

Managing Internal Parasites in Goats



*Robert Van Saun, DVM, MS, PhD
Department of Veterinary Science
Penn State University*



Presentation Outline

- Understanding the important goat parasites
 - Life cycles
 - Disease and clinical signs
- Diagnostic approaches
- Control strategies
 - Anthelmintic usage
 - Alternative therapies
 - Management issues
- Control problems – anthelmintic resistance
- Recommendations

Goat Parasites

➤ External

- Lice – biting and sucking
- Ticks and mites
- Flies

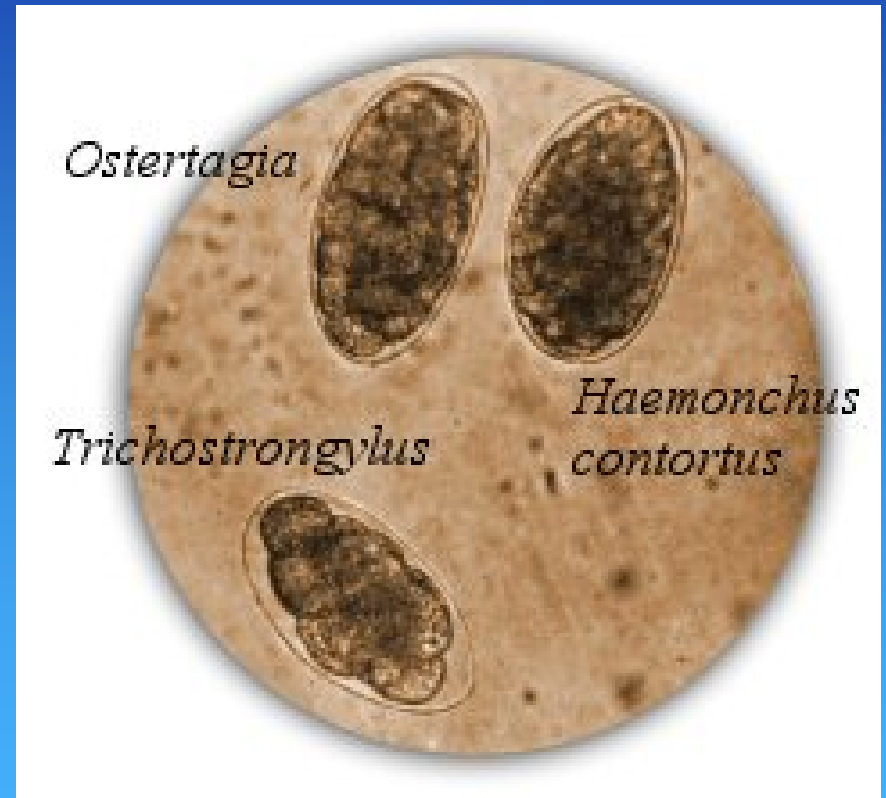
➤ Internal

- Protozoa – coccidia
- Trematodes - flukes
- Cestodes - tapeworms
- Helminths – roundworms



Most Important Ones

- Haemonchus – barberpole worm
- Ostertagia – nodular stomach worm
- Trichostrongylus – stomach worm
- Coccidia – intestinal protozoan



Parasitic Disease

- **Directly or indirectly responsible for most goat deaths, especially for kids under 6 months**
- **Symptoms include**
 - **Weak, Anemic**
 - **Weight loss**
 - **Unthrifty, poor appetite**
 - **Death**

