Controlling livestock parasites through proper management and optimal nutrition

Katherine Petersson, PhD, University of Rhode Island
Host/Parasite Relationships

- Which is parasitized?
Host/Parasite Relationships

- Infection does not equal disease
General Principles of Parasites

- We all know parasite infection can be a problem in animals.
- Because they live outside we can’t expect to eliminate the parasites.
- When do parasites become a problem in livestock?
General Principles of Parasites

- We all know parasite infection can be a problem in animals.
- Because they live outside we can’t expect to eliminate the parasites.
- When do parasites become a problem in livestock?
Balance Shifters—Parasite Factors

• Favorable weather
  • Most common/important parasites spend time in environment developing to infective stage (infective = able to infect the host)
  • Warm temperatures, high moisture best for development
  • Once developed—cool, moist conditions best for survival
• Helps explain disease patterns, control methods
Balance Shifters - Parasite Factors

• Management extremely important in determining parasite numbers
  • Parasite problems are very often the result of management and can be fixed by management changes

not equal to
Balance Shifters—Host Factors

- Some animals especially vulnerable
  - YOUNG ANIMALS
    - Immune response to parasite is complex takes time to develop
    - Often don’t have reserves to withstand parasite effects
Balance Shifters—Host Factors

- Some animals especially vulnerable
  - ANY ANIMAL THAT HAS ANOTHER DISEASE OR STRESS IN ITS LIFE
    - Infectious diseases
    - Old age
    - Other diseases
    - Early lactation
Balance Shifters—Host Factors

- Some animals especially vulnerable
  - ANY ANIMAL ON A NUTRITIONALLY DEFICIENT DIET
    - If you have a parasite problem in animals of all ages check the diet
Balance Shifters—Host Factors

• Some animals especially vulnerable
  • Animals with increased genetic susceptibility
    • In populations of animals, some have genetic increased susceptibility to a parasite, usually about 20-30%
    • 20:80 Rule
Parasites

• There are primary parasite problems and secondary parasite problems
  • Always look for those other factors when you have what appears to be a parasite problem
  • Immediate cause of death on report from diagnostic lab may identify parasites as the cause of death, but high parasite load may be the result of another problem—management, infectious, dietary, etc.
Parasites

- There are primary parasite problems and secondary parasite problems
- Diarrhea in a calf from GI worms
  - *Too many worms in an animal with incomplete immune response*
- Diarrhea in an adult cow with worms
  - *Unexpected, likely due to suppression of immunity from some other cause*
- Treatment with anti-parasitic drug not sufficient to control the problem in either animal
- Always consider what balance shifter(s) might be present---
  - Ask yourself:
    - Are parasite numbers increased/increasing?
    - Did something make this animal more susceptible?
How are animals infected with parasites?

- Common/important parasites of livestock are eaten by the host in 2 forms
  - **Eggs, oocysts (coccidia)**
    - Egg shell makes them hard to kill
    - Disinfectants usually ineffective
    - Can last a long time in the environment
  - **Worms (larvae) that have hatched out of the egg**
    - Not as well protected as eggs, easier to kill
    - More likely to be killed by adverse environment
- Most common/important parasites go from one livestock host to another
  - A few pass through another type of animal on the way (tapeworms)
Controlling Parasites

- **Reduce number of parasites in the host**
  - Drugs - dewormers
  - Alternative anti-parasitics
  - Selection for host parasite resistance
  - Ensure optimal nutrition

- **Reduce parasites in the environment**
  - Pasture management—rotation, cropping, mixed species
  - Sanitation
  - Reduce animal density
  - Remove animals from contaminated area
Reduce number of parasites in host

**Drugs - dewormers**

- Major Drug Groups (some others, more restricted in use)
- Widely used in ruminants, horses, pigs

<table>
<thead>
<tr>
<th>Group</th>
<th>Members (in U.S.) Generic names</th>
<th>Trade names (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzimidazoles</td>
<td>fenbendazole, albendazole, oxibendazole</td>
<td>Safegard, Panacur, Valbazen, Anthelcide All given orally</td>
</tr>
<tr>
<td>Nicotinics (tetrahydropyrimidines and imidazothiazoles)</td>
<td>pyrantel, morantel, levamisole</td>
<td>Prohibit, Strongid, Rumatel, Banminth Mostly given orally</td>
</tr>
<tr>
<td>Macrocyclic lactones</td>
<td>ivermectin, doramectin, eprinomectin, moxidectin</td>
<td>Eqvalan, Ivomec, Noromectin, Eprinex, Dectomax, Cydectin, Quest, Longrange Oral, pour-on, injectible</td>
</tr>
</tbody>
</table>
Deworming Drugs

