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Modified McMasters Tests and Fecal Egg Count Reduction Tests

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Fecal Egg counts are a quantitative diagnostic tool that determines the number of parasite (Haemonchus, Ostratagia, Trichostrongylus) eggs that are in 1 gram of feces. This can be a useful tool for managing parasites in livestock herds. Within a herd of animals, a few susceptible animals may harbor the greatest numbers of parasites because they are less genetically resistant to parasites. By comparing fecal egg counts within a group of animals, these less resistant animals can be identified and removed from the breeding herd, which will in turn decrease the overall parasite burden on farms and pastures and, through selective breeding, create a herd that is more resistant over time.

Current recommendations for treatment are to only treat animals when they display clinical signs of parasitism. Fecal egg counts should not be the only tool used to determine when to deworm animals because other factors may affect which animals need to be treated. Some individual animals will have a higher resilience. Animals with higher levels of resilience can have higher parasite levels but not show the symptoms. This is also a good trait for the animals, as they have less clinical problems, but shedding eggs on the pastures can still increase the parasites loads in the environment. According to the American Consortium for Small Ruminant Parasite Control, deworming is recommended to deworm bucks/rams or does/ewes that are not nursing kids at 2,000 eggs per gram of feces, and young kids/lambs, yearlings or does that are lactating at 1,000 eggs per gram. Due to the stress of milk production, dairy breeds should be dewormed at 750 eggs per gram. Individual animals

may vary from these numbers, so you should also consider the FAMACHA score (based on the color of ocular subconjunctival membranes), the animal's body condition score and any other health or stress factors to determine if treatment is needed.

As resistance to multiple classes of dewormers are very common, it is not only important to monitor parasites in the animals, but also to determine the effectiveness of treatments. In many herds, producers will find a product they are comfortable with and use it exclusively for several years until the parasites on that farm become resistant. Once parasites are resistant to that class of dewormer, even when given

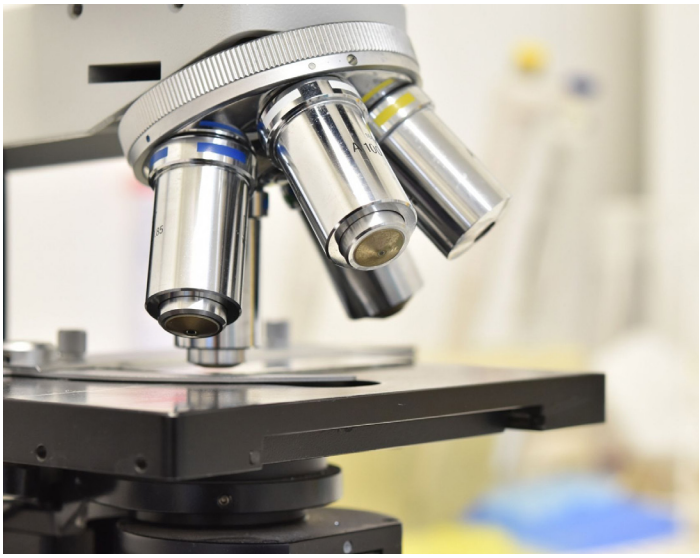
at the correct dose and administered, it will not be effective. Fecal Egg Counts can be very useful to identify resistance to dewormers. See Fecal Egg Count Reduction test below.

What you will need for a Modified McMaster's Fecal Egg Count Test:

Compound Microscope (at 10x magnification)
McMaster Fecal Egg Count Slide
Gram scale
3-4 inch tea strainer
Fecasol solution (or similar solution)
30 mL syringe
Pipettes or 3 mL syringe
3 oz wax cups
Stirring sticks

How to do Modified McMaster Tests:

1. Collect a sample of feces. The sample should be fresh or less than 24 hours if kept in a refrigerator. (If doing multiple samples, don't forget to label bag or glove with a sharpie.)
2. Using gram scale, measure the gram scale and wax cup. Place the cup on the scale, then push the zero or tare button to make sure you are counting the weight of the cup. Measure out 2 g of feces. (For adults, 2 g is about 2 pellets; young animals may be 4-6 pellets.)
3. With a large syringe, add 28 mL of fecal solution to the feces in the cup and mix thoroughly with stir stick until pellet is dissolved. Small pieces of debris may still be present.
4. Pour the solution through the tea strainer into a clean wax cup to remove large particles from feces.
5. Use a pipette or small syringe to carefully fill both chambers of the McMaster's slide. Slowly pull up fluid from the cup and completely fill chamber, avoiding air bubbles within the area of the grid. To avoid air bubbles in the chamber, hold slide horizontally and place tip of pipette or syringe in one corner and slowly fill.
6. Let the McMaster's slide sit for 5 minutes to allow eggs to float to the top.
7. Place slide on the microscope stage and focus at 10x magnification until the gridlines are clear.
8. Count number of parasite (HOT) eggs within each grid. Use the gridlines to systematically move through the slide, up one column and down the next, until the entire grid is counted. Do not count eggs outside of gridlines.
9. Add the total number of eggs from each chamber and multiply by 50 to get number of eggs per gram of feces.



Fecal Egg Count Reduction Tests

Fecal Egg Count Reduction Tests are used to determine the effectiveness of dewormers. Resistance to dewormers in small ruminants may develop on multiple types of dewormers, and dewormer effectiveness may vary from farm to farm. Because of this, a specific dewormer may be effective for a herd/flock and not be effective for a farm next door. Some of the causes for loss of effectiveness are overuse of a product, repeated use of a product and improper dosing or administering of product. For these reasons, it is important to monitor for resistance in your herd to make sure that the product is being effective and, if not, finding a product that is effective.

For this test, an initial Fecal Egg Count (FEC) is determined; the animal is then given a dewormer and, after a certain amount of time (preferably 10-14 days post deworming), another FEC is done to see how much the FEC was reduced by giving the dewormer. To determine the effectiveness of a drug for an entire herd/flock, multiple animals should be tested based on the size of the herd/flock. In some situations, an individual animal may have a weakened immune

system or could have potentially not got the correct dose, so by testing a group of animals you may get more accurate information for the herd as a whole.

1. Collect feces and determine a FEC by using the modified McMaster's technique described above. This will be your pre-treatment FEC.
2. Give a dewormer to the animal at the dose and route recommended by your veterinarian.
3. Wait 10-14 days to give the product time kill parasites.
4. Collect feces and determine a FEC (post-treatment FEC).
5. Calculate the percentage of reduction using the following formula:

$$\frac{\text{(Pretreatment FEC – Posttreatment FEC)}}{\text{Pretreatment FEC}} \times 100 = \text{\% FEC reduction}$$

Dewormers that produce over a 90% FEC reduction are said to be highly effective. If the Fecal Egg Count reduction is less than 50%, the product can be said to be no longer effective. Parasite resistance usually develops over a long period of time. Doing FEC reduction test allows you to monitor over time. If you begin to start seeing FEC% declining under 80%, you may want to start doing FECRT every few months to monitor the decline. In that case, you may consider changing to a different class of dewormers. If resistance is developing to multiple types of dewormers, you may also use copper oxide wire particle boluses or use "cocktail" strategies of giving multiple dewormers at once. You should discuss all specific treatment recommendations with your herd/flock veterinarian before giving any treatment to small ruminants.

References and Additional Information

https://www.wormx.info/part6

https://web.uri.edu/sheepngoat/files/McMaster-Test_Final3.pdf

https://content.ces.ncsu.edu/modified-mcmasters-fecal-egg-counting-technique

https://extension.psu.edu/parasite-management-fecal-egg-count-test-considerations-and-protocols