Managing Gastrointestinal Parasites in Small Ruminant Herds

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Objectives

• Learn about the most important parasite that affects sheep and goats in Florida and the Southeastern US.

• Define parasite resistance.

• Discuss the options to control GI worms in sheep and goat operations.

• Promote a hole-farm approach and less reliance on dewormers.

• Discuss the process of Smart Drenching.

• Define how FAMACHA works.
• Number one cause of death in sheep and goat herds/flocks in the Southern United States.

*Haemonchus contortus* – most common endoparasite in Florida and the humid tropics.
Gastrointestinal parasite problems

• More frequent under these conditions:
  • Immune compromised.
    • 4 month olds
    • Older animals
    • Stressed animals (Lactating, sick, etc..)
  • High stocking rate situations.
  • Overgrazed/ inappropriately pastures.
**Haemonchus contortus** (Barber Pole Worm)

- Literally a blood sucking worm
- Very prolific – one adult female can produce **5,000 eggs per day.**
  - **500 worms = 2.5 million eggs/day/animal.**
  - **50 goats = 1 billion eggs per week.**
- **Short life cycle** – about 3 weeks from time of infection until eggs are produced.
  - Preys on the weak, young, pregnant, or lactating animal.
- **Developing resistance to all classes of dewormers**
“Resistance”

- The ability of certain worms in a population to survive drug treatments that are generally effective against the same worm species and stage of infection.
  - Caused by changes in levels of “resistance” genes carried by worms in a population.
  - Result of drug treatment that produces genetic selection of resistant worms in a population of worms.
**Dewormer Resistance History of the Problem**

- Age of modern dewormers.
  - Effective, broad-spectrum, cheap, safe.
- **Over-reliance on dewormers**
  - Addiction to drugs, improper use of dewormers.
  - Loss of common sense approaches.
  - Belief there will always be a new drug.
- No new drug classes introduced since 1981.
  - We have what we have !!!!

***New anthelmintic announced by Novartis in 2007 – Zolvix® (monepantel). Not available in the US.***
Resistance is an *inevitable consequence* of using any particular drug to kill worms.

- “Resistant” worms – worms that can survive drug treatment, actually exist prior to the first use of a drug.

- **Treatment eliminates worms whose genes render them susceptible to the drug.**
  - Parasites that are resistant survive and pass on their “resistant” genes to their offspring.
    - Over time with continued treatment, more and more resistant worms build up in the population.
  - High level of animal movement spreads resistant worms (Animals shipped from state to state or country to country carry their worm infections with them).
Selection for Drug Resistance

Parents

Resistant

Next Generation

Drug Treatment

Susceptible

Resistant
Changes in “Resistance” Genes in Response to Drug Selection

Percent of Worms that Are Resistant

Worm Generations (exposed to repeated treatments)

Apparent as a clinical problem

Detection level with tests

Resistance is Forever
Life Cycle of GI Worms
Why is *H. contortus* Such a Problem??

- Evolved in tropics.
  - Thrives in warm/wet climates.
- Long transmission season in southern states.
- Short life cycle.
- Goats acquire only partial immunity.
- Immunity is slow to develop in sheep
  - Kids and Lambs are highly susceptible.
  - Immunity wanes around time of kidding/lambing.
Goats Were Never Intended to Live (and Graze) in a Warm Humid Climate
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High Humidity
Standing water
No rocks
Long growing season
+ Warm nights
Hell for a goat
Overview of Anthelmintics

• Only 3 actual classes or families of anthelmintics exist.
  ✓ Drugs within a class (or family) are very similar in properties and activity.

• Sold under many different trade names.
• Can be very confusing.
1. **Benzimidazoles (BZ)**
   - fenbendazole (FBZ; Panacur, Safeguard)
   - albendazole (ABZ; Valbazen)

2. **Avermectins (Milbemycins)**
   - ivermectin (IVM; Ivomec)
   - moxidectin (MOX; Cydectin)

3. **Imidazothiazoles (Tetrahydropyrimidines)**
   - levamisole (LEV; Tramisole, Levasole), morantel (MOR; Rumatel, Golden Blend, others)
1. Diatomaceous Earth
2. Herbal Dewormers
   ***No scientific evidence that these have any benefit for worm control.***
3. Copper oxide capsules – has proven to reduce worm loads in sheep and cattle.
The Traditional Approach to Parasite Management

- Treated entire herd.
- Dewormed by the calendar.
- Rotated wormers regularly.
- One Pasture – may be only option.
- Over crowding/overstocking.
- If multiple pastures, dewormed at move to new pasture.
- Unknowingly purchased resistant worms.
What Causes Resistance To Dewormers???

- **Lack of Refugia**
  - Refugia = the proportion of the worm population that is not selected by drug treatment.
    - Worms in untreated animals.
    - Eggs and larvae on pasture.
  - Provides pool of sensitive genes.
    - Dilutes resistant genes.
  - Considered the **most important factor in the development of drug resistance**.
1. Treatment strategies that **reduce** refugia.
   - Examples:
     - Treating and moving to clean pasture.
     - Treating when few larvae are on the pasture (drought).
     - Treating all animals at same time.

