
Chapter 6

Herd Health

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Any domestic herd health program, regardless of animal species, requires a definite level of commitment from the herdsman to develop the necessary knowledge and skills to maintain the health and well being of the animals, in addition to developing a working relationship with their veterinarian. The ability to observe and recognize not only disease symptoms in animals, but also potential disease situations in the herd, along with proper recordkeeping, and management skills will save time, money and effort and improve the opportunities for financial success. A complete herd health program encompasses many aspects of production. However, this chapter will focus more on those factors contributing to infectious diseases, their prevention and/or control measures.

If just beginning your goat enterprise, consider buying all your goats from one well-established herd with good health records. This is important to minimize the chances of buying diseased animals and starting out with health problems. If expanding your already existing herd by purchasing replacement stock, then isolate the new replacements from the existing herd for 30 days in an effort to avoid introducing any disease into the herd. This management practice will prevent the introduction of potentially infectious organisms from the newly purchased animals to your herd through commingling. The immunity level of your herd may be significantly different than that of the other goats, and make them particularly susceptible to any pathogenic organisms the replacements may be harboring in their population.

Generally speaking, goats are fairly healthy animals. However, as with any animal, stress will weaken the immune system's response to exposure to infectious organisms and increase the chances for disease to develop. A good health program emphasizes prevention (proper vaccination), good management (minimizing stress) to keep animals healthy and avoiding exposure to infectious organisms.

Common Diseases and Vaccination Programs

Consult a veterinarian to establish a vaccination regime. Vaccines give the best results when the animals being vaccinated are healthy, and not stressed due to poor nutrition, parasites, weather or previous exposure to the disease organisms. Development of the immune response is somewhat age sensitive, and depending on the circumstances, the relatively older kids seem to respond to certain vaccines better than younger kids. If tetanus is a problem in your herd, then vaccinating early would be recommended. Vaccinate kids either before weaning or after they have recovered from the stress of weaning. Vaccinate in the neck or side of the brisket just under the skin (subcutaneously) by making a tent when you pinch the skin with your thumb and forefinger. Use a one-inch long, 18-gauge needle. An example list of vaccines for Oklahoma might include the following:

As a minimum, use a clostridial vaccine offering protection against *Clostridium perfringens* type C and D as well as tetanus (CDT) and either a Leptosporosis or Vibrio-Lepto (for southeast Oklahoma). Your veterinarian should be consult-

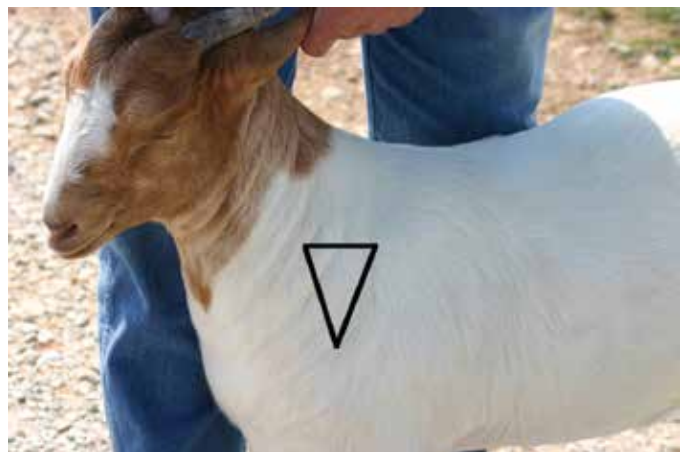


Figure 6-1. Area of the neck that injections should be administered to a goat.

ed for other recommended vaccinations in your area, such as Chlamidia, sore mouth or *Caseous Lymphadenitis*.

A suggested vaccination regime might be:

Vaccinate kids from unvaccinated mothers with CDT at about four weeks, then every four weeks through weaning. Vaccinate kids from vaccinated mothers at eight weeks and again at weaning between 12 and 16 weeks. Adult animals should be vaccinated annually. If does receive their annual booster 30 to 45 days before kidding, their immunity level, and subsequently the immunity level in the colostrum, will be at an optimum level. This results in the greatest possible passive immunity for the kids near kidding time and provides better and longer newborn protection.

