

Use of Copper Oxide Wire Particles (COWP) to Control Barber Pole Worm in Lambs and Kids¹

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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 four to five weeks, severe outbreaks of barber pole worm 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 abomasum of 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. These larvae can survive harsh conditions on pasture, sometimes for months, depending on soil moisture and temperature. Many producers have experienced dewormer resistance to these parasitic nematodes and have no effective anthelmintics. Recently we have discovered that low doses of copper oxide wire particles (COWP; currently available as a cattle supplement) can effectively control barber pole worm in young lambs and kids.

COWP Trials with Sheep

COWP (0.5 g) and levamisole (Levasol, 8.0 mg/kg) were administered every six weeks to 90 day old weaned Dorper-sired lambs in Booneville, Arkansas until lambs reached market weight in the fall. Levamisole has been 80% effective in reducing nematode infection on this farm. Both the COWP and the levamisole administered at weaning and six weeks later were highly effective in reducing nematode infection for four to six weeks. Treatment was unnecessary for the final two treatments based on level of anemia. Concentrations of copper in the liver, which is the best estimate of copper toxicity, was within the “safe zone” for all animals at the end of the study. In other studies, similar low doses of COWP effectively reduced barber pole worm infection in nursing Polypay lambs at Iowa State University, weaned Katahdin and Gulf Coast Native lambs grazing grass pastures in Arkansas without risk of copper toxicity. Use of COWP in mature sheep appears to be less effective than in lambs less than one year of age with approximately 50% efficacy.

COWP Trials with Goats

Weaned Boer x Spanish kids treated with as little as 0.5 g COWP responded well with reduced fecal egg counts, but because of overstocking and an overwhelming parasite challenge, deworming was necessary within three weeks after initial treatment. More

studies are being conducted to determine effects of repeated use of COWP in kids during their first summer. Studies on mature goats were conducted during cooler months in Georgia and during warmer months in Arkansas. Mature meat goats received up to 10 g COWP under a variety of management conditions in Georgia, but fecal egg counts only decreased by approximately 40%. Worms were likely a mix of barber pole and other species that do not respond as well to COWP as these studies occurred during cooler months in Georgia. In Arkansas, fecal egg counts were reduced by nearly 75% during summer months in mature goats treated with 5 g COWP. More research is being conducted on use of COWP in mature goats.

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, which can then be absorbed. 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 recommendations from Australia to include copper sulfate in the mineral for “parasite control” have not been scientifically documented. 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 in sheep 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. Although goats are less susceptible to copper toxicity than sheep, toxicity can still occur if exposed to too much copper.

Using COWP in Lambs and Kids

Use of COWP should be combined with other worm control strategies. Selective treatment is advised to minimize development of nematode resistance to available anthelmintics and/or 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). 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.

Using COWP On-Farm

COWP boluses can be made by obtaining boluses (Copasure[®]; Animax Veterinary Technology) marketed for copper deficiency in cattle from livestock catalogues and repackaging from either 12.5 or 25 g boluses into smaller gel capsules that can be purchased at a local pharmacy or health food store. Size 1 gelatin capsules filled one third or size 3 capsules filled at three quarters make a 0.5 g dose (see Figure 1). The capsules can be administered using a pill gun designed for pets or wooden dowel with PVC pipe (see Figure 2). Alternatively, research is being conducted on incorporating COWP in feedstuffs such as molasses and oats. 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 and could lead to copper toxicity. However, beyond the end of the worm season in the fall, as the animal matures, the COWP becomes less effective.

Summary

In summary, as an alternative to chemical dewormers, 0.5 g COWP (**extremely important not to overdose**) can be administered to selected individual lambs or kids determined to be anemic for control of barber pole worm with supervision by a professional. Treatment can be repeated in six weeks if necessary, but do not use more than four treatments within a worm season. COWP should not be used in sheep breeds sensitive to copper toxicity or when other sources of dietary copper are available, in areas of low soil molybdenum or high copper, or in sheep grazing pastures fertilized with poultry waste (high in copper), all of which may augment copper toxicity.

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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Figure 1. Gelatin capsules, Size 3 and Size 1, filled with 0.5 g or 500 mg of COWP.

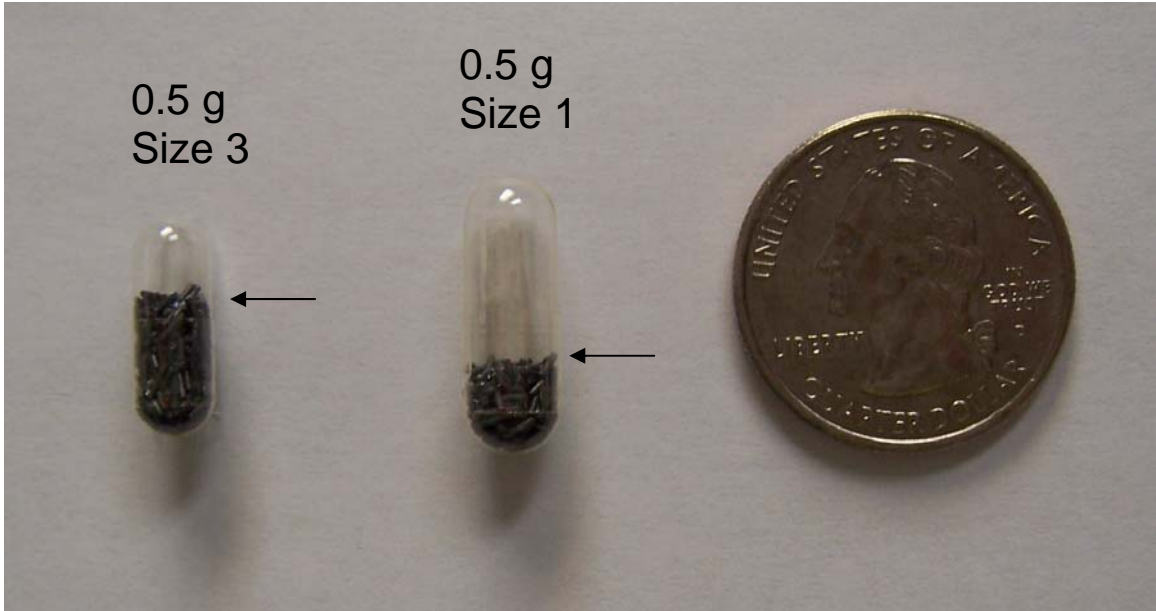


Figure 2. Suggested pill guns to administer COWP to sheep and goats. Top pill gun is marketed for dogs and cats (Dr. Hanson's[®] Bullseye pill gun) and bottom is wooden dowel inserted into a filed PVC pipe (5/8 inch outer diameter, 1/2 inch inner diameter) with a rubber band wrapped around the dowel.

