Small Ruminant Integrated Parasite Control
Smart Drenching and Application of the FAMACHA© Eye Chart

Southern Consortium for Small Ruminant Parasite Control

Will R. Getz, Ph.D.
Fort Valley State University
Georgia Small Ruminant Research and Extension Center

Internal Parasites: What Can We Do?

- "Smart Drenching"
- Use FAMACHA diagnostic tool

The Big Problem facing producers

- Anthelmintic (dewormer) resistance is considered a major threat to the current and future control of parasites of ruminants and horses
  - Worldwide phenomena
  - The prevalence of multi-drug resistant worms is extremely high in many areas of the world

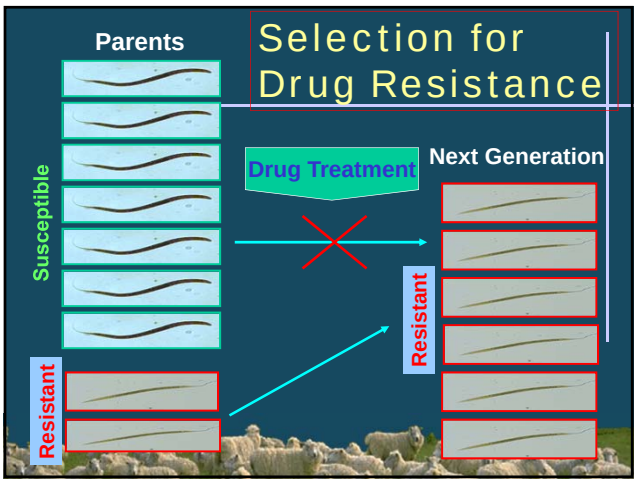
What is "Resistance"?

- 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

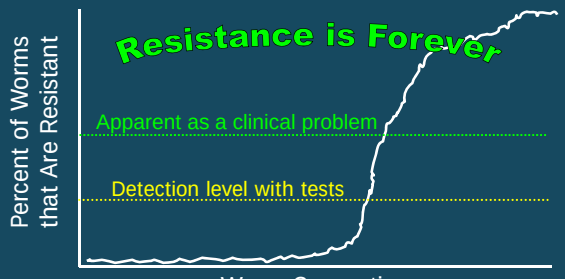
Resistant Worms

- 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



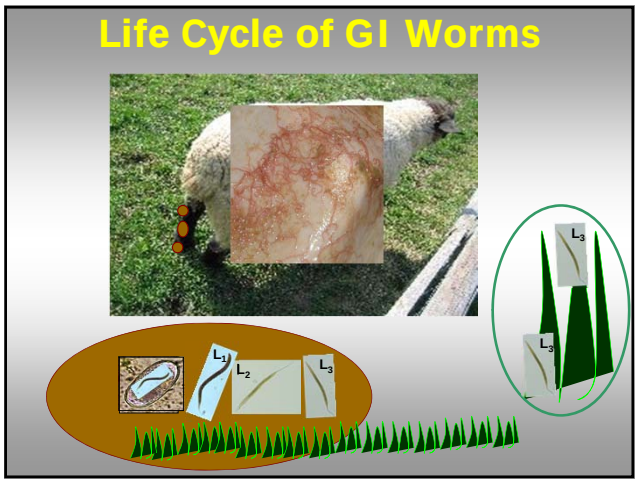
Changes in "Resistance" Genes in Response to Drug Selection



Gastrointestinal Nematodes (Worms) of Sheep and Goats

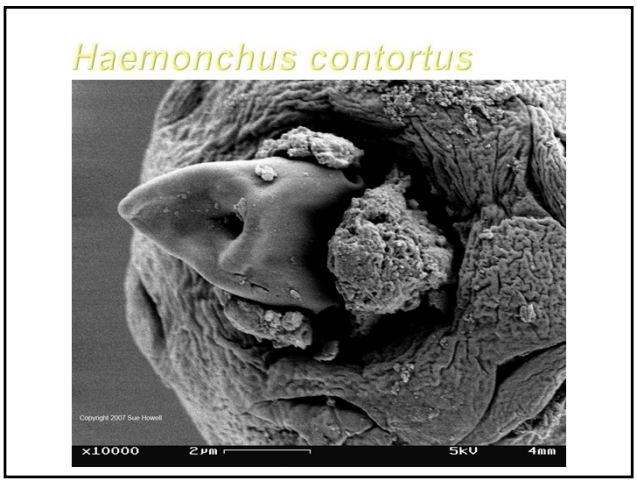
Most Important Species:

