Management of Barber pole Worm in Sheep and Goats in the Southern U.S.

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This publication will address management of *Haemonchus contortus* or barber pole worm, which is the parasitic nematode responsible for anemia, bottle jaw, and death of infected sheep and goats mainly during summer months in warm, humid climates. Recommendations are based on current research findings and are subject to revision as we learn more about the biology of the parasite and host and alternative products that may act as anthelmintics.

Biology of *H. contortus*

First a little background on what is known on the biology of *H. contortus*. This parasite has a relatively short life cycle of approximately three weeks and thrives in warm, humid conditions. Grazing animals pick up infective larvae on forages that are relatively short. Early to mid-morning forages contain the most larvae on its dew covered tips. As the forage dries, the larvae migrate back to the moist soil or coil up and slowly dry out (but can survive for a relatively long period of time in this dehydrated stage and once moistened can re-hydrate and become motile again). Once in the rumen the larvae continue development, travel to the abomasum, or true stomach, and become adults. The adult female can lay thousands of eggs daily and can consume 200 microliters of blood daily. An average of 10,000 adults is enough to kill a sheep or goat. The female's prodigious output of eggs is partly responsible for the explosive nature of outbreaks, especially in favorable weather conditions. The eggs are deposited in the feces, hatch on pasture and the life cycle begins again. Outbreaks are worst when warm summer rains break up the fecal pellet and create a moist environment for the hatched larvae. During drought or very cold conditions, a majority of larvae become dormant or die and transmission to the animal is very low.

Drug Resistance

Different populations of the parasite have developed resistance to all available pharmaceutical dewormers, ranging from low to complete resistance. This means that dewormers are not effective in reducing the adult worm population. The highest resistance has been observed with ivermectin (Ivomec®) and albendazole (Valbazen®) or fenbendezol (SafeGuard® or Panacur®) and low to moderate resistance has been observed with levamisole (Levasol®, Tramisol®). Resistance to moxidectin (Cydectin®) is prevalent and increasing on many farms. Moxidectin should not be used on farms unless selective treatment (treatment of a limited number of animals) is practiced. If moxidectin is used on all animals at once development of resistance will be accelerated.

Resistance has developed because past recommendations did not consider refugia, which is the proportion of a population of worms that are sensitive to dewormers or in "refuge" from a dewormer. When treating all animals in a flock/herd as has been practiced in the

past, only resistant worms survive. If these animals are moved to a "clean" pasture (one that has not been exposed to sheep/goats for four to six months or longer or has had hay removed from it) only resistant worms can develop in that pasture. However, if only animals in need are treated, and they then go back to a "dirty" pasture of low to moderate level of pasture infectivity, as now currently recommended, the resistant worms can breed with sensitive worms and maintain a worm population that should still respond to dewormers. In other words, the population of worms in refugia provides a pool of genes to dilute the resistant genes. This is the most important component of maintenance of a population of worms that will remain susceptible to dewormers. Past recommendations included deworming ewes over winter. We now know that this leads to survival of resistant worms and in the spring an outbreak of a more resistant *H. contortus* can occur. Current recommendations include treatment of only animals in need (selective treatment). Untreated animals will harbor sensitive worms.

Selective Treatment/FAMACHA

Selective treatment or deciding which animals to deworm can be decided by the use of FAMACHA. FAMACHA was developed by a group of veterinarians and scientists in South Africa and was validated in the southern U.S. by members of the Southern Consortium for Small Ruminant Parasite Control (SCSRPC; www.scsrpc.org). A complete description of FAMACHA can be found on the website. Briefly, FAMACHA is a tool used by farmers that consists of examining the color of the lower eyelid, matching the color on a chart that ranges from red or healthy to almost white or anemic. The lighter the color, the more anemic an animal is. Anemia occurs as a result of the adult worm removing more blood than the animal can replace. There may be other causes of anemia, so the farmer must be aware of the health and nutrition status of the flock/herd. Animals with red color can be left untreated, whereas paler scores indicate that an animal should be treated. Determining the need for deworming based on other criteria is being researched and include measures such as fecal egg counts (FEC), body condition scores (BCS), or weight change. Research indicates that 20% of the flock/herd carry 80% of the worms. Or in other words, 20% of the animals consistently are more susceptible to infection with *H. contortus*, carry the worms, and distribute the eggs in the pasture. Identification of these animals is possible partly through the use of FAMACHA and these animals can be culled or removed from the population. It is possible to develop a more resistant group of animals that need less frequent treatment for parasites.