- Drugs we have for many common/important parasites are terrific
- **BUT**
  - For some animals (poultry) not many products approved
    - Read the label, the label is the law!
  - If you buy a drug (FDA approved) at the feed store and use it differently than described on the label, that is **off-label use**, must be done under the supervision of a veterinarian and may require long withholding times for meat and milk
- **RESISTANCE TO DEWORMERS INCREASING!**
  - Only 3 major groups

Reduce number of parasites in host
Alternative Anti-Parasitics

Herbal products

Silver Lining Herbs 13 Herbal Wormer 1 4 lb | AA Callister Back

no reviews for this product. Login to place a review.

Item Number: 55163
The herbs used in this herbal combination are for the maintenance of a healthy and naturally worm- and parasite-free system. This combination works by simply maintaining an environment which is not welcoming to parasites and worms; they are opportunistic and need an unclean environment to thrive. Active Ingredients: A proprietary blend of (Garlic, Cascara, Clove, Kelp, Sage, Slippery Elm, Black Walnut, Chaparral and Juniper) 7560 mg per tsp. Scoop Included. Inactive Ingredients: None. Recommended use: 1 level scoop per day for 10 days, for 1000-1200 lb horse. There are approximately 60 scoops per 1 lb bag, and 15 scoops per 1/4 lb bag. 1/4 lbs wormer comes in tub with lid.

Herbal Wormer

SKU: 20F-5

The original, all natural, herbal wormer is compounded especially for goats. This wormer contains no artificial chemicals and is non-toxic and non-sickenning. Safe for kids & pregnant does. No milk dumping or withdrawal time for slaughter. 200 doses in every pound of wormer. Dosage for mature goats is 1-1/2 tsp. (per 100lbs) weekly. We recommend an initial dosing of twice a day for three days in a row. Safe for most farm animals (including sheep!) except for cats. Dosage for chickens is 1 tsp. per 5 chickens mixed in feed weekly. Ingredients: Worm Wood, Gentian, Fennel, Psyllium, Quassia
Reduce number of parasites in host

**ALTERNATIVE ANTI-PARASITICS**

**Diatomaceous Earth**

- Fossil diatoms, crystalline
- Used in the environment for insects, etc
  - Acts as desiccant
  - Sharp edges cut insect exoskeleton
- Also used for internal parasites, no good data to support

---

**Fecal Egg Counts**

<table>
<thead>
<tr>
<th>Date</th>
<th>Eggs/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-Apr</td>
<td></td>
</tr>
<tr>
<td>23-May</td>
<td></td>
</tr>
<tr>
<td>23-Jun</td>
<td></td>
</tr>
<tr>
<td>23-Jul</td>
<td>D</td>
</tr>
<tr>
<td>23-Aug</td>
<td></td>
</tr>
</tbody>
</table>

**Body Weights**

<table>
<thead>
<tr>
<th>Date</th>
<th>Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-Apr</td>
<td></td>
</tr>
<tr>
<td>30-Apr</td>
<td></td>
</tr>
<tr>
<td>7-May</td>
<td></td>
</tr>
<tr>
<td>14-May</td>
<td></td>
</tr>
<tr>
<td>21-May</td>
<td></td>
</tr>
<tr>
<td>28-May</td>
<td></td>
</tr>
<tr>
<td>4-Jun</td>
<td></td>
</tr>
<tr>
<td>11-Jun</td>
<td></td>
</tr>
<tr>
<td>18-Jun</td>
<td></td>
</tr>
<tr>
<td>25-Jun</td>
<td></td>
</tr>
<tr>
<td>2-Jul</td>
<td></td>
</tr>
<tr>
<td>9-Jul</td>
<td></td>
</tr>
<tr>
<td>16-Jul</td>
<td></td>
</tr>
<tr>
<td>23-Jul</td>
<td></td>
</tr>
<tr>
<td>30-Jul</td>
<td></td>
</tr>
<tr>
<td>6-Aug</td>
<td></td>
</tr>
<tr>
<td>13-Aug</td>
<td></td>
</tr>
<tr>
<td>20-Aug</td>
<td></td>
</tr>
<tr>
<td>27-Aug</td>
<td></td>
</tr>
</tbody>
</table>
Reduce number of parasites in host

