Cornell University
College of Veterinary Medicine

Internal Parasites of Sheep and Goats

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- References:
- Foreyt WJ 1997 Veterinary Parasitology Reference Manual 4th ed SCAVMA
- Georgis' Parasitology for Veterinarians 10e, Bowman ed, Saunders 2014
- Merck Veterinary Manual https://www.merckvetmanual.com
- http://www.goatbiology.com/
- http://blogs.cornell.edu/smallruminantparasites/
- https://www.wormx.info/ American Consortium for small ruminant parasite control
- https://web.uri.edu/sheepngoat/ NE Small Ruminant Parasite control
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Know the problem!

WHY????

- Understand parasites lifecycles
- Infection method
- Identify infected animals
- Prevent others from getting infected
- Interventions/Disrupt cycles
- Efficacy - What may or may not work

Parasites of Sheep

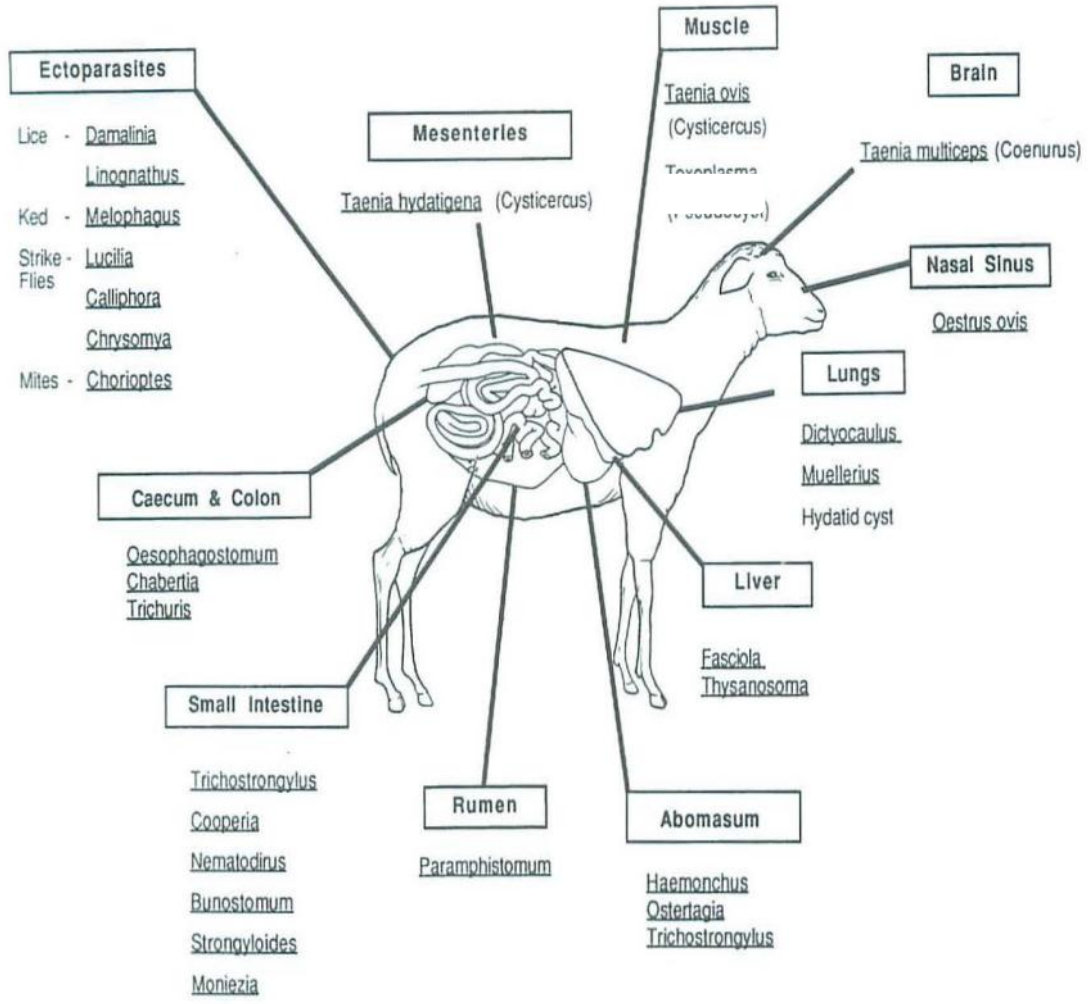
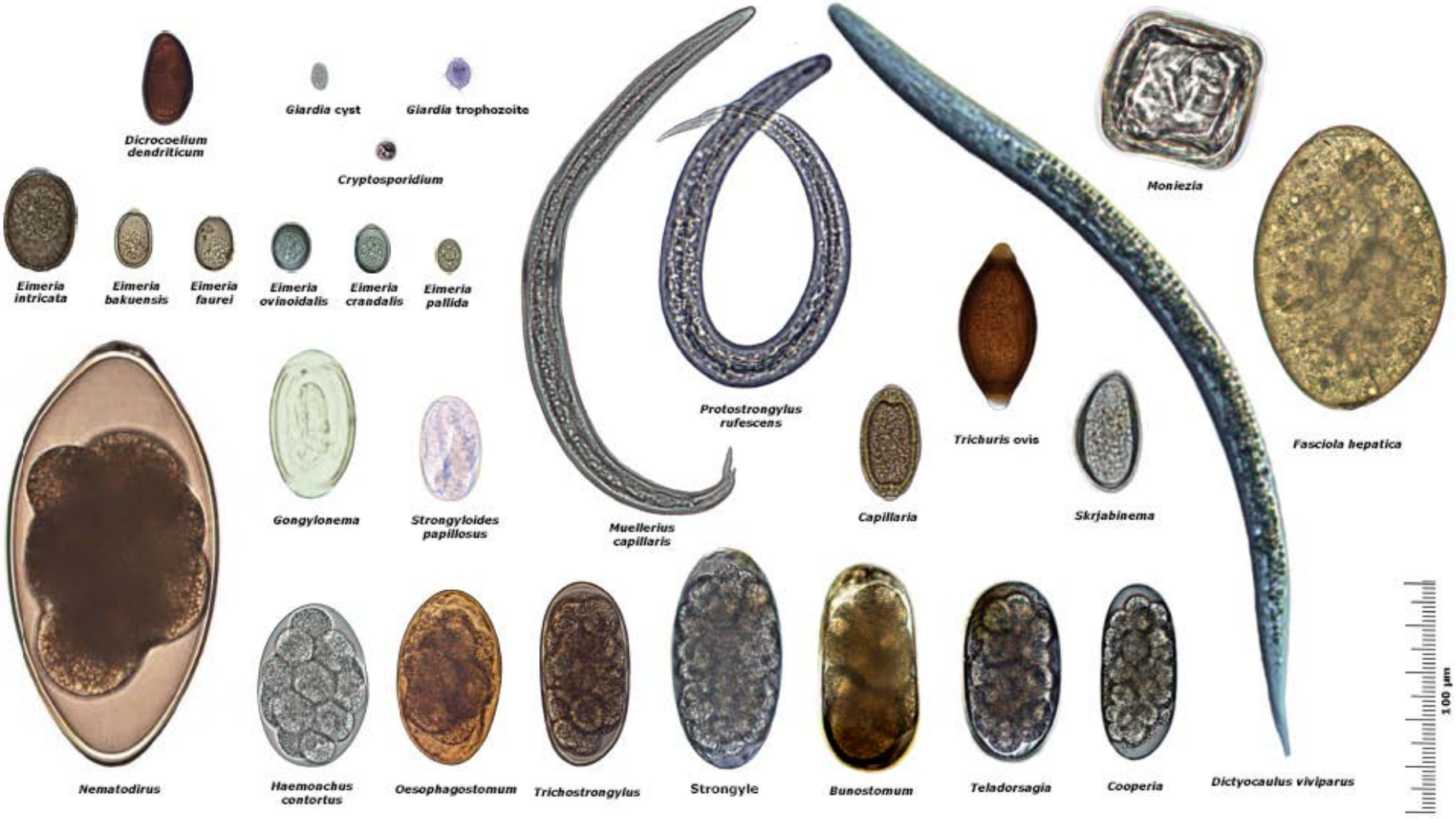


Fig 74. Locations of the major parasites found in sheep (Most of these are also in goats).

Foreyt WJ 1997 Veterinary Parasitology Reference Manual 4th ed SCAVMA

Stages in Sheep Feces



A few NOT found in sheep/goat feces

- Toxoplasma gondii
- Fascioloides magna
- Parelaphostrongylus tenuis
- Echinococcus granulosis

Parasites of Sheep

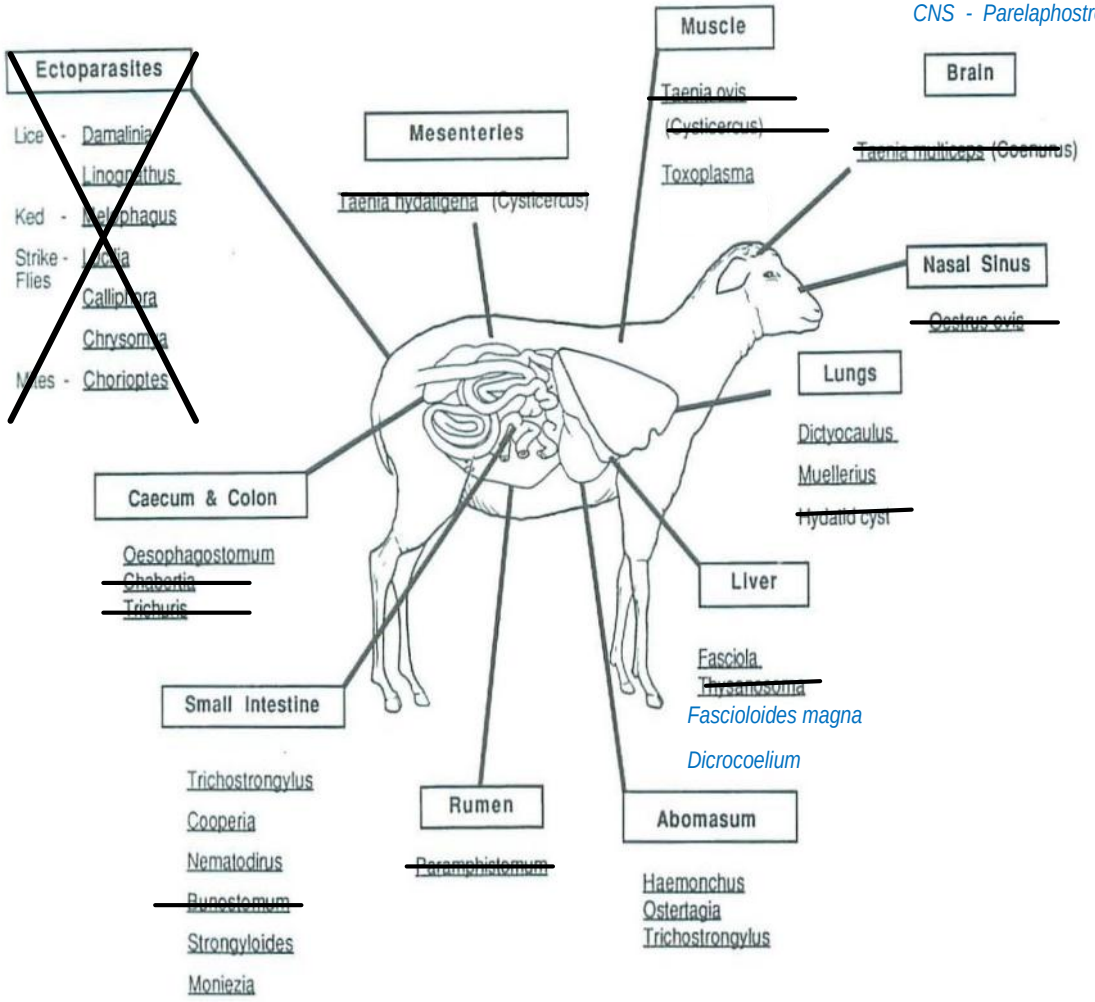


Fig 74. Locations of the major parasites found in sheep (Most of these are also in goats).

