REFERENCES AND RECOMMENDED READING

BOOKS AND TECHNICAL MANUALS


Smart Drenching and FAMACHA®, Integrated Training for Sustainable Control of Gastrointestinal Nematodes in Small Ruminants. Southern Consortium for Small Ruminant Parasite Control.


SELECTED RESEARCH AND REVIEW PAPERS


Kenyon F, Greer AW, Coles GC et al. The role of targeted selective treatments in the development of refugia-based approaches to the control of gastrointestinal nematodes of small ruminants. Vet Parasitol 2009;164:3-11.


Larsen M. Biological control of nematode parasites in sheep. J AnimSci 2006;84(E. Suppl.):E133–E139


Morgan ER, Coles GC. Nematode control practices on sheep farms following an information campaign aiming to delay anthelmintic resistance. Vet Rec 2010;166:301-303.


APPENDICES

1. PROTOCOL FOR COLLECTING FAECAL SAMPLES FOR FAECAL EGG COUNTS

**Equipment and Supplies:**

- Ziploc or sealable sandwich bags
- Ice packs and styrofoam cooler if need to ship to lab
- Disposable gloves and lubricant (if taking samples from the rectum)
- Sharpie black pen (for identifying samples)
- Form on which to record: date samples collected; from which group of animals; from which pasture; age of animals samples; total number of individual samples collected

**Sample Collection**

- Collect 8-10g fecal samples (for lambs or kids 10 to 15 fecal pellets and from adults, 6 to 8 fecal pellets) from each of 10 to 15 different animals that are representative of their group (e.g. nursing lambs; weaned kids; pregnant ewes) or pasture.
- Don’t mix samples from different groups or pastures.
- The simplest way to collect samples is from the ground. Close the animals in a clean pen or crowd into a clean corner of the pasture, leave them for 15 minutes, release the group and then collect the feces from the ground.
- You can also purposely collect from specific animals. The best way is to put on a glove, use a small amount of lube and using 1 finger in the rectum, tease out the faecal pellets.
- To be sure samples from the ground are fresh; they should be warm and moist. Old samples will give a false negative result as the eggs may have hatched and so won’t be visible under the microscope.
- You do not need to keep track of who shed the feces, but if you are interested in individual egg counts, you may do so.

**Sample Submission**

Once you have collected the samples in separate Ziploc bags, place them in the Styrofoam boxes, put in the ice-packs, and fill in the records. Deliver the samples to your veterinary clinic while still chilled. If kept cool, the samples are good for a few days but room temperature will allow the eggs to hatch. The samples can be processed either by your veterinarian or they may be sent to the Animal Health Laboratory, University of Guelph (Ontario producers) for analysis via courier through your veterinarian. Although individual samples are collected, request that samples be “pooled” for analysis. One pooled result per group of animals (e.g. production group, pasture etc).
2. McMaster Counting Technique

**Principle:**

The McMaster counting technique is a quantitative technique to determine the number of eggs present per gram of feces (epg). A flotation fluid is used to separate eggs from fecal material in a counting chamber (McMaster) with two compartments. The technique described below will detect 50 or more epg of feces.

**Application:**

This technique can be used to provide a quantitative estimate of egg output for nematodes, cestodes and coccidia.

**Equipment:**

- Beakers or plastic containers
- Balance
- A tea strainer or cheesecloth
- Measuring cylinder
- Stirring device (tongue depressor)
- Pasteur pipettes and (rubber) teats
- Flotation fluid (e.g. salt/sugar solution: 400 g NaCl + 1000 ml water + 500 g sugar (fluid specific gravity = 1.280)
- McMaster counting chamber
- Microscope

**Procedure:**

- Weigh 4 g of feces and place into Container 1.
- Add 56 ml of flotation fluid.
- Mix (stir) the contents thoroughly with a stirring device (tongue depressor).
- Filter the fecal suspension through a tea strainer or a double layer of cheesecloth into Container 2.
- While stirring the filtrate in Container 2, take a sub-sample with a Pasteur pipette.
- Fill both sides of the McMaster counting chamber with the sub-sample.
- Allow the counting chamber to stand for 5 minutes (this is important).
- Examine the sub-sample of the filtrate under a microscope at 10 x 10 magnification.
- Count all eggs and coccidia oocysts within the engraved area of both chambers.
- The number of eggs per gram of feces can be calculated as follows: Add the egg counts of the two chambers together. Multiply the total by 50 to give the epg of feces. (Example: 12 eggs seen in chamber 1 and 15 eggs seen in chamber 2 = (12 + 15) x 50 = 1350 epg).

3 – RECORD FOR PASTURE USE AND PARASITE CONTROL

5 STAR WORM PLAN  PASTURE USE PLANNING SHEET - 20_____

Use this form to track pasture use, results of parasite management of animals. This form is to help you plan pasture use in order to minimize contamination of the pasture with parasite eggs and exposure of livestock to infective parasite larvae.

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Record Grazing Details: e.g. species (e.g. sheep, goats, cattle etc), age of animals, number of animals, production stage

Record Pasture Management Details: e.g. resting (no livestock); hay making; seeding; spreading manure; strip grazing

Adapted from A Handbook of Sustainable Worm Management for Livestock Farms
### 4. RECORD FOR FAECAL EGG COUNT MONITORING

#### 5 STAR WORM PLAN
**FAECAL EGG COUNT RECORD**

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<th>Pasture History</th>
<th>Species / Class</th>
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