Integrative Parasite Management: Know Your Parasites Know Your Animals

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TODAY'S PROGRAM

- The problem
- The parasites; where we are and why
- Biology of important GI Parasites
- Parasite control in sustainable systems

Vermont Historical Society

Worms are not a new problem!

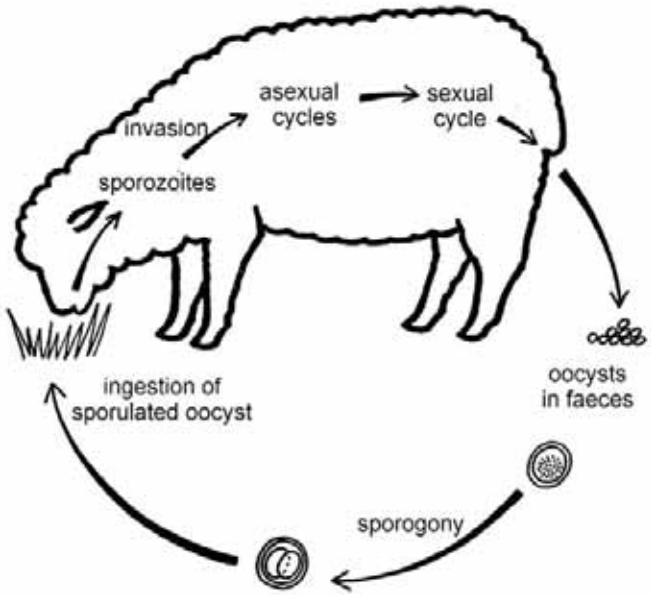
In the 1920's drenches included carbon tetrachloride and copper sulfate/nicotine

Parasites in Sheep and Goats

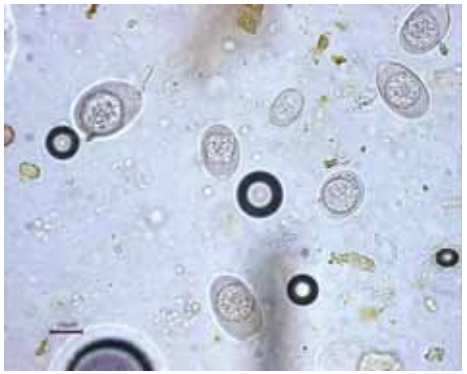
- Stomach and intestinal worms the major health problem faced by producers in eastern U.S.
- Focus of this presentation

Other Common/Important Parasites

- Coccidia
  - Protozoan (single cell) parasites
  - Infect all small ruminants but host specific
    - Sheep coccidia don't infect other animals and visa versa
  - Oocysts (eggs) shed in manure
  - Cause diarrhea in young animals especially with stress, diet change, etc.
  - http://www.sheepandgoat.com/ for good info

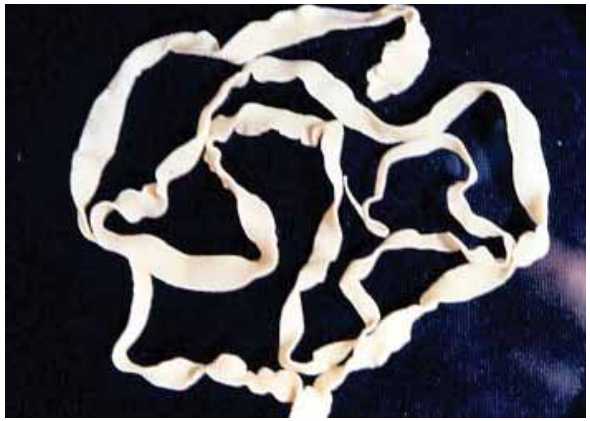


Maryland Sheep and Goat News



Other Common/Important Parasites

- *Moniezia* (tapeworms)
  - Shared by sheep and goats and camelids
  - Adults in small intestine, feed on intestinal contents
  - Eggs passed out in tapeworm segments
    - eaten by free living mite intermediate host
  - Sheep infected by ingesting infected mite



Other Common/Important Parasites

- *Moniezia* (tapeworms) cont'd
  - Common in young animals
  - Adverse effects?
    - Owner disgust
    - Other effects difficult to demonstrate