Other vaccines are sometimes used, but not labeled for goats and require a veterinarian-client-patient relationship for extra label usage.

Enterotoxemia

Enterotoxemia is commonly called “overeating disease” and is caused by *Clostridium perfringens*. This bacteria is almost always present in the environment and in the ruminant digestive tract. It usually does not cause problems, but with the right conditions in the gut due to sudden changes of feed or by ingestion of large quantities of concentrates, the organisms multiply rapidly and produce a toxin. This toxin causes necrosis of the gut, diarrhea and central nervous system dysfunction. The onset and progression of the disease is very rapid and often not noticed until they are at or near death. There is an antitoxin available but seldom are the affected goats noticed in time for it to be effective. Although nursing kids and mature animals can show the condition, it is most often seen in weanlings and yearlings. Often, the biggest and best kid in the group is the one affected. Prevention relies on a good CDT vaccination program and avoiding sudden changes in feed and feeding high levels of concentrates.

Urinary Calculi

This condition also is called urolithiasis or urinary stones. It is caused by an imbalance of phosphorous and calcium. When the phosphorous level in the diet is too high or the calcium level too low we get the formation of stones. This is most often seen in wethers, is common in bucks, but is almost never



Figure 6-2. CD&T vials.

seen in females. It most often affects weanlings and yearlings. Since grains and protein supplements are typically high in phosphorous, while forages and hays are typically high in calcium, it is usually seen with high concentrate diets. It is seen commonly in young animals that are being pushed for maximum growth and development, such as show prospects. It is important to make sure water is clean and fresh because limited water intake due to dirty water or cold weather can bring on problems. Urinary acidifiers such as ammonium chloride in the diet can help prevent the formation of stones, but this is no substitute for adequate roughage in the diet. Affected animals are in pain, hump up or lie down, cry repeatedly and may dribble urine. Once a blockage has occurred it should be considered an emergency and a local veterinarian called at once.

Caseous Lymphadenitis

Caseous lymphadenitis (CL) is caused by a bacteria invading the lymph nodes of goats and sheep, causing abscesses. These lesions show up as lesions under the skin in various areas of the goat’s body and grow in size until they rupture and spread infection in the herd. Because the organisms can live for some time, this condition is highly contagious. Some goats may only have one lesion then live a normal life, while others have repeat episodes, ultimately involving the internal lymph nodes, causing poor performance and death. Common treatment involves opening the lesion and flushing with iodine to kill the organisms. This should be done away from areas that the goats can access. Abscess from other causes are common in goats and it is important to remember that not all lumps are caused by CL. A conditionally licensed CL vaccine is available from Texas Vet Lab. It is commonly used in herds with endemic and severe problems or show

goats, but should only be used under the advice of a veterinarian. The best way to prevent this problem is to purchase breeding stock from reputable breeders and to avoid sale barn bargains.

Contagious Ecthema

Contagious ecthema, commonly called sore-mouth, is caused by a virus and affects predominantly younger animals. In kids, scabby lesions develop on the lips, gums and sometimes on the eyelids and ears. The lesions clear up with time and leave no permanent damage. Economic loss, and in severe cases death, is due to the kid's inability to nurse effectively. If the mother has not had the disease earlier in life to give her immunity, she is likely to develop lesions on the udder and not allow kids to nurse due to the pain. Common disinfectants can help shorten the duration of the disease. Any kind of soothing salve helps lessen the discomfort and makes nursing easier. There is a vaccine labeled for sheep, but not labeled for goats, therefore may only be used on the advice of a veterinarian. This is a disease with public health significance. People can get lesions on their hands and arms from exposure to the affected animals or to the vaccine. When the scabs fall off, they contain the active virus and remain infective for long periods of time. It is very common on any farm where sheep or goats have been raised.

