Parasite Control with Multispecies and Rotational Grazing

Dr. Steve Hart, Langston University

Parasites, worms or more specifically, the barber pole worm (*Haemonchus contortus*) is a major cause of reduced production, morbidity and mortality in grazing goats. Formerly, worms could be readily controlled with dewormers, but the overuse of dewormers has caused dewormer resistance to the point that we are concerned whether we can still effectively deworm animals with any dewormer or combination thereof.

Grazing and herd management control the level of infection in the pasture (larvae per acre). The fewer eggs your goats produce, the fewer eggs there are to hatch to infective larvae. Ten to fifteen percent of your animals produce 50% of the eggs in your herd. Twenty to thirty percent of the goats produce 80% of the eggs. If we cull these animals, we reduce eggs and the consequent infective larvae and pasture infection level, and help everyone in the herd. Also, if we graze the pasture continuously over the summer, a lot of eggs, and consequently larvae, accumulate on the pasture. Better to have several pastures and rotationally graze. Another factor in number of eggs on pasture is the number of goats per acre (stocking rate). More goats on a pasture means more eggs (and infective larvae) on a pasture and more mouths picking them up. If you have less than 2 goats per acre, stocking rate is not a factor. More than two goats per acre means that stocking rate will increase parasite problems and require better animal management.

Some areas that animals frequently travel through or rest on can become heavily contaminated with infective larvae. This is often called the "barn effect". Some examples are trees in your pasture – goats like to rest under the same trees every day. This equals more poop and eggs, and the trees shade the eggs and larvae from the sun and pump out more humidity, creating good hatching conditions for the many eggs deposited there. Goats keep the grass nibbled short under and around the trees, picking up many infective larvae. This happens when a common lane is used for animals to water in a rotation grazing system – the lane becomes heavily contaminated and goats graze it short, and the waterer also adds humidity to help the eggs hatch. This can also happen at a barn or in a night lot. Rotating pastures takes care of the tree problem. Water may need to be moved to the rotation pastures. You may need to shut the gate on the barn lot or have another night lot.

Now that we know some things that reduce eggs on the pasture, which limits the number of larvae on pasture, how can we decontaminate a pasture that has a lot of larvae on it? Can we spray the pasture with something to clean it up? Infective larvae can survive for several days in 4% formalin – they're tough. However, there are several things that we can do. We can make hay on the pasture. When larvae are rolled up in the hay bale, they die within a month and the hay is no longer infective. The sun can get to the ground and kill the eggs and remaining infective larvae. Some pastures are too rough for making hay. They can be grazed by cows or horses, which do not share parasites with sheep and goats. The horses or cows consume the infective larvae, which die in their stomachs. Time will help also. Larvae that hatch from eggs live off the fat on their back until they

get into your goat. Warmer temperatures make these cold-blooded critters burn their fat up faster so they die when they run out of fat. So, a 6-week rest when the temperature is in the 90's will kill most of the larvae on pasture. Hundred-degree days and powder-dry will require less time than that. Helen Jordan, OSU parasitologist, observed in a co-species grazing project at Fort Reno, that two weeks of 100˚F reduced pasture infectivity substantially. Often, an improved pasture such as Bermuda or bluegrass cannot be rested 6 weeks without forage quality becoming very low. In these cases, pastures need to be grazed with cattle or horses or hayed after 3-4 weeks so that in several more weeks when it is time for your goats to go in, there is high quality forage available. Since it takes 6 days for an egg to develop to an L-3 infective larva, if we have a rotational grazing program where goats (or sheep) are on a pasture for only 5 days, they leave before there are significant L-3 larvae to infect them. Here at Langston, we did a rotational grazing system in native range, which maintains its forage quality over time better than improved pastures. The rotational grazing program allowed 5 days for goats to graze the pasture, which was followed by 65 days of rest. Pastures were grazed for 140 days with does and their kids. Fecal egg counts went down in the does across the summer and does and kids did not require deworming. The larval infection level was much lower on the rotationally grazed pastures as compared to the continuously grazed pastures.

Another thing we can do is to help our goats avoid picking up infective larvae by grazing management. Most of the larvae are concentrated in the lower 3 inches of the grass and much fewer the higher you get from the ground. Goats will tend to graze a pasture in layers. If we do not force them to graze closer than 4" to the ground, they will pick up a lot fewer larvae. Goats that are browsing brush and trees seldom get closer than 6" from the ground and do not pick up worm larvae. In all the grazing studies where we have had goats browsing for controlling vegetation, goat fecal egg counts decreased and we did not deworm for the whole summer. Kentucky State has a program for goat raisers where they plant sorghum-sudan grass and do not graze it closer than 8" during the summer and goats seldom need to be dewormed. In addition, tillage for planting buries any worm eggs that were on the pasture and cleans the pasture up. Very few eggs and larvae overwinter on pastures if you get a significant number of days below 20 degrees. In warmer winters, you are more likely to have significant numbers of barber pole larvae overwinter on the pasture.

The animal's immune system is the first line of defense against infections of all sorts, especially worms. The immune system has a genetic component and a nutrition component but its functioning can also be depressed by stress. It takes good nutrition to fuel the immune system, protein, energy, minerals and vitamins. Since the immune system has the lowest priority for nutrients, when an animal is deficient in nutrients, the immune system function will be reduced. This is why starved animals are so susceptible to worms as well as other diseases. Monitor your animal's body condition and make sure that you are also providing adequate minerals (more is not always better). I recently worked with a producer who had bad worm problems and a copper deficiency (shown by low liver copper levels), because he was using a sheep and goat mineral that had no copper in it. More of a given mineral is not better because a mineral in excess may depress the absorption of another, causing what is called a secondary deficiency

(adequate amount of deficient mineral in diet, but antagonist in diet ties it up, causing a deficiency). Suffice it to say that good nutrition helps immune system function and will reduce worm problems and other infections. There is a lot of research showing that protein supplementation will reduce worm problems.

