Approaches to GI Parasite Management

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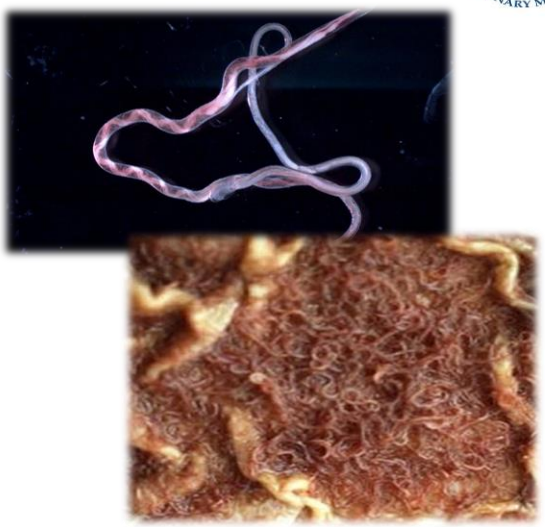
Outline

- The Worm of Concern
  - *Haemonchus contortus*
- Anthelmintics and resistance
- Multi-tool Approach to Parasite Control

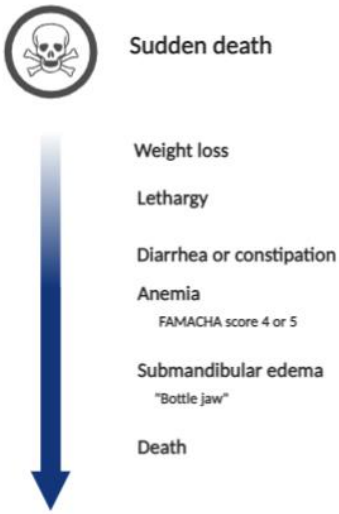
The Worm of Concern

- *Haemonchus contortus*
- Barber's pole worm
- Gastrointestinal nematode (GIN)
- Extremely pathogenic
- Highly fecund
- All grazing animals are infected
- Consume 0.05 mL blood/day

(Alba Hurtado and Munoz-Guzman, 2013)



Clinical manifestations



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VA Tech Extension. FAMACHA® Card.

Miller et al. (1998)
doi:10.1016/s0304-4017(97)00094-0

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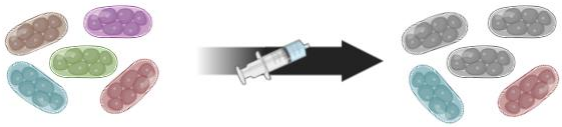
Anthelmintic Resistance

- "A substantial increase in a specific nematode population which is able to tolerate lethal drug doses for the majority of individual nematodes that are of the same species." (Nari Henrioud, 1987)
- Evidence of extensive worldwide anthelmintic resistance in small ruminants (Kaplan, 2004)



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Multi-tool Approach to Parasite Control

- Rotational Grazing
- Targeted-selective dewormer use
- Utilize resistant animals for breeding
  - Phenotypic selection
  - Estimated Breeding Values (EBVs)
  - Genomic-Enhanced Estimated Breeding Values (GEBVs)

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Rotational Grazing

- Using more than one pasture during the grazing season
  - Rest periods provide time for plant regrowth and death of parasitic larvae on pasture
- Good rule of thumb is 10 ewes and 15 lambs per acre of pasture
- Pasture rotation intervals depend largely on forage quality and quantity
  - For the purpose of parasite control, rotation of pasture every 30 days is recommended.
    - Allow the pasture to rest for 31-100 days, prior to allowing repeat grazing.

