Attached to this document you will find the results of the fecal egg counts for the samples that you submitted to my laboratory at Virginia Tech as part of Northeast SARE project LNE15-342

The procedure we are using for the fecal egg counts (FEC) is the Modified McMaster procedure, the most commonly used method for evaluating small ruminant fecal samples. As you look at the results, here are some things to keep in mind:

Fecal evaluation of eggs of gastrointestinal nematodes (GIN) is useful for assessing parasitism in animals and, in the case of barber pole worm we know that generally the more eggs there are in the manure the more worms there are in the stomach. But there are several factors that affect the accuracy of FEC:

- Parasite eggs are not necessarily evenly distributed in the animal's manure and we are only looking at a very small portion of the total daily output.

- A number of GIN produce eggs that look like barber pole worm eggs so we can't know exactly which species we are looking at (on your report they are called **strongylid** eggs). In the late summer we expect the large majority of the eggs to be from barber pole worm. The other GIN making similar eggs aren't nearly as prolific as barber pole worm (for more information on these worms see the footnote at the end of this document).

- FEC only allows us to see evidence of adult, egg producing worms. We ask for samples in the late grazing season as this is when we expect the population of egg producing adults to be highest. During the winter, barber pole worm and others in the strongylid group can be in animals, but they are in a larval stage and not producing eggs so a FEC would not be helpful in evaluating susceptibility to parasites.

- **We would like to stress that animals cannot be truly compared unless they are managed in exactly the same way and are exposed to the same parasite challenge (they should be on the same pasture).**

As there is a heritable component to susceptibility to parasites, we are hoping that you are doing these fecal egg counts on young stock to help you make selection decisions. We also are asking that you FAMACHA© score your animals at the same time that you take the fecal samples because it is the combination of the two that will help you make the best selections for susceptibility to parasites.

For example, you may have 2 lambs with a FAMACHA© score of 1 (not anemic), but one has a much lower FEC than the other. The lamb with the low FAMACHA© score of 1 and the low egg count is more likely to be resistant—its egg count is low because it is better able to limit the number of worms present. This is the animal that would be considered more parasite resistant. The low FAMACHA© score in the

animal with the higher egg count means that the animal is resilient and able to tolerate a higher worm burden without adverse effects, however it can still, very happily, contaminate your pastures.

So how much of a difference in egg counts is needed to say an animal is more or less resistant? You need a big difference—remember we said that the McMaster test is not 100% accurate in reflecting the number of parasites in an animal. It is very important to have adequate numbers of eggs in order to make a comparison. If all your egg counts are less than 1000 epg you will not be able to make an accurate comparison. With small groups of animals there may not be obvious differences.

In this table of FEC from randomly sampled lambs in August there are not meaningful differences:

Lamb #	Strongylid Eggs/g
64	**1150**
105	**750**
120	**1650**
89	**1050**
116	**850**
88	**2000**
108	**900**

It becomes easier to evaluate animals when 2 fecals are carried out on each animal. In this next example you can see that there is greater variation among animals and it can be seen where animals are consistently higher or lower (ns means none seen).

Lamb #	Strongylid Eggs/g July	Strongylid Eggs/g August	FAMACHA SCORE	
101	**50**	**ns**	**1**	**More resistant**
110	**3000**	**6000**	**4**	**More susceptible**
192	**500**	**400**	1	
64	**600**	**1150**	2	
105	**800**	**750**	2	
120	**500**	**1650**	3	
89	**350**	**1050**	2	
95	**1000**	**4050**	**4**	**More susceptible**
116	**300**	**850**	1	
100	**500**	**1900**	3	
75	**150**	**100**	**1**	**More resistant**
88	**100**	**1050**	2	
108	**400**	**900**	3	

The McMaster procedure allows us to see all the parasites that are present in the manure sample and we report them. Please remember that you should focus on the reporting of the strongylid (eggs/gram) as this is the information you will use to help select breeding stock. Below is an example of results that you might see:

Sheep	Coccidia	Strongylids	*Trichurs* (Whipworm)	*Strongyloides* (Threadworm)	*Other*
1	500	3000	150	400	ns
2	10,000	600	ns	ns	tapeworm
3	2000	150	50	200	ns
4	200	1500	ns	100	ns
5	900	500	ns	ns	tapeworm
6	ns	400	100	750	tapeworm

Ns means "none seen". But if one animal in the herd has a parasite, assume that they are all exposed and probably have some, even if it says none seen. Tapeworms are only reported as present since the number of eggs can't be related to the number of tapeworms present. Tapeworms (*Moniezia)* are often present in young animals, but are not considered to be harmful.

The number of coccidia oocysts can vary tremendously and sometimes is very high. If your animals are behaving and eating normally and there is no diarrhea, it doesn't matter what the oocyst count is. Some species of coccidia cause no evident disease but may be present in very large numbers. So don't worry about the coccidia unless you have a clinical problem.

Whipworm (*Trichuris*) and threadworm (*Strongyloides*) are very common in young sheep and goats but almost never cause problems. The numbers shown in this example would be normal.

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FOOTNOTE

Strongylid nematode worms (GIN)

All the worms described below contribute to the clinical syndrome known as Parasitic Gastroenteritis (PGE). While we associate barber pole worm with the anemia and bottle jaw seen in the summer months, the presence of other parasites doesn't help the animal, and contributes to a burden of worms that the sheep or goat host has to deal with.

Haemonchus: This is the barber pole worm. It lives in the abomasum (true stomach) and feeds on host blood. It is the most important member of this group of parasites in the eastern U.S. The larval stages of this parasite do best on pasture under warm, humid conditions and large numbers can lead to heavy worm burdens in susceptible animals causing anemia and loss of condition. The most severely affected animals may die. This parasite is very successful and very common and it is reasonable to assume that virtually all grazing small ruminants are exposed to infection in the summer.

Teladorsagia: (also called *Ostertagia):* This is the brown stomach worm and is another parasite of the small ruminant stomach that is better adapted to cold weather than *Haemonchus* and would be expected to be more important during the cooler seasons of the year. Large numbers of parasites can cause diarrhea and loss of condition.

Trichostrongylus: Small ruminants can be infected with several species of *Trichostrongylus*. One common species lives in the stomach and others are found in the small intestine. This worm genus has broad environmental tolerance and can be found in hot summer weather. Heavy infections can cause diarrhea and condition loss in some situations. Very heavy infections could be fatal in susceptible animals.

Cooperia: This is another small intestinal parasite, but it usually is not considered to be a major player in causing clinical disease.

Oesophagostomum/Chabertia: These are 2 different worms that live in the large intestine. Heavy worm burdens could cause diarrhea and poor condition, but they rarely present in large enough numbers to be associated with clinical signs.

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