Other Common/Important Parasites

- *Moniezia* (tapeworms) cont'd
  - Diagnosis
    - Observation
    - Eggs in manure
      - Number meaningless because eggs not uniformly distributed
  - Treatment
    - Valbazen, Safeguard, double dose

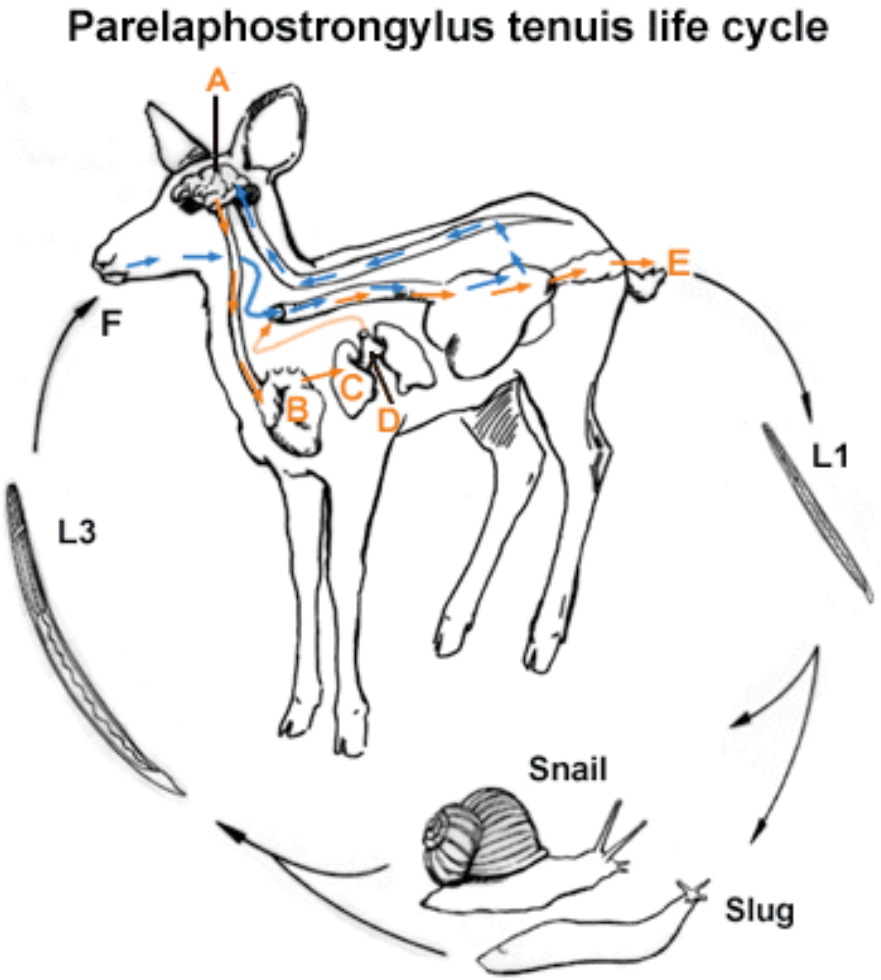
Other Common/Important Parasites

- Meningeal Worm (brain worm)
  - *Parelaphostrongylus tenuis*--Parasite of the blood vessels of the meninges of white tailed deer

