Using Fecal Egg Counts In Parasite Management

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Sheep Fecal Egg Counts

- What is a fecal egg count?
- What are they good for?
- What are they not good for?
- Should you do your own fecal egg counts?
- What’s needed to do them?

Fecal Egg Counts

- Most common way and the best way to get fecal egg counts for sheep, goats and horses is McMaster test
- Uses special slide with a grid to make counting easier
  - Measure manure and flotation fluid so know exactly the quantity of manure in the test
  - Count eggs, then can calculate back to yield eggs/gram manure

Why Count Egg Numbers in Fecal Exams?

- In pets (or people) we don’t want any parasites at all so positive/negative test is desirable
- In grazing animals we accept the presence of some level of parasites so positive/negative test less helpful

Which Parasites Do You See in Fecal Test?

- Coccidia
- Strongylids (GI worms including H. contortus—barberpole worm
  - May also be called trichostrongyles or strongyles
  - Several species produce identical eggs
- Tapeworm (Moniezia)
- Whipworm (Trichuris)
- Threadworm (Strongyloides)

Other parasites?

- Lungworms
  - A different test is better for lungworms
- Deer (meningeal) worm
  - Not in manure because worms never become adult
Parasites in a Fecal Egg Count

- Example: results from 4 month old lambs
- Whipworms, threadworms not considered important except under unusual circumstances
- Number of tapeworm eggs meaningless because eggs passed in segments
- ns = none seen

<table>
<thead>
<tr>
<th>Sheep</th>
<th>Strongylids</th>
<th>Coccidia</th>
<th>Tapeworm</th>
<th>Whipworm</th>
<th>Threadworm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3000</td>
<td>500</td>
<td>ns</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td>2</td>
<td>600</td>
<td>10,000</td>
<td>150</td>
<td>ns</td>
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<td>150</td>
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<td>400</td>
<td>ns</td>
<td>ns</td>
<td>100</td>
<td>750</td>
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</tbody>
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Why Do Fecal Egg Counts (FEC)?

- To see if drugs still work
- Indicate relative susceptibility of individual animals to parasite
- Use in conjunction with other information to design and evaluate parasite control programs
- However
  - Fecal exams are not a reliable way to diagnose parasitic disease in individual animals

Parasites in a Fecal Egg Count

- As an example, results from 4 month old lambs
- Recognize that if one sheep infected with parasites below, they are all exposed
- ns doesn't mean they are not infected

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<tr>
<td>8</td>
<td>400</td>
<td>ns</td>
<td>ns</td>
<td>100</td>
<td>750</td>
</tr>
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What To Do With FEC Results?

- Most natural reaction is –this will tell me who to treat
- FEC provide an estimate only, eggs not uniformly distributed
  - Not a highly accurate test, especially at low numbers
- Numbers not absolute, have meaning in context
  - Time of year (winter, summer, early/late grazing season, etc)
  - Treatment history (dewormed last week, last month, last year, etc)
  - Animal condition: age, clinical signs, etc.
- FEC never intended to be sole determinant of disease status of an animal

FEC and Disease

- Many assume that over a certain number of coccidia in a fecal sample means it’s coccidiosis
- Not as straightforward as it seems
  - Diarrhea may precede high oocyst shedding
  - Clinically normal animals can have high oocyst counts
  - What species is it?

Diagnosing Disease with Fecal Egg Counts

- What’s the disease cutoff for coccidiosis?
  - All over the place, see 5,000 up to 50,000 oop
- Same with worms, egg count may not tell you if they have disease
- What to do with these lamb results?
  - Nothing without further information
    - Are there signs of disease?
    - Anemia, diarrhea
    - Treatment history, time of year

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Strongylid worms

- Number of eggs in manure will vary seasonally
- Population of adult worms in gut lower in winter months
  - Many larvae in the host in a dormant state (arrested or hypobiotic)
  - No disease, no eggs in feces

What are FEC Good For: Testing Drug Efficacy

- Fecal Egg Count Reduction Test (FECRT) for sheep and goats
  - Usually done by comparing pre and post treatment samples from a group of animals (should have 10-15)
  - Need 2 fecal samples from each animal—at the time of treatment and 10-14 days later (not after that)
  - Most scientific is to have a treated group and an untreated group because egg counts might change for other reasons, but this isn’t always practical
  - Calculate the % reduction in fecal egg counts (FECR)

FECRT example 1

<table>
<thead>
<tr>
<th>Animal</th>
<th>Pretreatment</th>
<th>Post Treatment</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>90%</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>50</td>
<td>92%</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>3000</td>
<td>250</td>
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<td>100%</td>
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<tr>
<td>7</td>
<td>500</td>
<td>100</td>
<td>90%</td>
</tr>
<tr>
<td>8</td>
<td>400</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Average</td>
<td>919</td>
<td>59</td>
<td>90%</td>
</tr>
</tbody>
</table>

CALCULATE FECR 100 (1—(Post/After)) for each animal, calculate mean

One sheep is not enough; what if you picked #5?
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However:
- Fecal exams are not a reliable way to diagnose parasitic disease in individual animals

Individuals Vary in Susceptibility to Worms

- Normal immunity controls parasites, doesn’t eliminate them
  - Immune animals will have eggs in manure
  - Immunity in place at maturity
  - Variation in level of immunity in individuals