2. **Frequent Treatments.**
   - More than 3 treatments per year.

3. **Under-dosing.**
What Does This Mean For The Small Ruminant Industry ???

Dewormers can no longer be thought of as a cheap input to maximize productivity.

- **Extremely valuable and limited resources.**
- Requires a medically-based approach to treatment.

- Control of *Haemonchus* must be practiced with an eye to the future.

- **Reality** = long-term control of *Haemonchus* will only be possible if dewormers are used intelligently with prevention of resistance as a goal.

- Reduced-chemical and non-chemical approaches are needed.
Slowing down “Resistance”

• Given that “resistance” is inevitable and “resistance” is forever, how do we slow it down?
  • Reduce genetic selection pressure.
  • Maintaining a pool of sensitive genes (REFUGIA).
  • Treat individuals, not herds.

• Concept known as...
Using what we have learned to develop deworming strategies that maximize the effectiveness of treatments while at the same time decreasing the rate at which we create drug resistance.
Components of a Smart Drenching Program

1. Know the resistance status of the herd/flock.
2. Sound pasture management.
3. Keep resistant worms off the farm.
4. Administer the proper dose.
5. Utilize host physiology.
6. Selective treatment → FAMACHA.
Know the Resistance Status of the Flock/Herd

- Perform FECRT or DrenchRite®.
- Repeat every 2 years.
- When resistance is recognized in early stages.
  - Drug can still be used.
  - Must be managed appropriately.
Recommendations For Pasture Management

- **Use appropriate stocking rates.**
- **Build fences – provide safe pastures.**
- **Use multispecies grazing.**
  - mix 2 or more species on same pasture (sheep with cattle or horses).
  - rotate pastures between different species.
Smart Pasture Management

- Avoid overstocking.
- Limit to the minimum recommended stocking rate for your area (4-6 animals/acre).
- Less is better.
Do Not Buy Resistant Worms

- All new additions should be quarantined and aggressively dewormed upon arrival.
- Deworm with 3 anthelmintics from different drug classes:
  - moxidectin, levamisole, and albendazole upon arrival.
- Should remain in quarantine for 10 - 14 days
  - Perform FEC to confirm that no eggs are shed.
Goats: **2X sheep dose**

- **exceptions**
  - Levamisole (1.5X)
  - Moxidectin injectable (1X)
Dose According to Weight

• Weigh scales (1st choice).

• Weight tapes.
  • Only accurate for dairy goats.
“Resistant” Breeds

Kiko
Pygmy
Katahdin
Gulf Coast Natives
Dorper
Spanish
The FAMACHA© System

- 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
Since the primary impact of *H. contortus* is anemia, one can indirectly measure parasite burden (and need for treatment) by measuring anemia.

**Only useful where *H. contortus* is the primary parasite species**
Heavy burden can result in the loss of ½ cup or more of blood per day.

The total blood volume of a goat makes up approximately 1/12th its total body weight.

- A 120 pound goat → 10 pounds of blood → 4.5 kg of blood → 4.5 liters or 4,500 ml of blood volume. 120 ml in ½ cup → 50% blood loss in 37 days.
Conjunctiva color relationship to Anemia

<table>
<thead>
<tr>
<th>Clinical Category</th>
<th>Color Classification</th>
<th>Hematocrit Range (%)</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>
Conjunctiva color relationship to Anemia

1) Place gentle downward pressure on eye with upper thumb

2) Pull down lower eyelid with other thumb

3) Read color of eye on mucous membranes of lower eyelid
FAMACHA® System “rules”

- Score using the chart
- Evaluate in bright light (sunlight)
- Be quick
- Score both eyes (of the animal)
- Use higher score if eyes differ
What Do I Do With The Results?

• **Always** treat goats and sheep in categories 4 and 5

• Don’t treat 1’s and 2’s

• When should you treat the 3’s?
Animals in Category 3

Treat when

- >10% of herd scores in categories 4 or 5
- Young animals
- Ewes/does (pregnant or lactating)
- Animals in poor body condition
- If any concern about animals general health and well being

- Consider using less effective drugs
If more than 10% of flock/herd scores in categories 4 and 5:

- Recheck weekly
- **Treat the 3’s**
- Rotate paddocks (if possible). Introduce animals to clean pastures a week after they have been dewormed, not right away.

**CULL PROBLEM ANIMALS**
• Select animals that are easy keepers. Decide if its worth keeping problem animals.
  1. FEC
  2. Age
  3. Body condition
  4. Production level
  5. Conformation
Summary

- Do not expect anything different if you are not changing your parasite management strategies.
- Always read and follow the label.
- Only treat animals that need to be treated.
- Consider different pasture management strategies.
- Cull problem animals.

**Consult with your Extension Agent!**
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