

Livestock Health Series

Herd Health Program for Meat Goats

Chelsey Kimbrough, Ph.D.
Assistant Professor -
Animal Science

Heidi Ward, DVM, Ph.D.
Assistant Professor -
Veterinarian

Importance of Health Program

An effective animal health program is an essential part of a successful meat goat operation. Good feeding and breeding will not result in maximum production if goats are not kept in good health. Since each herd is unique, each owner should work with his or her veterinarian to create a herd health plan. Keep good records for each animal regarding medications, vaccinations, dewormers, injuries, production, breeding and culling. Preventive medicine is less expensive than treating a disease.

The best economic returns are realized when disease is at a minimum. Because the symptoms of some diseases are so similar (i.e., white muscle disease, polyarthritis, CAE, tetanus), you need to work closely with a veterinarian, ideally one familiar with goats. In some cases, you may have to select a veterinarian that you like and allow him/her to gain experience with goats in your herd. The veterinarian has the training to provide a diagnosis or the means of obtaining a diagnosis when a disease occurs. The veterinarian should also be familiar with products for treating goats, as well as current regulations and health requirements for shipping animals.

As part of the scrapie eradication program, all goat operations must have a premise identification number. Goats will need a scrapie tag if they are to be transported off the original premise, except for goats less than 18 months of age moving to slaughter,

castrated males less than 18 months of age or goats being moved for grazing or similar management reasons without a change in ownership. Call 1-866-USDATAG (866-873-2824) for information to obtain an identification number for the premise.

Observation and Records

Spending a few minutes every day watching your animals is time well spent. Learning the normal behavior and attitude of your goats will help you recognize unusual behavior. This knowledge is one of the most important characteristics of a good manager. If abnormal behavior is observed, use common sense, experience, knowledge and your physical senses to determine the problem.

Don't overlook the obvious. A physical exam may show an abscess, cut or bruise. Ask questions such as: How is the behavior abnormal? What is the FAMACHA score? What is the Body Condition Score? Is the head down or are the ears drooping? Is the animal off-feed? Is it sweating or shivering? Is the respiratory rate normal at 12-20/minute? Is there a fever? Is the temperature in the normal range of 101.5-103.0°F? Is the heart rate normal at 70-90 beats/minute? Has this disease occurred previously?

Record all observations. Do you have a record of these same symptoms at another time? Consultation with your veterinarian may help identify if this is an issue you can treat or if the goat should be examined by the veterinarian.

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Nutrition and Feeding Practices

Goats that are too skinny or too fat are at higher risk for health problems and need nutritional adjustments. Goats that go off feed may have an illness or nutritional problem that requires prompt attention and should be checked closely and possibly examined by your veterinarian. Each can be prevented by properly balancing the ration and controlling other diseases. Frequent observations can allow early detection of these disorders and minimize their effects. The quality and quantity of feed during the dry period affects the doe and kids throughout the next year. Much emphasis should be given to the importance of nutrition in any stage of development of your goats. The Extension publication MP427, Nutrition of Meat Goats, is available at www.uaex.uada.edu with more details on feeding.

Meat goats should be fed similarly to maximize production while minimizing feed costs. As such, good-quality forage should be the basis of the ration, and minimal amounts of a 14- to 18-percent protein concentrate should be fed as a supplement when does are nursing kids. Higher-producing females with multiple kids may require additional energy in the ration. The most economical forages are usually pastures that are growing vigorously and have not reached maturity. Excess forage can also be harvested as hay or silage but should be cut when the grass is high quality (low in fiber and in a vegetative stage of growth).

Periodically, feel your does to determine their body condition score (BCS). Usually does will not need extra grain after the kids are weaned unless they have poor quality forage. Acquiring the desired BCS is the main decision maker for using supplementation. The best location to feel is along the backbone and over the ribs. Fat goats are more prone to go off feed, have problems at kidding and tend to have pregnancy toxemia. Additionally, overfeeding grain may lead to foundering the animal. See FSA9610, Body Condition Scoring of Sheep, for more detailed information about body condition scoring.

Loose trace mineral salt (TMS) should be available at all times. Goats are susceptible to copper deficiency and, unlike sheep, are fairly resistant to copper toxicity. Therefore, goat TMS, rather than sheep (mineral with low copper), should be offered. The salt and other feeds should be kept dry and off the ground. It is best to offer an excellent quality goat mineral.