Other Common/Important Parasites

Meningeal Worm cont'd

- brain worm
- Transmitted by snail/slug intermediate host



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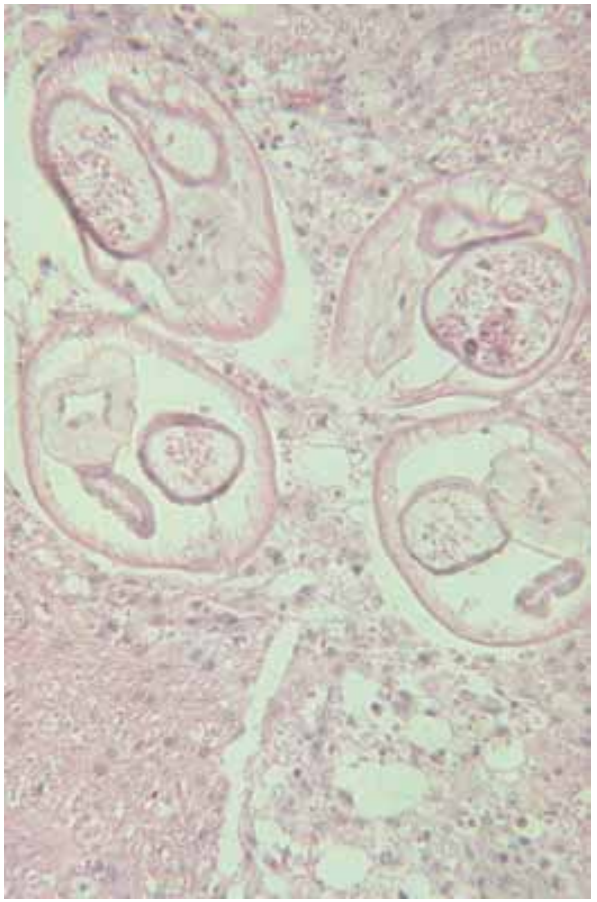
Other Common/Important Parasites

Meningeal Worm cont'd

- Parasite in deer does not cause disease
- Infection in sheep, goats, camelids MAY cause clinical signs
  - Parasite goes into spinal cord, elicits more inflammation in abnormal hosts



Other Common/Important Parasites

Meningeal Worm cont'd

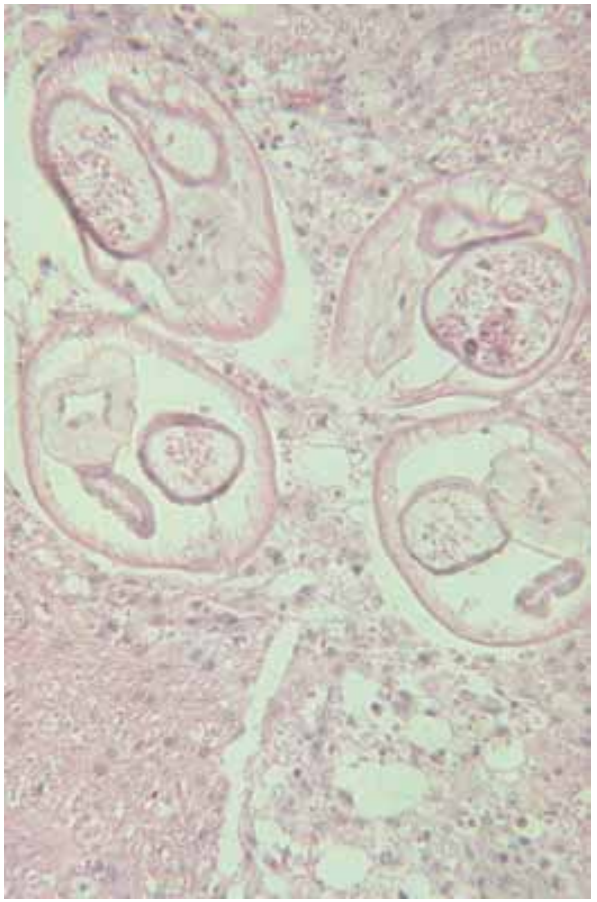
- Infection in sheep, goats, camelids MAY cause clinical signs
- Range of signs, may progress
  - Knuckling over
  - Lameness
  - Abnormal gait
  - Rear limb paralysis
  - Rear and fore limb paralysis

Univ. Minn.