Contagious Foot Rot

Contagious foot rot, also known as virulent foot rot or malignant foot rot is a specific, lingering or reappearing, tissue-destroying disease affecting the outer skin between the toes and hoof matrix (Figure 6-3). As it destroys the tissue, it causes the hoof to detach at the skin-horn junction. As its name implies, it is contagious and with ideal conditions can infect up to 100 percent of the herd. The disease is caused by the combination of two bacterial organisms working together. The spread of the disease from one animal to another requires warm, moist environmental conditions. Injuries to the feet of goats will enhance the spread of the disease. However, soil temperatures below 40 F will impede the spread of the disease. Affected animals will lose body condition, develop lameness and be seen laying down for a good part of the day. The dying tissue has a characteristic unpleasant odor. Recovery from foot rot occurs, but the affected animal does

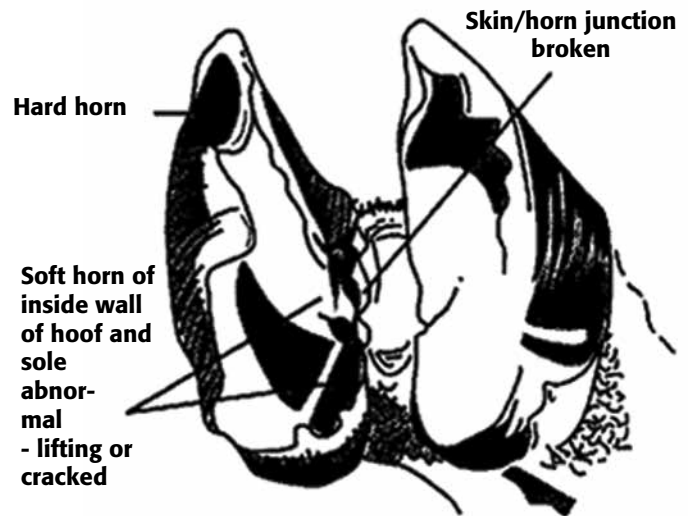


Figure 6-3. Contagious foot rot.

not have a permanent immunity from it, and can become re-infected when conditions are suitable. Preventing the disease begins with proper sanitation throughout the operation, isolating and examining introduced stock for up to 30 days before turning them in with the herd. Treatment includes trimming hooves of affected animals, use of bactericidal solutions in topical sprays and footbaths and antibiotic injections. Although these methods can be effective in reducing the impact and incidence of the disease, constant vigilance and time are required to identify the subclinical or relapsing cases.

White Muscle Disease

White muscle disease in kids, though not common in Oklahoma, does occur in areas where does have been subjected to selenium-deficient and/or vitamin E-deficient diets during or prior to gestation. Forages grown on selenium-deficient soils account for most of the recorded cases of this disease. However, in some cases, various metals (silver, copper, cobalt, cadmium, mercury and tin) present in the soil and/or diet have antagonistic effects on selenium uptake and/or utilization. Acute symptoms of the disease may manifest as sudden death within 2 to 3 days after birth, usually with involvement of the heart muscle, or a general weakness of skeletal muscles preventing the act of nursing, resulting in starvation. In less severe cases, the only observed symptoms may be poor posture, general unthriftiness and diarrhea. Affected kids often are unable to rise due to lack of muscle control, but remain alert and will nurse

if held in position. Prevention of the disease would include an awareness of soil fertility and proper maintenance and proper mineral and/or vitamin supplementation of the herd when necessary. A local veterinarian should be consulted for treatment options if a problem with the disease has occurred.