Water should be fresh and plentiful, especially for does in early lactation. If possible, water should be warm in winter and cool in summer, although water from a ground source is acceptable if it is clean and free of manure and other contaminants.

Bucks and wethers fed on substantial amounts of grain are prone to develop urinary calculi. Genetics may also be a factor in the disease. Reducing grain consumption, adding ammonium chloride to the diet, keeping the calcium-to-phosphorus ratio at 2:1 and keeping the magnesium level low help prevent the buildup of calcium in the urinary tract.

Common Diseases

Internal parasites are the most common disease facing meat goat producers in Arkansas. Generally, goats should be dewormed as indicated by FAMACHA scores and fecal egg counts (FECs). There are a variety of parasite control measures that can be used. Good management practices should be the priority to help control for internal parasites. Some of these practices include grazing at least 4 inches off the ground, the use of tannin-rich forages such as sericea lespedeza, multi-species and/or co-species grazing, proper stocking rates, using proper sanitization and biosecurity measures and culling. Due to anthelmintic resistance, dewormers are often used differently than the label suggests. A veterinarian recommendation is required to use the product in any way not listed on the label.

Coccidiosis is a common disease of young kids. Older goats shed coccidia in the manure, which causes coccidia to build up in pens, causing infection in kids to increase. Signs of diarrhea or pasty feces (sometimes on rump or legs), loss of condition, general unthriftiness, or poor performance are often the first signs noticed with coccidiosis. Death can occur if left untreated, infection is severe, or other disease issues complicate the problem. To help prevent coccidiosis, kids should be grouped by age in well-ventilated pens that are cleaned regularly. A good management program minimizes exposure of kids to coccidia from the manure of adults or infected kids. Chronic coccidiosis is one of the main causes of poor growth in kids.

Enterotoxemia, also called overeating disease, typically occurs in younger goats. Vaccinating pregnant does about 4 weeks before kidding is likely the best protection for very young kids. *Clostridium perfringens* type C or D, primarily type D, can be fatal. It is usually, but not always, associated with a change in quality and quantity of feed. In problem herds, vaccinating every 3-6 months may be necessary compared to once yearly in other herds. Depending on the severity of the problem, young kids will have to be vaccinated at 1 month of age or at least before weaning and being switched to a high grain diet. Vaccination helps prevent the acute death syndrome. In the young kid, signs for enterotoxemia include: watery diarrhea, depression, wobbly gait, and sometimes convulsions. In acute cases, the temperature may be 105° F, and death usually occurs in 4 to 24 hours. Milk yield drops abruptly if the animal is

lactating, and death may occur in 24 hours. Contact your veterinarian immediately if you have a problem.

Pneumonia and related respiratory problems are more common in kids but may affect all ages of goats. To prevent the disease, decrease stress on the goats. Stress during weaning and travel are often the biggest problems. Good nutrition, and providing dry, well-ventilated housing with adequate space will help to limit stress and airway irritation. In weaned and adult goats, high energy diets, high growth rates, and feed changes are associated with disease. In young kids, there is often no diet change. The kids that are fast-growing are the most likely to be affected. Vaccinating pregnant does four to six weeks before kidding is the best way to prevent disease in very young kids.

Caprine arthritis-encephalitis (CAE) is caused by a retroviral infection in goats. Typically, kids are infected via ingestion of infected colostrum and milk. The disease is usually slow to develop and normally occurs after goats reach adulthood. Lateral transmission can also occur when infected goats transmit the disease to other susceptible goats in the herd. This may occur through long-term direct transmission (close contact), reuse of contaminated needles or through inanimate objects like water troughs and feed bunks. Occasionally, young goats that are infected may begin to show signs at two to four months of age. Kids may develop encephalitis leading to lethargy, decreased appetite, paralysis of the hind legs and convulsions.

Clinical signs of CAE can fit into several categories. If the disease occurs in adult goats, it normally leads to arthritis. Symptoms include pain, lameness and swollen joints, particularly the knees, hocks and elbows. As the infection continues, other signs may follow like paralysis of the hind legs, head tilt, lying, paddling, and seizures. Chronic CAE infections have been associated with interstitial pneumonia and “hard udder” syndrome. Diagnosis for CAE can be based upon clinical signs and serologic testing. Although a diagnosis can be made, there are currently no specific treatments for the syndromes caused by CAE. Supportive care can be done in order to eliminate as much suffering as possible. Control of the disease can be accomplished by frequent serologic testing and culling the seropositive goats.

