



Barberpole Worm: Fighting the Wiggler Wars

BY LISA H. WILLIAMSON, DVM, MS



Barberpole worm is a formidable foe in the alpaca world. Many gastrointestinal nematode parasites act as thieves, robbing animals of body condition and production. However most of them take a “back seat” to the barberpole worm in sheer virulence.

Known in the scientific community as *Haemonchus contortus*, barberpole worm has the distinction of being a ruthless killer as well as a thief. Heavily infected alpacas can develop life-threatening anemia and weight loss as a result of the blood feeding activities of this worm in the third compartment (true stomach). If you are fortunate enough to NOT have barberpole worm on your farm, keep it that way.

Even if you already have barberpole worm on the farm, keep the nastier versions off your farm. How? Isolate incoming alpacas off your pasture until you have had feces analyzed (i.e., fecal egg count), and you have treated appropriately to eliminate the worm burden. Parasite experts recommend that new herd additions be treated with a combination of dewormers, each from a different dewormer class. (See wormx.info¹ for more information on dewormers.) Combination treatment is recommended because currently most barberpole worms are resistant to one or more of the dewormers on the market.

The fecal egg count should be re-assessed 10-14 days after treatment. The alpaca should not be allowed on your pasture

unless treatment eliminated fecal egg shedding. This management practice (isolating newcomers in a quarantine facility for several weeks and testing for diseases of concern) has an additional payoff: it is a great way to help prevent spreading other problems to your herd.

Barberpole worm has the distinction of being highly adaptable. Adult worms that survive exposure to dewormers have successfully passed on these survival advantages to their offspring. Frequent, nonselective use of dewormers has led to a serious global problem with multidrug-resistant barberpole worms. The issue is especially bad on sheep and goat farms, but drug-resistant barberpole worms are also a problem on camelid farms.

Work supported by the Morris Animal Foundation and the Alpaca Research Foundation showed that on southeastern U.S. alpaca and llama farms, the resident barberpole worms were resistant to white dewormers such as Panacur on 100 percent of the farms.

Barberpole worms were resistant to ivermectin on 91 percent of these camelid farms.

Although moxidectin is in the same chemical class as ivermectin, it is a much more potent drug. Only 26 percent of the farms had barberpole worms that were resistant to moxidectin.

Levamisole resistance was only documented on 18 percent of the farms. This finding possibly reflects historic reluctance to use levamisole, as it has a low margin of safety. To avoid accidental overdose, weigh animals and use the correct dose.

A camelid dewormer (anthelmintic) dose chart is available at www.wormx.info.

Sensible control of barberpole worm requires an integrated approach that involves reducing worm transmission through pasture management, good nutrition to enable animals' immune systems to repel infection, and selective use of dewormers. It is very difficult to manage worms on overgrazed, crowded permanent pasture. Stocking density ideally should be maintained at five to seven alpacas per acre. Pasture rotation is a very useful way to reduce animal exposure to infective larvae.

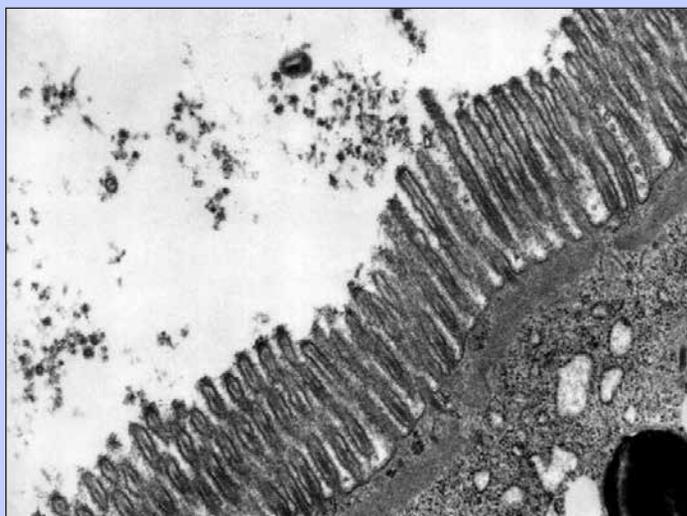
Treatment with dewormers should be reserved for alpacas showing signs consistent with parasitism. This approach prolongs the effective lifespan of the drugs, and manages worms as well as whole-herd treatment does.

The majority of the alpacas in most herds have low parasite burdens, and they will not gain much benefit from treatment. Additionally, small numbers of parasites are thought to provide benefit through immune stimulation.