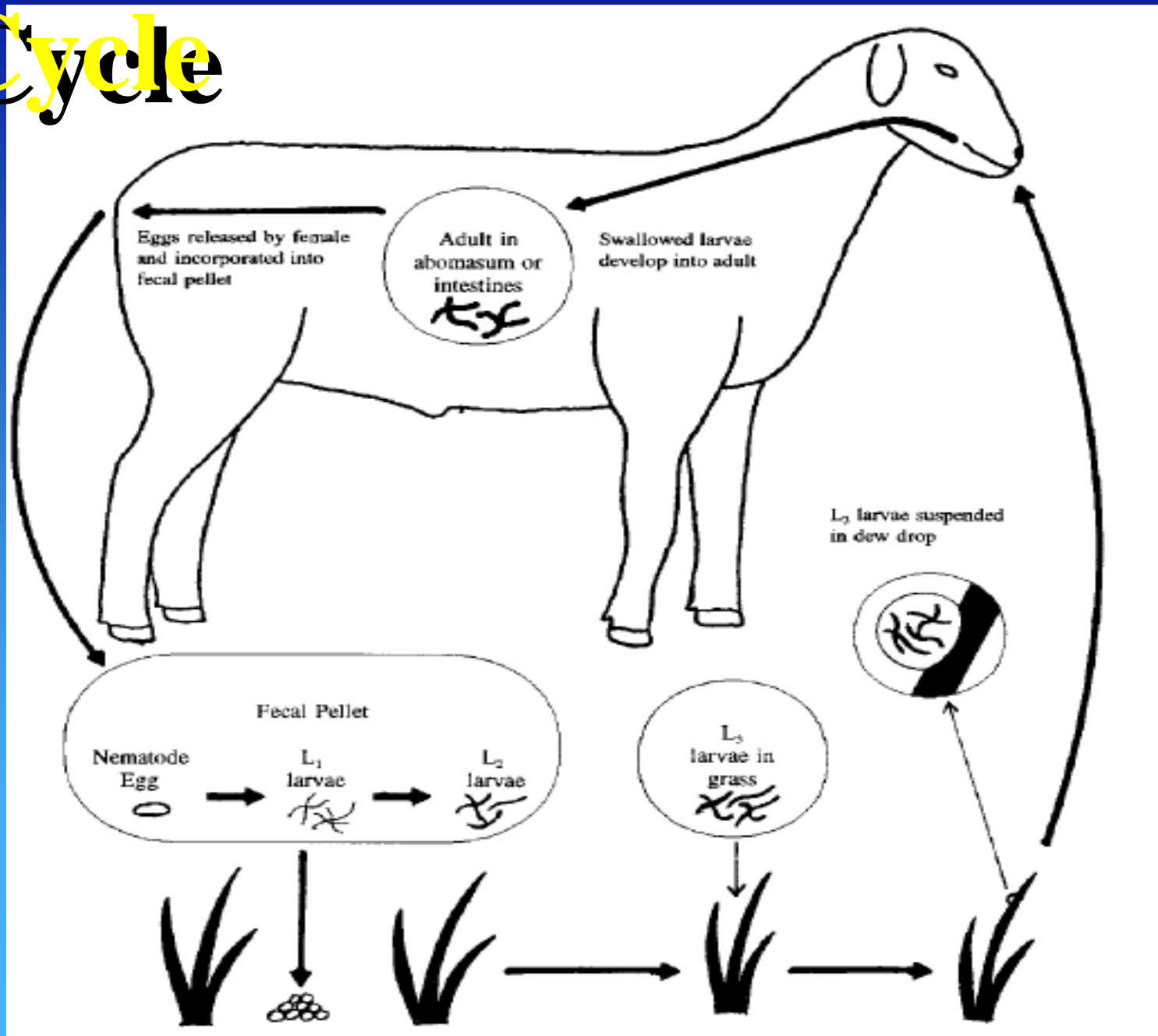


Clinical Signs

- Poor/rough condition
- Bottle jaw
- Anemia

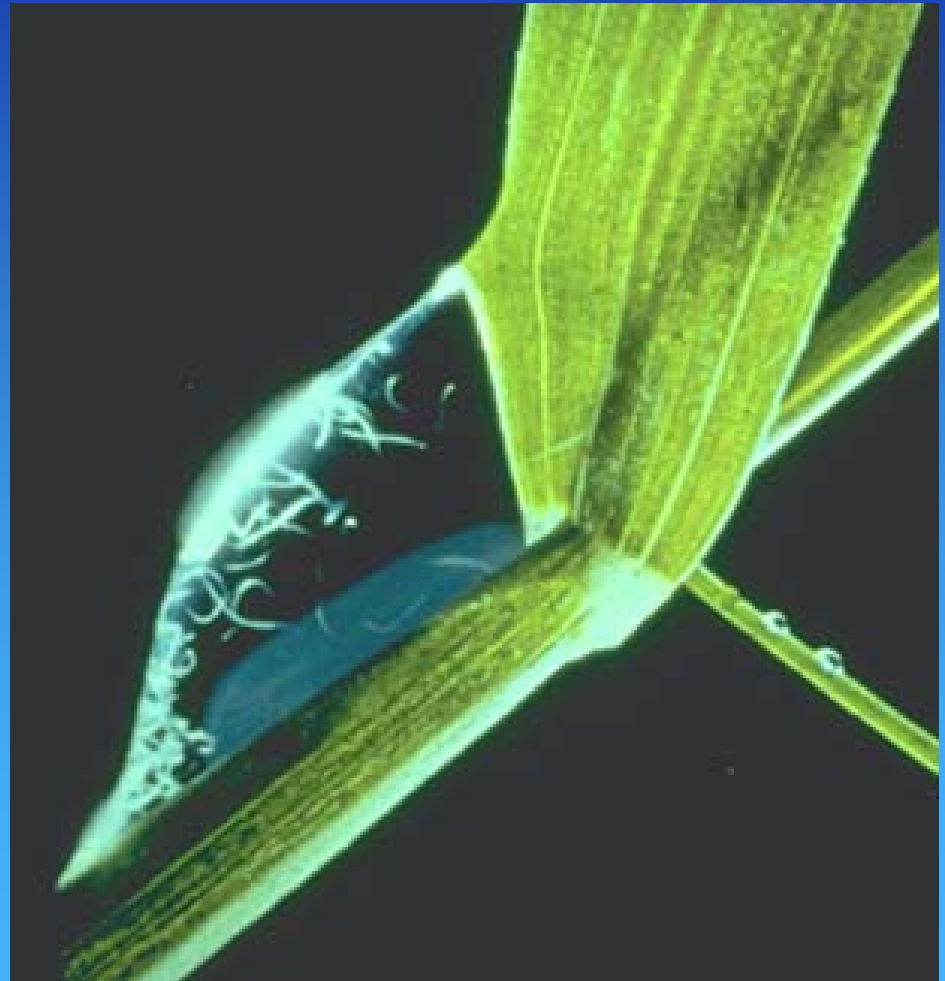


Life Cycle

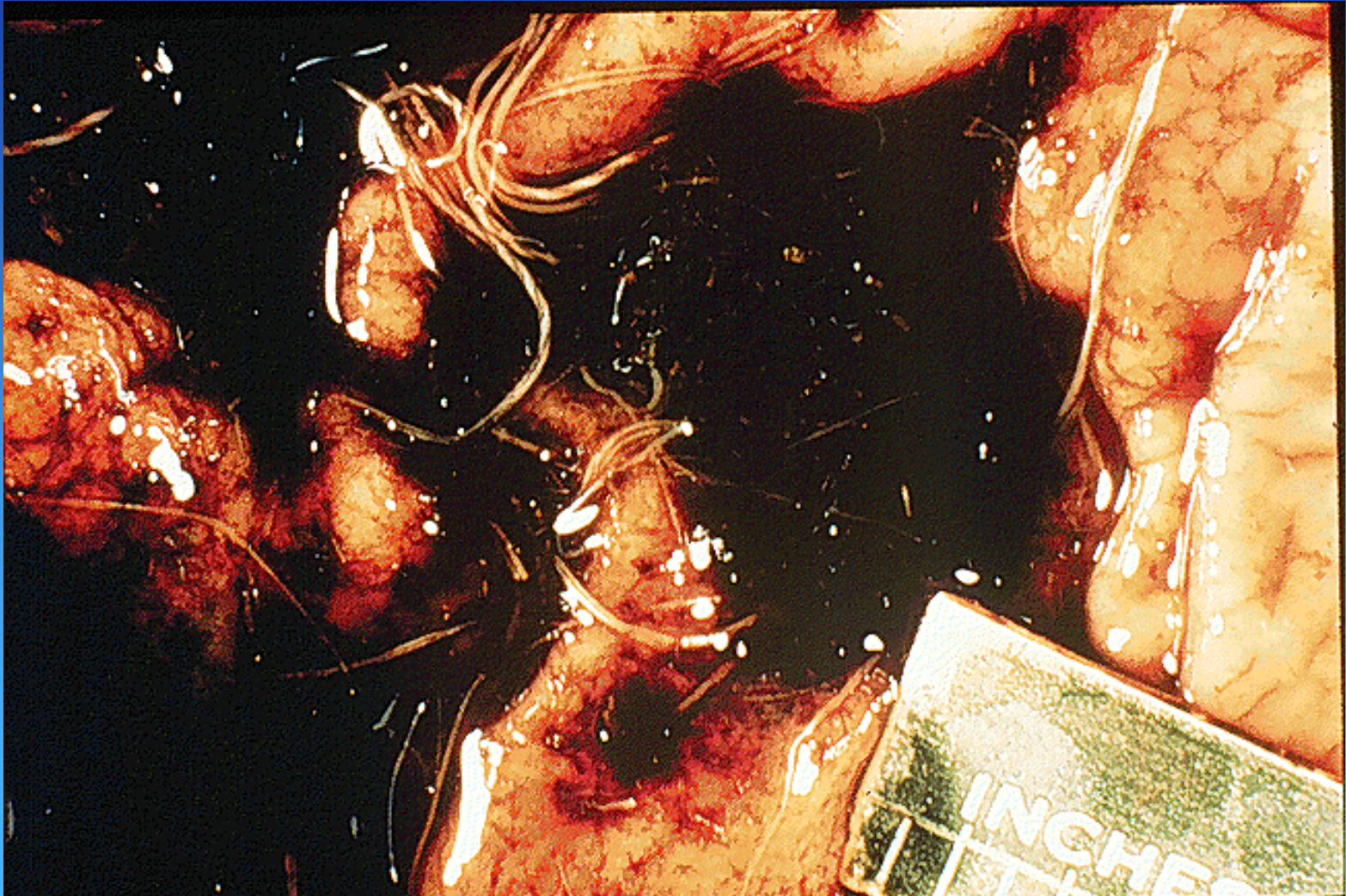


L3 Larvae

- Infective stage
- Non-feeding
- Consumed on vegetation by definitive host