Other Common/Important Parasites

Meningeal Worm cont'd

- Diagnosis
  - No antemortem test currently available
    - Postmortem find suggestive lesions or worm sections
  - Diagnosis on the basis of clinical signs and history
- Treatment
  - Dewormers and anti-inflammatory drugs
    - Ivermectin and fenbendazole (Safeguard) used most often
  - Many recover, some don't



Other Common/Important Parasites

Meningeal Worm cont'd

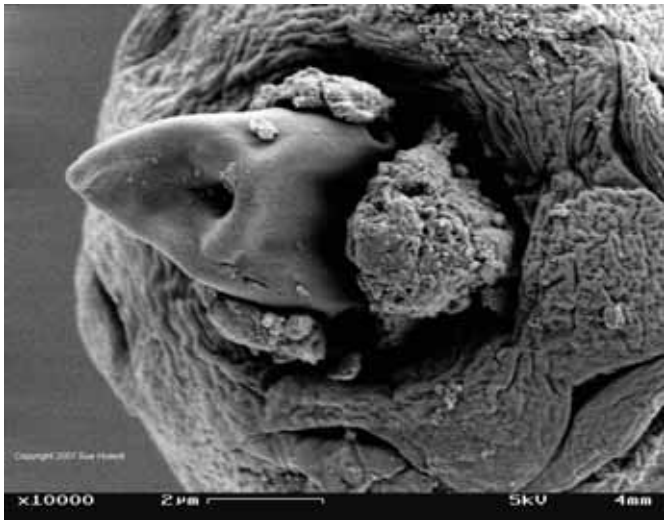
- Management
  - 4-8 wk treatments with ivermectin or related drug--can work to increase resistance in GI nematodes
  - Reduce deer/snail/slug activity on pastures
    - Fences, birds
    - Fencing off, draining swampy spots

Stomach and Intestinal Worms

- GI nematodes biggest health problem east of the Rockies
- Most important--barber pole worm, *Haemonchus contortus*
  - Abomasal (stomach) parasite
  - Exploits many environments, management practices
    - Typically warm weather worm but survives everywhere with adequate moisture
    - In summer predominant even in Vermont

Stomach and Intestinal Worms

- *Haemonchus contortus*
  - Blood sucking parasite
    - Large numbers can cause anemia and bottle jaw, weakness
    - Not diarrhea usually
    - Subclinical losses possible
      - Decreased gains, growth



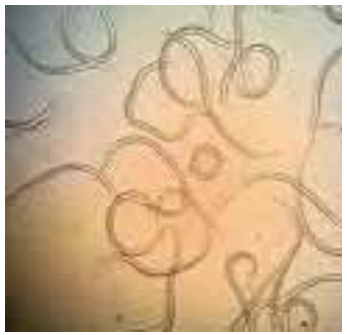
Haemonchus—heavy infection

Stomach and Intestinal Worms

- Nematodes
  - Most important is barber pole worm, *Haemonchus contortus*
  - Related parasites also contribute to problems and can cause diarrhea
    - Brown stomach worm (*Ostertagia,Teladorsagia)*
    - *Trichostrongylus*
    - Others-- less important

