Goat Parasites and their Control

Anne Zajac, DVM, PhD
Virginia-Maryland Regional College of Veterinary Medicine

Infection with parasites, especially those of the gastrointestinal tract, continues to be an important problem faced by goat owners. The most important of the intestinal parasites are the worms and the coccidia. Effective control of these 2 groups of parasite will make a significant contribution to your goat's health and well-being.

It is important to recognize from the start that drugs alone are not the answer to parasite problems. Thirty odd years ago, when thiabendazole first appeared on the market, it was widely believed that modern animal production had seen the end of worms. You will know from your own experience that this was not the case. Worms resistant to thiabendazole appeared rapidly and we can be certain that resistance will eventually develop to all the dewormers (anthelmintics) we use. Another factor which makes parasites so difficult to control effectively is their complex life cycles which help ensure that they are present in the environment, ready to infect the next group of animals. At this time, eradication of these parasites is impossible, but with some understanding of where they live and what they do, as well as knowing the benefits and limitations of control techniques, it will be possible to limit their numbers and effects.

Worms

The most important worm parasites are the gastrointestinal trichostrongyles. This is a whole family of worms, but the really important ones are the barber pole worm (*Haemonchus contortus*) and the brown stomach worm (*Ostertagia circumcincta*). In this region of the country the barber pole worm is by far the most significant parasite and causes many goat deaths every year. This is a bloodsucking parasite which causes anemia but usually not scouring. In order to use anthelmintics and other means of parasite control most effectively there are some fact about the life cycle which are important to understand.

1. Adult female worms produce eggs which are passed in the feces

2. Egg develops and then hatches, a little larva emerges which goes through several stages of development in the environment and then becomes infective for the next host.

3. The success of these stages outside the host depend on the climate. Barber pole eggs and larvae:
LOVE WARM, MOIST CONDITIONS
HATE COLD OR VERY HOT, DRY CONDITIONS

4. *Haemonchus* larvae can also undergo a process called ARRESTED DEVELOPMENT where they sit quietly in the abomasum following infection and don't become adults until several months later. This is an important adaptation for keeping the worm around through cold winters when eggs and larvae don't survive well on pasture.

This information can be used in several ways to target parasite control for times of the year when it will have the greatest impact

**Dewormers**

There has been little change in recent years in the dewormers that are licensed for use in goats. Considering only the "modern dewormers" which are effective against a number of species and have a high safety margin, there is only 1: thiabendazole. In general, the efficacy of this product is regarded as low. Several other products have been shown to have efficacy against barber pole worm and other members of the same family in experimental situations:

1. Other benzimidazoles (drugs in the same family as thiabendazole, i.e. fenbendazole, oxfendazole, albendazole). There is evidence indicating that goats metabolize this group of drugs differently and require higher doses than sheep (2 times the sheep dose) as a result. Also, oxfendazole and albendazole have been associated with problems in pregnant sheep. Doses that have been used in sheep include: fenbendazole--5-10 mg/kg; oxfendazole--5 mg/kg; albendazole-- 5 mg/kg.

   When a worm becomes resistant to one product in this group it becomes resistant to all of them. Resistance to benzimidazoles is widespread in *Haemonchus* and once it occurs it will stay around for years whether you continue to use the drugs or not.

2. Levamisole is another widely used deworming product for ruminants. In goats, it is usually used at the sheep dose (8 mg/kg or 3.6 mg/lb). Again, goats need a higher dose than the sheep dose and 11 mg/kg has been recommended. The safety margin for this product is lower than for the other anthelmintics and side effects, especially salivation, may be seen after treatment especially if the injectable form is used. The oral form is safer and will be eliminated from the animal faster. *Haemonchus* resistant to levamisole have been documented, although resistance to this product does not appear to be as widespread as benzimidazole resistance.

3. Ivermectin is available as an injectable product for cattle and a drench for sheep (0.2 mg/kg). Experimentally, the oral form appears to be more effective against the GI trichostrongyles than the injectable, especially in goats. The withdrawal time is also shorter when the product is given orally.
4. Morantel is a product which chemically is very similar to pyrantel, which is the active compound found in the Strongid® horse dewormers. Morantel is currently marketed for cattle (Nematel and Rumatel®) and is useful because it has no milk withdrawal time. Research has been done with goats and this product appears to be effective (4.5 mg/lb) and not have milk residues. Formulations of this drug for administration in feed are available for other species.

It is difficult to stress too much the importance of minimizing the development of drug resistance. Once these products lose their efficacy, there isn't really much on the horizon to replace them. An Australian educational program to help reduce the development of resistance suggests the following steps that owners can take. The acronym of the program is especially appropriate!

C heck for Resistance
If you suspect that a dewormer is not working it is possible to check for resistance by doing a fecal parasite egg count before and after treatment.

R educe the Frequency of Exposure to Dewormers
The more frequently the worms are exposed to a drug, the more likely it is that resistance will develop. Because *Haemonchus* has a slightly shorter generation time than other members of its family and because females produce huge numbers of eggs, parasite populations can increase to dangerous levels in very short periods of time and many owners rely on frequent treatments. Reducing treatments by incorporating pasture management techniques into your control programs is a practical way to limit use of dewormers.

A nnually Rotate Dewormers
It is not a good idea to use the same dewormer year after year. The best interval for switching dewormers is still a bit controversial, but most parasitologists now agree that annually is probably best.

C heck the Dose
It is very easy to underdose animals. Even experienced owners may underestimate average weights. Always dose groups of animals for the heaviest, not the average goat.