- L3 stays ensheathed in L2 cuticle

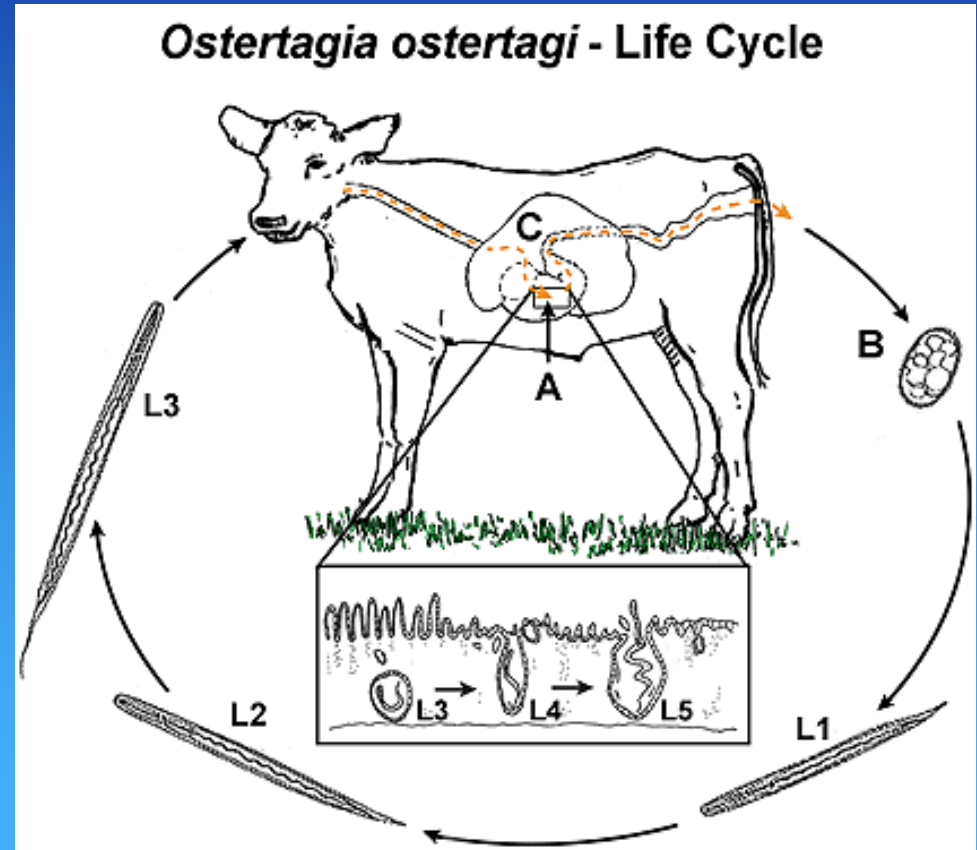


Haemonchiasis

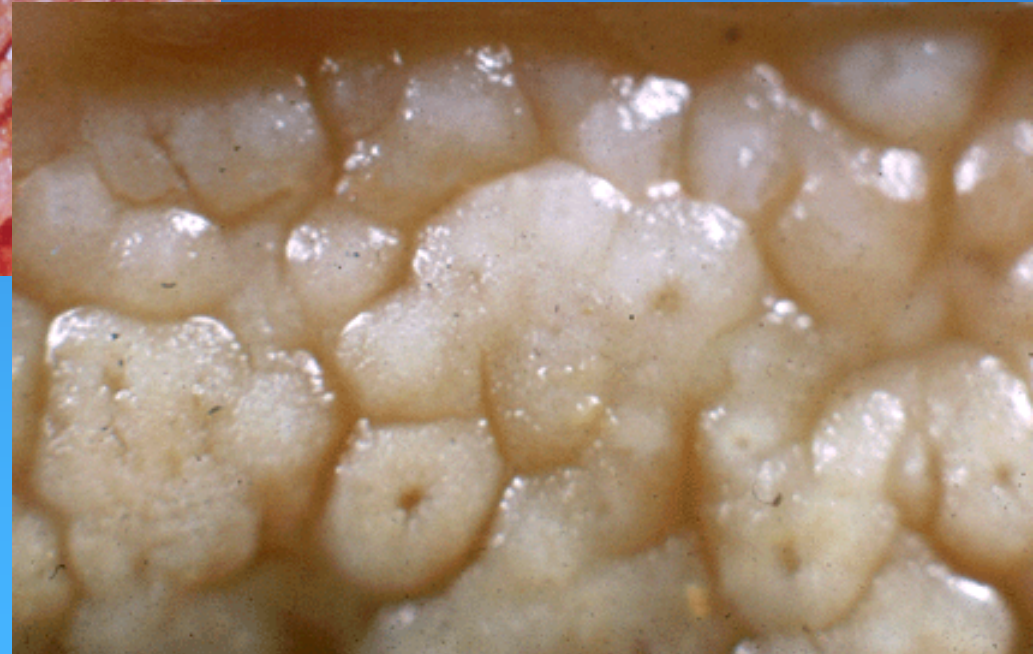


Life Cycle

- Similar to Hemonchus
- J3 burrows into abomasal mucosa and molts
- Return to lumen, feed, molt to adults
- Produce eggs in approximately 17 days