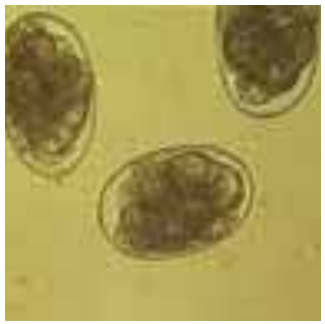
GIN Life Cycle

L3→ L5
17-21 days



L4

L5



L3

All Grazing Animals Have Worms

Egg

L3

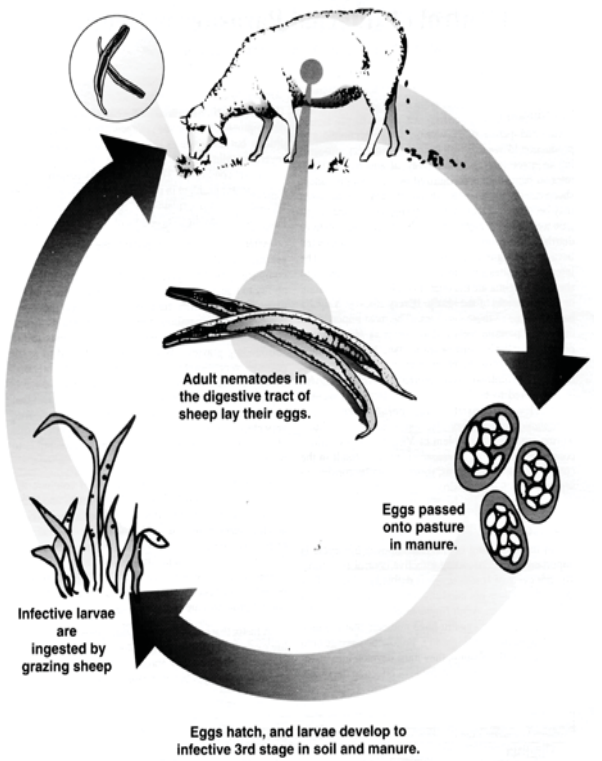
L2

L1

L1→L3
5-7 days

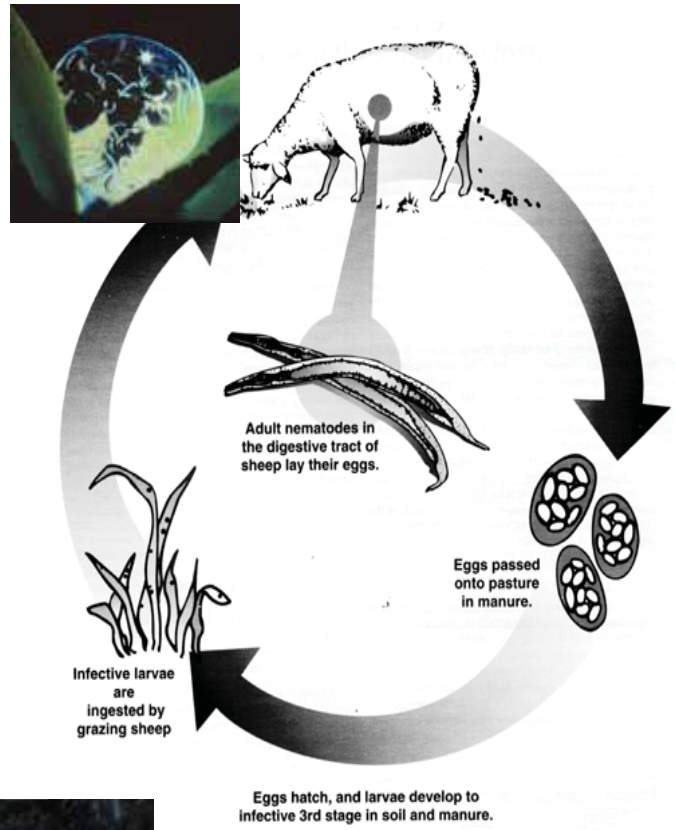
Life as a Worm

- How long can the infective larvae last on pasture
- They can't eat once they reach the infective stage
- Once metabolic reserves used up, they die
- Hotter it is, the faster they wiggle, the quicker they die
- Cool, moist conditions they live for months
- Don't typically survive well in housing
- Freezing kills some species
  - Includes *Haemonchus*



Life as a Worm

- How do worms survive the winter?
  - On pasture as eggs, larvae
    - Only some species can make it through the winter on pasture
  - As larvae in the host in a dormant state (arrested or hypobiotic)
    - No disease, no eggs in feces



Getting Rid of Parasites

- If your animals are on pasture they will have worms
- Goal is to manage the worms

Stomach and Intestinal Worms

- What contributes to their success and increases losses?
  - Climate/weather
  - Management
  - Immunity of the host
  - Drug resistance

Stomach and Intestinal Worms

- Climate/Weather
  - Warm, wet grazing seasons perfect for *Haemonchus*
    - Short life cycle
      - About 3 weeks from infection to egg laying
  - Milder, shorter winters extend transmission season
    - Vermont worm season July-August
    - Virginia worm season June-October
    - Florida worm season all year

Stomach and Intestinal Worms

- Is barber pole worm important in the Northeast?
  - Past wisdom--other worms more important
  - Vet, producer experience say yes
  - Most numerous eggs found in project samples
  - Has importance increased?
    - Resistant worms?
    - Changing grazing season?