K eep resistance off your farm
New goats may bring resistant parasites with them. Never mix new animals with residents without deworming them first. It has been recommended that new animals be treated with 2 times the normal dose of 2 dewormers to make sure that any resistant worms are eliminated and don't have an opportunity to infect your pastures with eggs.
Monitoring resistance
It can be difficult sometimes to decide whether you have worms resistant to a specific drug or whether animals are just becoming reinfected with parasites so rapidly that it appears that resistance is present. It is possible to determine if parasites are resistant using the Fecal Egg Count Reduction Test (FECRT). Fecal samples are collected from goats which are then dewormed. Ten to 14 days after deworming a second sample is collected and the parasite eggs are counted again. If your dewormer is still effective you should see at least a 90% reduction in fecal egg counts. It is very important that all goats be dewormed with an accurate dose when performing the FECRT. It is also important to wait about 10 days before collecting the second sample because some drugs may still decrease egg production for several days, even when the adult worms are resistant and are not killed. By waiting 10 days, you allow egg production to come back to normal. This is not a highly sensitive test for resistance and if the results indicate that the dewormer is no longer very effective you can be assured that there is widespread resistance in the population of parasites infecting your goats.

Pasture management
One of the best ingredients of a parasite control program is reducing the number of parasites that the goats are exposed to in the first place. One way to accomplish this is to manage your pasture in a way that will reduce its parasite load. There are several ways to do this:

1. Take a hay crop or plow and reseed. This type of pasture can be incorporated into a dose and move program in which goats are grazed on one pasture in the early grazing season and then dewormed and moved to another goat pasture which was used for a first cutting of hay. Another move before the end of the grazing season will probably provide the best parasite control.

2. Graze a contaminated pasture with another species. There is only one worm species that can infect cattle, sheep, goats, pigs and horses and for practical purposes it isn't very important. When another animal species eats the goat parasite larvae they will be killed. THIS DOES NOT APPLY TO SHEEP, which goat worms find equally delectable.

3. Pasture Rest.
   Unfortunately, it takes a long time for the worm eggs and larvae to die off if the pasture is just left empty. A year or at least an entire grazing season is required. This is usually impractical and it also means that the kind of rotational grazing at short intervals used to maximize pasture production usually doesn't have much impact on parasites.

Tapeworms
Another worm that many owners become concerned about is the tapeworm, *Moniezia*. The tapeworm is acquired by goats when they inadvertently eat the parasite's intermediate host, a free-living mite. The tapeworm matures into an adult in the goat's small intestine and then
releases mature segments into the feces. These segments are one of the few indications of worm parasites that owners will actually see and often there is a concern that they are harmful. In general, tapeworms are pretty innocuous and specific treatment for them will not necessarily lead to increased body weight, milk production or improvement in condition. If you do choose to treat for tapeworms, the benzimidazole drugs are widely used in ruminants.

**Meningeal worm** (*Parelaphostrongylus tenuis*)
This parasite is a worm that usually lives in the brain of white-tailed deer where it causes little problem. Larvae of the parasite are passed in the feces and are eaten by a snail or slug. A grazing animals unintentionally eats the snail or slug and the parasite is released in its new host. It penetrates out of the GI tract and migrates through the body to the spinal cord. It then migrates up the spinal cord to the brain. If this parasite enters a host other than deer, the same process occurs, but because it is an abnormal host/parasite system, the body tries very hard to expel the parasite. That tissue reaction, plus the presence of the parasite and the mechanical damage it produces can cause serious disease in a wide variety of animals, including goats, sheep, llamas, elk and moose. Affected goats may initially show lameness and weakness in the rear limbs which then proceeds to paralysis. Treatment of this condition is very difficult and is often not successful. Prevention of infection is also difficult. Some producers give their animals monthly treatments of ivermectin, but this will not provide complete protection. Other producers appear to have had some success using daily administration of morantel in a preparation sold for dairy cows.

**Protozoan (single celled) parasites**
The most common and important members of this group of parasites are the coccida. Coccidian parasites infecting goats all belong to the group *Eimeria*, but there are a number of different species in goats, some can cause serious infection while others may be present but cause no signs of disease. Goats become infected after ingesting the oocyst ("egg") from the environment. There are a few important facts to remember about coccidia:

1. Coccidia are very host specific; that is, the species that infect goats infect only goats and will not be found in birds, cattle, dogs or even sheep.

2. If you check a fecal sample from virtually any goat of any age, sex, breed, milking or not milking, etc. you are likely to find coccidia. Virtually every animal has some level of infection, but illness occurs only in some animals.

3. The primary sign of coccidiosis is diarrhea. This disease is almost always going to occur in young animals. Adults will have immunity to the parasite that is pretty effective in preventing disease, but not infection.

4. Look for disease to occur in stressed goats. Kids will become infected early on from the environment. Happy, well nourished kids left with the doe may show no diarrhea until they
are weaned. The stress of weaning may depress immunity enough that the coccidia get the upper hand and cause disease.

5. Dairy breed kids may have very severe problems with coccida that can cause rapidly fatal disease. This is probably a combination of weaning stress and exposure to lots of oocysts and perhaps other factors.

6. Drugs used to treat clinical cases of coccidiosis include sulfa drugs and Amprolium (Corid® at 3 to 5 times the cattle dose listed on the label)

7. Control of coccidiosis includes removing manure, not feeding off the ground or letting goats jump into feeders. Coccidiostats (preventatives) including amprolium, decoquinate (Decox®) and lasalocid (Bovatec®) may be used in the feed or water to prevent the development of disease.