**ALTERNATIVE ANTI-PARASITICS**

- Plant secondary metabolites (PSM) being investigated at a furious rate
- Condensed tannin containing forages and other crops grown in the U.S. that have a negative effect on parasites
  - Birdsfoot trefoil—north
  - Sainfoin—west
  - Sericea lespedeza—south
  - Cranberry vine
Reduce number of parasites in host

**SELECTION FOR HOST PARASITE RESISTANCE**

- Selecting animals that are more parasite resistant
  - Currently being done with small ruminants
  - Could be done in any animal species
Reduce number of parasites in host

SELECTION FOR HOST PARASITE RESISTANCE

FAMACHA©

• Eye color chart with five color categories
• Compare chart with color of mucous membranes of sheep or goat
• Classification into one of five color categories:
  - 1  not anemic
  - 5  severely anemic
Reduce number of parasites in host

**SELECTION FOR HOST PARASITE RESISTANCE**

**FAMACHA©**

Relationship of Eye Score to Anemia

<table>
<thead>
<tr>
<th>FAMACHA score</th>
<th>Color class</th>
<th>Hematocrit (% Red Blood Cells)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>≥ 28</td>
</tr>
<tr>
<td>2</td>
<td>Red-pink</td>
<td>23-27</td>
</tr>
<tr>
<td>3</td>
<td>Pink</td>
<td>18-22</td>
</tr>
<tr>
<td>4</td>
<td>Pink-white</td>
<td>13-17</td>
</tr>
<tr>
<td>5</td>
<td>White</td>
<td>≤ 12</td>
</tr>
</tbody>
</table>
ENSURE OPTIMAL NUTRITION

- Good nutrition CRITICAL to effective immunity
- Consider increasing protein levels in young or lactating animals
  - Immune response develops faster
  - No hard and fast rules (18% mentioned)
  - Benefit depends on circumstances
- Also need adequate minerals, vitamins
  - Vitamin E at current NRC recommendations (sheep)
- Heavily parasitized animals – pull off pasture and supplement with high quality feed

Reduce number of parasites in host
Reduce Parasites in the Environment

SANITATION

- Remove or manage manure
- Removing manure best parasite control ever!
- Not enough just to remove it, parasites survive
- Spreading manure—just spreading parasites around for animals, wait until pasture empty and then allow time to pass
Reducing Parasites in the Environment

PASTURE MANAGEMENT

• Move through paddocks in a rotation
  • Parasites die over time in resting pastures
• BUT, length of rest is critical
  • Some parasites may die in a months, others take years
  • Parasite infections transmitted by larvae will die sooner than those transmitted by eggs
• Don’t graze pasture down to the ground
  • Longer forage—many parasite larvae don’t migrate up grass or only migrate a few inches
Reducing Parasites in the Environment

PASTURE MANAGEMENT

• Mixed grazing
  • Sheep/goats/camelids ≠ cattle ≠ horses ≠ pigs for most parasites
  • Each host is a vacuum cleaner for the parasite larvae of other hosts
    • Few exceptions
      • barber pole worm can infect calves
      • Pig roundworms can infect other animals
  • Can mix species or graze one species followed by another
Reducing Parasites in the Environment

REDUCE STOCKING DENSITY

- Generally helpful, but can still get foci of intense transmission when animals congregate—“Barnyard effect”

not equal to
Reducing Parasites in the Environment

• “Babies Get the Best”
  • The most vulnerable animals should always go where parasites are fewest
  • Least vulnerable animals can help remove larvae
  • Example: Wean onto pasture with few larvae, leave non-lactating, immune animals on contaminated pasture
Recap – Parasite Control

- No silver bullet
- Good management critical
- Optimal nutrition essential
- General principles apply across species
- Understanding these principles is key to control