Internal Parasites Summary Table Sheep and Goat Workshop

Note: This is NOT a complete list of sheep and goat parasites this is ONLY a summary of what was presented at this workshop.

Scientific name	Common name	Location	Method of infection	Clinical Symptoms/Disease
Protozoan				
Eimeria spp.	Coccidia	Small and Large Intestine	Ingestion of infectious oocyst	"mucky butt' in lambs; Diarrhea with or without mucus or blood, dehydration, emaciation, weakness, anorexia, and death.
** Cryptosporidium spp.	Coccidia	Small Intestine	Ingestion of infectious oocyst	Diarrhea, more in neonates
** +Toxoplasma gondii (intermediate Host)	Toxoplasmosis	Muscles and brain	Ingestion of infectious oocysts – hay or grain contaminated with cat feces	Abortions, stillbirth, weak kids (depend on timing of infection) crosses the placenta
Platyhelminths (Trematodes & Cestodes)	Flat worms (flukes and tape)			
Moniezia	Tapeworm	Small Intestine	Ingestion of infected free living pasture mite	Relatively nonpathogenic, but heavy infections can result in mild thriftiness and GI disturbances, bowel obstruction and cause death (rare)
Fasciola hepatica	Common liver fluke	Migrates through liver to Bile Duct	Metacercaria encysted on vegetation	Anemia unthriftiness, may be fatal
+ Fascioloides magna	American Deer fluke, Giant liver fluke	extensive migration in liver , not maturing	Metacercaria encysted on vegetation	Does not mature extensive migration in liver causing hemorrhaging and death, no eggs in feces
Dicrocoelium	Lancet fluke , Lesser liver fluke	Bile duct	Infected Ant	Cirrhosis (scarring of the liver) can develop, and the bile ducts may be thickened and distended
Nematodes	Roundworms			
Haemonchus contortus	Barber pole worm	Abomasum	Ingestion of infectious Larva (L3)	Anemia, Bottle Jaw, High EPG
Teladorsagia (Ostertagia) spp	Brown stomach worm	Abomasum gastric glands	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Trichostrongylus axei	Small stomach worm/ Bankrupt worm	Abomasum	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Bunostomum	Hookworm	Small intestine	Ingestion of infectious Larva (L3) or skin penetration	Rarely causes disease, Large numbers diarrhea, anemia, sore feet at hairline - skin penetration point

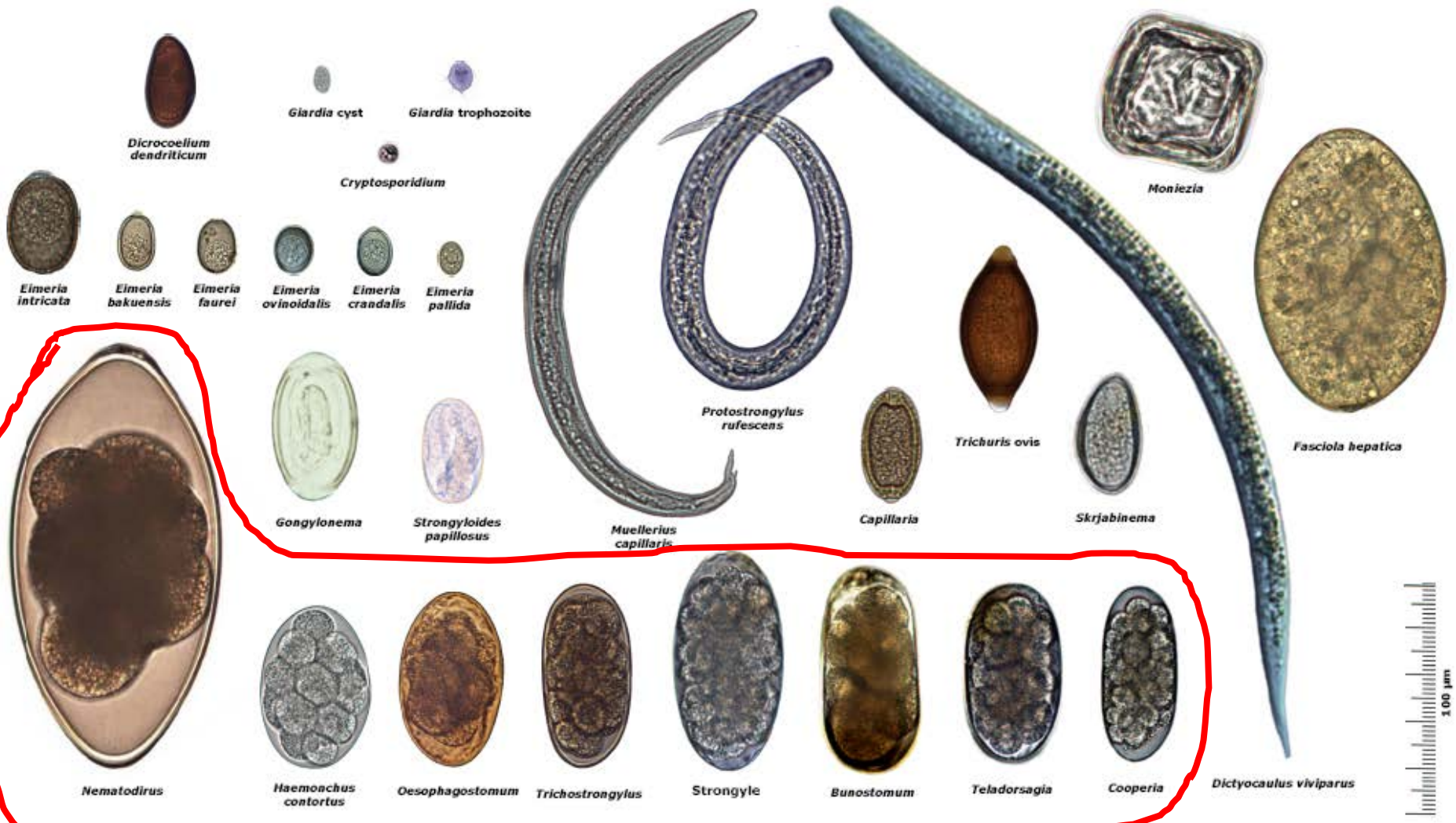
Scientific name	Common name	Location	Scientific name	Common name
Cooperia spp.	Intestinal worm	Small intestine	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Strongyloides papillosus	Intestinal threadworm	Small intestine	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Trichostrongylus colubriformis	black scour worm/ hairworm	Small intestine	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Nematodirus spp.	Thread-necked worm	Small intestine	Ingestion of infectious Larva (L3)	Diarrhea, pot-belly, poor coat
Oesophagostomum	Nodular worm	Large intestine	Ingestion of infectious Larva (L3)	Diarrhea, excess mucus with blood, weak, weight loss intermittent diarrhea and constipation, stilted gate often humped back
Chabertia ovina	Largemouth bowel worm	Large intestine/colon mucosa	Ingestion of infectious Larva (L3)	Infected sheep are unthrifty; the feces are soft, contain much mucus, and may be streaked with blood
Dictyocaulus	Lung worm	Lumen of the bronchial tree	Infective L3 larva	bronchitis or pneumonia, coughing
Muellerius	Lung worm	Embedded in lung tissues	Snail intermediate host	bronchitis or pneumonia, coughing
Protostrongylus	Small red lung worm of sheep		Snail intermediate host	bronchitis or pneumonia, coughing
+ Parelaphostrongylus tenuis	Deer Brain Worm	CNS	Ingestion of infectious Larva (L3) (snails)	Neurological symptoms such as Paralysis & incoordination, larva cause severe inflammation to CNS,

** Zoonotic
+ Not shed in feces

References:
Foreyt WJ 1997 Veterinary Parasitology Reference Manual 4th ed SCAVMA
Georgis' Parasitology for Veterinarians 10e, Bowman ed, Saunders 2014
Merck Veterinary Manual https://www.merckvetmanual.com

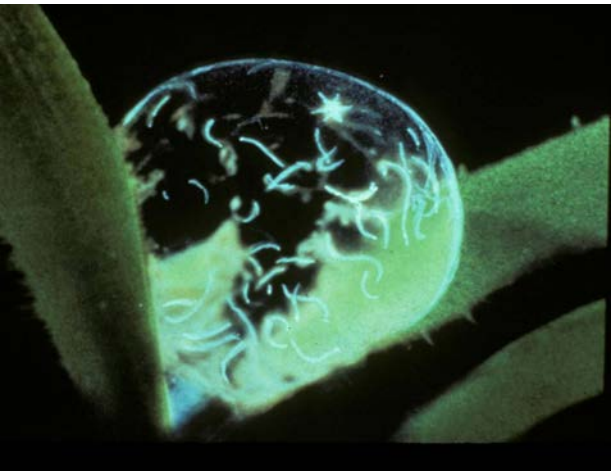
Resources: http://www.goatbiology.com/animations/parasites.html

Stages in Sheep Feces



Basic Life Cycle Strongylid Nematodes

Direct life cycle



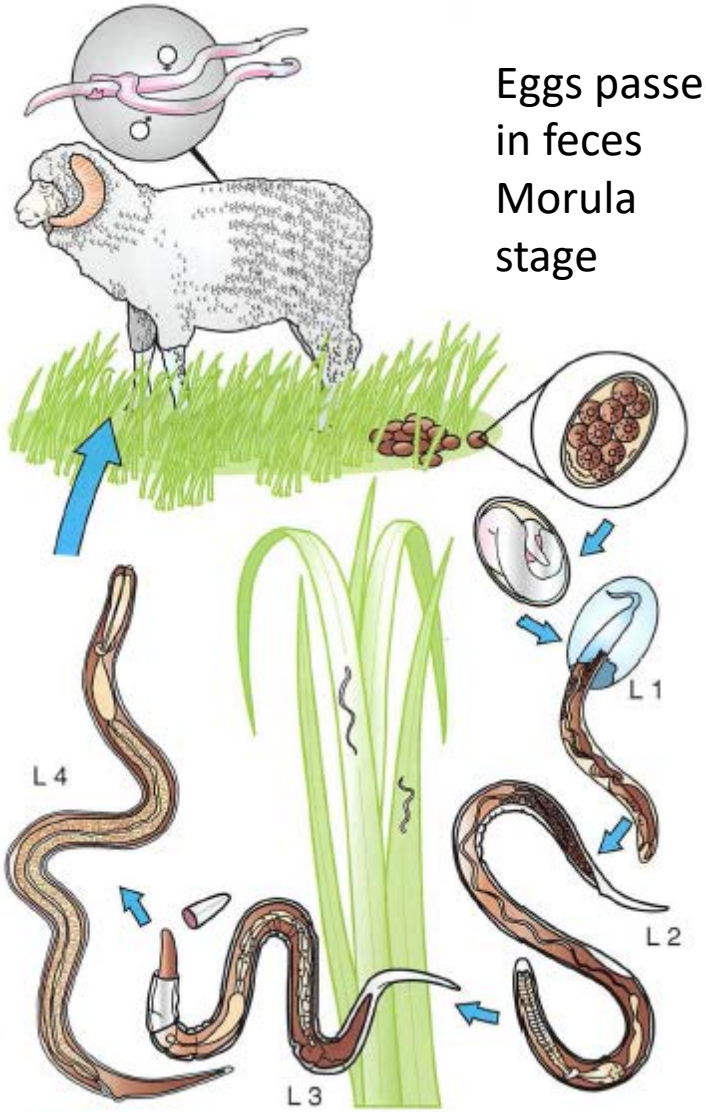


FIGURE 4-73. Life history of a typical strongylid nematode, *Haemonchus contortus*. Eggs are shed in the feces in the morula stage of development. First-stage larvae develop and hatch in a day or two to feed on microorganisms in the feces. After a molt, the resulting second-stage larva also feeds on microorganisms. The second molt is started but not completed in the external environment, so the infective third-stage larva remains encased in the cuticle of the second stage until it is ingested by a sheep. The sheath is cast off in the abomasum of the sheep, and the now parasitic third-stage larva undergoes a molt to the fourth stage. The fourth stage sooner or later molts to the fifth or adult stage, depending on whether it enters a period of arrested development.

