



Integrated Parasite Management: Train the Trainer Project

How Fecal Egg Counts Can Help You Fight Parasites

The Barber Pole Worm (*Haemonchus contortus*) ultimately becomes a major source of concern on every irrigated or high-rainfall sheep operation. It has a proven track record, and one that has resulted in areas of the United States becoming unable to raise sheep or goats. Fecal Egg Counts (FEC) and FAMACHA are two of the main tools that producers have for successfully reducing *Haemonchus* infections. These two tools go hand in hand. Be sure to read the first tip sheet in this series, *Why FAMACHA?*

Parasite Resistance versus Resilience

A sheep's *resistance* to Barber Pole Worm infection and its *resilience* to the effects of that infection are two different properties. Understanding the difference between resistance and resilience will help in managing the Barber Pole Worm.

Resistance. This is the sheep's ability to avoid Barber Pole infection in the first place. The mechanism is not well known. It is thought that a resistant sheep's immune system in some way reduces the Barber Pole Worm's ability to penetrate and extract blood from the abomasal wall.

Resilience is the animal's response to Barber Pole infection. One avenue of mitigation by the host animal is increasing the amount of red blood cells in the blood stream. There may be more responses.

We can use our knowledge of resistance and resilience to understand where fecal egg counts fit into parasite management. First, by themselves, fecal egg counts do not do a very good job of indicating if a sheep is in need of deworming. This is because a ewe or lamb moderately (1,000 eggs per gram) or even heavily (>3,000 epg) infected with parasites may be sufficiently resilient to the infection and show no clinical signs (FAMACHA score of 1 or 2). This animal does not need treatment. It needs to be watched carefully, however, with follow-up FAMACHA scoring in two weeks. Conversely, an animal may have only 500 epg but a FAMACHA score of 4. This animal most definitely needs to be dewormed, or else death may occur.

There is no better clinical indication of Barber Pole Worm than the FAMACHA score. Use it in deciding which animals to deworm when *Haemonchus* is the major parasite in a pasture. Given that, what role do fecal egg counts play in parasite management?

Reasons for Performing Fecal Egg Counts

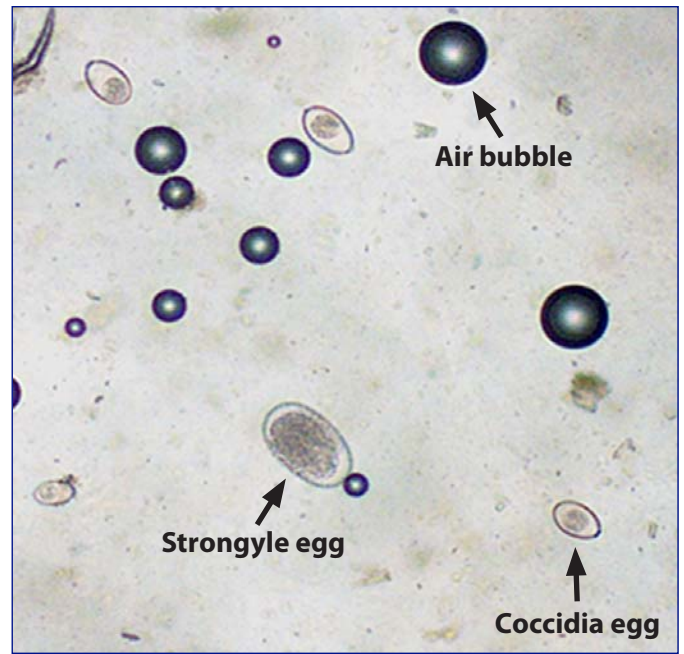
- Determine which internal parasites are present in the flock. Parasites in the Strongyle family, Brown Stomach Worm (*Teladorsagia*), Bankrupt Worm (*Trichostrongylus*), *Cooperia*, and Barber Pole Worm (*Haemonchus*) are potential parasites in Western flocks, with Barber Pole Worm being by far the most detrimental. To graziers, all of the Strongyle eggs will look the same under the microscope. However, we only need to differentiate between a Strongyle egg and a Coccidia egg in order to manage these two different types of parasites. This is easily done. A Strongyle egg is two to three times the size of a Coccidia egg and is visibly different. Once we know what we have, we can manage accordingly, because treatments for Coccidia are different from other sheep internal parasites.



Happy sheep on pasture can be jeopardized by parasites. We can keep them healthy and happy. Photo: Dave Scott, NCAT

Tapeworms (*Moniesia*), even though they look terrible, have no documented production loss in sheep (Zajac, 2014a).