Management

- Most parasites part of an animal's natural world
- Usually become a primary problem because of our management practices
  - High density grazing on permanent pastures

TRENDS in Ecology & Evolution

GI Worm Control in Sustainable Systems

- Goal is not to eradicate the worms
- Goal is to keep worms at a level that doesn't have detrimental health effects

Parasite Control in Sustainable Systems

- Parasite losses are a management disease
- We have ways of controlling parasites
- Each producer has to decide which control methods work best for him/her
- Must have integrated parasite control program

Reduce Parasite Exposure on Pasture

- Change reproductive cycle
- Limited or no pasture exposure
  - Great for coccidia!
- Especially important to limit exposure for vulnerable animals

Reduce Parasite Exposure on Pasture

- Vulnerable animals
  - Lactating does/ewes
  - Growing lambs/kids
  - Stressed animals
  - Genetically susceptible animals
- The safest pasture is reserved for the most vulnerable animals
  - Safe pasture=pasture with low numbers of larvae

Reduce Parasite Exposure on Pasture

- Reducing parasite numbers on pasture
  - Reduce stocking density
  - After grazing pasture, harvest regrowth for hay
  - Diversification is good for parasite control!
    - Alternate or mixed grazing
      - Sheep/goats ≠ cattle ≠ horses for GI worms
      - Each host is a vacuum cleaner for the parasite larvae of other hosts
        - Few exceptions, usually not practically important
    - Can also use immune animals to remove worms to a lesser degree
      - Dry ewes on a lamb pasture

Reduce Parasite Exposure on Pasture

- Pasture rotation
  - May be or may not be helpful in parasite control, depending on your situation
    - Rotation may put animals back right as parasite larvae become infective
    - Option for organic production
    - Try combining methods--alternate sheep and cattle in rotation for example

Reduce Parasite Exposure on Pasture

- Forages
  - Most parasite larvae will probably not migrate up more than ~4-6 “
    - Goats prefer browsing to grazing
  - Some high tannin forages seem to have limiting effects on parasites
    - See www.acsrpc.org for info on sericea lespedeza
    - See http://web.uri.edu/sheepngoat/ for info on birdsfoot trefoil
  - Evidence of activity against worms in other plants, ex. chicory

Immunity of the Host

- Sheep and goats develop immunity to GI worms
  - Controls parasites, doesn't eliminate them
    - Immune animals will have eggs in manure
  - Immunity in place at maturity
  - Goats more susceptible than sheep

Immunity of the Host

- Which animals have the most worm problems?
  - Animals with temporary high susceptibility to parasites
    - Young--before immunity develops
    - Lactation
      - Sheep at time of lambing especially susceptible
    - Poor health or nutrition
  - Animals with INHERITED high susceptibility to parasites

Immunity of the Host

- All animals develop immunity, but some do a better job than others
- Much of an individual animal's susceptibility is inherited
- All other things equal, **~30% of the animals have 80% of the worms**

Immunity of the Host

- Selective breeding!
  - Cull highly susceptible animals (FAMACHA good for this)
  - Select more parasite resistant breeding stock
    - Ask breeders if they have info
    - Use fecal egg counts to assess
  - You can make any group of any breed more parasite resistant with selective breeding

Immunity of the Host

- Breeds with higher levels of resistance to parasites
  - St. Croix
  - Katahdin
  - Gulf Coast/Florida Native
- Have to keep selecting for parasite resistance even in more resistant breeds
- Less research on variation in resistance in goat breeds

Provided by Katahdin Hair Sheep International

Immunity of the Host

- How can you use immunity?
  - Selective deworming programs
    - Concentrates dewormer use on animals that need it the most
      - Use less dewormer
      - Slow development of resistance to dewormers
      - Can use FAMACHA© coupled fecal egg counts to identify susceptible individuals

Immunity of the Host

- Development and maintenance of immune response requires good diet
  - Consider increasing protein levels in young, lactating animals
    - Immune response develops faster
  - Also need adequate vitamins, minerals, energy

Immunity of the Host

Host Immunity	⇓	⇓	⇑	⇑
Pasture Infectivity	⇑	⇓	⇑	⇓

Example

Stomach and Intestinal Worms

- What contributes to their success and increases losses?
  - Climate/weather
  - Management
  - Immunity of the host
  - Drug resistance
    - Increasing problem
    - Makes integrated parasite control that much more important