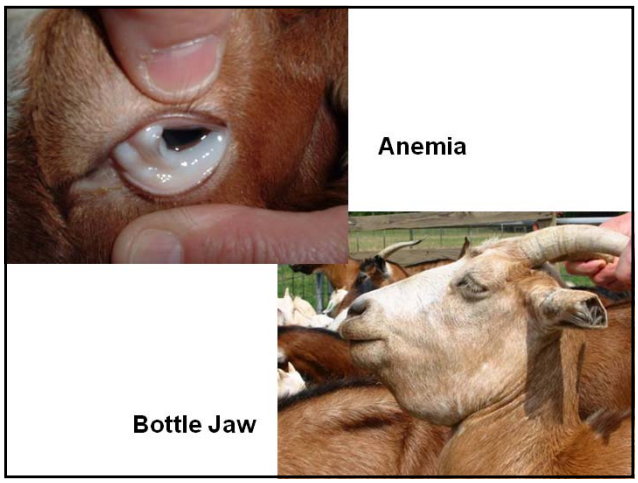
1. *Haemonchus contortus* ***
   - Barberpole worm
2. *Teladorsagia (Ostertagia) circumcincta*
   - Brown stomach worm
3. *Trichostrongylus colubriformis*
   - Bankrupt worm
4. *+/- Nematodirus*



Haemonchus contortus
(Barber Pole Worm)

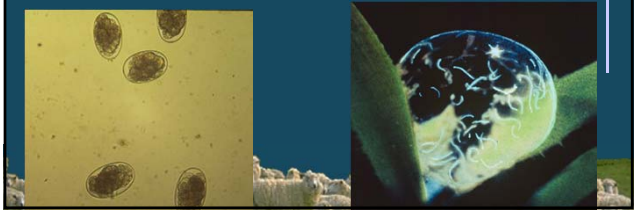
- **PUBLIC ENEMY NUMBER ONE** for small ruminant farmers
- Literally a blood sucking worm
- Very prolific – one adult female can produce 5000 eggs per day
  - Short life cycle – about 3 weeks from time of infection until eggs are produced
- Preys on the weak, young, pregnant, or lactating animal
- Developing resistance to all classes of dewormers





Why is *H. contortus* Such a Problem ???

- Very prolific – each female worms produces ~ 5,000 eggs per day
  - 500 worms → 2.5 million epd per animal
  - 50 goats → 1 billion eggs per week



So, How did we get here?

By doing what we thought was right, based on what we knew

What was recommended by the "experts"

The Traditional Approach to Parasite Management

- Treated entire herd
- Dewormed by the calendar
- Rotated dewormers regularly
- One Pasture – may be only option
- Over crowding/grazing
- 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**

Resistance is Inevitable
What Can We Do ???

- Resistance is a natural biological consequence of drug treatment
- **Rate** of development of resistance is within our control and can be greatly reduced
- Goal = Preserve drug efficacy for as long as possible
  - **Increase refugia**
  - **Selective treatment**

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…..

"Smart Drenching"

- 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

- Know the resistance status of the herd/flock
- Sound pasture management
- Use alternative forms of control
- Keep resistant worms off the farm
- Administer the proper dose
- Selective treatment -- FAMACHA

Know the Resistance Status of the Flock

- Perform FECRT or DrenchRite©
- Repeat every 2 years
- When resistance is recognized in early stages
  - Drug can still be used
  - Must be managed appropriately

Use Proper Technique

- Ensure proper dose is delivered
- Proper technique when drenching sheep and goats is very important
  - drench should be delivered over the back of the tongue
  - critical that full dose lodges in the rumen
    - drench delivered to the mouth may stimulate esophageal groove to close
      - significant drench bypasses the rumen
      - efficacy is reduced

Images courtesy of premier1supplies.com

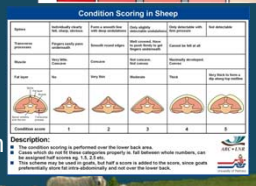
Dewormer Savvy
Give the *Right* Dose


Dose According to Weight

- **Weigh scales**
- **Weight tapes**
  - ***Only accurate for dairy goats***

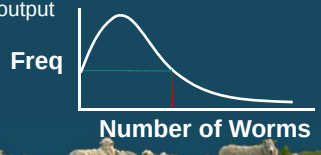
Selective Treatment

- FAMACHA©
  - For *H. contortus* only
- For other GI worms
  - FEC
  - Age
  - Body condition
  - Production level
  - Symptoms
  - Short term weight gain



Concept Behind Selective Treatment

- Parasites are not equally distributed in groups of animals
  - Overdispersed / aggregated distributions
  - 20-30 % of animals harbor most of worms
    - Few animals are responsible for most of egg output



So, how do we easily determine who to treat?