Floppy Kid Syndrome

Floppy kid syndrome is more appropriately called acidosis of newborns. Unlike white muscle disease, which affects kids from birth, with this syndrome, the kids are normal and active after birth and for the first 3 to 5 days. Newborn kids eat only very small amounts, but eat often. Their mothers may look like they would have a lot of milk, but are actually producing small amounts at a given time due to swelling and edema. As the kids get to be a few days old their appetite and stomach capacity increases just as the doe “comes to her milk.” This can result in an overeating condition, which causes acidosis. The kids who were healthy and active progressively become weak and recumbent. They show no interest in their surroundings, no desire to eat and are flaccid or “floppy.” Respiration is very fast as their system strives to correct the acidosis. If found soon enough, the condition can be corrected by giving baking soda dissolved in water via stomach tube every two hours. The incidence of this condition is increased by feeding does high levels of concentrates prior to and soon after kidding and by confining does and their kids. It is seldom seen in kids born in a pasture and allowed to spend their first few days there.

Common Internal Parasites and Deworming Programs

Of all the predators (coyotes, dogs, cougars, etc.) internal parasites (including coccidia) will kill more goats than all of the others combined. This is primarily due to the barber-pole worm (*Haemonchus contortus*). Common roundworms of cattle feed on mucous and protein in the digestive tract causing unthriftiness, while the barber-pole worm feeds on whole blood, causing death due to anemia. Complicating the control of parasites is that each region of the country will have different parasite problems, requiring different preventive/treatment programs. This is just another example of why it is important to involve a local veterinarian in a para-

site control program for the herd. While the use of dewormers is a necessary tool in an internal parasite control program, it shouldn't be seen as the only tool. Proper nutrition and sanitation is of extreme importance in the control of the effects of parasitism. Goats in good condition and receiving adequate feed often are able to establish a degree of resistance to parasitism, while nutritionally-stressed goats are unable to cope with parasitism, and high death losses can occur. Parasites are opportunists, and therefore parasitic disease problems increase with intensification of production practices and lack of attention to strict sanitation.

A basic understanding of the worm life cycle will help in designing an appropriate parasite control program. The adult female worms lay eggs in fecal matter that passes through goats and is deposited on the pasture. Warm and moist conditions on the ground cause the eggs to hatch within four to 80 days. Upon hatching, the tiny larvae crawl up the blades of grass or weed stems and are eaten along with the plant material as the goat grazes. In extremely hot and dry, or freezing cold weather the eggs will either not hatch or will die. This is why goats in south Texas, New Mexico, Wyoming, and Montana have very few (if any) worm problems. The number of goats, stocking density, forage species, etc. have an impact on the number of worms. The more goats – the more worm eggs! There also will be some goats in the herd that always tend to be more “wormy” than their herd mates. In fact, research indicates 20 percent of the animals produce 80 percent of the worm eggs on pasture. Culling the chronically infested animals will reduce the number of worm eggs available to hatch. Since goats share worms with sheep, but very few with cattle or horses, co-species grazing is a reasonable management tool to reduce the number of worm eggs on pasture. Any goat parasite larva ingested by the cattle or horses will not develop into adults, but be digested. This serves to reduce the number of infected larva and make the pastures safer for goats. Also, rotational grazing programs will help eliminate the number of viable larvae to infect goats as long as the goats do not return to highly infested pastures (sufficient time between grazing infested pastures, or grazing behind other species such as cattle or horses). Other management considerations may include baling extra forage production in certain infested pastures, or plowing under temporary winter or summer annual pastures where appropriate to decrease the number of worm eggs.

There are four classes of internal parasites: (1) roundworms, (2) tapeworms, (3) flukes and (4) protozoa. Of the four types, roundworms are the most economically important. Flukes are economically important in some areas, while adult tapeworms are of minor importance. Coccidiosis is an opportunistic infestation, chiefly caused by stress. It most often occurs around weaning time. It can be prevented by feeding goats medicated feed (containing Deccox®) for two weeks prior to weaning. Proper sanitation in keeping surroundings clean and dry can reduce the spread of the disease. Signs of parasitism are most common in young, very old or diseased and/or stressed animals. Different parasites cause different disease symptoms. In general, most infestations cause weight loss, unthriftiness and poor weight gains. Some parasites can cause diarrhea, decreased appetite, poor conception rates and fluid retention (bottle jaw). In addition to these symptoms, as the goat begins to lose blood from the feeding activity of the worms, pale mucous membranes caused by anemia can be seen around the eye or inside the mouth on the gums. Official diagnosis of worm infestations in goats can be made by gathering fecal samples and taking them to a local veterinarian for a fecal flotation assay, or in some instances when a goat dies, a determination can be made with a necropsy.

