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# SMALL RUMINANT EDITOR

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# NUTRITION THROUGHOUT PREGNANCY FOR MEAT GOAT DOES

## Feeding the meat goat herd is a critical aspect of meat goat production and management. Good nutrition influences the overall health status of the entire herd, as well as the growth performance of kids.

Nutrition is particularly important throughout the breeding season and pregnancy. Goats must eat a balanced diet in order to be healthy and productive.

Proper nutrition starts with the six classes of nutrients. These six classes of nutrients include water, carbohydrates, lipids (fats), protein, vitamins, and minerals. The proper balance of these nutrients can be achieved with a wide range of feed ingredients. A well-balanced diet during pregnancy will help ensure embryo survival and can also lead to healthy and vigorous kids at birth.

Water is often referred to as the most "forgotten nutrient" in animal diets. Fresh, clean water should always be available to goats at any stage of life, but it is critical for the pregnant doe. Stale or dirty water will decrease water intake, ultimately decreasing feed intake. Decreased feed intake will decrease kid growth and could impact the pregnancy status of does. Producers should test water periodically. Water can impact the absorption of another essential class of nutrients, minerals. Water concentrations of sulfur and other potentially toxic minerals should be evaluated. Inadequate water intake can cause dehydration and impact an animal's ability to excrete waste. Be sure to plan for increased water intake when the temperature is above 70 degrees F and during very cold temperatures. Goats normally consume between one-half to one and a half gallons of water per day, depending on the temperature and humidity, as well as their body size and production status.

The other five nutrients, carbohydrates, fat, protein, minerals, and vitamins, as stated previously, are met through a variety of feedstuffs. The most common feedstuffs fed to meet the nutrient requirements of goats for these essential nutrients are discussed mainly as ingredients. However, it is important to remember that the daily requirements of goats are only for the nutrients, not necessarily every ingredient discussed.



Pasture is an excellent source of nutrients for the goat herd and is often one of the cheapest feed sources for most operations. When grazing goats, there are fundamental objectives that producers should keep in mind to maintain the pregnant doe's health and meet her nutritional needs. Good quality pastures often meet the nutritional needs of a pregnant doe, but she may need to be supplemented with concentrates as she enters late gestation.

Pasture height is critical for goat health to prevent infections with internal parasites. Most parasite larvae can be found in the first two inches of forage growth. Therefore, pasture forages should be maintained at four inches or higher to prevent infection. Pastures can also be rotated every four to five days or less to allow grazing goats to stay ahead of a parasite's life cycle. For fall grazing, goats can be rotated through crop residues or through hay fields. This will provide a "clean" pasture area with no parasite larvae present while providing adequate nutrition. For crop residue fields, subdivide them using temporary fencing so that goats can better use all of the residues without wasting them by trampling and fecal contamination.

Goats can also browse brushy areas for their forage needs. This provides high-quality feed and serves to clean up brush that is overtaking grazing areas. Goats consume the leaves and twigs on these plants, which weakens the plants due to the plant's inability to photosynthesize sugars that the plant needs to grow. Eventually, this kills the woody plant.

During the fall of the year, the grazing season can be extended with stockpiled forages. Stockpiling forages essentially involves saving pastures for fall grazing by keeping animals off these fields for several months and allowing forages to regrow. Begin stockpiling forages around the middle of August to the first of September to be grazed in November and December. The quality of fall forage should meet the nutritional needs of goats during early and mid-gestation. Remember that although tall fescue is the most common plant species used for stockpiling, this plant species is not very palatable for goats until after a hard frost. Other grass species can work well for stockpiling but will not retain their nutrient concentrations as far into the winter season as tall fescue.

Regardless of when and where you graze, the forage quality must meet the nutrient requirements of the goats. Forages in a growing vegetative state, without any seed heads, are better quality and contain more protein and carbohydrates to supply energy. Producers should clip seed heads to keep the forages in this vegetative state throughout the grazing season because forage growth will slow when maturity is reached and seed heads develop.

If adequate quantity and quality of forage is not available to graze, average quality to high-quality hay should meet the nutritional needs of pregnant does. The table below outlines the changing nutrient requirements for protein, energy, and dry matter intake through various production stages for a 150 lb. doe pregnant with a single or twins. Dry matter intake is the amount of feed an animal consumes with all water removed.

Thin does, with body condition scores of less than 3, should gain weight to maintain their pregnancy and target a body condition score of 3 to 4 by the time they kid. This can be accomplished with high-quality forage or by supplementing their diet with concentrates (i.e., grains). This article is written for sheep but can also be used as a guideline for body condition-scoring goats.

