

Use of Copper Oxide Wire Particles (COWP) to Control Barber Pole Worm in Lambs¹

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Barber Pole Worm

Barber pole worm, or *Haemonchus contortus*, is the parasitic nematode that causes anemia, bottle jaw, and sometimes death of infected sheep and goats mainly during summer months in warm, humid climates. Because it is highly prolific and has a short life cycle of approximately three weeks, severe outbreaks can occur during favorable weather conditions (warm summer rains, high humidity). Grazing animals pick up the infective larvae from grass and shorter forages and the larvae develop into adults, which live in the abomasum, or the true stomach of ruminants. The adults feed on blood from the animal and lay eggs, which are excreted in the feces. The life cycle continues when the eggs hatch and develop into the infective stage on pasture. Many producers have experienced anthelmintic resistance to these parasitic nematodes and have no effective chemotherapy. Recently we have discovered that low doses of copper oxide wire particles (COWP) can effectively control barber pole worm in weaned lambs.

COWP Trials with Sheep

COWP (Copasure[®]; Animax Veterinary Technology) was administered to weaned Dorper-sired lambs in Booneville, Arkansas, that were 90 days of age every six weeks for a total of four treatments until lambs reached market weight. The doses were either 0.5 g or 1 g (repackaged from a 25 g bolus to size 1 gelatin capsules that were approximately 85% filled for the 1 g dose; these capsules can be found in pharmacies) compared with a control group of lambs that were administered levamisole (Levasol, 8.0 mg/kg). Levamisole has been 80% effective in reducing nematode infection on this farm. Both doses of COWP and the levamisole administered at weaning and six weeks later were highly effective in reducing nematode infection. Treatment was unnecessary for the final two treatments based on level of anemia. Concentrations of copper in the liver, which is the best measurement of copper toxicity, was within the “safe zone” for all animals at the end of the study. COWP was effective in reducing the number of nematode eggs found in the feces for a four to six week period. In another study, similar low doses of COWP effectively reduced barber pole worm infection in nursing Polypay lambs at Iowa State University without risk of copper toxicity.

Copper Absorption and Toxicity

COWP were developed for copper deficiency in cattle and sheep. The copper in COWP is a form that is poorly absorbed, which makes it safer to administer with less risk of copper toxicity compared with copper sulfate. COWP pass from the rumen to the abomasum where it is retained. Free copper then is released in the abomasum. This

concentration of soluble copper creates an environment that causes expulsion or death of the worms.

The copper found in copper sulfate differs from COWP in that it is readily absorbed and can lead quickly to copper toxicity. Recent mineral fads formulated for “parasite control” contain copper sulfate. Sheep are highly susceptible to copper toxicity because the liver can become overloaded and lacks the ability to rid itself of excess copper. In a study at the Booneville, Arkansas ARS station, excess dietary copper sulfate did not reduce barber pole infection in growing kids and may have slowed growth.

The amount of copper required in the diet and the amount that leads to copper toxicity is not very different. Errors in feed mixing or offering cattle mineral mixes to sheep frequently lead to mortality due to copper toxicity. There are complex mineral interactions (molybdenum, sulfur, selenium, iron) that can bind copper and create a copper deficiency. When these minerals are deficient in the diet, copper is more readily available and copper toxicity can occur. In some areas of the U.S., copper oxide should not be used because of the high levels of copper in the environment. Check with local experts for environmental copper status. Also, some breeds of sheep may be more susceptible to copper toxicity than others (Texel and dairy breeds). COWP should not be administered to animals of unknown copper status or those supplemented with other forms of copper. COWP should not be used in animals suffering from jaundice or any other liver disorder.

COWP Use

Use of COWP should be combined with other worm control strategies. Selective treatment is advised to minimize development of nematode resistance to COWP. Selective treatment can be implemented using the FAMACHA system. Only animals with anemic FAMACHA scores should be treated. Other control methods include rotational grazing, avoidance of over-grazing, mixed species grazing, use of resistant breeds or resistant animals within a breed, good nutrition, feeding of condensed tannin-rich plants such as sericea lespedeza, and eliminating wet spots in pastures where barber pole worm flourishes. Discussion of novel methods of control of gastrointestinal nematodes can be found on the Southern Consortium for Small Ruminant Parasite Control website (www.scsrpc.org).

COWP has also been used with mixed results in goats to reduce barber pole infection. Recently, doses as low as 0.5 g were effective in reducing fecal egg counts in weaned kids, but was not effective in controlling incoming larvae that are still capable of causing anemia. COWP administered to lactating ewes was not very effective for control of barber pole worm and growth of lambs may have been reduced. Therefore, COWP administration to mature sheep is not recommended. COWP does not appear to be effective in reducing other intestinal worms. Professional consultation from veterinarians and extension agents is strongly advised to assess farm conditions, feeding programs, and other management and environmental factors that will affect copper oxide metabolism.

In summary, as an alternative to chemical dewormers, 0.5 g COWP (*extremely important not to overdose*) can be administered to weaned lambs every six weeks as needed for control of barber pole worm for not more than four treatments with supervision by a professional. COWP should not be used when other sources of dietary copper are available, in areas of low soil molybdenum or high copper, in sheep grazing

pastures fertilized with poultry waste (high in copper), all of which may augment copper toxicity, or in breeds sensitive to copper toxicity.

COWP boluses can be made by obtaining boluses sold for cattle from livestock catalogues and repackaging into smaller gel capsules that can be purchased at a local pharmacy. Size 1 boluses filled will yield approximately 1 g, so half-filled will yield approximately 0.5 g. These are the recommended low doses to use in weaned lambs or kids every four to six weeks if necessary, according to anemic FAMACHA scores, during their first summer. COWP is not administered based on weight, which means that as the animal grows, the small doses will still be effective and an increase in dose is not necessary. However, beyond the end of the worm season in the fall, as the animal matures, the COWP becomes less effective.

¹Mention of trade names or commercial products in this manuscript is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

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