In Oklahoma, goat producers must remember that given the right conditions, worms can be present in the pasture to potentially infest goats any time of the year. The following suggestions are made to minimize the occurrence of experiencing a serious internal parasite infestation.

- To stop intestinal worms from accumulating, do not use the same pastures for kidding every year.
- Rotate pastures used for grazing every three to six months.
- If possible, all animals that are de-wormed should be held in a dry lot for at least 24 hours. This is because most de-wormers do not kill the parasite eggs, just the adult worms. Waiting 24 hours will help the animal eliminate most of the parasite eggs in the dry lot and not on pastures, where other animals may ingest the eggs.
- Prevent the post-kidding rise in parasite egg production because goats are very susceptible to worms while lactating.

- Have a veterinarian perform a fecal egg count to check the effectiveness of any de-worming or parasite control programs. This should be done before and 10 to 14 days after de-worming. The amount of fecal egg reduction will show if that dewormer is effective on the farm.
- Select animals that are parasite-resistant. These are goats that have a natural resistance to internal parasites. These animals are often identified through the use of fecal egg counts and Faffa Malan Chart (FAMACHA) eye scores.

Dewormer resistance is a big problem facing goat producers in Oklahoma. Management to slow the development of this problem on the farm can be utilized by:

- Never deworm all of the animals, then move to clean pasture. This ensures that the only worms available to parent the next generation will be resistant ones.
- Do not rotate dewormers as this builds resistance to several dewormers simultaneously. Find a drug that is effective and stay with it as long as it works.
- Use FAMACHA eye scores to determine which goats need deworming and only treat those goats.
- Use management techniques to minimize the need for drug usage as much as possible. The more parasite population on the farm exposed to the drug, the faster they will develop resistance.
- Cull any animals that repeatedly need deworming. By eliminating them, the contamination burden on the other goats is reduced.
- Remember, if deworming more than twice per year, resistant parasites are common.

Most of the products used in other ruminants are not labeled for use in goats and their use would be considered “extra label.” By law, producers must use them as advised by a veterinarian with a veterinarian-client-patient relationship when using them. Drugs are labeled for use in goats are Safeguard® and Rumatel®. Often, goats require doses 1.5 times higher than the typical sheep dose for many of the internal parasite products. Most small ruminant veterinarians recommend giving only oral internal parasite products to goats, as some studies have in-

icated that pour-on products are not very effective in goats.

Common External Parasites and Control Program

Goats are susceptible to many of the same ectoparasites as other livestock species, such as flies, lice and ticks. Many of the ectoparasites are spread by direct contact, or having infested animals in close association with other animals. Some of the symptoms of affected animals would include weight loss, unthriftiness, hair loss, severe scratching, skin lesions, poor appetite and nervousness. Fly control is more a matter of sanitation and chemical use. Keeping barns and pens cleaned will help keep fly numbers down considerably. In addition, premise sprays can be used to assist in fly control. Insecticide dispensers that can be placed in barns, sheds and other structures occupied by goats can be purchased that will emit small doses of insecticide automatically on an intermittent schedule to control flies. Most of the premise sprays labeled for other livestock will work for goats too, however, this is an opportunity to remind producers that many of the insecticides recommended for other livestock do not carry a recommendation on their label for goats, and that this “extra label” usage by the producer should be accompanied with a veterinarian-client-patient relationship. The insecticides listed in Table 6-1 have been found to be effective in controlling many of the goat external parasites mentioned.