During early gestation, defined as the first 15 weeks of pregnancy, fetal kid growth is minimal, and a doe's nutritional requirements are similar to her maintenance requirements. Thus, during early gestation, does can consume average-quality pasture or stored forages. However, nutrition does play a critical role in ensuring embryonic survival. Therefore, a doe's diet must at least meet these maintenance requirements in order to ensure adequate nutrients to support placental development. Drawing from the previous example of body condition, a doe in early gestation should maintain body condition, not lose condition. Monitor does every two weeks to ensure their body condition remains adequate.

Much of the fetal growth occurs during the last third of gestation, the four to six-week period at the end of the pregnancy. During this time, the does should be supplemented to meet the increased nutrient demands for the added fetal growth and to allow her to produce adequate quality and quantity of colostrum, the antibody-rich milk consumed by the kid in the first twenty-four hours after birth. Energy consumption during the last third of gestation will affect the size and vigor of newborn kids as well as doe milk production. Increasing energy consumption will also prevent pregnancy toxemia. Pregnancy toxemia is a condition that occurs when pregnant does are using more nutrients than they are consuming, thus, they are drawing heavily on body reserves. Generally, energy requirements for a doe carrying a single kid increase approximately 50% over her maintenance requirements, while energy requirements for a doe carrying twins increase 75%. Therefore, during the last four weeks of gestation, does should consume 53 to 67% TDN, 10 to 13% crude protein, and approximately 3.7 to 4.1 lbs. dry matter.

Due to the increased nutrient requirements during the last four to six weeks of gestation, does may be unable to consume a large enough quantity of forage, particularly when carrying more than one kid. Body capacity becomes an issue as the kids increase in size, and there is less room for the stomach to expand for forage consumption. Therefore, most goat producers supplement does with some type of grain in the last trimester to increase energy consumption and, sometimes, protein concentrations in the daily ration. The rate at which producers supplement grain varies from one-half to one pound per doe each day, depending on doe size and genetics. In colder climates, and with does that often produce triplets, the supplemental feed should be started four to six weeks prior to parturition (birth of the kids). Always remember that any ration changes should occur gradually over a period of several days.

During the winter, producers should increase the amount of feed offered to all goats, regardless of pregnancy status, to compensate for the additional energy the animal needs to keep warm in cold temperatures. The lower critical temperature at which rations should be adjusted is 32 degrees F. However, if the goat's hair coat is wet, this lower critical temperature rises to 58 degrees F. (Source: Winter Sheep and Goat Feeding Guidelines by Rory Lewandowski, Retired OSU Extension Educator ANR). Energy requirements increase greatly with cold rains (temperatures in the 30s and 40s) and ice. A wet hair coat can drain the energy reserves of an animal. Thus, if possible, bring animals indoors or provide additional shelter during cold rain or ice storms. Wind chills also contribute to additional energy needs and should be accounted for when making feeding adjustments.

It can be very difficult to predict increased dietary needs during the winter. Therefore, many producers provide forages free choice during cold winter, allowing goats to increase consumption as needed. Producers who hand-feed forages can adjust hay supply based on decreased temperatures and any residual left in the feed bunk between feedings. Forages are key to maintaining body temperature in winter months because fermentation in the rumen makes heat and helps keep animals warm. However, over-conditioned (fat) goats and goats carrying multiple kids may be unable to consume adequate amounts of additional forage and would, therefore, need supplementation with concentrates such as corn.

While forages and concentrates supply the bulk of the goat's carbohydrate, protein, and fat requirements, they often lack adequate vitamins and minerals. Because of this, goat producers should also provide free choice access to a trace nutrient mix formulated for goats. These mixes contain salt to stimulate intake and contain a combination of minerals and vitamins formulated specifically to meet the micronutrient requirements of goats. A well-balanced goat mix should be available at all times throughout the year. Failure to supplement these micronutrients results in poor fertility, weak kids at birth, reduced milk production, impaired immunity, and can lead to numerous metabolic disorders.

Paying close attention to nutrition throughout the year can lead to healthier and more productive goats.

*Penn State Extension*

# GENETIC AND DISEASE TESTING OPTIONS FOR SHEEP FLOCKS

## Sheep producers can seek to ensure buyers that their sheep are free from specific genetic abnormalities or diseases through testing. Learn about testing options in this publication.

One of the last things a sheep producer would like to hear from one of their customers is that they sold a sheep that produced lambs with genetic or disease issues. This would be a particularly unwanted call when that issue could be identified through testing. Some testing is commonplace, while other tests are increasing in significance.

