How to Do Quantitative Fecal Egg Counting (FEC)

Quantitative fecal analysis determines the specific number of parasite eggs per gram (EPG) of feces through a controlled sampling procedure. This is different from a qualitative test that simply identifies whether parasite eggs are present and what types there are (strongyle, tapeworm, and coccidia eggs are easy to tell apart from each other).

Basic Quantitative Analysis for small ruminants – start with known quantities of feces and flotation solution.

Supplies:

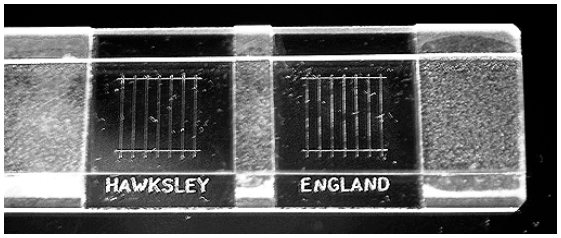
1. fecal sample – 2 to 4 grams obtained directly from the rectum of the animal and kept chilled or refrigerated (not frozen!) to keep the parasite eggs from hatching.
2. tongue depressors, applicator sticks or popsicle sticks to mash up feces
3. gram scale - Fecal egg counting procedures assume that a gram of feces is 1 ml (1 cc) in volume. Therefore, if you do not have a scale, you can mash the feces and pack it into a 3 cc syringe with the top cut off to get 3 grams OR drop feces into a beaker with ml measurements and displace a specific volume of liquid (2 to 4 grams).
4. 100 ml beaker or other container marked at 5 ml increments
5. flotation solution
6. 1 cc plastic syringes or pipettes (3 cc livestock syringes will do in a pinch)
7. "McMaster" egg counting chamber slide
8. Microscope
9. *If you plan on shaking sample by hand* –
   Leak proof plastic jar with screw top that can hold up to 80 ml of liquid easily
10. *If you plan on shaking sample mechanically* – Magnetic stir plate, and 1.25 in. magnetic stir bar

Flotation solutions:

1. Epsom salts (Magnesium sulfate) – dissolve 400 g(~1 ⅔ cup) in 1 liter of water (can store) **OR**
2. Granulated sugar – dissolve 1 lb (454 g) in 355 ml of hot water (~1 ¼ cups of sugar/per cup of water), tends to ferment if stored very long so be sure to refrigerate if storing
3. Saturated salt - Approximately 350 g / 1 liter (0.8 lbs/ 1 quart). 350 g =303 ml or 1.28 cups of table salt. (Do not mix prior to use and use only the liquid at the top of the precipitate not the settled out portion.)

McMaster slide:

The egg counting or "Mcmaster slide" can be ordered from Chalex Corporation https://www.vetslides.com/ PO Box 981956, Park City UT 84098, (ph: 430-800-2907, email: ChalexLLC@gmail.com). Another source is FEC Source fecsource.com (ph: 844-838-7543, email: info@FECsource.com). The volume under each grid for each chamber should be 0.15 ml. Counting chambers come with either etched or colored grids. The etched grids are cheaper, last longer, but are harder to see than the higher contrast green or blue grids. When cleaning slides, do not leave in soapy water for very long or they will get cloudy. Allow slides to air-dry as rubbing can damage the grids.



Microscope:

Ideally, you need a compound microscope with a 10X eyepiece and 10X lenses (it will also have 4X and 40X) lenses) with an internal light source. A movable stage is helpful. You can order used or re-furbished microscopes on the web or sometimes get them from high schools or colleges that have not traded in older microscopes yet for reconditioning.