Conclusion

From this discussion on goat herd health, it should be apparent to the producer that raising or producing goats is like any other livestock enterprise. To be successful and profitable in a meat goat operation the producer must manage his or her resources, and produce to optimize the net return to the investment in land, labor, capital, management and time. Critical to the success of a goat operation is the attention and effort provided to the proper care and maintenance of a whole herd health program which begins with establishing goals and objectives for the operation, developing a relationship with a local veterinarian who can help in outlining the health management protocols for the different production phases of the operation, following proper sanitation procedures throughout the operation, developing sufficient herd immunity through appropriate vaccination procedures, assuring adequate nutrition and providing for effective parasite prevention and control.

References

- Faerber, Cody W., (2004) *Small Ruminant Manual, Third Edition*. Animal Health Publications.
- Ferrell, Mark (2005) “Goat Medications Table.” Proceedings: S.E. District OSU Extension Agricultural Educators Training Conference, McAlester, OK.
- Hart, Steve (2005) “Goats ‘n More Goats.” Proceedings: S.E. District OSU Extension Agricultural Educators Training Conference, McAlester, OK.
- Parker, DVM Gene (2006) “An interview with an OSU Extension Area Food Animal and Quality Assurance Specialist,” Oklahoma Cooperative Extension Service.

Table 6-1. Insecticides for external parasite control.

| <i>Active Ingredient</i> | <i>Effective Against</i> | <i>Treatments</i> |
|-------------------------------------|--------------------------|---|
| Malathion | Mites, lice | 0.5% spray, 4% dust |
| Lime-sulfur | Mites, lice | 2-5% dip |
| Coumaphos | Mites, lice | 0.05 – 0.3% spray or dip; 0.5 – 1% dust |
| Phosmet | Mites, lice | 0.15 – 0.25% dip |
| Methoxychlor | Mites, lice, ticks | 0.5% spray or dip; 5% dust |
| Atroban 11% EC (Spray) | Lice, ticks | Follow label directions |
| Atroban 42.5% EC (Spray) | Lice ticks | Follow label directions |
| GardStar 40% EC (Spray) | Lice ticks | Follow label directions |
| Python dust (0.075% z-cypermethrin) | Lice, ticks | Follow label directions |

Table 6-2. Medications used in goats.

