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Controlling *Haemonchus contortus* in large, extensively managed flocks

American Consortium for Small Ruminant Parasite Control

Gastrointestinal nematodes (GIN), especially the blood feeder *Haemonchus contortus,* are a leading health concern for small ruminants, even those in large-scale, extensively managed situations with hundreds, if not thousands of animals. Due to the growing variation in how sheep are produced in the U.S., it is difficult to limit "extensive management" to a single context, as large flocks under this style of management can be found grazing federally-owned lands in the western US, in large fenced pastures in the Great Plains, and even on large solar farms throughout the country. Regardless, increasing pressure from GIN and associated anthelmintic resistance across all systems is occurring.

Due to the scale of extensive operations, it is common for animals to not be handled unless absolutely necessary and daily observance for clinical signs of parasitism may not be feasible. Best management practices for controlling GIN in more intensive situations consists of routine individual animal evaluation of parasitism with FAMACHA©, treating with combination dewormers only as necessary, and maintaining refugia. However, in large, extensive operations where animal handling is not always pragmatic, there is an even greater need to prioritize strategies that prevent parasitism so as to avoid as much treatment as necessary.

Nutrition

Regardless of breed, the immune system of sheep and goats provides a line of defense against gastrointestinal nematodes[1]. The nutritional requirement of small ruminants will be higher than normal to sup-

Parasites are a growing issue even in large scale production settings.

port their immunity when they are facing a significant challenge from GIN [2]. It can be advantageous to provide supplemental protein (e.g., ½ lb. per head per day of a high protein cube) to mature animals when they are at a high risk of GIN infection. Lambs tend to be even more susceptible to GIN than adult sheep. They have less acquired immunity, given their age, and mortality is a major concern if lambs undergo a stress period such as weaning, while carrying a significant worm burden. While providing supplement to the lambs in addition to the ewes would be beneficial, this can be a challenge when the flock size is large and creep feeding isn't practical. This suggests it is even more critical that the dams are in good body condition and milking well in order to provide an optimal maternal environment for the lambs.

It is also worth considering using a supplement that is a smaller pellet or finer textured that lambs can consume alongside their dams. Providing extra feed can come at a significant cost therefore targeting just the times when animals are at greatest risk of parasitism is the most economical approach. During the periparturient time period, around lambing and through lactation, ewes and does tend to have a suppressed natural immunity, especially if they are raising multiple offspring [3]. Implementing other management tools, such as ultrasounding and body condition scoring (BCS) to identify and supplement the members of the flock with the greatest need and excluding the others can help control costs.

Reducing worm exposure

It is a good idea to familiarize yourself with the lifecycle of GIN (more information at www.wormx.info) so that grazing practices can be implemented to reduce worm exposure. *Haemonchus contortus* needs warm, wet weather to hatch and develop during it's free-living phase outside of the animal. Freezing and very hot temperatures (more than 90 degrees F) will shorten the time free-living larvae survive on pasture and may work to the producer's advantage when thinking about re-entering a previously grazed area. It is always a good idea to try and save pastures/range with low worm burden potential for those animals that may be more susceptible, such as lambs/kids or periparturient ewes/does. It is also worth noting that most GIN do not ascend higher than about 4 inches on forage, so a good strategy to reduce worm exposure is to try and not graze short-grass situations. This can be hard when pastures are large and ani-

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mals tend to congregate in the same location, such as water sources or shade when temperatures are hot. Even if the overall stocking rate of the grazing area is calculated as being low, if animals are gathering in a smaller area for any period of time it is likely here where the worms will be more concentrated and the potential for infections to develop. If possible, move mineral feeders (or even water sources) around the pasture to try and discourage continuous grazing of locations where the flocks/herds are spending the majority of their time.

In In flocks with GIN susceptible breeds it may be advantageous to shift the timing of reproduction so that the time the flock is most vulnerable does not coincide with high levels of pasture contamination. An example would be to fall lamb instead of spring lamb as populations of Haemonchus contortus on pasture tends to reduce with cooler fall temperatures. Additionally, in this situation lambs are not exposed to as high levels of GIN leading up to and during weaning- a particularly vulnerable period for them, especially if they are of a susceptible breed. An important consideration here too is the reproductive seasonality that is also present in some non-equatorial breeds, which may prevent this from being an economical strategy. For example, Dorpers are a GIN-susceptible breed, but tend to be less seasonal compared to European wool breeds, which means switching to a fall lambing schedule and maintaining a similar level of lamb production is feasible. This might not be the case for Merino-derived breeds. Ultimately this will be a flock-by-flock decision that will be impacted by many factors, not just breed type.