Eggs passed in feces Morula stage

Feces is a nice place moisture, warmth, and food

Larva develops and hatches 1-6 days depending on temperature/humidity

L1 free living eats bacteria in feces grows & molts (sheds skin like a snake)

L-2 free living eats bacteria, grows but does not shed its skin/cuticle – keeps it = L3

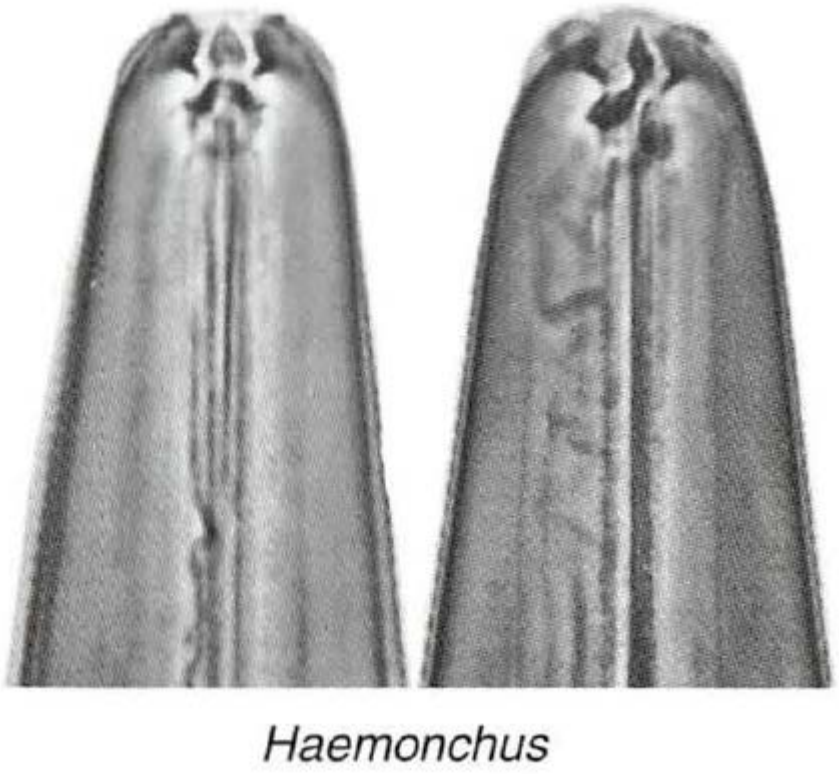
Cuticle protects L3 drying out
L3 does not eat; EATEN BY SHEEP

Haemonchus contortus
Barber pole worm

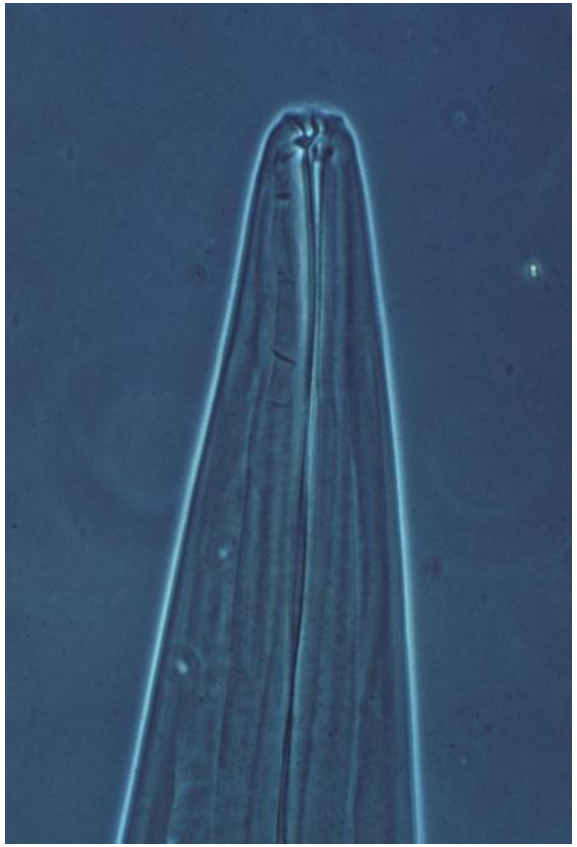
- Blood sucking – lancet pierces **abomasum** mucosa
- 50 ul of blood lost/worm/day beginning 6 days after infection
- lambs may lose 1/10th to 1/5th of blood volume per day
- Blood Plasma and protein Loss
- Short generation time < 3 weeks
- Heavy egg producer 5000-10,000egg/worm/day

Kaplan RM. 2010. Small ruminant recommendations for control of parasites. Large animal. Proceedings of the North American Veterinary Conference, Orlando, Florida, USA, 16-20 January 2010 Pages: 348-356

Haemonchus Lancet

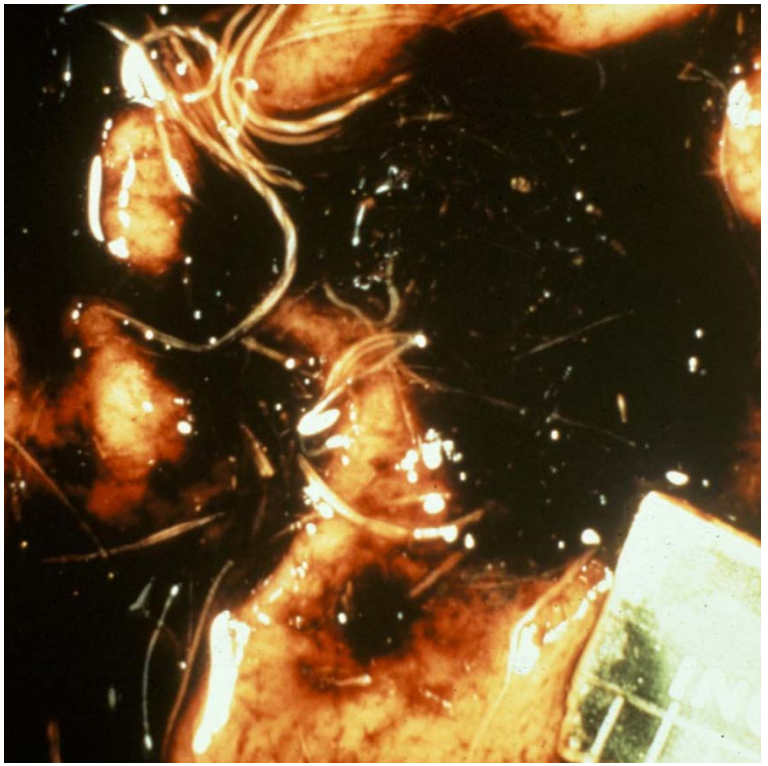


Haemonchus



From Whitlock JH: *Diagnosis of veterinary parasitisms,* Philadelphia, 1960, Lea & Febiger.)

Haemonchus



Adult males red, females - white ovaries wrapped around intestine of worm giving a barber pole appearance

Adults are = 1-3 cm long

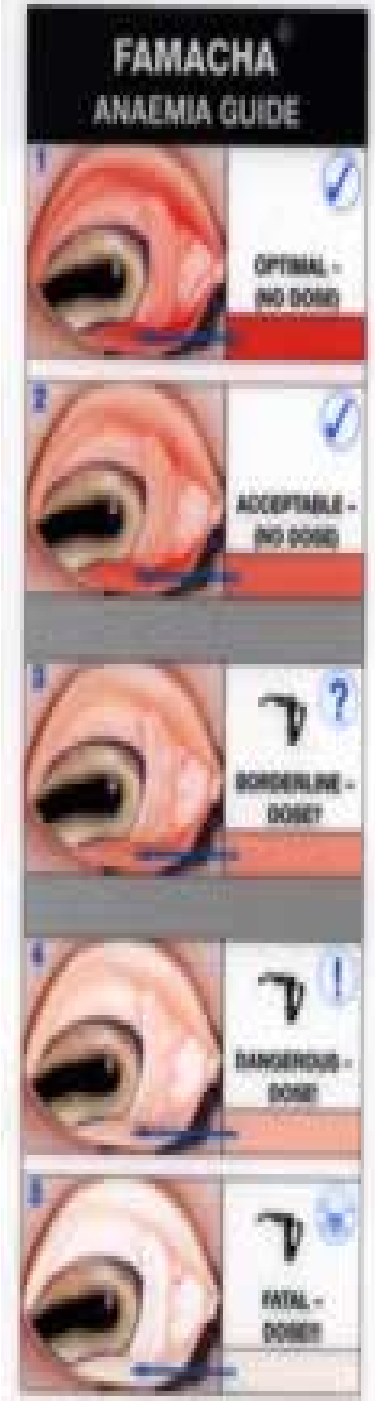
Clinical Symptoms

- Anemia
- Bottle jaw
- High fecal egg counts with anemia
- Feces often well formed
  may even have constipation (of course, with mixed infections with Trichostrongylus & Teladorsagia may have diarrhea)