The most common tests performed would probably be for scrapie susceptibility and spider lamb syndrome. Additional tests covered in this article include dwarfism, ectodermal dysplasia (hairy lamb syndrome), and ovine progressive pneumonia. None of these issues can be treated, so control involves identifying affected individuals and culling them from the flock.

### Scrapie

Scrapie affects the central nervous system in sheep and goats. In cattle, this disease is called mad cow disease, and in deer, it is called chronic wasting disease. The disease is considered a transmissible spongiform encephalopathy (TSE) because it affects the brain and causes it to look like a sponge. The impact on the brain leads to problems with muscle control or incoordination and problems with moving and getting up from lying down. Sheep infected with scrapie may stumble and fall or lift their legs higher than normal when walking. Infected sheep often experience intense itching, which causes bare spots on their sides and sometimes open sores. The bare spots may also appear on their head due to head pressing.

Sheep producers can test for susceptibility to this disease using tissue samples or blood samples. Testing looks at the DNA genotype at codon 171 or 136. Codon 171 testing results identify genotypes as RR for sheep resistant to scrapie if exposed to the disease, QR for sheep that have some susceptibility to the disease, and QQ for sheep that are highly susceptible when exposed to the disease. Codon 136 testing works the same way, with AA sheep resistant to the disease, AV sheep having some susceptibility to the disease, and VV sheep being very susceptible to the disease. More information on scrapie and the scrapie eradication program can be found at USDA's Sheep and Goat Disease or by contacting your local veterinarian.

### Spider Lamb Syndrome (Ovine Hereditary Chondrodysplasia)

Spider lamb syndrome causes skeletal deformities in affected lambs. Some affected lambs may be born dead or aborted. However, most lambs are born alive. Often, these lambs have twisted spines and deformed legs that look like spider legs. The condition typically worsens as lambs grow, frequently resulting in lambs not surviving past six months. A gene mutation causes the disease, which impacts bone and cartilage growth. The mutation occurs most often in black-face sheep and crosses. Sheep with two copies of this gene mutation exhibit the disease. However, testing can identify gene mutation carriers, and therefore, producers can cull these individuals and prevent passing the gene mutation to offspring.

Producers can use hair, tissue, or blood samples to test for spider lamb syndrome. The results of these tests categorize lambs with the disease as SS, carriers of the gene mutation as SN, and lambs free of the gene mutation as NN.

### Sheep Dwarfism

Dwarfism in sheep is a genetic defect that causes shortened extremities from abnormal cartilage development and bone growth, thus leading to a smaller overall size. Some lambs may be born with a domed head and shortened nose. Research by Thompson et al. (Inherited Chondrodysplasia in Texel Sheep) noted that affected lambs appeared normal at birth but grew slowly and developed a short neck and a wide-based stance. These lambs also showed an intolerance of exercise. Many of the severely affected lambs died within three to four months after birth. Researchers also noted abnormalities in the trachea. Lambs that survived to breeding age developed severe degenerative joint disease and had to be euthanized.

Producers can test for dwarfism using tissue samples or blood samples. The results of these tests categorize dwarf lambs as DD, which will pass the mutation to their offspring 100% of the time. Normal-sized lambs that are carriers of the mutation are categorized as FD and will pass the mutation to their offspring 50% of the time. Normal lambs that do not have the mutation are categorized as FF. They do not have the gene for dwarfism and, therefore, would not pass the mutation to offspring.

### Hairy Lamb Syndrome (Ectodermal Dysplasia)

Hairy lamb syndrome is a genetic disorder that appears as fine wispy hair instead of wool on the lamb's body. This syndrome is characterized by thin skin, abnormal teeth and jaw, and dysfunctional sweat glands. The disorder affects the development of the ectodermal layer in embryos, which plays a role in the animal's hair, skin, teeth, and hoof development. Lambs often die within several weeks after birth.

Producers can test for hairy lamb syndrome using tissue samples or blood samples. The results of these tests categorize affected lambs as EDA. Normal-appearing lambs that are carriers of the mutation are categorized as EDC and will pass the mutation to their offspring 50% of the time. Normal-appearing lambs that do not have the mutation are categorized as EDF. They do not have the gene for hairy lamb syndrome and, therefore, would not pass the mutation to offspring.