FAMACHA©

Fafa Malan's Chart

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

How Does FAMACHA Work ??

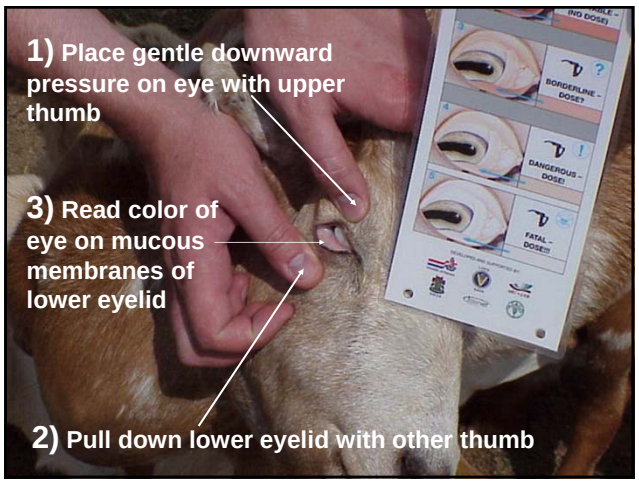
- Since the primary impact of *H. contortus* is anemia, one can indirectly measure parasite burden (and need for treatment) by measuring anemia
- Only useful where *H. contortus* is the primary parasite species

Anemia

- Definition – a reduction below normal in the number or volume of red blood cells in the blood
- Symptoms depend on degree/severity
  - Sub-mandibular Edema (Bottle Jaw)
  - Unthrifty Condition
    - Poor BCS
    - Broken coat
  - Exercise/Heat intolerance
  - Pale mucus membranes

Conjunctiva color relationship to Anemia

Clinical Category	Color Classification	Hematocrit Range (%)
1	Red	≥28
2	Red-pink	23 -27
3	Pink	18 -22
4	Pink-white	13 - 17
5	White	≤12

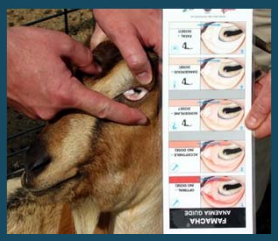


FAMACHA© System "rules"

- Score using the chart
- Evaluate in bright light (sunlight)
- Be quick
- Score both eyes
- 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

How Often Do I Monitor

- **If <10% of the herd/flock scores in categories 4 or 5:**
  - Re-examine in **2 weeks** if it is *Haemonchus* "season" (warm, moist conditions)
  - In dry or cool times of year, every **4 -6 weeks** is probably sufficient
  - More often at first to be safe – with experience you will learn what the proper intervals are for your farm

How often...

- **If >10% of flock/herd scores in categories 4 and 5:**
  - Recheck weekly
  - Treat the 3's
  - Change pastures (if possible)

Precautions

- **FAMACHA© only applicable where *Haemonchus* is the main worm causing clinical disease**
- **Conjunctival redness can be caused by eye disease, environmental irritants, and systemic disease**

Precautions....

- **Don't use it as a sole criteria for whether or not to drench**
  - If you see other symptoms such as bottle jaw, you know you need to drench
  - Look at all available signs
    - Body condition score
    - Coat condition
    - Consistency of feces
    - Heat/exertion intolerance

The Famacha Card

- **Store in dark place when not in use**
- **Replace card after 12 months' use**
- **Keep a spare card in a light protected place**

Why use FAMACHA

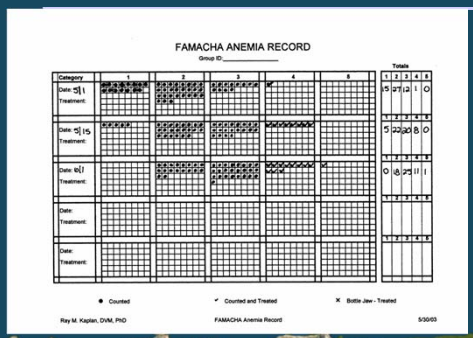
- **Decreased Worm burdens**
- **Creates "Refugia"**
  - **Decreased development of resistance**
- **Saves money**
- **Identifies animals that need less frequent deworming -- keep for breeding**
- **Identifies animals that need more frequent deworming -- cull**

Remember Refugia ("In Refuge")

- Untreated animals harbor susceptible worms
- Dilutional effect
- Resistance develops more slowly

Keep Herd and Individual Records!!!!

Example Herd Anemia Record



Control Parasites by Determining

- Which parasites are present
- When they are being transmitted
- How they survive
- Which anthelminthics are effective
  - What dose is required for host species
- When is the most appropriate time to administer anthelminthics or use other alternative control methods


Questions ???