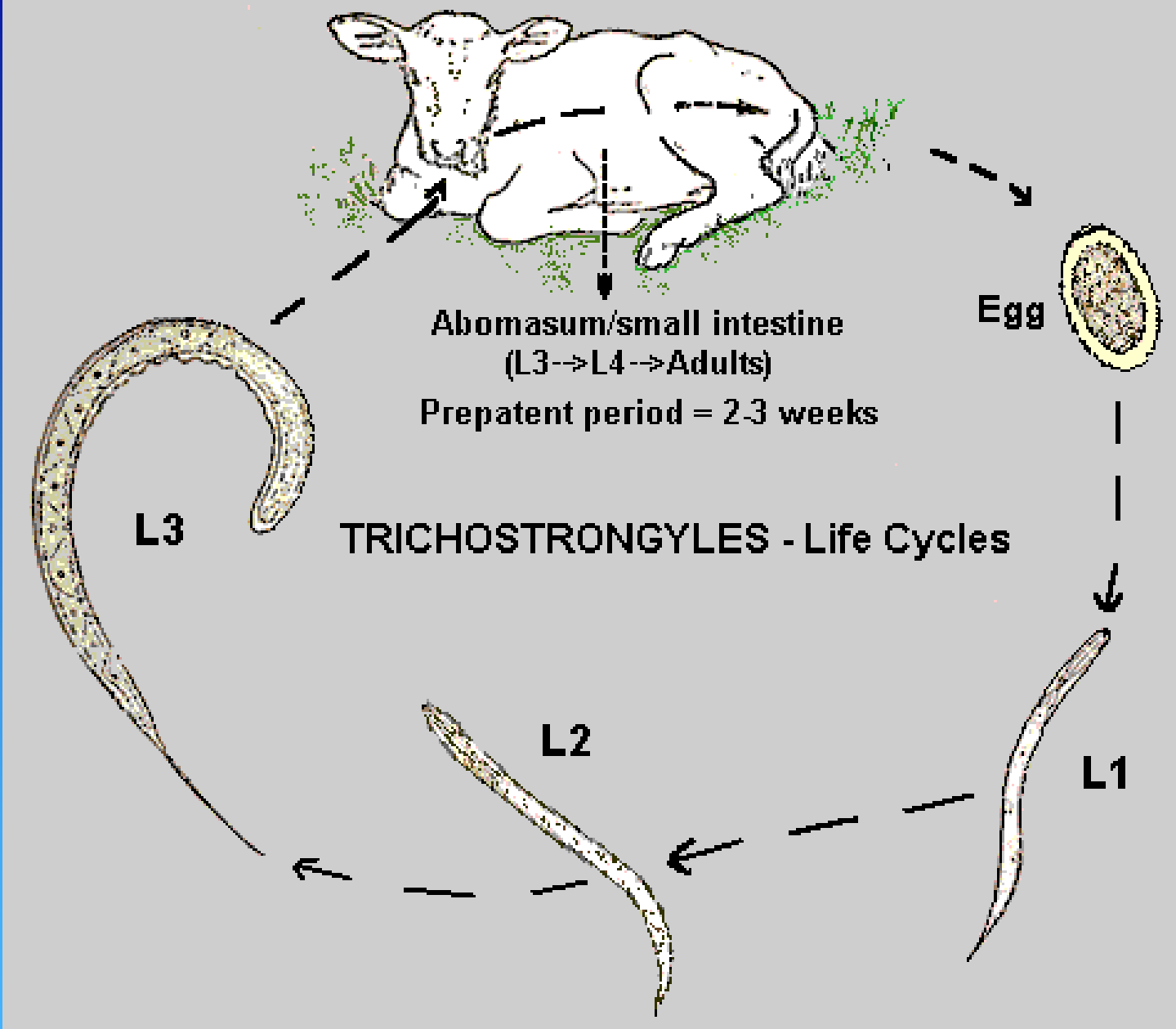
Abomasal Nodules



Hypbiosis

Ostertagia ostertagi
arrested larva (early L4)





Clinical Signs

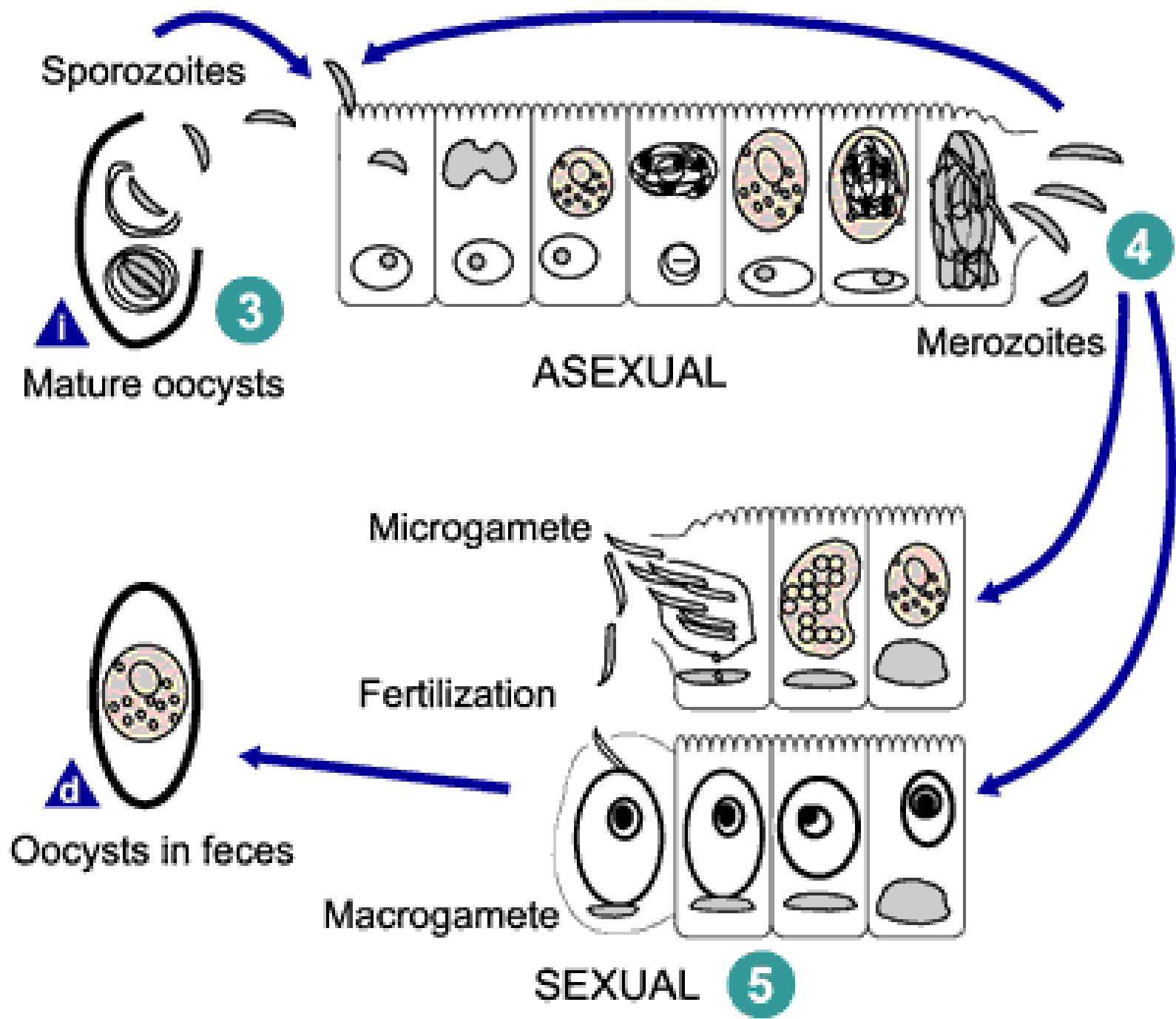
Can range from asymptomatic to fatal overwhelming infestations. May have secondary myiasis from diarrhea