| ANTIBIOTICS | <i>Brand Name</i> | <i>Approval</i> | <i>Dosage</i> | <i>Route</i> | <i>Frequency</i> | <i>Withdrawal Interval (Meat)</i> | <i>Withdrawal Interval (Milk)</i> |
|--|---------------------|-----------------|----------------------|-------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Procain Pen G | Crycistillin® | extra label | 10,000-20,000 IU/lb | SQ | QD | 16-21 days | 120 hours |
| Benzathine Pen G | Pen BP-48® | extra label | 20,000 IU/lb | SQ | q 48 hours | 30 days | NA |
| Amoxicillin | Amoxi®-inject | extra label | 5 mg/lb | SQ | QD | 25 days | 120 hours |
| Ampicillin | Polyflex® | extra label | 5 mg/lb | SQ | QD | 10 days | 72 hours |
| Oxytetracycline | LA-200® | extra label | 9 mg/lb | SQ | q 48 hours | 50 days | 144 hours |
| Sulfadimethoxine | Albon® | extra label | 25 mg/lb | PO | QD | 7 days | ? |
| Ceftiofur | Naxcel® | approved | 0.5-1 mg/lb | IM | QD | 0 days | 0 hours |
| Erythromycin | Erythro-200® | extra label | 1 mg/lb | SQ | QD | 5 days | 96 hours |
| Tylosin | Tylan-200® | extra label | 10 mg/lb | IM | QD | 30 days | 96 hours |
| Neomycin | Biosol® | approved | 5 mg/lb | PO | BID | 3 days | NA |
| Florfenicol | Nuflor® | extra label | 9 mg/lb | IM | q 48 hours | 28 days | 120 hours |
| Gentamicin | Gentocin® | do not use | | | | | |
| Tilmicosin | Micotil® | do not use | toxic to goats | | | | |
| ANTI-INFLAMITORY DRUGS | | | | | | | |
| Flunixin meglumine | Banamine® | extra label | 1.1-2.2 mg/kg | IV / IM | QD | 10 days | 72 hours |
| Phenylbutazone | Bute® | extra label | 10-20 mg/kg | PO | QD | 45 days | 120 hours |
| Aspirin | Aspirin | extra label | 100 mg/kg | PO | QD | 1 day | 24 hours |
| ANESTHETICS & TRANQUILIZERS | | | | | | | |
| <i>Brand Name</i> | <i>Approval</i> | <i>Dosage</i> | <i>Route</i> | | <i>Withdrawal Interval (Meat)</i> | <i>Withdrawal Interval (Milk)</i> | |
| Xylazine | Rompun® | extra label | 0.05-0.1 mg/kg | IM/IV | | 5 days | 72 hours |
| Ketamin | Ketaset® | extra label | 5-10 mg/kg | IM/IV | | 3 days | 48 hours |
| Thiamylal Na | Biotal® | extra label | 10-20 mg/kg | IV | 1 day | 24 hours | |
| Yohimbine | Yobin® | extra label | 0.25 mg/kg | IV | 7 days | 72 hours | |
| Lidocaine | Lidocaine® | extra label | variable for local | anesthesia use 1% | | | |
| ANTHELMINTICS | | | | | | | |
| 1. Avermectins | | | | | | | |
| Ivermectin | Ivomec® | | | | | | |
| | Drench | extra label | 0.3 mg/kg | PO | 14 days | 9 days | |
| Ivermectin | Ivomec® 1% | extra label | 0.3 mg/kg | SQ | 56 days | 40 days | |
| Doramectin | Dectomax® | extra label | 0.3 mg/kg | SQ | 56 days | 40 days | |
| Eprinomectin | Eprinex® | extra label | 0.5 mg/kg | PO | NA | NA | |
| Moxidectin | Quest® | | | | | | |
| | Cydetctin | extra label | 0.5 mg/kg | PO | 23 days | 56 days | |
| 2. Benzimidazoles | | | | | | | |
| Albendazole | Valbazen® | extra label | 10 mg/kg | PO | 7 days | 120 hours | |
| Fendendazole | Panacur®/Safeguard® | approved | 10 mg/kg | PO | 14 days | 96 hours | |
| Oxfendazole | Synanthic® | extra label | 10 mg/kg | PO | 14 days | 120 hours | |
| 3. Cholinergic Agonists | | | | | | | |
| Levamisole | Levasole® | extra label | 8 mg/kg | PO | 10 days | 4 days | |
| Morantel Tartrate | Rumatel® | approved | 10 mg/kg | PO | 30 days | 0 days | |
| COCCIDIOSIS PREVENTION | | | | | | | |
| Monensin | Rumensin® | approved | 15-20 gms/ton feed | | 0 | 96 hours | |
| Decoquinatate | Deccox® | approved | 13-91 gms/ton feed | | 0 | 24 hours | |
| | | | feed or water | | | | |

Route Abbreviations: PO = Oral Administration SQ = Subcutaneous Administration
IV = In The Vein IM = Intramuscular Administration

Withdrawal Interval – Milk: NA = Insufficient Kinetic Data Available to make a WDI Estimation

Frequency Abbreviations: QD = once a day BID = twice a day
q 48 hours = every other day

To calculate dose from mg/kg:

Dose in cc = pounds body weight divided by 2.2, times dose in mg/kg, divided by mg/cc in drug
For example: a 100 lb goat getting Fenbendazole at 10 mg/kg and Fendendazole has 100 mg/cc
Dose = 100 divided by 2.2, times 10, divided by 100 mg/cc = 4.5 cc dose for a 100-lb goat