FAMACHA

- LIVING WITH WORMS

- FAffa MAlan CHArt



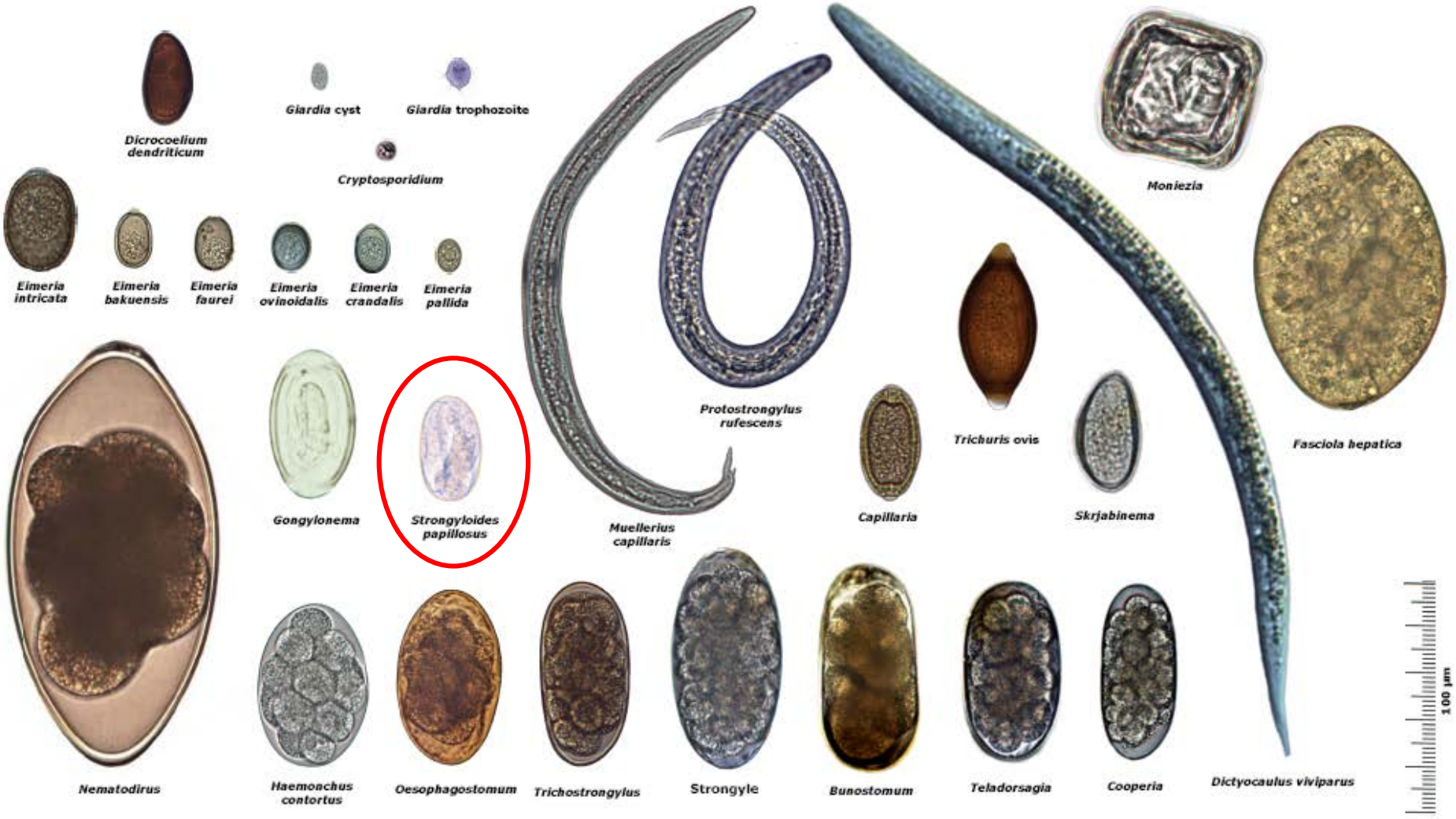
Other Strongyles

- *Nematodirus* – very large egg (develops to L3 in egg then hatches)
- *Trichostrongylus* spp.
- *Teladorsagia (Ostertagia)*
- Cooperia spp.
- Oesophagostomum spp
- Bunostomum

- Direct life cycle
- Eggs indistinguishable from one another except Nematodirus
- Eggs/Larvae tolerate cold temperatures and some even overwinter on pasture
- **Clinical Symptoms:**

  scouring, weight loss, rough hair coat, ill thrift

Stages in Sheep Feces



Strongyloides Papillosis

(INTESTINAL THREAD WORM)

- **Complicated life cycle**

  Asexual and sexual

  ***Larvated egg passed in feces – collect fresh feces**

- **Infection methods:**

  ingestion –

  L3 pasture,

  Dam's milk if larvae migrate to her udder

  Pentration of skin

  (i.e. hairline above the hoof in muddy, infected pasture, shed or barn)

  Transmammary transmission
  (larvae migrate through the placenta)

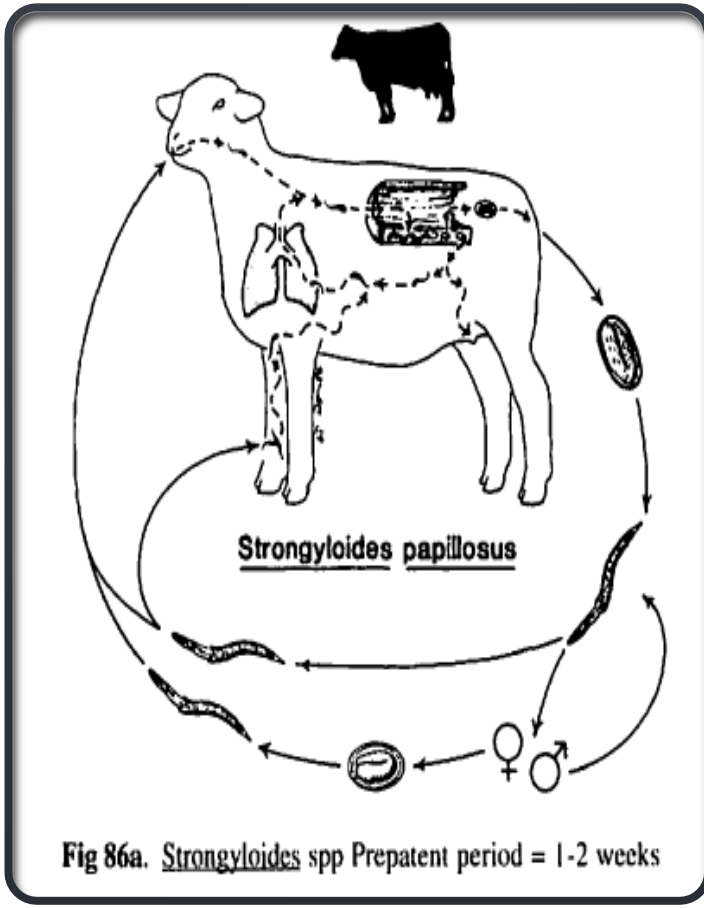


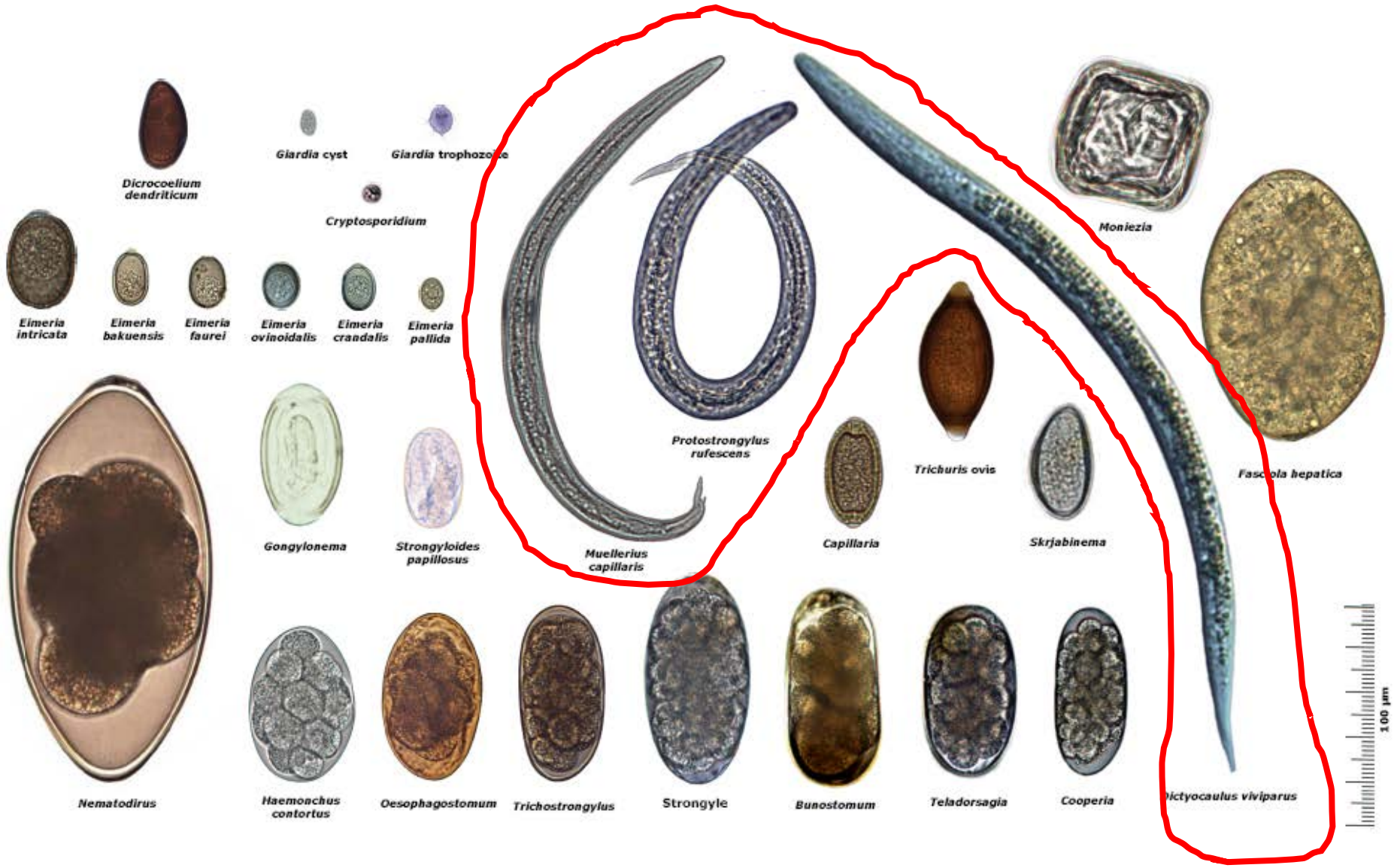
Fig 86a. Strongyloides spp Prepatent period = 1-2 weeks

- **Not infectious to people**

Strongyloides Papillosis

- Penetrating larvae cause lesions on feet of lambs, predisposing to foot rot
- Rarely, may have death in lambs due to erosion of the intestinal mucosa
- **Symptoms – diarrhea, coughing → pneumonia if lungs infected by migrating larvae**
- **Larvae are sensitive to cold and dryness**
- **Same control program as stomach and intestinal worms.**

Stages in Sheep Feces



Dictyocaulus (Lung worm)

- direct life cycle
- Bronchitis and Emphysema
- Frothy white mucus in airways
- Parasitic pneumonia - caused by aspiration of eggs and larvae into the alveoli