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## Ovine Progressive Pneumonia (OPP)

Unlike the other issues above, OPP is caused by a lentivirus infection rather than a genetic mutation. This virus affects the lungs and udder. Many producers overlook OPP in their flock until mature ewes begin losing weight, develop respiratory problems, or develop a hard udder that does not produce milk for lambs. This disease is similar to caprine arthritis and encephalitis or CAE in goats. The American Association of Small Ruminant Practitioners fact sheet on Ovine Progressive Pneumonia describes OPP as a "slow-growing virus that causes wasting and replaces healthy tissue with solid non-functional tissue due to the cellular immune response of sheep to the virus." They state that the virus cannot survive for very long outside of the sheep. The most common way sheep contract the virus is through respiratory particles.

Producers can test for OPP using a blood sample. Labs conduct one of two serologic tests to identify affected individuals. Affected individuals can also be identified through necropsy examination of the lungs or mammary tissue. Any producers who suspect one or more of these issues within their flock should consult their local veterinarian and begin testing to identify carriers. Producers may also wish to select rams and replacement females with negative test results, particularly when purchasing breeding stock from other producers if they have concerns about these issues.

*Penn State Extension*

# MANAGEMENT TIPS FOR SUCCESS WITH SHEEP AND GOAT ARTIFICIAL INSEMINATION

### Producers can complete several management steps before an artificial insemination program is set into motion to ensure its success.

Starting an artificial insemination program, or AI program, can be confusing as there are many steps to the protocol. However, producers can complete several steps before a program is set into motion to ensure its success. Producers should keep in mind that managing animals before, during, and after an artificial insemination protocol is equally as important as synchronization. Without proper management, producers can expect a decreased pregnancy rate in animals that have been artificially inseminated. But don't be alarmed, as a few conscious decisions in managing your flock or herd can set them up for success with this new reproduction technology.

The first and possibly biggest management tool that can be utilized to achieve success is the nutritional flushing of the females. Nutritional flushing, as described by senior extension educator Melanie Barkley, is when the animal's plane of nutrition is raised, increasing the ovulation rate. When flushed, females increase the amount of insulin they produce, which then affects the production of the luteinizing hormone (LH). LH is responsible for releasing the oocyte and increasing the ovulation rate. Therefore, flushing before an AI program can result in an increased rate of pregnancy in your ewes or does, because the female produces more oocytes to be fertilized.



However, flushing will have a negative effect on animals with a body score of 4 or 5. Excessive body condition results in a poor effect from nutritional flushing and decreases the success of laparoscopic AI. Making sure that animals are in proper body condition as well as nutrient plane is the first step for a successful program.

In addition to increasing the plane of nutrition, producers should ensure that animals have access to proper mineral supplementation. Ewes and does should have access to a high-quality mineral mix formulated for their species several months before starting an AI program. The minerals can help replenish any deficiencies in the ewe or does before the day of AI. This is important because many trace minerals can influence the reproductive health of that animal. As an example, the National Animal Disease Information Service (NADIS) states that a selenium and vitamin E deficiency within ewes and does can cause a lower implantation rate after mating or insemination.

As you can see, improper supplementation can decrease the pregnancy rate in sheep or goats. To fix this problem, reach out to your local veterinarian or extension agent to ask if there is any deficiency in your area or for mineral mixes that they recommend.

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Another thing to remember when setting up an AI program is the animals' environment. The key thing is the consistency of the environment where the animals are housed. When setting up an area, make sure there is a safe way to handle those animals when they receive their shots or CIDRS. Easy access to a chute system or catch pen is preferred, but any system that does not add extra stress to that animal can be used. Animals must have access to clean, fresh water, and they may also need access to a shelter if housed outside. Lastly, ensure that these animals can stay in that pen or housing area for at least a month before and after the program. Moving these bred females to a new environment can add stress, which negatively affects pregnancy rates with AI.

Overall, you can see that a few management decisions can greatly impact the pregnancy rate of the ewes and does. Making sure that you have a plan set in place before the AI program starts can have a positive impact on your AI success. Proactively managing and caring for your animals can significantly increase your operation's reproduction success and the success of your flock or herd.

*Penn State Extension*

# 4-H LIVESTOCK BIOSECURITY TIPS

## Biosecurity benchmarks to help keep you and your animals safe.

- Watch your animals and learn to recognize the differences between healthy and unhealthy behavior.
- Isolate unhealthy animals, new animals, or animals that have been off your property. Limit visitors to driveways.
- Sanitize everything from your boots to your trailer. First step: provide a boot-washing area for visitors.
- Educate yourself, establish a plan, and hold everyone to the details of the biosecurity plan.
- Share your biosecurity measures with visitors, including family, farm friends, feed and animal deliveries, agencies, and vets.