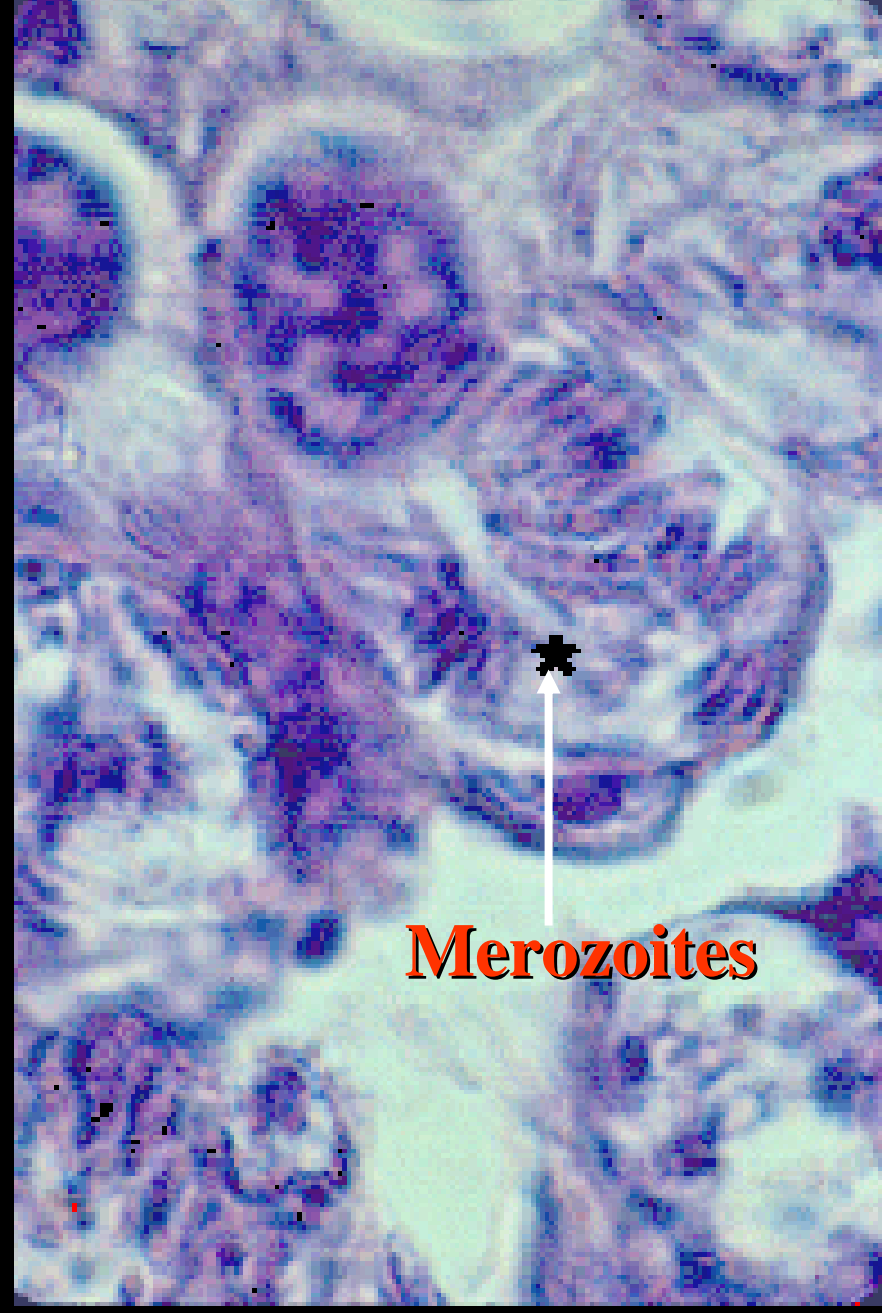
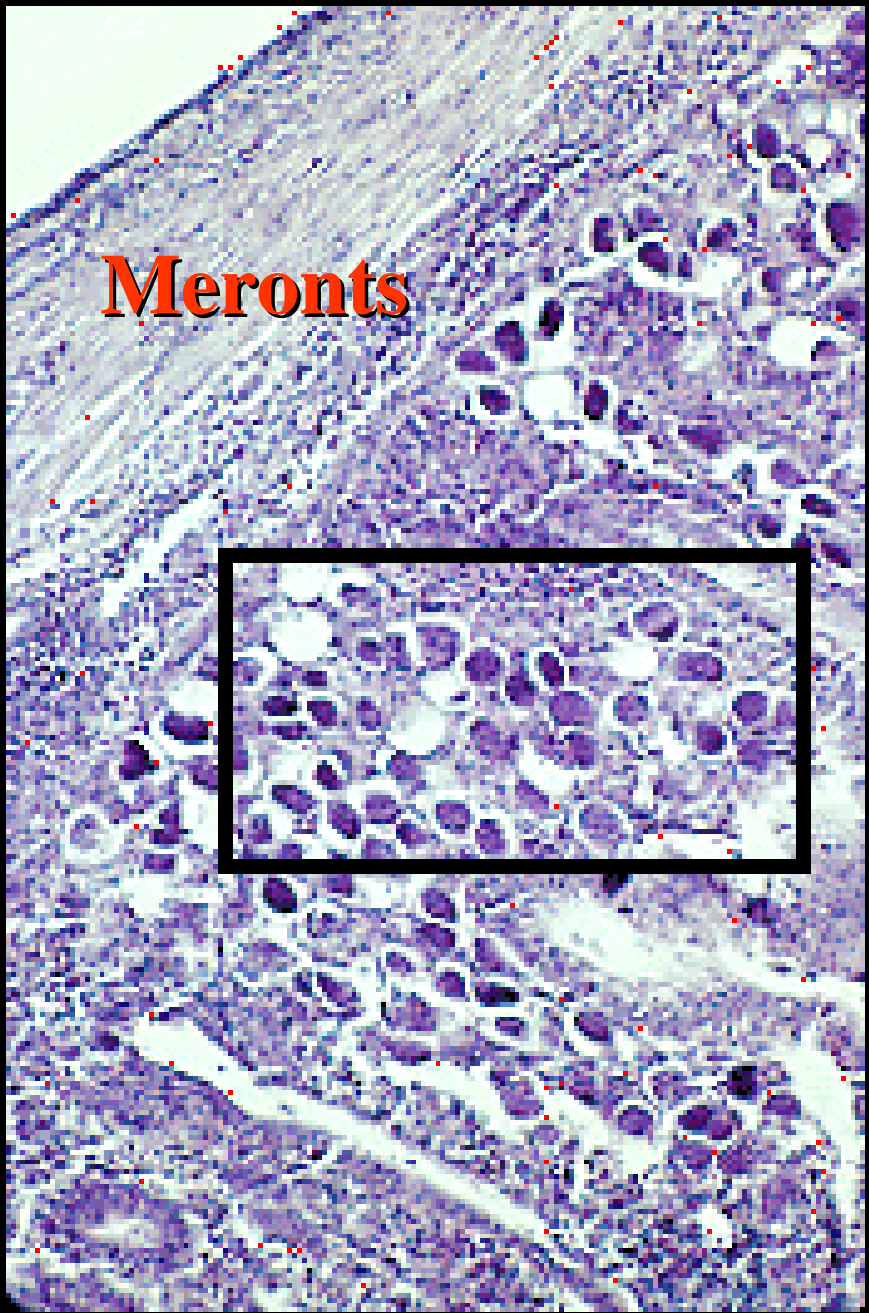