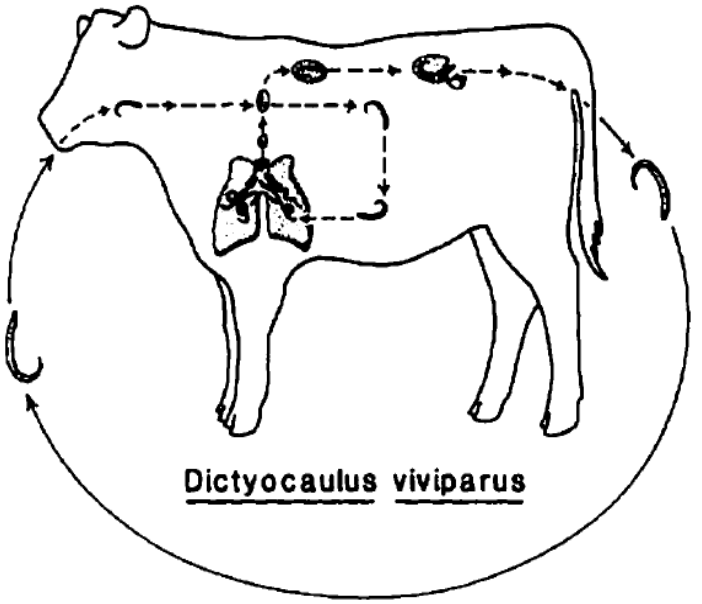
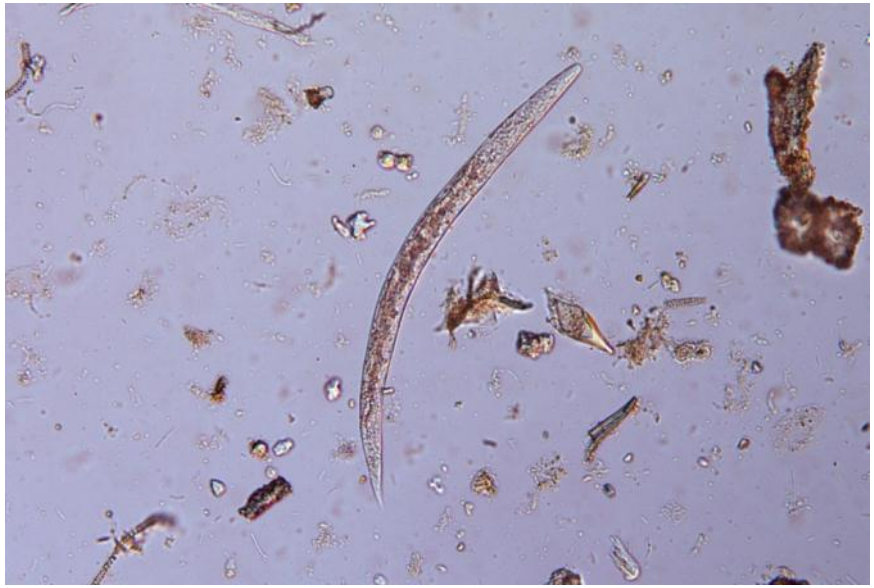
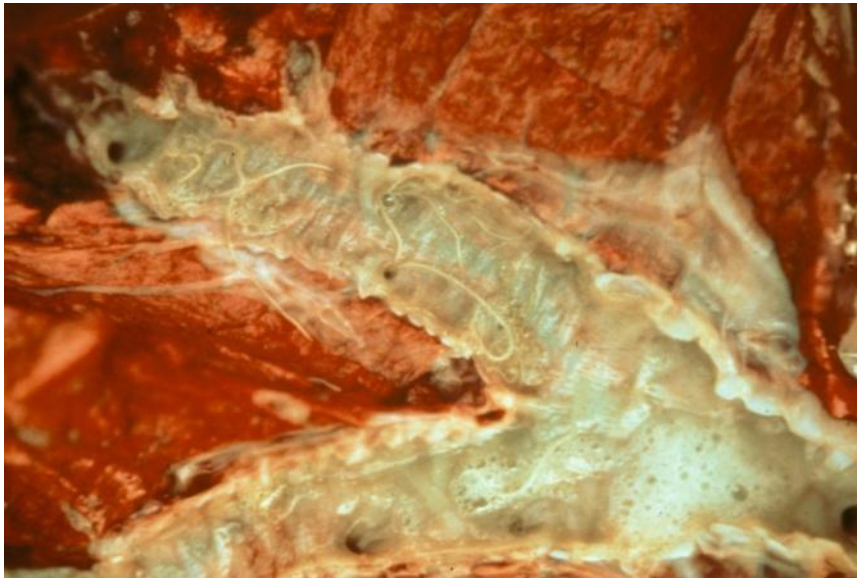


Fig 94a. Dictyocaulus viviparus (cattle) Dictyocaulus filaria (sheep) Prepatent period = 4 weeks (22-25 days)

Dictyocaulus



Larvae in feces



Adults in Lumen of the bronchial tree

Take fecal sample direct from animal
(otherwise can confuse with soil nematodes)

Muellerius & *Protostrongylus* more lung worms

- **Indirect life cycle**
- eggs laid in lung, larva hatches, coughed up and swallowed, passed as larva in feces
- **penetrate snail and develop to infective third stage**
- host eats snail while grazing
- larvae enter lymphatics - right heart to lung
- adults in small bronchi
- PPP = 5 to 6 weeks

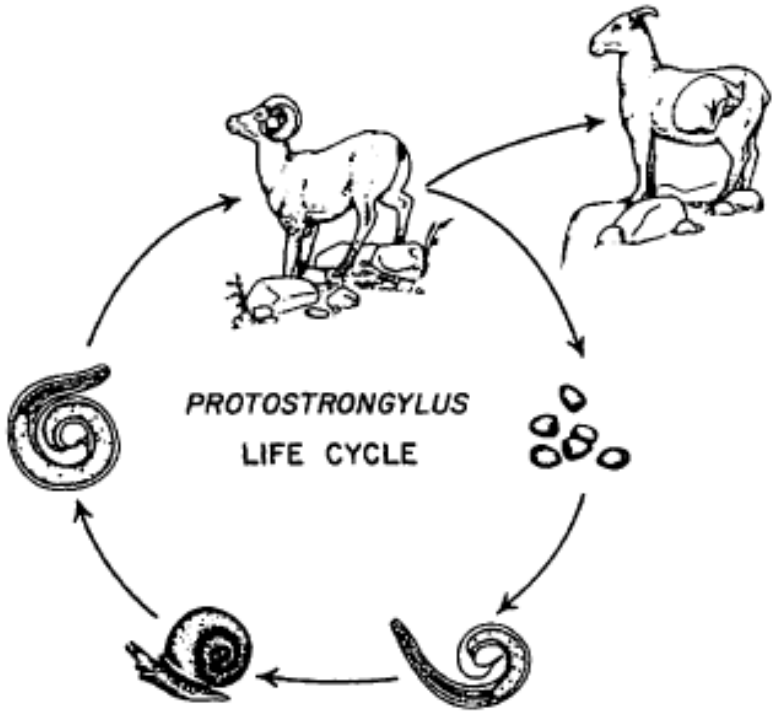


Fig 214a. Protostrongylus spp

Lungworms

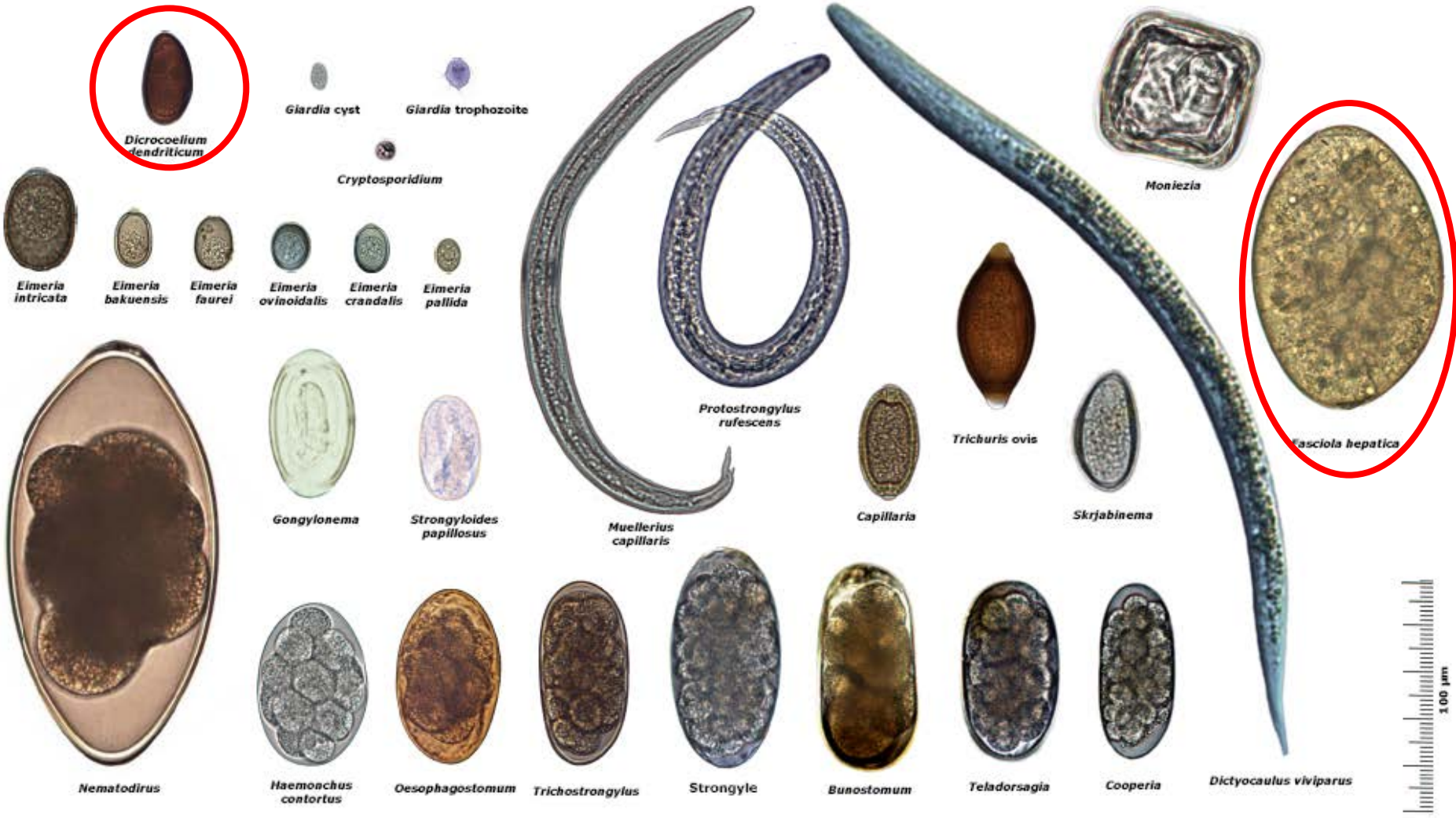
- Indirect or direct life cycle
- Severe infestations cause coughing, fluid in lungs, pneumonia
- Transmitted in feces
- **Take fecal sample direct from animal (otherwise can confuse with soil nematodes)**
- Same control program as stomach and intestinal worms.