FAMACHA examination should occur more frequently on weaned lambs/kids and late pregnant/early lactation ewes/does. The immune system becomes depressed around the time of lambing/kidding, which leaves the animal more susceptible to parasites. Also, watch for signs of an infection such as bottle jaw or animals that lag behind.

Other Control Methods

There are a variety of other parasite control measures farmers can use in addition to anthelmintics. Farmers may use a combination of methods and must be thoroughly familiar with the advantages, disadvantages, and risks of each. Some of these include the use of tannin-rich forages such as sericea lespedeza, copper oxide wire particles, mixed species grazing, grazing browse rather than grass, and supplemental feeding. Recently

there has been some success in reducing FEC and perhaps the adult worm numbers by feeding sericea lespedeza, either fresh or as hay. Animals prefer the young plant, but it should not be grazed until it is at least six inches in height to preserve the plant. Over-mature plants may lose the ability to reduce infection with *H. contortus*. More research is being conducted in these areas.

Copper oxide wire particles have been used to markedly reduce infection with *H. contortus* in lambs. Copper oxide is very different from copper sulfate, which when fed to sheep can quickly lead to copper toxicity. Copper oxide is given to animals as a bolus (not more than 2 grams) and should not be used more than one time per year per animal for sheep until more is learned on reducing the potential for copper toxicity during its use. Copper oxide is available for cattle as a supplement to alleviate copper deficiency. Copper oxide has been used in sheep for the same purpose. In some areas of the U.S. copper oxide should not be used because of the high levels of copper in the environment. Also, some breeds of sheep may be more susceptible to copper toxicity than others (Texel and dairy breeds). Copper oxide has also been used with mixed results in goats to reduce infection with *H. contortus*. Copper oxide appears to be effective in reducing FEC for at least a four week period and does not appear to be effective in reducing other intestinal worms. It may not be effective in all animals and it may be too slow to work in severe cases. If producers want to consider this option they **must** seek professional advice to assess farm conditions, feeding programs, and other management and environmental factors that will affect copper oxide metabolism.

In drier weather, wet patches around leaky drinking troughs, marshy areas or grass pens where animals are kept regularly may lead to an unexpected buildup of worms. Eliminate these factors or fence off.

There are several grazing strategies that can minimize pasture contamination of larvae. Mixed species grazing is effective in reducing the population of worms on pasture. An example of an effective grazing strategy would be to allow cattle to graze pastures before sheep or goats. Mixed species does not include a mix of sheep and goats because they are both affected by *H. contortus*. Grazing resistant breeds of sheep (St. Croix, Barbado Blackbelly, Gulf Coast or Florida Natives, Katahdin) with susceptible breeds, may act to "sweep" pastures and reduce contamination to susceptible animals. Goats were evolved to graze browse rather than grass. Larvae cannot reach browse plant species and goats can be maintained with a low level of parasites using this management. Goats can be extremely susceptible to parasites if grazing only grass pastures. Rotational grazing has been used successfully to minimize pasture contamination, but more research is needed for southern pastures to make proper recommendations. Overgrazing or overstocking can quickly lead to parasite problems by creating large numbers of infective larvae on pasture. Avoid overstocking! Try to leave a grazed pasture to rest for as long as possible if it has to be grazed again by sheep or goats.

Supplemental feeding should not be overlooked as a means to control parasites. By increasing dietary energy, protein, or both, lambs and late pregnant or lactating ewes can become less affected by parasites. The health of the animal is improved and animals

consume less infected pasture. The body condition score (an index of nutrition; 1 = emaciated, 5 = obese) should be above 2. A complete ration has been fed to lambs at the Booneville station resulting in nearly complete reduction in fecal egg counts and reduced anemia. More research is being conducted on this diet as a creep feed.

Smart Drenching

Remember, if use of chemical dewormers becomes necessary, use proper dose by knowing how much an animal weighs, administer drench in the back of the mouth (not on the tongue), and if possible, withhold feed from animal prior to treatment for more effective worm kill. It may sound a bit overwhelming to control internal parasites without complete reliance on chemical dewormers, but with a few changes in management, it is possible to control the parasites and be productive. As always, contact Dr. Burke (jmburke@spa.ars.usda.gov), a veterinarian, or extension agent for help or advice if necessary. To schedule a FAMACHA training session near you please contact your local extension agent (if not trained ask them to see Dr. Burke).

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