Dead sheep: diagnosis = Trichostrongylosis

Coccidia

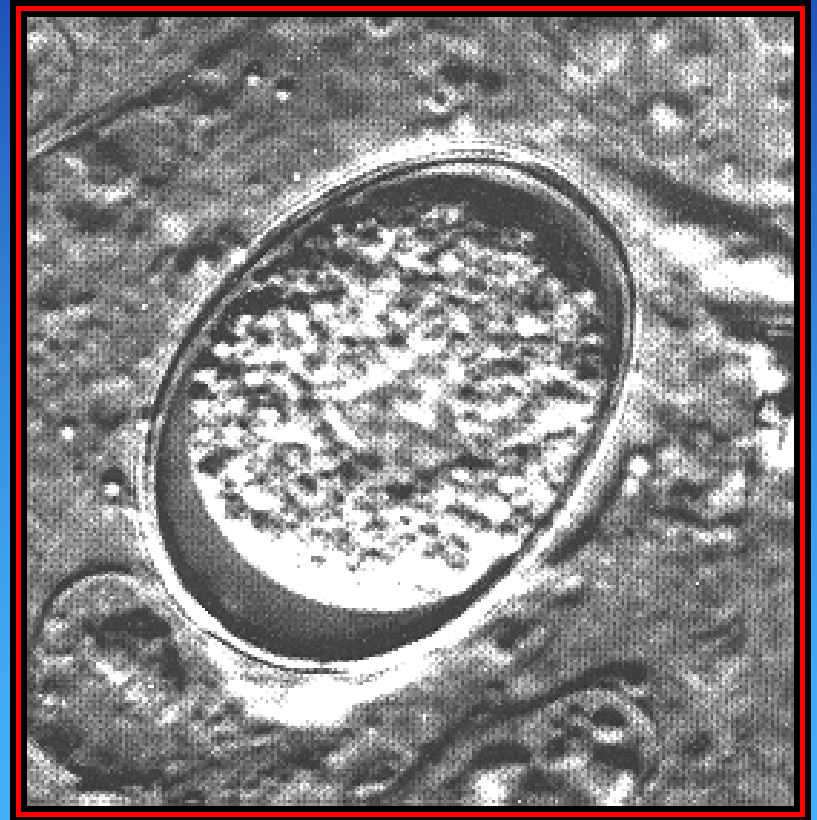
- **Passed in feces of infected goats to kids**
- **Life cycle takes 3 weeks**
- **Symptoms include:**
 - **Diarrhea (sometimes bloody)**
 - **Severe weakness**
- **Prevention:**
 - **Coccidiostats: Deccox, Bovatec, Amprolium**
 - **Separate older animals from young**