PARELAPHOSTRONGYLUS TENUIS

(DEER MENINGEAL/BRAIN WORM)

- Meningeal worm of the white-tailed deer
  - adults 6 to 10 cm long
  - Indirect life cycle typical of metastrongyles
    - snail - ingested
    - worm migrates through or along spinal cord to brain to the brain pan.
    - non-pathogenic in deer, however may cause neurological damage in goats, sheep and camelids (alpacas, llamas, etc).
    - WE will talk about this parasite in more detail in part 3 of our presentation

Stages in Sheep Feces



Flukes

- **Indirect life cycles** snail/ant intermediate host
- Fasciola hepatica – common liver fluke
- Fascioloides magna - Deer Fluke
  - nonpatent in sheep/goats **One fluke can kill a sheep**
  - Extensive Migration in liver
  - nonpathogenic in deer and elk
- Dicrocoelium dendriticum - Lancet fluke

Life cycle Fasciola and Fascioloides

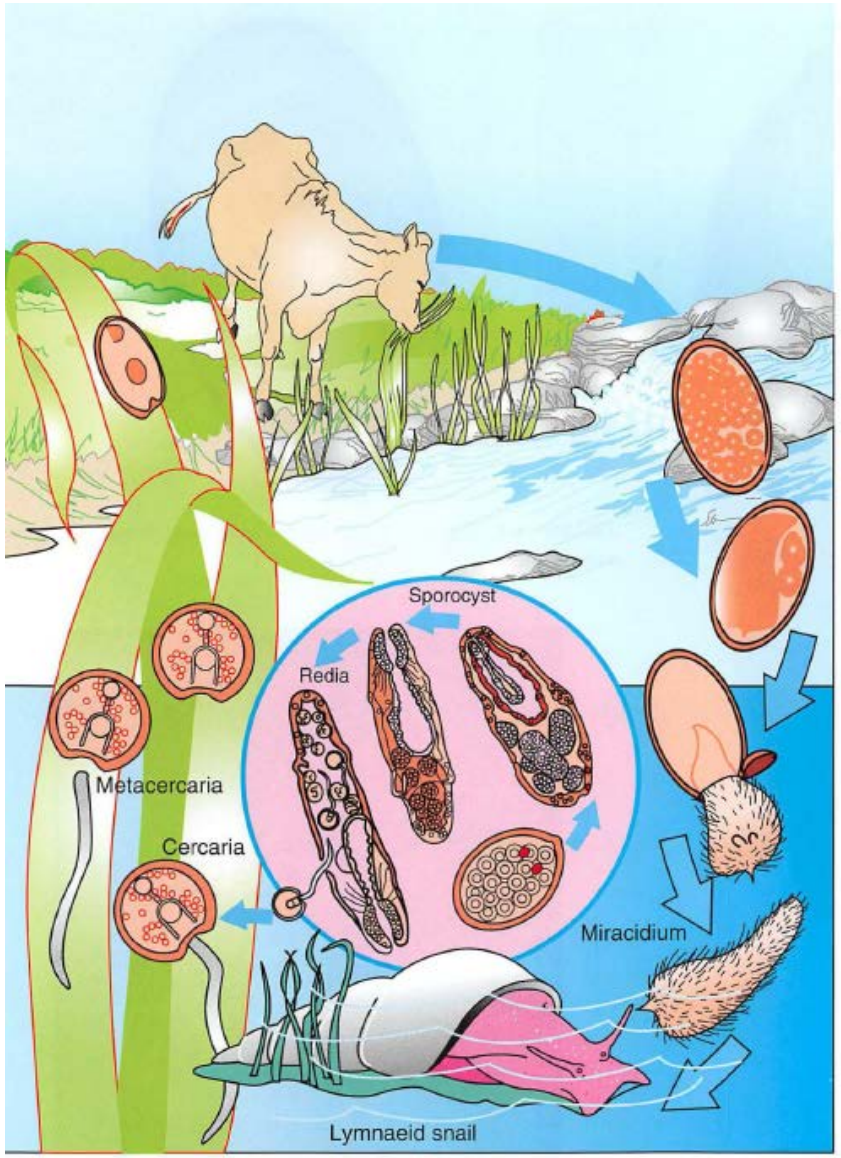


FIGURE 4-1. Life history of *Fasciola hepatica*. Adult liver flukes produce fertile eggs that leave the host by way of the common bile duct and intestinal tract. If these eggs are carried to water, a ciliated miracidium develops within them over a period of several weeks or months, depending on the temperature of the water. On hatching, the miracidia seek certain species of lymnaeid snails, in which they develop and multiply through one generation of sporocysts and two of rediae. Second-generation rediae produce free-swimming cercariae that leave the snail and encyst as metacercariae on various submerged objects, including aquatic vegetation. Ruminants and other animals become infected with *F. hepatica* when they ingest aquatic plants contaminated with metacercariae.

Dicrocoelium dendriticum

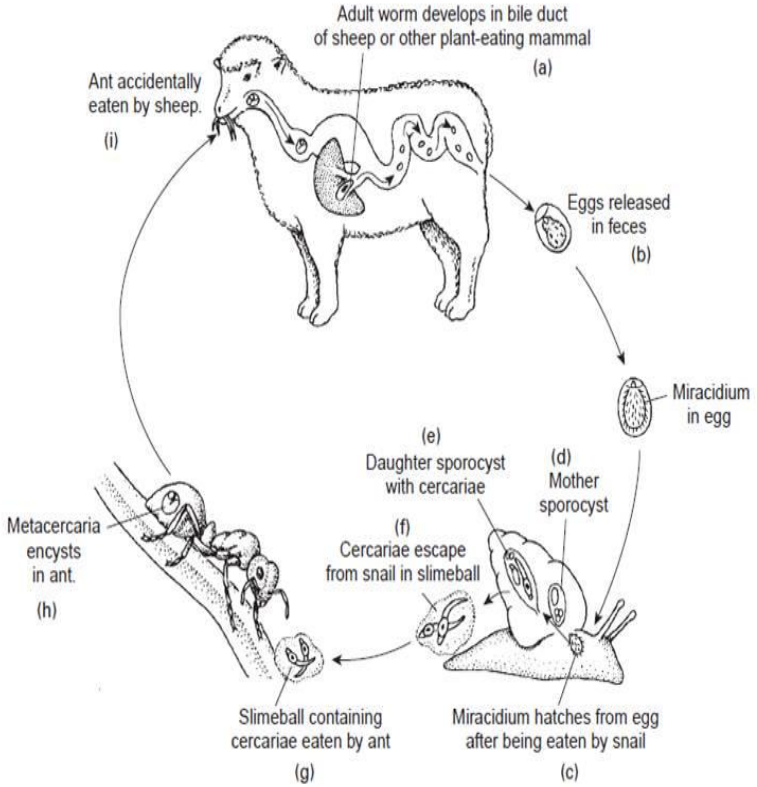


Figure 18.2 Life cycle of *Dicrocoelium dendriticum*.
(*a*) Adult, in bile duct of sheep or other plant-eating mammal. (*b*) Egg released in feces. (*c*) Miracidium hatching from egg after being eaten by snail. (*d*) Mother sporocyst. (*e*) Daughter sporocyst. (*f*) Cercariae escaping from snail in slimeball. (*g*) Slimeballs containing cercariae eaten by ant. (*h*) Metacercaria encysting in ant. (*i*) Ant accidentally eaten by sheep.
Drawing by William Ober and Claire Garrison.

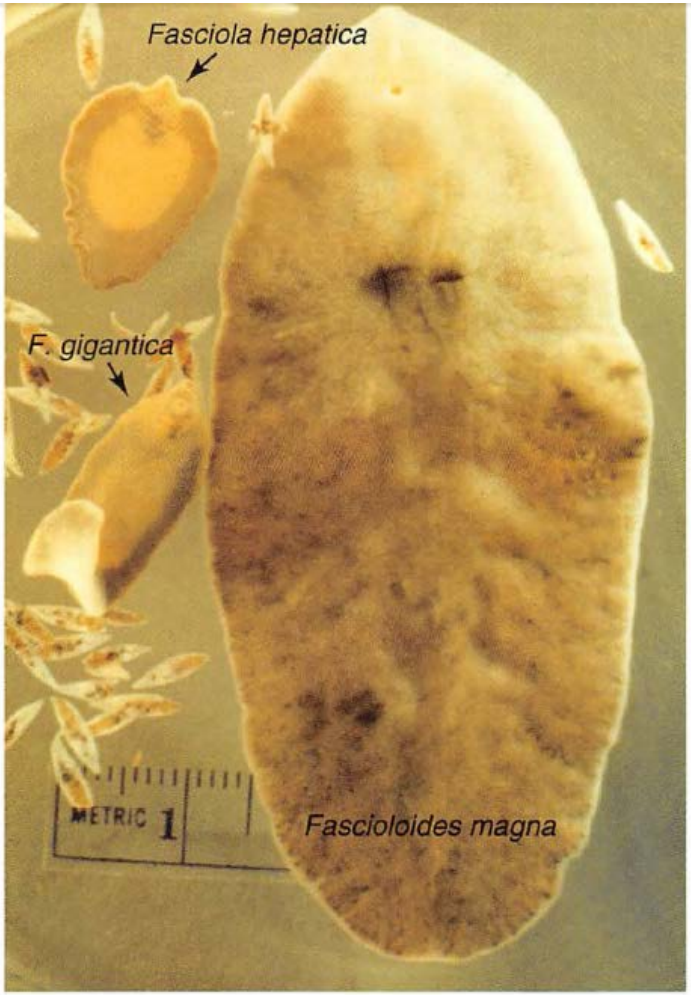
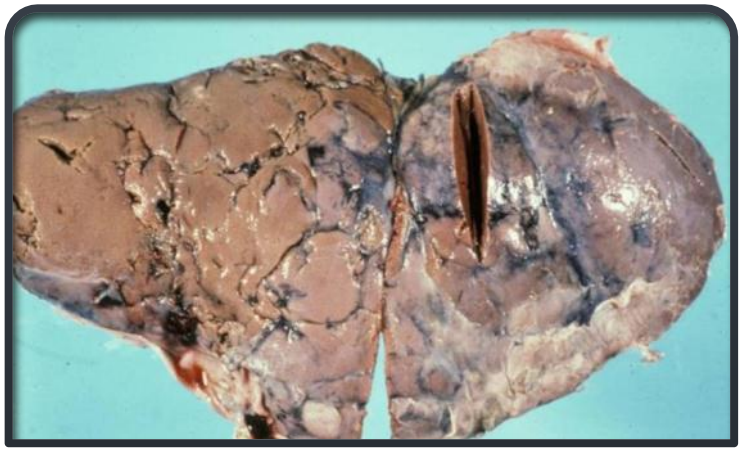


FIGURE 4-11. Liver flukes of ruminants. *Fasciola hepatica, Fasciola gigantica,* and *Fascioloides magna* belong to the family Fasciolidae. The small flukes scattered about are *Dicrocoelium dendriticum* of the family