- Test for anthelmintic resistance: Fecal Egg Count Reduction Test (FECRT). This procedure will test the effectiveness of your dewormer. It does little good to use a dewormer that is not at least 95% effective.
 - Sort out 10 animals, mark them, and take a FEC of each animal or a composite sample of all 10. With a composite sample, be sure to weigh out an equal amount of fecal material from each animal. (Two grams is sufficient.)
 - Deworm.
 - Ten to 14 days after deworming, take fecal egg counts of the same 10 animals.
 - Fecal Egg counting involves a microscope and some training in the McMasters flotation technique. You may want a veterinarian to do it for you. If you are interested in learning how to do fecal egg counts, see the slide presentation by Langston University (www2.luresext.edu/goats/library/fec.html) and the video, Why and How to do Sheep and Goat Fecal Egg Counting, by Dr. Ann Zajac, of the University of Rhode Island. www.youtube.com/watch?v=ZZQymZKe_hs.
 - For the dewormer to be effective, there should be 95% reduction in FEC.
 - When performing a FECRT, remember:
 - i. Use the correct dose of dewormer that is within its expiration date. For dosage information, see the American Consortium for Small Ruminant Parasite Control resource, Dewormer Chart for Sheep by Ray Kaplan, DVM, PhD, and Lisa Williamson, DVM, MS
 - ii. Any dewormer that has been accidentally frozen does not work!
 - iii. Use the same animals
 - iv. A FECRT works best if there are at least 500 epg in the fecal sample.
- Use in genetic selection of flock-bred dams and rams.
 - In general, 30% of your sheep flock is depositing 80% of the parasite eggs on your pasture (Morgan, 2005).
 - You can use fecal egg counts to identify and eliminate heavily infected sheep, whether or not they are showing clinical signs. Get rid of those sheep that are shedding lots of worm eggs. They are exposing others to infection.
 - Keep ewes with high fecal egg counts out of your replacement breeding program.
 - It is more difficult to apply maximum selection for resistant flock genetics using FAMACHA alone because FAMACHA does not distinguish between resilience and resistance. You want to select for resistance rather than resilience. This is where fecal egg counts come in. They are a direct measure of genetic resistance to parasites.
 - Conduct Barber Pole egg counts from late spring to early fall, when egg counts are high. The McMasters test is more accurate than.
 - ii. In small flocks, conduct fecal egg counts twice during the season on breeding lambs. Compare results between the two times. A large difference in eggs between the two tests is desirable in order to determine an individual's resistance. For example, a lamb with a FEC of 1,000 epg in July and 3,000 epg in August has low resistance to the Barber Pole Worm. As the parasite load increased in the pasture, the lamb was not able to resist the challenge (Zajac, 2014b). Do not use this lamb in your breeding program.
 1. If the maximum of the two fecal egg counts is only 1,000 epg or less, there is not enough range to compare. Consider those individuals resistant.
 - iii. For large flocks, take fecal egg counts on prospective breeding ewe lambs and rams in late July or August. Select ewe or ram lambs from the top 20% for resistance if possible.
- Providing data for Estimated Breeding Values (EBV). Very significant genetic progress can be made in parasite resistance by using low worm count EBV rams. Why? In four generations, 90% of a flock's genetics is from the sire side (NSIP, 2015)). Fecal egg counts are the basis for parasite EBVs. See the National Sheep Improvement Program website (<http://nsip.org>) for more information on how to improve your flock's genetics for economically important traits.
- Fecal egg counts are used in the University of Georgia DrenchRite Analysis. This test will tell you what parasites are present in your flock and which dewormers are effective against them. www.wormx.info/drenchrteassay



Strongyle eggs are two to three times the size of Coccidia eggs. This makes the two easily distinguishable. Air bubbles are a quick reference structure that you can focus upon. Photo: Bob Storey, UGA College of Veterinary Medicine

General Guidelines for Collecting Fecal Egg Counts:

- If there is one animal with Barber Pole eggs in the feces, assume that all sheep are exposed and that vigilance is a priority.
- Barber Pole Worm is a “warm season” parasite. Take fecal egg counts in late spring through early fall. In the Intermountain West, it usually takes a minimum of 45 days on irrigated pasture for Barber Pole Worm infections to become significant.
- Don’t take fecal egg counts within four to five weeks after deworming unless it is for a FECRT (10- to 14 days). The dewormer will (hopefully) reduce the Barber Pole Worm populations in your sheep until they are re-infected.
- Hypobiosis of late stage (L4) larvae occurs in the ewe through the winter. The parasites are in an arrested state in the abomasum with no eggs being shed. Taking FECs in winter is not predictive of summer egg counts. Sheep must go through periparturient rise (see www.wormx.info/pper) and be out on pasture for a FEC to be indicative of animal and pasture parasite loads.
- It is best to collect a fresh sample by inserting a gloved, lubed finger into the sheep rectum. Pull out about two to four grams. Record the animal’s FAMACHA score. If this is not possible, corral the sheep for an hour, let them lie down and then get them up. There will be a number of fresh fecal samples that you can scoop up off the ground. For the complete procedure of collecting a fecal sample, see: https://www.youtube.com/watch?v=ZZQymZKe_hs.

How Can I Learn How to do FEC?

Fecal egg counting technique is easily learned. It requires the use of a \$300 microscope and some accessories. Many veterinarians will charge \$25 per FEC so you can pay for the microscope in a few seasons and be that much more self-sufficient. See the very informative video, *Why and How to do Sheep and Goat Fecal Egg Counting*, by Dr. Ann Zajac, of the University of Rhode Island www.youtube.com/watch?v=ZZQymZKe_hs.

Acknowledgement

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Zajac, Ann. 2014a. Disgusting Tapeworms! American Consortium for Small Ruminant Parasite Control www.wormx.info/tapeworms

Zajac, Ann. 2014b. How and Why to do Fecal Egg Counts. www.youtube.com/watch?v=ZZQymZKe_hs&feature=youtu.be

Further Resources

ATTRA Resources

Don't Let the Barber Pole Worm Devastate Your Flock
<https://attra.ncat.org/multimedia/ppr>

FAMACHA© Scoring Out West
www.youtube.com/watch?v=qk9vtCnbh4

Managing Internal Parasites in Sheep and Goats
<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=215>

Managing Internal Parasites: Success Stories
<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=493>

Tips for Managing Internal Parasites

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=495>

Tips for Preventing Internal Parasites

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=494>

Tips for Treating Internal Parasites

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=496>

Tipsheet: Organic Management of Internal and External Livestock Parasites

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=524>

Tools for Managing Internal Parasites in Sheep and Goats: Animal Selection

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=398>

Tools for Managing Internal Parasites in Sheep and Goats: Pasture Management

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=415>

Other Resources

American Consortium for Small Ruminant Parasite Control

www.wormx.info

American Institute for Goat Research at Langston University

www.luresext.edu

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