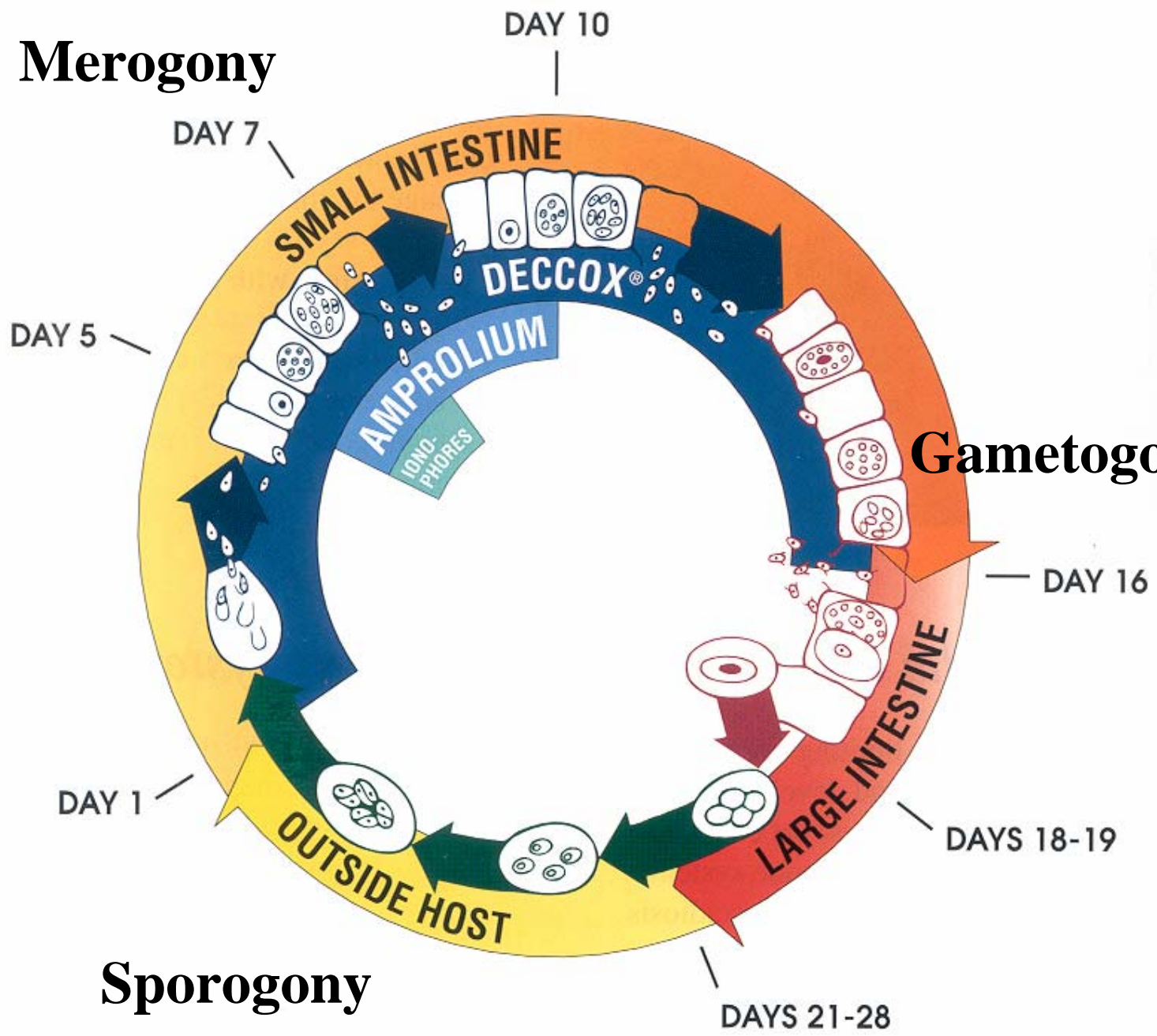


Coccidian Oocyst

- Fusion of micro- and macrogametes produces zygote
- Zygote extruded from cell and forms cyst wall
- Cyst wall makes egg very resistant within environment
- Not infective until sporulated



Merogony



Gametogony

Sporogony

Parasite Diagnosis

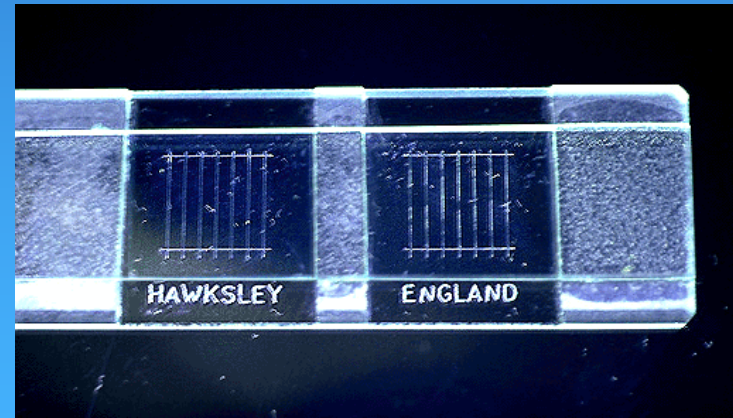
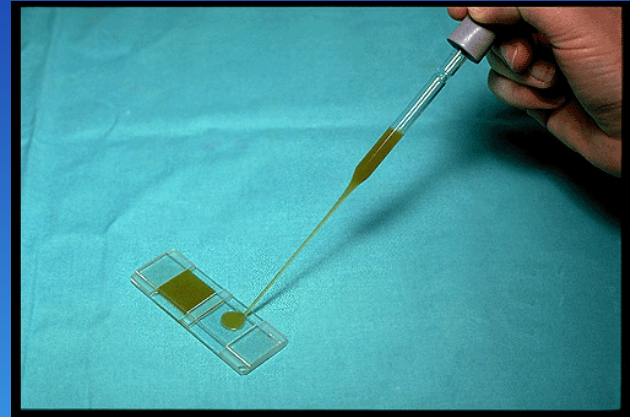
- McMaster Egg counts
- Most common technique used
- Relies on the use of a floatation fluid in which eggs float and heavier debris in feces sinks
- Floatation fluid needs to be at least Sp. Gravity of 1.2
- Common floatation media are various salt solutions including
 - Saturated common salt (NaCl)
 - Sodium nitrate (specific gravity of 1.2)
 - Sugar

Fecal Egg Counts



Fecal Egg Count

- Count all eggs within grid (10x power)
- Count second grid
- Add counts per grid
- Divide by 2
- Multiply by 100
- Result is #eggs per gram feces



Fecal Egg Counts

- Recommendations are a cut-off value of 1000 eggs/g indicates the goats need treating
- Goats can die with egg counts of only 2000 eggs/g so be careful
- Haemonchus is a very prolific egg layer with about 6000 per day but Trichostrongylus only produces about 600 per day and Nematodirus many fewer than this
- The immune response can reduce the ability of individual worms to produce eggs so more eggs per worm in young than old, especially with sheep

FAMACHA System

- Clinical identification of developing anemia
- Scoring system for scleral color
- Score 1: **Normal**
- Score 2:
- Score 3:
- Score 4:
- Score 5: **White**



FAMACHA Advantages

- Decrease in the amount and frequency of treatment for the majority of the herd
- Slows the development of anthelmintic (dewormer) resistance
- Allows owners to identify and cull chronically heavily parasitized goats
- It is relatively cheap, if labor costs are not considered
- As goats are examined more frequently, other problems that might have gone unnoticed are identified earlier