Destroyed Liver : BLACK or FLUKE pigment deposited by migrating stages

Liver flukes

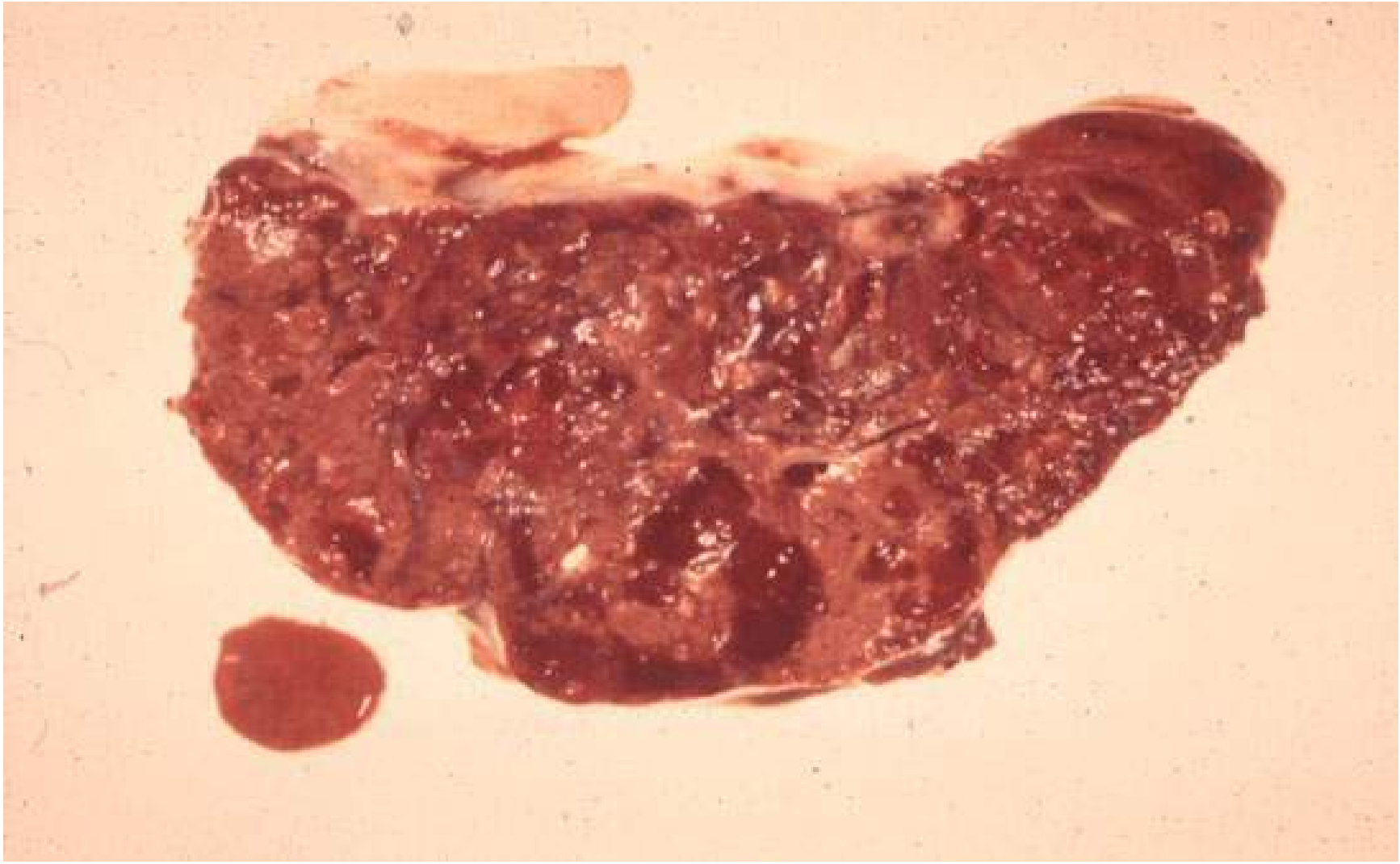
- Some farms in NE US have acute or chronic liver fluke populations
- Requires open water, snails (wet conditions)
- Can kill adult liver flukes with Albendazole (Valbazen®) or Ivomec® Plus)

Fasciola hepatica

- common liver fluke – used to assume not east of Mississippi but some veterinarians have observed affected animals in NY
- cycle includes fresh water snails
- acute peritonitis (during migration)
- Often causes chronic problems afterwards
- hypoproteinemia, anemia (blood leaks into bile)

Fascioloides magna

- American deer fluke – found in Adirondacks
- natural parasite of deer and elk
- sheep and goats abnormal hosts
- larval stages continue to migrate through liver - sheep and goats don’t excrete eggs
- **ACUTE disease - usually fatal within 6 months**



liver of goat killed by fluke

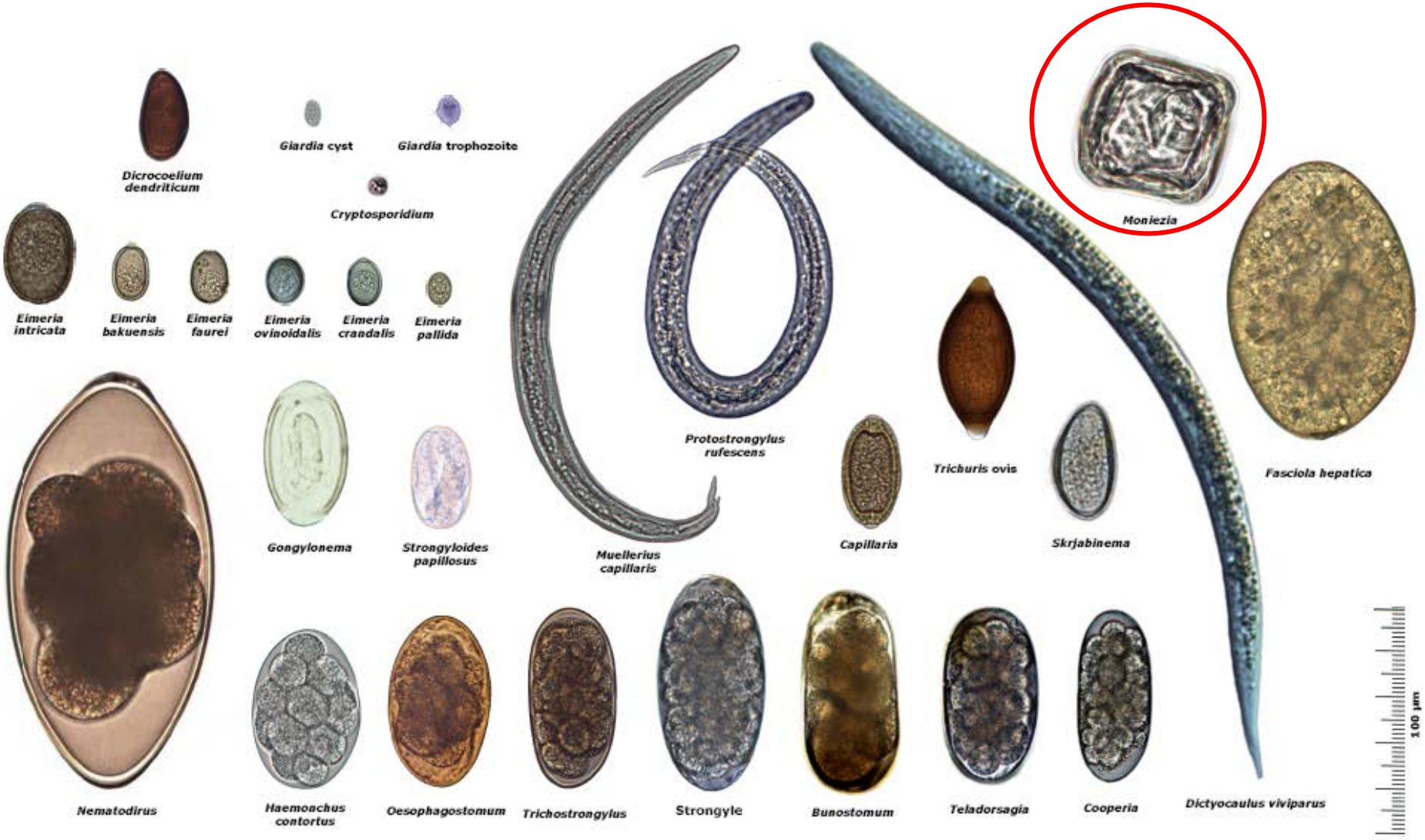
Treatment of liver flukes

Black Liver Disease (deadly) - To try to prevent: 1)try to kill flukes and 2) administer a vaccine for *Clostridium novyi B* such as **Covexin® 8**
as soon as possible

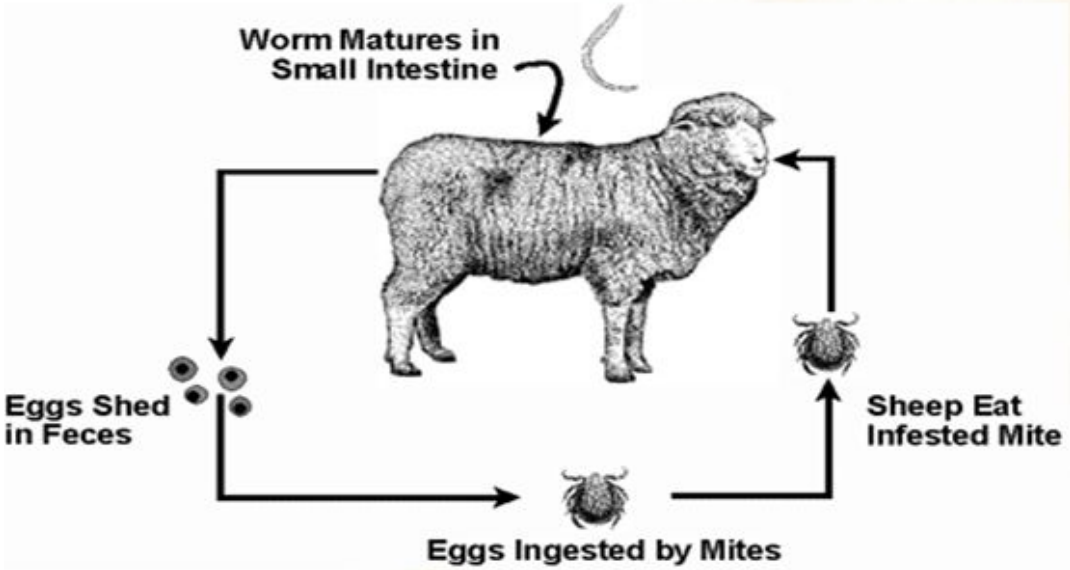
Treatment for liver flukes

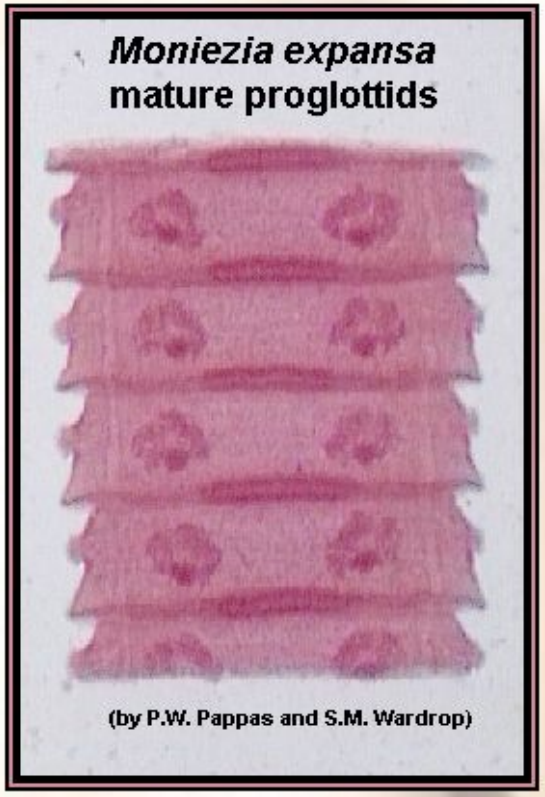
- Prevention – stay off wet areas
- Kill flukes in animal
  - albendazole – can cause abortion in early pregnancy, 15 to 20 mg/kg to kill adult flukes
  - clorsulon orally - adult *Fasciola .* 3.5 mg/kg sheep, 7 mg/kg goats
  - clorsulon orally – 8 wk. old *Fasciola,* 7 mg/kg sheep, 15 mg/kg goats
  - clorsulon for *Fascioloides* – 21 mg/kg
- Prevent Black Liver disease - *Clostridium novyi B* vaccination such as **Covexin® 8**