## Small-farm Biosecurity Measures Rubric

Use these biosecurity benchmarks to help keep you and your animals safe.

| 2 Points | 1 Point | 0 Points |
|---|---|---|
| Watch your animals and learn to recognize the differences between healthy and unhealthy behavior. | | |
| Daily routine consists of less than one visit per day. | Daily routine consists of two visits per day. | Daily routine consists of more than two visits per day. |
| Daily time spent with animal(s) is less than 10 minutes. | Daily time spent with animal(s) is 11 to 30 minutes. | Daily time spent with animal(s) is more than 31 minutes. |
| Average temperature of individual animals at rest is not recorded. | Average temperature of individual animals at rest is recorded but not monitored | Average temperature of animals is recorded at various times of the year and monitored on a regular basis. |
| None of your animals are vaccinated either because of choice or the characteristics of the species. | Only project animals receive required vaccines and/or recommended vaccines are absent from the routine. | All animals on the premises are fully vaccinated with required and recommended vaccines. |
| Isolate unhealthy animals, new animals, or animals that have been away from your property. Recognize that trucks, trailers, and other vehicles can carry disease. | | |
| No quarantine facility is available. | A separate area is identified for quarantined animals, but it is in the same building as the healthy animals. | A separate area is identified for quarantined animals in an isolated building. |

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|---|---|---|
| The same tools, equipment, and feed storage are in one location and used for all animals. | Feed is stored in one location for all animals, but separate tools and equipment are kept for isolated animals. | Separate feed storage is available for isolated animals, and specific tools and equipment are identified for quarantine area only. |
| No signage is available to let visitors know that biosecurity measures are in place. Traffic entering the farm is not guided or directed in any manner. | Biosecurity signage is visible and traffic entering the farm is limited to specific driveways and lanes. | Biosecurity signage is visible, traffic entering the farm is directed to stop at a "clean/dirty" line, and agents are asked to enter on foot. |
| Sanitize everything from your boots to your trailer. Recognize that disease can survive longer in organic matter, and cleanliness is the key factor in containing or preventing disease. | | |
| One pair of shoes or boots is worn for all farm chores and trips off of the farm for farm business. | A separate pair of boots or shoes is worn in quarantine areas and/or when going off the farm for farm business. | A boot wash is in place for regular use, and a separate pair of boots or shoes is worn in quarantine areas and/or when going off the farm for farm business. |
| Trucks, trailers, feed pans, buckets, and equipment are rarely sanitized after traveling to other farms, shows, or events. | Trucks, trailers, feed pans, buckets, and equipment are sometimes sanitized after traveling to other farms, shows, or events. | Trucks, trailers, feed pans, buckets, and equipment are always sanitized after traveling to other farms, shows, or events. |
| Educate yourself, establish a plan, and hold everyone to the details of the biosecurity plan. | | |
| No biosecurity plan is in place. | A biosecurity plan has been created but is loosely practiced. | A biosecurity plan is in place and best management practices are an integral part of the farm. |
| Education on biosecurity is not a priority. | Education on biosecurity is practiced but not shared with others. | Education on biosecurity is a priority and information is shared with others. |

**Modest security = over 15 total points**

**Standard security = 5 to 14 total points**

**Excellent to exemplary security = under 4 points**

*Penn State Extension*

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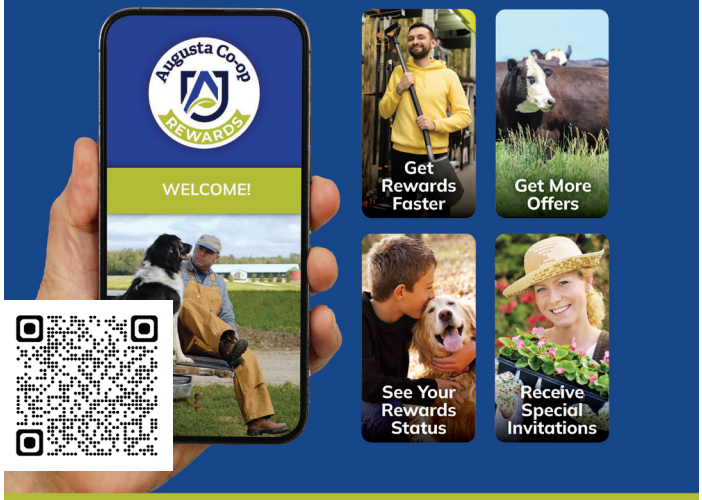


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