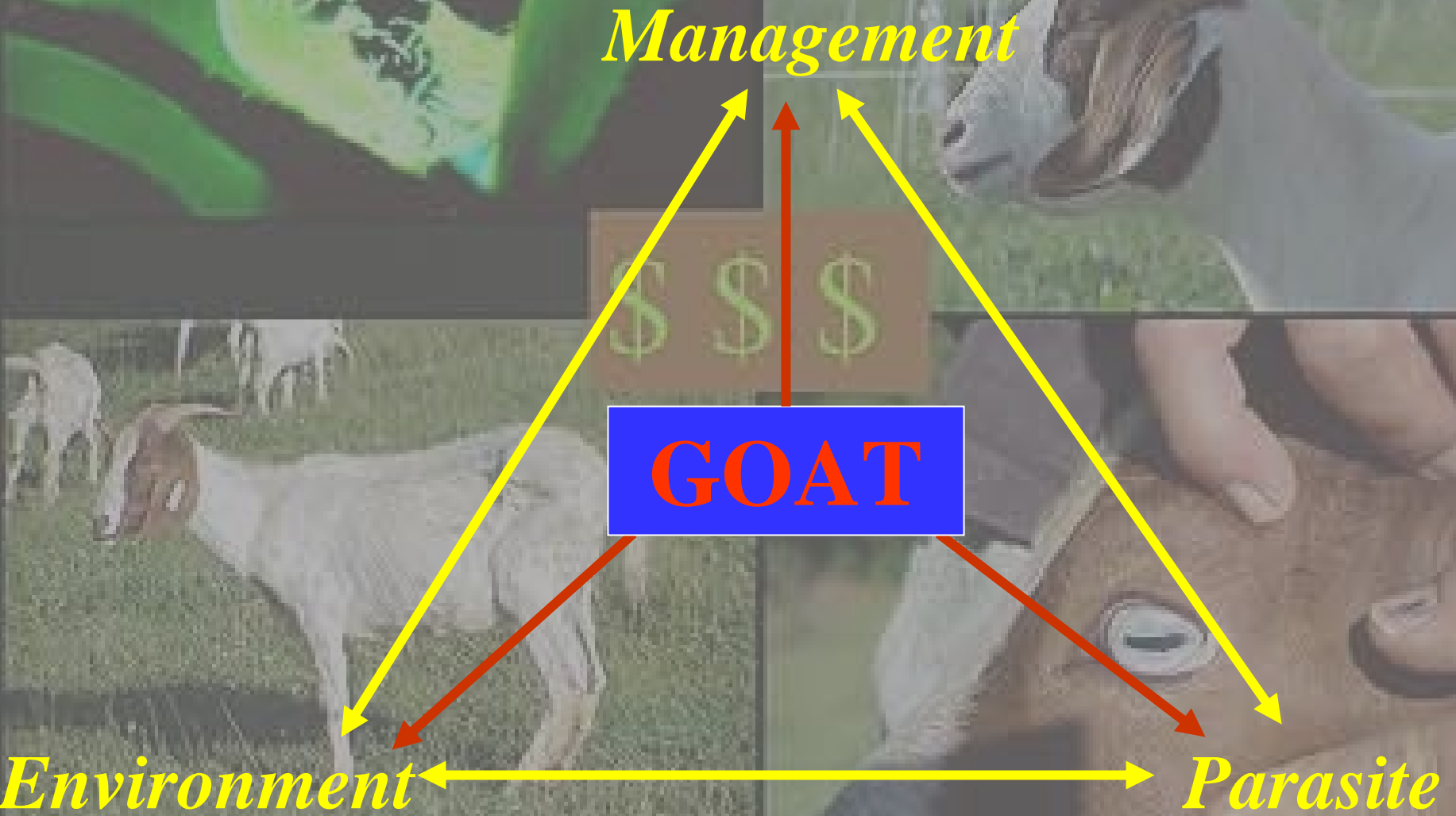
FAMACHA Disadvantages

- System is only for *H. contortus* infestations, the primary internal parasite of goats in the southeastern U.S.
- Flock fecal egg counts should be monitored every 4-6 weeks
- Not specific as other causes of anemia exist

FAMACHA Disadvantages

- Goats must be regularly monitored (every 2-3 weeks) to keep a check on developments
- Some animals are more susceptible and may need special attention (kids, pregnant does)
- Cannot be used alone, to be used in conjunction with a properly designed worm control program
- Proper training is imperative before using this system

Parasitic Diseases



Parasite Control Programs

- **Goals of a program:**
 - **Treat animals before they show clinical signs**
 - **Maintain a “safe pasture” system**
 - **Prevent or minimize overwintering load or periparturient rise**
 - **Tailored to the herd**
- **Drug (anthelmintic) therapy alone is not a successful control program**

Anthelmintic Considerations

- Approved drugs
- Efficacy against
 - Adult parasite
 - Larval forms
- Dosage
- Oral vs. Injectable
- Withdrawal times
- MUMS Act
- Resistance
- Combination therapy



Anthelmintic Agents

Product	Dosage	Withdrawl
Thiabendazole (TBZ)	44 mg/kg	30 days*
Fenbendazole (Safe-Guard)	5.0 (10) mg/kg	6 days*
Oxfenbendazole (Synanthic)	5.0 mg/kg	6 days
Albendazole (Valbazen)	7.5 mg/kg	27 days
Ivermectin (Ivomec Drench)	0.2 mg/kg	56 days
Doramectin (Dectomax)	0.2 mg/kg	56 days
Eprinomectin (Eprinex)	0.1 mg/kg	0 days
Ivermectin (Ivomec Plus)	0.2 mg/kg	56 days
Levamisole (Levasole)	8.0 mg/kg	10 days
Morantel tartrate (Rumentel)	10 mg/kg	30 days
Pyrantel pamoate (Strongid T)	25 mg/kg	30 days

Control Approaches

- **Strategic**
 - **Fall/Spring deworming**
 - **Aimed at dormant worms and spring rise**
- **Tactical**
 - **Treat according to potential problems**
 - **Weather conditions**
 - **Movement to new pastures**
- **Opportunistic**
 - **Treat when available, independent of need**
- **Individual**

Control Approaches

➤ **Suppressive**

- **Repeated doses at regular intervals with no management change**
- **Expensive and selects for resistance**
- **Prevents good immunologic response in animal**

➤ **Salvage**

- **Therapeutic treatment to prevent death**

Anthelmintic Resistance

- Commonly seen in goats from southeastern US
- Under dosing of drug
 - Underestimate individual body weights
 - Goats have higher metabolism – require 1.2-1.5x sheep dose, unless specified for goat
- Overuse
 - Limited available drugs
 - Rapid rotation of drug (within grazing year)
- Use of injectable products

Anthelmintic Resistance

- **Determination of:**
 - **Determine FEC**
 - **Weigh and treat**
 - **Determine FEC 7-10 days later**
 - **Expect >90% reduction without resistance**
 - **Best to maintain a couple of nontreated control animals to assess if other factors involved**

Alternative Therapies

- Nicotine
- Turpentine
- Herbal medications
 - Worm wood
 - Many others
- Diatomaceous earth

Although there seems to be anecdotal evidence for efficacy, not controlled clinical studies have proven these compounds to be effective.

Management Alternatives

- Grazing other species
- Limit grazing, force browsing
- Reduce stocking density
- Clip and drag pasture – hay crop
- Maintain good nutrition (e.g., immunity)
- Dung destroying insects
- Select for resistance
- Graze plants high in tannins
- Combination therapy

Recommendations

- **Ensure anthelmintic efficacy (kills at least 90% of the available worms)**
- **Deworm the herd during the period the worms are in hypobiosis and are being transmitted at low levels**
- **Utilize clean or safe pastures when possible; the aftermath of crops, annual forages, rotational or co-grazing with cattle or horses**

Recommendations

- **Do not rotate anthelmintics within year, but use until evidence suggests there is resistance**
- **Deworm new animals, place them in a non-pasture environment such as a dry lot of barn after treatment and only allow them to forage after they are checked for the presence of worm eggs and none are found 7 to 14 days after treatment.**

Recommendations

- Selection of livestock resistant to worms, zero grazing systems or other suggestions may be ideal for some herds but not at all practical for others
- Interactions among parasites, hosts and environment are complex so there are no simple answers to everyone's problems



Questions

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