Genetics

Genetic susceptibility to GIN varies across breeds, but also within breed. Selection for animals with reduced susceptibility should be practiced at some level by all flocks, even those in arid environments. Even if resistance to GIN is not a leading priority in your operation, if it is completely avoided it is likely your animals will only become more genetically susceptible over time. When conditions do intermittently become favorable following a better than average rainfall, or even the opportunity to graze irrigated pasture presents itself, some natural resistance will likely be beneficial. This can best be accomplished with estimated breeding values (EBVs) for fecal egg counts (FEC) which are available for a majority of the popular sheep and goat breeds through the National Sheep Improvement Program (http://nsip.org/).

There is also growing evidence that FEC EBVs may be linked to improved immunity against other pathogens besides worms, though this research is still in the early stages. The use of breeds with higher natural resistance (such as St Croix, Katahdins, Barbados Blackbelly, Gulf Coast Native, etc.) or at least cross-breeding with these breeds, maybe be imperative in warmer, wetter climates where GIN are a consistent issue.

Determining the need for treatment

It is recommended by the ACSPRC to FAMACHA© score all members of the flock and only treat those that need it, but this might not be pragmatic with large numbers of animals. Treating as necessary is still a good idea in large flocks as anthelmintic resistance buildup can occur in any style of production. However, before FAMACHA© scoring the whole flock, start first with the animals that may be the

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most vulnerable (sentinels), such as lambs or even those that were slow to be gathered into the pens. If there are not high levels of anemia in the dozen or so sentinels, then FAMACHA© scoring (and treating) the whole flock is not necessary.

Using BCS, which can be performed quickly in a race or handling system, may be a more efficient way of determining which ewes are more (or less) resilient to GIN and in need of treatment. Be advised that even animals in good condition can become parasitized, though they are typically less susceptible than their thinner counterparts. Dams without a nursing offspring are also more resilient to GIN infection than those that are lactating, regardless of their breed, and typically don't need treatment.

Another option to determine if treatment might be necessary is to collect fecal samples from a representative group, about 10 to 15 animals, to run FEC analyses. A cost-saving alternative to collecting 10-15 individual samples is to collect a pooled sample, but also be mindful that many labs or clinics that run FECs use only a small amount of feces for the test [4]. When collecting a pooled sample, be sure to get only one or two pellets from multiple animals and request more than one FEC be ran to get a broader representation of the flock/herd.

Practices that should be avoided

Dewormers should not be rotated on a schedule, but rather only when (or if) they start becoming ineffective. Rotating dewormers, especially if done regularly, expose the GIN to all classes but in a manner that may not result in a high enough kill rate to stop the buildup

of resistance. The best strategy is to use at least two products, full dose, from different classes, in separate drench guns. Yes, the worms are exposed to multiple products, but since they are delivered simultaneously, the percentage that survive is lower, with the goal being that too few survive for resistant populations to have adequate time to develop.

While injectable dewormers are quick and easy to use, they should be avoided in small ruminants. For one, they are not labeled for small ruminants, which have different metabolization rates than cattle and proper withdrawal times are not well known. If a condemned carcass were to be traced back to you, that could potentially result in consequences. Secondly, injectables, particularly long acting dewormers such as LongRange™, tend to have a greater residual effect on the worms. While this may seem beneficial, it actually can lead to faster development of dewormer resistance. With the longer anthelmintic residual, there is ensured kill of the most susceptible worms for a sustained period of time, meaning only resistant worms are shedding eggs for a period of time. In addition to these reasons to avoid injectables, it is also important to remember that the continued use of needles for multiple animals also can result in transmission of many diseases such as caseous lymphadenitis (CL) and ovine progressive pneumonia (OPP).

Conclusion

Extensive sheep and goat production is a critical production system for the US small ruminant industry, accounting for a significant portion of the lambs produced domestically, according to the USDA National Animal Health Monitoring Systems study in 2011. Parasites are a growing issue in large scale production settings and the ability to control GIN with a single dewormer is becoming less effective. Employing a multiplicative strategy to control parasites is critical for the sustainable production of small ruminants.

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