Stress will also depress immune system functioning. We covered nutritional stress above, but also stress such as shipping or weaning or any significant change in an animal's routine or herdmates. One way to reliably create stress in goats (if you are doing research on it) is to remove two goats in the pen (or herd) each day and add two new animals. Stress is one contributing factor why kids get coccidiosis and other sickness when weaned. The stress depresses the immune system and this is often added to by the kids not eating. There has been quite a bit of research done on low stress weaning in calves, but none in goats.

One of our biggest problems is the development of dewormer resistance – the dewormer only kills some (half) of the worms instead of all of them. We can attack this problem from two sides. We can slow the development of dewormer resistance by using FAMACHA and the right dose, and we can do some things to increase the effectiveness of deworming. Don't forget that in every animal you purchase are worms and the higher priced the animal, the more resistant the worms are likely to be. Deworm new animals coming onto your place with at least two classes of dewormer and take a stool sample to your vet (or you can do your own fecal egg count) to make sure the dewormer killed the worms (before you turn them out to pasture). If they survived two classes of dewormer, you need to consult with your vet on what options are open to you and if you need to cull this animal (you should never pay so much for an animal that you cannot afford to cull them). FAMACHA is a method of selective deworming. That is, deworming only the animals that need it. It slows the development of dewormer resistance because most of the worms are in refugia (in animals that were not dewormed and eggs and larvae on pasture) that were not exposed to the dewormer (deworming selects for dewormer resistance because the only worms that survive deworming are the resistant ones). Refugia provide a pool of genes that are more susceptible to the dewormer. The worms that survive deworming (due to being resistant) can mate with the worms in refugia and dilute the genes for dewormer resistance. This slows the rate of development of dewormer resistance down, but does not stop it. It will keep a dewormer working significantly longer than if the whole herd were routinely dewormed. It will also save some money since less dewormer is used.

The FAMACHA program is detailed more on the website www.scsrpc.org. Basically, the color of the goat's inside lower eyelid is matched to a color chart with 5 different color chips. It is common knowledge that since the barber pole worm sucks blood and a heavily infected animal becomes anemic (too few red blood cells). The color of the inside of the lower eyelid (touching eyeball, when you pull skin down below the eye, it rolls out where you can see it) tells you about the degree of anemia. Most producers know that when it is white, the animal is anemic and likely to have a bad infection of barber pole worms and needs to be dewormed immediately (Don't forget that liver flukes and lice can also cause anemia). We do not want to let our animals get this bad, however,

before we deworm them, because we have lost considerable productivity. Scientists in South Africa devised a card with five color chips to match the color of the inside lower eyelid with to determine if the animals needs dewormed. The program was originally designed for sheep, but considerable research has validated its application to goats. The chip that is called a FAMACHA score of 1 is the darkest pink chip and represents an animal with few worms and having a very high level of red blood cells. Few goats score a 1. The chip for FAMACHA score 3 is the lightest color that the eyelid can be without requiring deworming. All 4's and 5's (lighter pink and nearly white, respectively) need to be dewormed. There are certain times that 3's get dewormed, such as a heavy pregnant or lactating doe, a young animal less than a year of age, or when a great proportion of animals get dewormed (indicating a heavily contaminated pasture). Animals with bottle jaw (edema under the lower jaw) also get dewormed. Animals are screened with FAMACHA at two-week intervals throughout the warm season when the barber pole worm is likely to be a problem. Producers can get training locally on this procedure from their extension small ruminant specialist or local veterinarian or consult the previously mentioned web site. Producers may consult with their local county extension educator about getting training in this technique. By using this system throughout the summer the animals that require worming the most times are those that have a low resistance to worms and produce a lot of worm eggs to contaminate the pasture. Keep records on who requires deworming, so that these animals requiring the most deworming can be culled.

One can breed for worm resistance in goats. Some people in humid areas have animals that have not been dewormed in several years. One producer who has been selecting goats for worm resistance for 7 years stated that worms are no longer a problem. He no longer routinely deworms. He does watch for problems and treats them and culls them. He treats only 3 or 4 animals a year in a herd of 70 does. You can get to this level of dewormer resistance after several generations of culling those getting dewormed the most, and also working on the buck end. Several producers are using the number of times an animal was dewormed and looking back at the buck who sired them. In this way they have located bucks that pass on worm resistance and those that don't. Working at animal selection from both the buck and doe side will enable you to make a lot of progress in two or three generations.

Sericea lespedeza or other tannin-containing plants such as sainfoin (has persistence problems) or chicory (grows better in northern states) can be used to control worms. The type of tannins in those plants has been demonstrated to reduce fecal egg count by 50+% and it also reduces the success of larval hatch and development. *Sericea lespedeza* and other improved lespedezas that have high tannin levels work well as a dewormer. A commercial company plans to pellet, bag and sell *Sericea lespedeza* pellets for treating goats. It is cheaper to graze *Sericea lespedeza* if you have it. It can be frost seeded if you get hard freezes that make the ground crack and heave. Kansas has declared *Sericea lespedeza* a noxious weed because it is highly invasive under their climate and management and it cannot be planted in that state. There are no restrictions on planting it in any other state.