Magnetic stirrer:

Refurbished magnetic stirrers are also available on the web

FECAL EGG COUNTING PROCEDURE

1. Using a tongue depressor, weigh out 2, 3 or 4 gm of feces into beaker.
2. Break up the fecal pellets and add the correct amount of flotation solution to the feces to make a slurry. You'll need a total of 56 ml flotation solution for 4 g of feces, 42 mls for 3 g or 28 ml for 2 gm. **It is easiest to add just a little of your floatation solution to first break up the fecal pellets and then add the remainder of the solution.** For example, for 4 g of feces, you can add about 20 ml flotation solution to help break up the feces using the tongue depressor to break lumps. Then bring the slurry up to the 60 ml mark on your beaker using the remainder of your flotation solution. **. If you do not have a scale, keep in mind that a gram of feces is approximately 1 ml in volume. Thus, you can put 28 mls of solution into a beaker and then add enough feces to bring the liquid level to 30 mls, etc.**

3. Add a stir bar, and stir on a magnetic stirrer at medium speed for 5 min. **OR** put in a leak-proof jar and shake vigorously for 5 minutes.

4. At the end of 5 minutes, while mixture is still stirring, draw about 1 ml fecal suspension from the middle to upper layer of the slurry into your syringe. If you have let the mixture settle, be sure to stir it again before taking your sample. Eggs float to the top so if you accidently take your sample from the upper layers without stirring you may end up with more eggs than are truly representative of your sample or vice versus for lower layers.

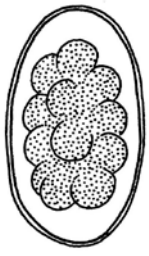
5. Load one side of counting chamber carefully to avoid producing bubbles – each chamber holds about .15 ml of slurry and repeat sampling and loading procedure for second side of chamber.

6. Let preparation stand a minimum of 5 min (examine it at least by 20 min.)

7. Place chamber on microscope and examine with 10 X objective (Adjust the focus until you can see grid lines clearly and then refine your focus to the air bubble layer).

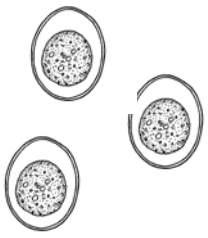
8. Count eggs in both sides of chamber- each chamber or grid has six sections. Do not count eggs outside the grid. Calculate the number of eggs per gram of feces: (side 1 + side 2) X 50

Notes: Fecal egg counts are a useful measure of potential pasture contamination. However, they are not necessarily correlated to actual parasite numbers or to the severity of parasitic disease. Some types of internal parasites lay more eggs than other types and some are more dangerous to their host than others are. Paired samples from the same animals before and after (7-10 days) deworming or treatment will help determine the effectiveness of the treatment. Failure to achieve at least 90 percent reduction of fecal egg counts after deworming is suggestive of worm resistance. Severe resistance is present when the reduction in worm eggs after deworming is less than 60 percentage.



Strongyle eggs

Tapeworm egg



Coccidia eggs

Langston University method
of preparing fecals for egg counting

Equipment needed

Fresh feces stored up to 7 days in refrigerator (do not freeze). You can mash pellets together and squeeze all the air out of the zip lock bag and they will store longer.
30 cc syringe
3 cc syringe with end cut off
Popsicle stick or tongue depressor or spoon
Eye dropper or pipette or another small syringe (3 cc or less)
Flotation solution such as 1 ¼ cups of sugar mixed into 1 cup of water
Small glass bowl (i.e. custard dish, salsa bowl)
Plastic tea strainer
McMaster slide, microscope, etc.

Procedure

1. Mash fecal pellets into the 3 cc syringe and form a solid column of feces. Push plunger to 2 cc mark and cut off. Push the 2 cc of feces into a tea strainer resting in the glass bowl.
2. Fill 30 cc syringe with 28 cc of flotation solution and add to the tea strainer in the glass bowl.
3. Use depressor or spoon to crush and break up feces into a slurry in the tea strainer. Finer particles and liquid will be pushed out into glass bowl.
4. Lift tea strainer out of bowl and discard the residue in it.
5. Stir solution in glass bowl 8 times and use an eye dropper, small syringe or pipette to fill one chamber of your "McMaster Slide". Stir solution 8 times again and fill the other chamber. Let slide sit for 5 minutes before looking at it under your microscope.