Regular observation of physical parameters, such as changes in body weight, body condition score, fecal consistency and pallor of the conjunctiva, allow producers to determine which animals will most likely benefit from dewormer treatment. Alpacas in optimal-to-high body condition are less likely to be harbouring health-threatening worm burdens than ones with suboptimal body condition scores. Camelids often develop loss of fecal consistency in association with high worm burdens, so unformed feces is another clue to infection intensity.

The pallor of the ocular membranes is a useful physical parameter for assessment of barberpole worm infection intensity. Assessment of the color of the lower eyelid conjunctiva has been dubbed the "FAMACHA System" Use of the FAMACHA System has been validated for use in sheep, goats and camelids in the United States.² FAMACHA scores in these species correlate well with hematocrits and fecal egg counts. FAMACHA training workshops are conducted in most regions of the United States, and online training is now becoming available.

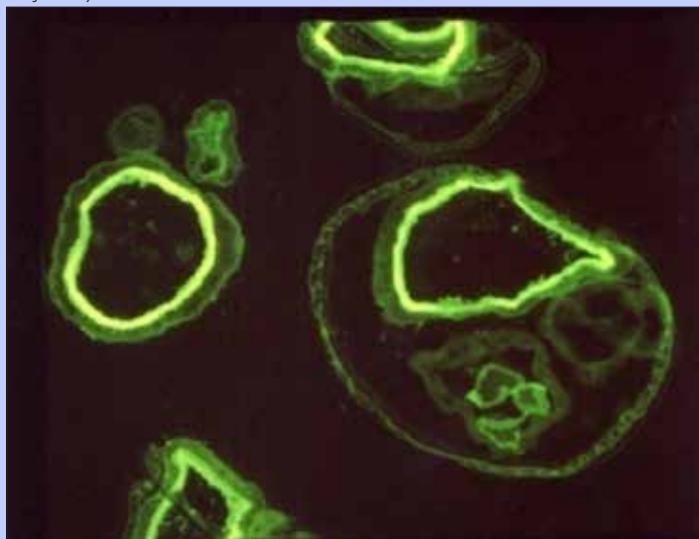
As dewormer resistance continues to escalate in worm populations, research efforts have turned to development of alternative barberpole treatment options (for example, administration of condensed tannins, copper oxide wire particles or nematophagous fungi).



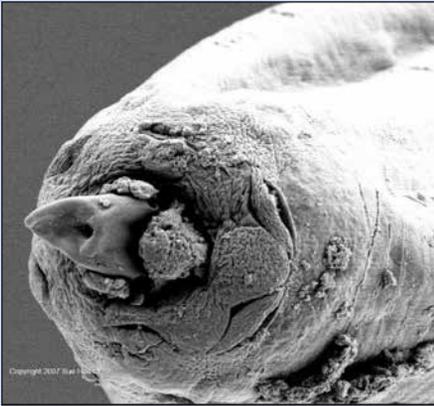
it responds and makes antibodies which circulate in the blood. If a vaccinated sheep gets infected, the parasites ingest blood so that antibodies bind to the worms intestines...

When surface proteins from the worm gut are injected into a sheep...

Images courtesy of Dr Dave Smith



...leading to greatly reduced egg output and worm numbers.



LEFT: Mouthparts of *Haemonchus contortus* (barberpole worm) show how it resembles a needle. CENTER: This photo shows where to check for conjunctival color. This llama is extremely anemic. It was assigned a FAMACHA score of 5/5, which is the most pale score. RIGHT: Barbervax being given subcutaneously to a sheep. This image is from the Barbervax webpage.

Photos courtesy of the author

Barberpole vaccines are currently being investigated in goats and sheep to gauge parasite control benefits, and determine optimal regimens. After years of research, a barberpole vaccine was released as Barbervax in Australia in 2014 for use in sheep. Appropriately vaccinated sheep were much less anemic, gained more weight, and had 85 percent lower fecal egg counts than non-vaccinated sheep during heavy exposure to barberpole worm on pasture. The vaccine holds great promise as a way to help control barberpole worm on endemic farms where other strategies are inadequate.

Very little work has been done to assess the benefits of these alternative barberpole management strategies in camelids. However, the Alpaca Research Foundation is actively working to fund a project that will investigate use of the barberpole vaccine in alpacas. ■

References cited (online resources located at wormx.info)

1. http://media.wix.com/ugd/6ef604_cb549a-8b2b114898960e39d5b3ee4870.pdf
2. <http://www.wormx.info/#!/camelids/c1wqq>

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