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Cattle Internal Parasite Diagnosis

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Fecal Egg Count

Fecal egg count (FEC) is a widely used method of evaluating internal parasite infestation in cattle. FEC is performed by mixing a known volume of feces with either a saturated salt or sugar solution, allowing parasite eggs to float to the surface where they can be captured on a microscope slide, evaluated and counted under magnification. FEC results are normally reported as eggs per one gram of feces. Misunderstandings about the level of parasite infestation occur with FEC results reported as eggs per 3 grams or eggs per 5 grams of feces. Some results are reported as either positive or negative, +1, +2, +3 and so on, or other qualitative value.

Fecal Egg Count Reduction Test

A fecal egg count reduction test (FECRT) utilizes two fecal samples from the same animal, two to three weeks apart. A calculation can then be made as to percent reduction in internal parasite eggs: FEC 1st sample – FEC 2nd sample / FEC 1st sample X 100 = FECR %. FECRT results are most useful if: 1) the first and second samples are from the same animal, and 2) spacing between the two samples is a minimum of two weeks and a maximum of three weeks. The first FECRT sample is often collected just prior to, or at the time of, anthelmintic treatment in an attempt to evaluate parasiticide efficacy. Timing of the follow-up sample is very important to accurately assess effectiveness of a parasite control product; adult parasites not removed by treatment may not shed eggs for ~14 days after exposure to the treatment drug, thus artificially underestimating remaining parasite levels. If the second sample is collected >3 weeks post-treatment, it could possess eggs from newly acquired infestations, there could be egg shedding variations due to diet change effects on the adult worm, or in the case of inhibited *Ostertagi*, a new crop of larvae may have developed into mature, egg-laying adults.

Coproculture

Fecal egg counts are relatively inexpensive and easy to accomplish. The information obtained provides the veterinarian and cattle producer with a rough idea as to the parasite load that an animal is carrying, but not a definitive differentiation as to which species of internal parasite(s) is present in the animal. Coproculture provides speciation of internal parasites present.

Coproculture is performed by incubating the fecal sample for two to three weeks, allowing eggs to hatch into larvae. The larvae can then be classified as to genus and species. Knowledge of which species of parasite are present is important since some internal parasites are considered more pathogenic than others and some are more proficient egg producers. Coproculture results aid in tailoring a dewormer program specific to the family of parasites present in a group of animals.[1]

Control Test/Quantitative Count

Control test is a quantitative count of the parasites present in an animal's digestive tract. The animal is sacrificed for the control test and gastro-intestinal organs and their contents are collected for direct count of adult and larval forms of parasites. Control test offers greater accuracy in determining parasites present, but is more time consuming, expensive, and requires sacrifice of the animal.

Parasite Diagnostic Errors

Other than the control test where a quantitative count is achieved, fecal egg count results are a subjective measure, a snapshot in time, of the parasite level in the animal. Following are several factors that, if not taken into consideration when interpreting FEC and FECRT, may lead to an incorrect conclusion:

1. Seasonality of inhibited *Ostertagi*—since this most economically significant parasite of cattle is known to arrest development of early larval forms in the animal by hibernating in the abomasal lining during hot summer months in southern climates and cold winter months in more northern climates, inhibited *Ostertagi* would not be detected by standard analysis of fecal samples.
2. Small or limited sample size—FECs vary greatly within a group of animals, so if an inadequate number of samples are analyzed, a true picture of the parasite level is not obtained. It is recommended to gather 20 samples or 10% of the group in herds larger than 200 head.
3. Sample source—Fecal samples are best obtained by rectal grab rather than picking them up off the ground. Errors in animal identification are minimized with rectal grab technique, which is especially important in FECRT where first and second sample need to be from the same animal. Samples can be picked off the ground only if fresh, no dirt or debris is gathered, and if the animal is positively identified.
4. Vastly different egg producing ability of GI parasites (fecundity)—some parasites are prolific egg producers *(Cooperia, Haemonchus)* while others *(Nematodirus)* are not as prolific.
5. Diet and consistency of feces—watery, diarrheal feces may dilute the parasite eggs being shed, such that an underestimation of parasite level is made.

Case Study Report: Misleading parasite diagnosis following use of Cydectin® Pour-On.

In October 2010, fecal samples were collected from weaned beef calves, weighing approximately 600#. The calves had been treated 30 days prior with Cydectin Pour-On. The samples were collected off the ground without animal identification being noted. Seven samples were submitted to a contract laboratory. FEC results were reported as 17, 9, 11, 7, 4, 3, and 63 eggs per three gram sample for the seven samples. The fact that results were reported on a three gram sample rather than a one gram sample was in very small print at the bottom of the lab evaluation form. The above FEC, if divided by three, yields a much different impression than the inflated values. Coproculture was not performed. The species of parasite was based on egg characteristics.

In November 2010, a properly conducted FEC (with coproculture) and FECRT, was performed on the same facility, with fresh weaned calves of similar type. The herd veterinarian was employed to collect rectal grab fecal samples and supervise the proper dosage and application of Cydectin Pour-On to a twenty head subset of the calves, with individual animal eartag identification. Individually identified samples were sent next day delivery on ice to a different independent laboratory than was utilized in October. Fifteen days later, a second rectal grab fecal sample was obtained from the same twenty head—samples handled and shipped identical to the first samples.

FEC results of the first sampling ranged from 0 to 67 strongyle-type eggs per gram of feces and only an occasional *Nematodirus* egg found. Coproculture indicated that 70% of the strongyle eggs were identified as *Cooperia spp*. and 30% as *Trichostrongylus spp*. FECRT results were all negative except one sample with 2 eggs per gram. Coproculture is not performed on samples of such low egg count.

[1] Summarized by: Yazwinski, T.A., Tucker, C.A., Powell, J., Reynolds, J., Hornsby, P., Johnson, Z., Fecal egg count reduction and control trial determinations of anthelmintic efficacies for several parasiticides utilizing a single set of naturally infected calves, *Veterinary Parasitology* (2008), doi:10.1016/j.vetpar.2009.06.022

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