Pinkeye, or infectious keratoconjunctivitis, occurs more often in warm or hot weather because it is spread by flies and close contact. To control the disease, good sanitation and management including fly control is essential. If severe, the goats should be removed from sunlight or have the eye covered with a pack. Treatment of pinkeye should be prompt since it can be highly contagious. Pinkeye in goats is different from that seen in cattle. There are two primary causes of pinkeye in goats: *Mycoplasma*

and *Chlamydia*. Both diseases are common causes of pinkeye in goats, are difficult to eradicate and often become long term recurrent issues within a herd. *Mycoplasma* is a primary cause of pink eye in goats. Infections may respond to antibiotic treatment, but often still require 2-3 weeks for healing. Often the disease is still present in the herd. Most animals will appear healthy, but carry the bacteria. Disease can then show up suddenly, especially in stressed animals, new uninfected additions, or young animals.

Chlamydia is a common name many goat producers are familiar with. There are several different *chlamydia* bacteria and many have been renamed or moved to new categories over the last few years. *Chlamydia pecorum* is associated with pink eye in goats. It is most commonly transmitted by close contact, but other carriers or vectors such as flies, may also play a role. *Chlamydia pecorum* eye infections in goats may respond to some antibiotic treatments, but often are self-limiting over two to three weeks. Affected goats may continue to carry the bacteria and flare ups may recur. Herd outbreaks can be seen, and often the infection becomes endemic, or stays in the herd for a very long time, with infections occurring occasionally in stressed or naïve animals. A few abortions have been reported from infection with *Chlamydia pecorum*, but it is uncommon. Abortions are more commonly associated with a different *Chlamydia* bacterium, *Chlamydia abortus*. *Chlamydia abortus* has not been reported to cause eye infections in goats. Another bacterial, *Chlamydia psittaci*, may also cause eye infections at times and be associated with other problems as well.

Both of these infections are challenging to control or eliminate from a herd once it is present. Good biosecurity, limiting stress, and prompt isolation of affected individuals is recommended to minimize the impact of the problem. Treatment of individual animals may help to shorten the course of disease, but is often frustrating. Consultation with your veterinarian is recommended.

Contagious ecthyma (soremouth) is a highly contagious, zoonotic disease caused by parapoxvirus. Goats typically develop sores around the mouth and lips, but lesions may also be present on the nose, teats, vulva, and legs. Lesions may last as long as four weeks. Affected animals should be quarantined from the herd as infection is spread from direct and indirect contact among animals.

Ringworm is caused by a fungus. Goats acquire ringworm through direct contact with other infected goats or from the environment by rubbing against objects that have the fungal spores. Wet or damp conditions is when ringworm becomes most prevalent. Ringworm causes a loss of hair in a circular pattern. It is important to quarantine infected goats as ring-

worm is highly contagious and zoonotic. Disinfecting pens and equipment is a good preventative measure.

Bloat results from the formation of a stable foam in the rumen that prevents eructation (belching) and release of gases produced normally from microbial fermentation. Gas production may then exceed gas elimination. Rumen expansion from gases compresses the lungs and reduces or cuts off the animal's oxygen supply resulting in suffocation. Goats will swell rapidly on the left side and may die very quickly. There are two types of bloat: legume/pasture bloat or frothy bloat. Several different forage species can cause legume bloat including alfalfa, ladino or white clover, and persian clover. Other legumes contain leaf tannins that help break up the stable foam in the rumen and are rarely associated with bloat. These tannin containing legumes include arrowleaf clover, berseem clover, birdsfoot trefoil, sericea lespedeza, annual lespedeza and crownvetch. Similarly, tropical legumes such as kudzu, cowpea, perennial peanut and alyce-clover rarely cause bloat. Bloat can also occur on lush ryegrass or small grain pastures, particularly in spring. Frothy bloat occurs in goats fed high grain diets. It is important to not turn shrunk or hungry goats out onto lush legume or small grain pastures without first filling them up on hay. Goats should be slowly adapted from forage-based diets to grain-based diets over a period of at least three weeks.

White muscle disease (WMD) can be seen in kids from less than one week to three months of age. This disease is normally noted in rapidly growing, heavily muscled kids that were born to does that consumed rations deficient in vitamin E and/or selenium. Other minerals can interfere with selenium metabolism. Minerals such as sulfur, iron and phosphate may bind up selenium's ability to work or be absorbed into the animal's body.