Targeted-selective dewormer use

- '80/20 Rule' = 80% of GIN eggs are shed by 20% of the individuals in the flock
- Goal: maintain refugia
  - Refugia– leaving some GIN unexposed to dewormers (giving them a refuge), resulting in reduced (slows the development of) drug-resistance
- Identify parasite burdened individuals in the flock
  - Develop a routine → Five point check®
    - Treat only the heavily parasite burdened individuals
    - Do NOT blanket deworm everyone
    - Do NOT rotate dewormers
    - Cull repeat offenders from the flock

Five point check®

- Used to evaluate deworming needs of the flock

No.	Point	Indicator	Which parasite(s)?
1	Eye	Paleness	Barber pole, liver fluke, coccidia
2	Back	Body condition score (BCS)	All
3	Rear	Dag score/fecal soiling	Brown stomach worm, hair worm, thread worm, nodule worm, coccidia
4	Jaw	Bottle jaw	Barber pole worm, liver fluke
5	Nose	Nasal discharge	Nasal bots

www.wormx.info/changingdogma

BioWorma® in the USA

- Available for purchase in 2019
- Not anthelmintics/dewormers
- Contains a natural fungus, *Duddingtonia flagrans*
  - Spores remain inert (no effect on host animal) and resist digestion when consumed → passed into feces and onto pasture
  - Interrupts the reproduction of infective larval parasites → reduction of parasite re-infection
- Label recommendation still includes utilization of chemical dewormers
  - Does NOT eliminate the use for anthelmintics
- Expensive! ($345/10 lb pail)

Utilization of resistant animals for breeding

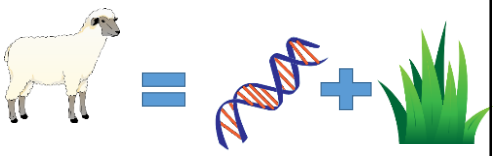
- Perpetuation of GIN parasite resistant genetics within flock
- Minimizes pasture parasite burden and contamination
- Economic benefits
  - Reduced losses due to treatment and death
  - Increased profit due to enhanced health and growth

Phenotypic selection

- Susceptible and resistant individuals
- Measurable parameters:
  - FAMACHA score
  - Body Condition Score (BCS)
  - Fecal Egg Count (FEC)
  - Packed Cell Volume (PCV)

Estimated Breeding Values (EBVs)

- Phenotype = measurable set of individual characteristics
  - Number of lambs born, birth weight, weaning weight, number of lambs weaned, mature body weight, loin muscle depth, etc.
- **Phenotype** is a result of the individual's **genetics** and the **environment** in which it is raised
- When selecting breeding animals:
  - Producer selects **genetics** they wish to pass on
    - Based on **phenotypic** traits
    - Problem: CANNOT differentiate what is caused by genetics versus environment
      - This is where EBVs come in!



Estimated Breeding Values (EBVs)

- Used to **quantify** the **genetic merit** of a breeding sheep
  - Calculated by accounting for known sources of variation for each phenotypic trait
    - Adjustment factors eliminate sources of environmental variation
  - Certain traits are influenced more by genetics than environment and vice versa
    - This genetic variation is called **heritability**
- **How does it work?!**
  - The National Sheep Improvement Program (NSIP) takes care of calculating the values
  - Producers need to submit measurements taken at set time points
    - Use of contemporary groups (lambs from at least 2 sires and 15 lambs from each sire)
  - Contact the NSIP for more info! www.nsip.org

Genomic-Enhanced Estimated Breeding Values (GEBVs)

- Brand new to the sheep industry -- beginning in 2021
  - For now, only the Katahdin producer community is eligible
- Use of genomics to more accurately predict genetic merit
- Provides improvement of EBV accuracy
  - Breeding values are simply **estimates** of genetic potential
    - **Accuracy depends on how close the EBV is to the true breeding value for a specific trait**
  - GEBVs suggest accuracy improvements of 2-24% depending on the trait
- Combines genomic technology, individual, pedigree, and progeny data
- For more information, visit the NSIP website at https://nsip.org/genomic-enhanced-ebvs/

Take Home Message

- GI parasite management requires a multi-tool approach
  - One size does not fit all
- Implementation of routine parasite mitigation strategies are crucial for success
- Purebred and seedstock producers -- consider joining the NSIP
  - Provides an opportunity to identify genetics to accelerate the genetic performance of your flock and the entire breed

Questions?

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