be a priority. It is important to consider all factors when determining appropriate facilities and equipment for each situation.

One last word of advice, when designing a facility, it is wise to plan for the unexpected, variables, and future expansion, but keep it practical, affordable, and expandable!

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