WMD affects skeletal and cardiac muscle. It disrupts the ability for these muscles to perform normally. Clinical signs that may be exhibited in kids with WMD include weakness, poor suckling reflex, stiffness, arched back, "sawhorse" stance, respiratory distress (if diaphragm is involved) and sudden death (if heart is involved). These signs can be misinterpreted as arthritis or pneumonia. This condition may be brought on by stressful events (handling, weaning, transport, etc.) or by vigorous exercise. Necropsy findings may reveal degeneration of heart and/or skeletal muscle. White, chalky, streaked areas may be observed intermittently throughout these tissues.

The affected area will have a pale and dry texture representing the fibrosis and calcification of the diseased tissue, hence the name "white muscle disease." Prevention of this disease is achieved through supplementation of vitamin E and selenium especially in pregnant does. Mineral supplements can be used

to offset deficiencies. To better understand if you are in a selenium deficient area, conduct a soil test. Contact your local Cooperative Extension Agent for more information about soil testing.

Diarrheal diseases, or scours, are more common in young kids. In addition to coccidia, other causes include colibacillus such as *Escherichia coli* (*E. coli*), worms, salmonella, and viruses. Symptoms vary with the cause but, generally include: anorexia (won't eat), high temperature, weakness, and watery or pasty feces. Good sanitation, housing and management are the primary methods to prevent diarrhea.

Abortion can be due to several infectious causes in goats. *Chlamydophila abortus*, toxoplasmosis and *Campylobacter fetus* are the three most common infectious agents that cause abortion in goats. Incidence of abortion in normal flocks is approximately 1-2 percent and can be caused by a mixture of the above agents. Some abortion diseases are zoonotic. See FSA3146, Livestock Health Series: Pregnancy Diseases in Sheep and Goats, for more detailed information about abortion diseases.

Footrot or foot scald is caused by an infection with bacteria that have been introduced to the farm. The bacteria can be introduced via new animals or by someone simply walking on your farm who had some mud on the bottom of their boot that was infected with the bacteria. Two bacteria are needed for footrot. Scald is usually noted first and caused by *fusobacterium necrophorum*. Scald weakens the skin and allows *dichelobacter nodosus* to enter and cause true foot rot. Scald is much more common.

Poor biosecurity, warm temperatures (above 50°F), and wet conditions provide the perfect anaerobic (lack of oxygen) conditions for the bacteria to spread. It spreads from an infected animal to the ground and is picked up by a noninfected animal. Outside the hoof, the bacteria have a short life span. If you can identify the pasture or part of the pasture where animals seem to be contracting the infection keep the goats from entering that area. If infected pasture is left alone for two weeks, it can be considered noninfectious. Since the bacteria thrive in anaerobic conditions, introducing oxygen helps in elimination. Proper hoof trimming is important to help in prevention. Keeping hooves from being overgrown will aid in eliminating mud and manure compaction. Overgrown hooves also stress the skin, providing another means of entry for the bacteria.

Once an animal has been treated, it should be kept in a clean, dry environment for at least 24 hours. It is important to use proper sanitation methods. Clean and disinfect hoof shears between animals and practice proper biosecurity measures when introducing new or recently transported animals to your farm.

Each meat goat operation should have an annual calendar listing approximate times and ages when certain activities should be performed to maximize profits. This annual calendar should begin with the pregnant doe at 40 to 90 days prior to kidding. The dry period should be considered the beginning of the next lactation. A more detailed calendar is available in FSA3098, Meat Goat Production Calendar. Additionally, operations should have a vaccination schedule in place (see chart below).

