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Gastrointestinal Parasite Control in Cattle: The Fecal Egg Count Reduction Test

Producers can determine if their current deworming program is working by conducting a fecal egg count reduction test on a group of cattle. The premise of this test is to determine dewormer efficacy by measuring how many parasite eggs are present in the manure before and after dewormer application. A dewormer is considered highly effective if there is at least a 95% reduction.

Why Should I Conduct a Fecal Egg Count Reduction Test?

Although cattle producers have the best intentions when it comes to treating their animals for intestinal parasites, routine and frequent deworming is likely contributing to parasite resistance. Similar to antibiotic resistance, continued overuse of dewormers inadvertently selects for dewormer-resistant parasites.

With the current practices of routine administration of dewormer to all animals on the farm multiple times per year, it is possible that cattle producers may be 1) administering dewormer to animals that do not actually need it or 2) administering a product with poor efficacy in their herd. Both situations represent an economic loss to the producer and contribute to dewormer resistance.

Data from cattle herds in the Mid-Atlantic and southeast regions of the U.S. as well as those in other countries, suggest that economically important parasites, such as the brown or medium stomach worm (*Ostertagia ostertagi*), are beginning to develop some resistance to available dewormers. To mitigate the development of dewormer resistance in cattle production systems, producers can use a fecal egg count reduction test to assess and adjust their parasite control program.

A Fecal Egg Count Reduction Test is Performed on a Group of Animals

Producers should collect samples from at least 15-20 individual animals within a group; the more animals that are sampled, the more accurately the results will reflect the true dewormer efficacy of the entire group. At the time of deworming, producers should collect fresh (directly from the rectum) samples of manure from each animal in the test group.

Manure should be collected in individual bags (one per animal) and then combined on an equal-weight basis before submitting for analysis. Approximately 10-21 days after dewormer application (the ideal time depends on the dewormer used; see Table 1), collect fresh manure again from those same individual cattle and submit for analysis.

Table 1. *Ideal times to collect post-treatment fecal samples for a fecal egg count reduction test*

Drug	Post-treatment Manure Sample Collection Time
Benzimidazoles Imidazothiazoles	10 to 14 days
Ivermectin Avermectins	14 to 17 days
Moxidectin	17 to 21 days

Samples should be stored in the refrigerator (40°- 35° F) after collection until they can be analyzed. The lab will analyze each sample for parasite egg count. The number of eggs counted in the pre- and post-dewormer treatment samples is utilized to calculate the percent reduction. Producers should work with their veterinarian or local extension agent to identify a laboratory for testing.

What Do the Results Mean?

A dewormer is considered effective if the fecal egg count reduction test shows a 95% or greater reduction in the number of eggs after dewormer application. Results of 90 to 95% suggest reduced dewormer efficacy and <90% indicates an ineffective treatment.

Table 2*. Interpretation of results of the fecal egg count reduction test*

Fecal Egg Count Reduction Test Results	Interpretation
>95%	Effective, no evidence of resistance
90-95%	Reduced efficacy, resistance suspected
<90%	Ineffective, resistance is likely
<70%	Highly ineffective, resistance present

Exercise caution when interpreting results if the initial, pre-treatment fecal egg count is very low (less than 100-150 eggs per gram). When initial parasite egg counts are very low, it can be difficult to make an accurate assessment of dewormer efficacy. Low initial counts suggest that cattle did not have a parasite problem and, as such, likely did not need to be dewormed.

Performing a fecal egg count analysis a week or two before deworming can help determine if cattle actually need it (see point 2 under "What Can I Do to Minimize Resistance on My Farm?"). Egg counts are often lower for older animals (>16 months) and during hot/dry weather, so results from a fecal egg count reduction test will also vary depending on the animals tested and the season.

What About Inconclusive Results?

If a fecal egg count reduction test generates a negative result (i.e., less than 0%), results are considered inconclusive. One possible explanation for a negative fecal egg count reduction test result is that both the pre- and post-treatment egg counts were very low (<100 eggs per gram). When this happens, a slight anomaly in the number of eggs counted in samples (caused by normal animal variation, lab analysis, etc.) can result in an inaccurate estimate for the test.

If pre- and post-treatment egg counts are not excessively low (>100 eggs per gram) and a fecal egg count reduction test shows a negative result (less than 0%), another possible explanation is that the drug was highly ineffective and that the animals picked up additional parasites from an infected pasture between sample collections. Regardless, an inconclusive result suggests the need for an additional evaluation at the next dewormer application.

What Can I do to Minimize Resistance on My Farm?

1. ***Only deworm "high risk" animals.*** These animals include younger cattle (<16 months), especially calves. Older cattle generally develop a tolerance to gastrointestinal parasites, are better able to cope with their presence than younger animals, and often have lower parasite loads.
2. ***Do not deworm by the calendar.*** Cattle should only be dewormed when they need it, not simply because of the season or time of year. A single composite fecal egg count can be performed for a group of cattle to evaluate current parasite load.

3. ***Perform selective non-treatment.*** This practice ensures that there are sufficient parasite numbers that are not exposed to a dewormer which will help maintain a population of susceptible parasites (referred to as "refugia"). To implement this strategy, producers should deworm all animals in their high-risk groups except for the top 10 to 15% heaviest/best performers.
4. ***Utilize combination treatments.*** This strategy involves simultaneous treatment with at least two drugs in different classes (e.g., one benzimidazole and one macrocyclic lactone; levamisole and one benzimidazole, etc.). With this approach, any parasites resistant to one drug class will likely be susceptible to the other class, which would greatly reduce selection pressure for resistance to either drug. This method is much more effective in controlling the development of resistance than rotating between drug classes.
5. ***Avoid under-dosing.*** Under-dosing commonly occurs when animals are not weighed prior to treatment so that a lower dose is used than is required for maximum effect. This is a serious problem that certainly contributes to resistance. To avoid under-dosing, be sure weigh animals to determine proper dosage. Ideally, a set of scales is used for this; however, if scales are unavailable, using an appropriate weigh tape is acceptable.

Photo 1: *Topical dewormers are commonly used for cattle because they are easy to apply. It is important to administer the proper dose by weighing animals before application.*

6. ***Examine grazing practices.*** Short forages resulting from overstocking and overgrazing pastures forces animals to graze closer to manure piles and increases the risk of parasite exposure. Implementing rotational grazing and giving paddocks adequate rest (4-5 weeks) can also help break the parasite life cycle and reduce risk of exposure.

Photo 2: *Avoid overgrazing to help reduce parasite exposure.*

7. ***Continue to evaluate the program to ensure efficacy.*** This can be accomplished by performing a fecal egg count reduction test every few years.

What are the different types of dewormers available?

There are three major anthelmintic drug categories available to livestock producers: benzimidazoles, macrocyclic lactones, and imidazothiazoles. Drugs in the benzimidazole and macrocyclic lactone classes are the most widely utilized for cattle. Macrocyclic lactones are available as pour-on or injectable forms, while benzimidazoles are typically administered orally. Table 3 shows a list of anthelmintics commonly used in cattle.

Table 3. *Drugs used for deworming cattle listed according to class*

Dewormer Class	Drug Name	Commercial Names
Benzimidazoles	fenbendazole	Safe-Guard® Panacur®
	oxfendazole	Synanthic®
	albendazole	Valbazen®
Macrocyclic Lactones	ivermectin	Ivermectin® Bimectin® Noromectin® ivomec®
	eprinomectin	Eprinex® Eprizero™ LongRange®
	doramectin	Dectomax®
	moxidectin	Cydectin®
Imidazothiazoles	levamisole	LevaMed™ Prohibit®

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