- Where do worm problems appear?
  - Sheep before immunity fully developed
  - Sheep with temporary reduction in immunity
  - Ewes at time of lambing especially susceptible
  - Poor health or nutrition
  - Animals with INHERITED high susceptibility to parasite

Immunity of the Host

- Under normal conditions, most animals control their parasites
- A few are highly susceptible
- Much of an individual animal’s susceptibility is inherited so that can be selected for in a breeding program
- Population rule: All other things equal, ~30% of the animals contribute ~80% of the parasite eggs to pasture
- But if you have only 10 sheep, you may not see exactly that breakdown

Selection for Resistance to Parasites

- Easiest to identify the most susceptible sheep with FAMACHA (anemia) scores
  - Tells you who not to use for breeding,
- Since most animals should not develop disease, FAMACHA not so good for identifying the sheep with the best immunity
  - This is were fecal egg counts come in

Interpreting Fecal Egg Counts

<table>
<thead>
<tr>
<th>Lamb #</th>
<th>Eggs/g</th>
<th>More resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>ns</td>
<td>More resistant</td>
</tr>
<tr>
<td>110</td>
<td>6000</td>
<td>More susceptible</td>
</tr>
<tr>
<td>192</td>
<td>490</td>
<td>More susceptible</td>
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<tr>
<td>64</td>
<td>1130</td>
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<tr>
<td>185</td>
<td>740</td>
<td>More susceptible</td>
</tr>
<tr>
<td>130</td>
<td>1990</td>
<td>More susceptible</td>
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<tr>
<td>89</td>
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<td>95</td>
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<td>75</td>
<td>100</td>
<td>More resistant</td>
</tr>
<tr>
<td>58</td>
<td>1550</td>
<td>More resistant</td>
</tr>
<tr>
<td>100</td>
<td>900</td>
<td>More resistant</td>
</tr>
</tbody>
</table>

- Fecal egg counts 4-5 month old lambs in August
  - McMaster not highly accurate especially when numbers low
  - Small differences not very meaningful
- When looking for resistant/susceptible animals do tests when egg counts highest
- May not tell you the BEST one, but can narrow it down
Interpreting Fecal Egg Counts

- Fecal egg counts 4-5 month old lambs in August
- The larger the group of sheep, the more likely you are to see meaningful differences
- In this group there are no differences

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<td>88</td>
<td>2000</td>
</tr>
<tr>
<td>108</td>
<td>900</td>
</tr>
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</table>

Should You Do Your Own FEC?

- Commercial labs vary in charge
  - Try and find one that does bulk rate
- Worth doing your own if you will be doing lots
  - Active selection program, drug testing
  - Strong interest
- If only doing a small number every year may not be worth investment and may not be easy to do them well

Performing Fecal Egg Counts

- Whether or not you do your own, need good sample collection
  - Know who the sample came from
  - Allows identification of highly susceptible/resistant animals
  - Need fresh samples
  - Samples that sit on the ground invaded by free living nematodes
  - Eggs may hatch
  - Use samples that you have seen hit the ground or rectal fecal samples

Performing fecal exam

- Collection of fecal samples
  - Rectal fecal samples
  - Wear glove, use water, spit or KY jelly to lubricate finger
  - Insert 1 or 2 fingers into rectum, animal often stimulated to push feces out or you can cup fingers and pull out
  - Turn glove inside out and label
  - Don’t try on babies!
  - Samples can be stored in the refrigerator for up to a week before examination
    - Put in plastic bag, press out excess air so eggs don’t develop

Performing the fecal exam

- Greatest amount of information comes from sampling individual animals
  - Representative sample from each category: ewes, lambs, rams, etc.
- Composite sample (samples mixed together)
  - More convenient, quicker
  - Can be misleading depending on which animals are included
  - If doing composites
    - Separate by category (ewes, lambs, etc)
    - Use the same amount of feces from each animal

Equipment

- Compound Microscope
  - Binocular more comfortable than monocular, not essential
  - Can also use attached to a computer
  - Internal light source important
  - Means to regulate amount of light reaching slide
  - Moveable stage
Performing the Fecal Exam

Equipment

- Way to measure feces
  - By weight or by volume
    - Recommend using weight
      - Can get inexpensive balances in 0.1 increments
  - Way to measure flotation solution
    - Syringe, graduated cylinder, small measuring cup

Supplies

- Other supplies
  - Paper/plastic cups
  - Something for mixing--spoon, tongue blades, etc.
  - Something for straining--tea strainer, cheesecloth squares, unfolded guaze pads
  - Something for transferring material to slide--pipette or 1 cc syringe
  - Nice to have some slides and coverslips on hand for unusual things

Methods of fecal analysis

- McMaster test based on flotation--parasite eggs float because they are less dense than the fluid they're in

- Flotation solutions
  - Saturated salt solutions
    - Table salt (NaCl) or Epsom Salts (MgSO4)
    - Add to warmish tap water until some stays undissolved, let sit overnight
  - Commercial solution--Fecasol (Sodium nitrate) can also be used
  - Sugar solution very viscous and sticky

McMaster Test

Equipment

- McMaster’s Slide

U.S. Supplier:
Chalex Corporation
5004-228th Ave SE, Issaquah, WA. USA 98029
Phone 425-391-1169
Fax 541-886-3300
http://www.vetslides.com
Get slides with green lines

Doing Your Own Fecals

- Can also buy complete set-ups like this website sells, also claim to provide on-line help