Vaccination Schedule for Meat Goats			
Dam - 1 month prior to kidding			
<ul style="list-style-type: none"> CD&T vaccine to help increase antibodies against enterotoxemia and tetanus in the colostrum. In areas deficient in selenium and where supplementation is inadequate. BoSe® to raise selenium levels and prevent white muscle disease in kids and retained afterbirth in dam. Providing a proper mineral nutrition program to ensure adequate consumption of all minerals is preferable. Get local veterinary advice on selenium injections as the need and dosage level depend upon how much selenium is in the soil in the region, as well as on the dietary supplementation. 			
Kid - birth to first week			
<ul style="list-style-type: none"> BoSe® + vitamins A&D - use depends on soil in the region and diet of the dam. 			
Kid - 3 weeks - begin coccidiosis prevention			
<ul style="list-style-type: none"> 4 and 8 weeks - CD&T series. 4 to 8 weeks - BoSe® - repeat if in selenium deficient area. 6 to 8 weeks - begin monitoring for parasites and deworm as needed, especially if kid has access to outdoors. 			
Period	Time to Vaccinate	Disease	Booster
Kids	4 and 8 weeks of age Between 8 and 12 weeks of age (single vaccination). 8 and 12 weeks of age. 16 weeks of age.	<i>C. perfringens</i> C&D*. <i>C. tetanus</i> - toxoid Contagious ecthyma. Caseous lymphadenitis. Rabies.	Prebreeding. If a problem in herd. If a problem in herd. If rabies is a concern. Yearly booster.
Prebreeding Doelings and bucklings	60 and 30 days prior to breeding.	Chlamydia Campylobacter Leptospirosis	If a problem in herd.
Does and bucks	30 days prior to breeding	Chlamydia Campylobacter Leptospirosis <i>C. perfringens</i> C&D*. <i>C. tetanus</i> - toxoid.	If a problem in herd.
Gestation Does	30 days prior to breeding.	<i>C. perfringens</i> C&D*. <i>C. tetanus</i> - toxoid.	

***8-way clostridials like Covexin® 8 could be used instead of *C. perfringens* CD&T.**

Adapted from Meat Goat Production Handbook, edited by R.C. Merkel, T.A. Gipson, and T. Sahl. Available from E (Kika) de la Garza American Institute for Goat Research, Langston University, Langston, OK 73050.

Culling

Culling is essential to the overall productivity of the herd. Goats become injured, some will not breed, and some will produce less milk than you are willing to accept. Generally, if a goat is well, has good teeth, and a low parasite load, it should thrive in a sound environment. If it becomes unthrifty and does not respond to treatment, it should be culled. Additionally, it is important to cull chronic animals. If you are repeatedly having to treat an animal (e.g., footrot, internal parasites), you should cull these animals from the herd as they are costing you extra time, money and labor resources.

Sanitation

Although sanitation requires time and money, it is time and money well spent since prevention of the diseases is more economical than treatment. Regularly cleaning and disinfecting animal facilities, equipment,

clothing, boots, and vehicles as well as removing manure and dirt helps to minimize the spread of disease. Personal Protective Equipment and sanitation is warranted especially with zoonotic diseases including soremouth, ringworm, and several abortion causing diseases.

Biosecurity

Every farm needs a biosecurity plan that includes the following protocols: vaccinations, disinfection, isolation, feed storage, farm visitor and all disease management plans. It is important to have a good relationship with your veterinarian to utilize disease testing in order to know exactly what has been introduced to your farm and how to treat it. When animals are first introduced on an operation or become sick, they should be isolated. Isolation of new animals, including show animals that have been exposed to other animals, allows for producers to ensure the animals are free from disease. Once newly introduced animals have been carefully monitored for 30 days, they can be introduced to the herd. Maintaining a closed herd is ideal. This allows for minimal introduction of new animals on the operation preventing the spread of disease.

Once an animal shows signs or symptoms of becoming sick, move them away from the rest of the herd and keep them in an isolation pen. Once the sick animal has fully recovered, you may introduce them back into the herd and then sanitize the isolation pen.

Establishing a protocol for visitors is important to ensure visitors do not transmit disease onto your operation. Consider requiring visitors to wear disposable boots or going through a footbath while on your operation. Additionally, consider a designated parking area away from livestock, especially if a visitor's vehicle is muddy or caked with manure.

References

- Extension Goat Handbook*, edited by G. F. W. Haenlein and D. L. Ace. Available from Caprine Supply, P. O. Box Y, DeSoto, Kansas 66018.
- Meat Goat Production Handbook*, edited by R.C. Merkel, T.A. Gipson, and T. Sahlu. Available from E (Kika) de la Garza American Institute for Goat Research, Langston University, Langston, OK 73050.
- Merck Veterinary Manual*, Merck & Co., Inc., Rahway, New Jersey 07065.

DR. CHELSEY KIMBROUGH is an assistant professor - animal science, located in Little Rock. **DR. HEIDI WARD** is an assistant professor - veterinarian, located at the University of Arkansas in Fayetteville. Both are with the Department of Animal Science of the University of Arkansas Division of Agriculture.

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