Stages in Sheep Feces



Moniezia (tapeworm)

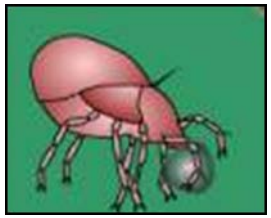


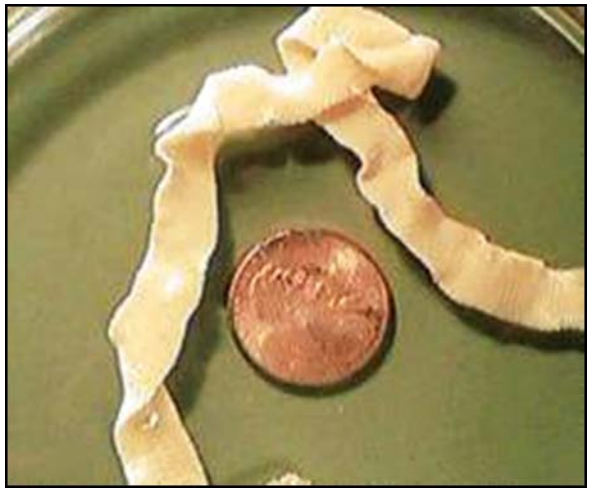


The life cycle of *Moniezia expansa* involves sheep as the definitive host and soil mites as the intermediate host. The tapeworm's eggs are passed in the sheep's feces, and mites are infected when they eat the eggs; the metacestode stage in the mite is called a *cysticercoid*. Sheep are infected when then ingest infected mites. This species of tapeworm is unusual in that each proglottid contains two sets of female reproductive organs

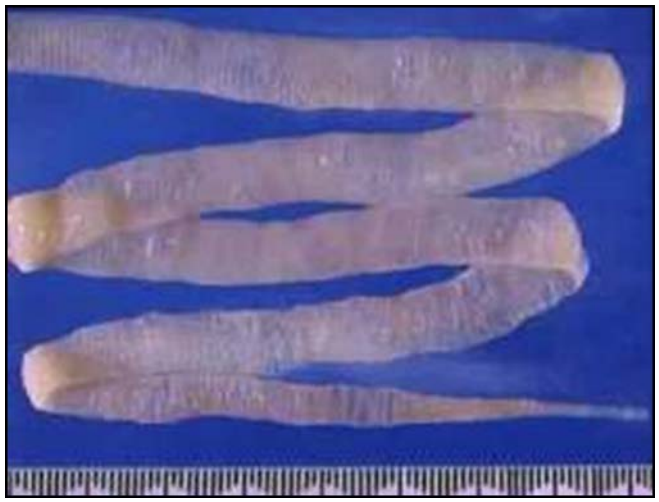
Moniezia (Tape worm)

- **INDIRECT LIFECYLE Intermediate host a free-living Oribatid mite**





- Pre patent period = 40days
- Relatively nonpathogenic, but heavy infections can result in mild thriftiness and GI disturbances.
- High numbers can obstruct the bowel and cause death (rare)



Moniezia egg

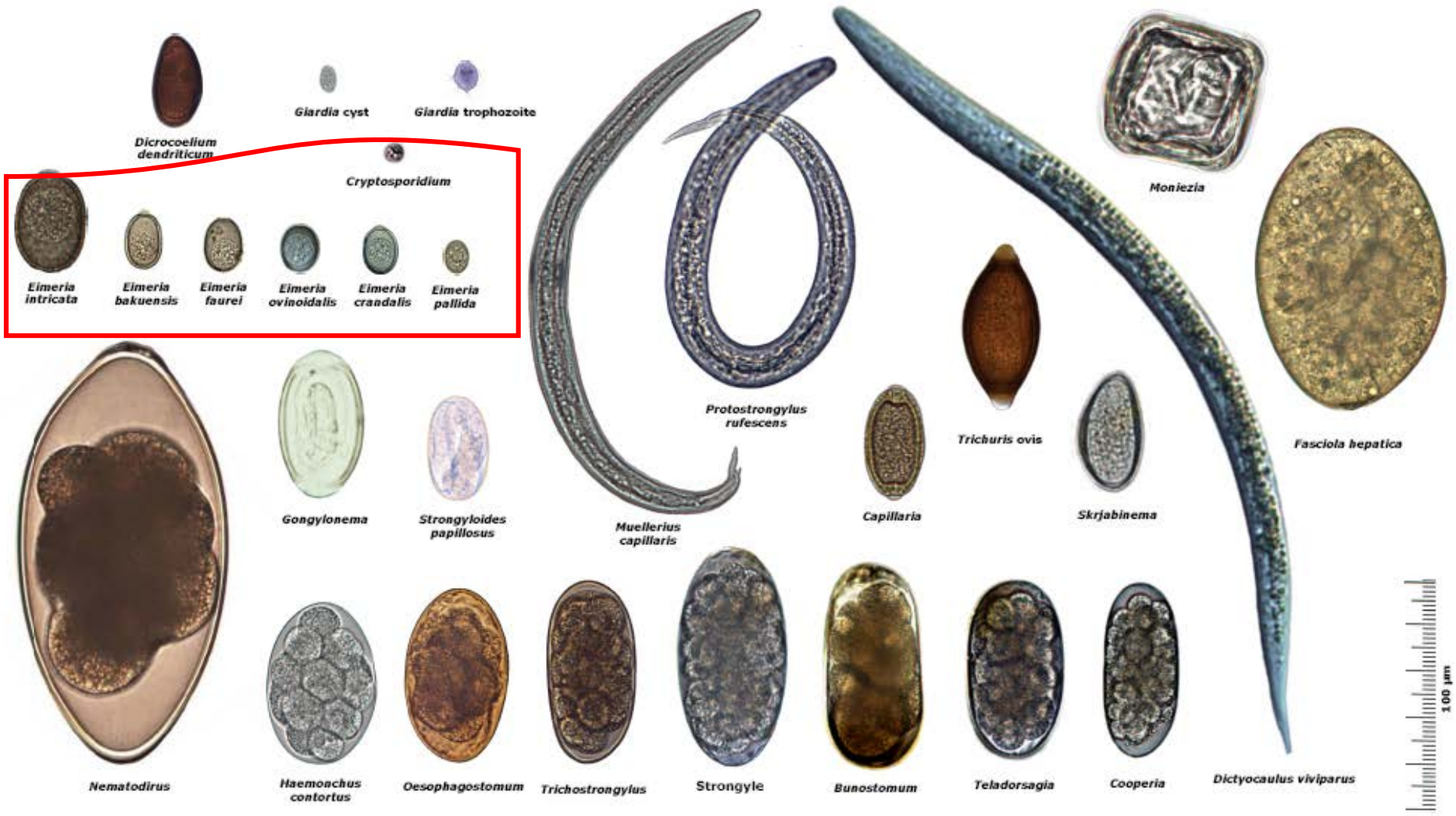
Moniezia Control & Prevention

- Free living mite Treat pasture ? Not practical, kill other beneficial insects & environmental issue.
- Useful practice harvest the hay, & deeply plow the fields (the mites tend to burrow deeply in the soil) and to reseed them. Help reduce the mite population.
- Use Mites behavior – mites prefer humid pastures and low light, more active early in the morning and at nightfall. So consider when deciding grazing areas.

Moniezia Chemical Treatments

- Dewormers will be discussed in the next presentation

Stages in Sheep Feces

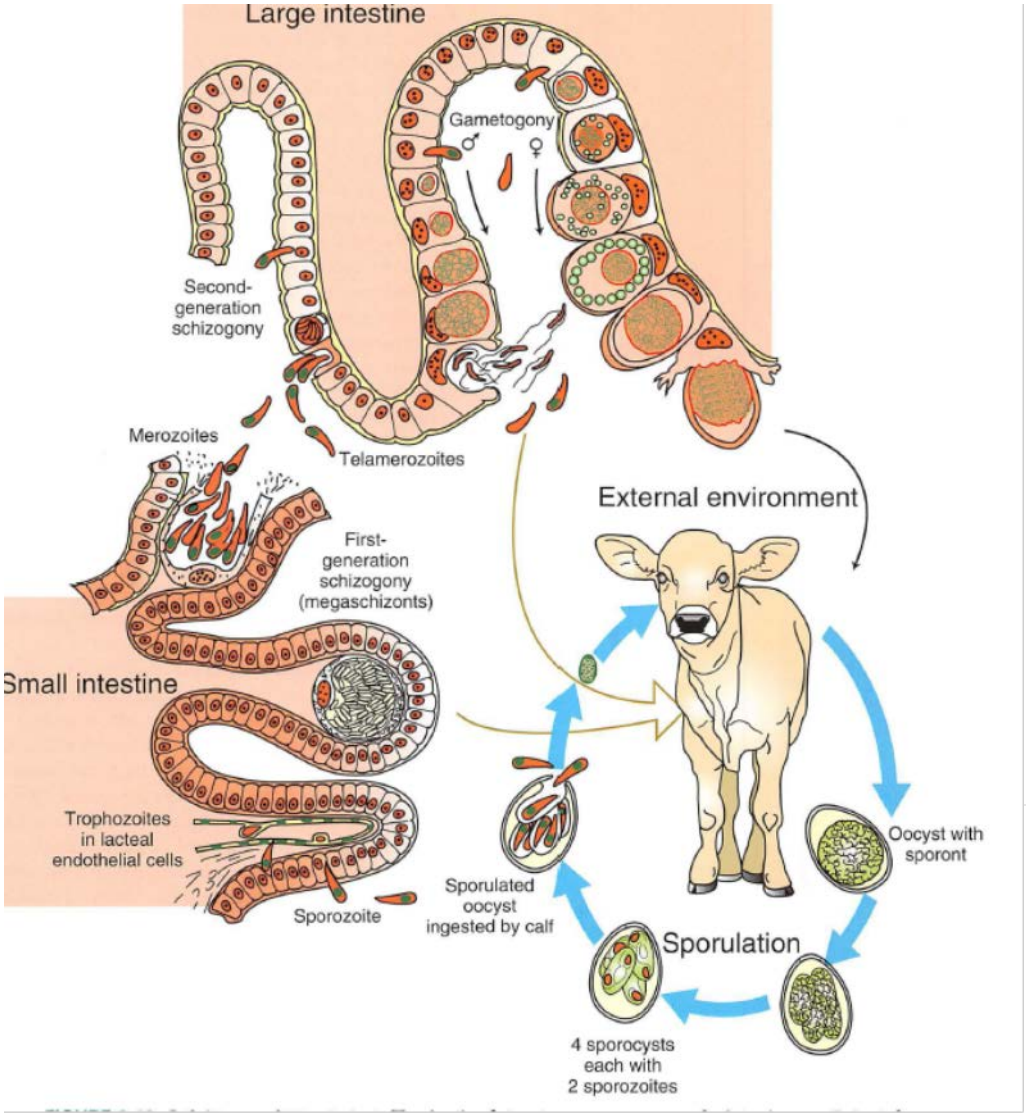


Protozoans

- Eimeria spp –Coccidia
- Cryptosporidium –Coccidia

- Toxoplasma gondii - no eggs in feces

Life cycle *Eimeria* sp



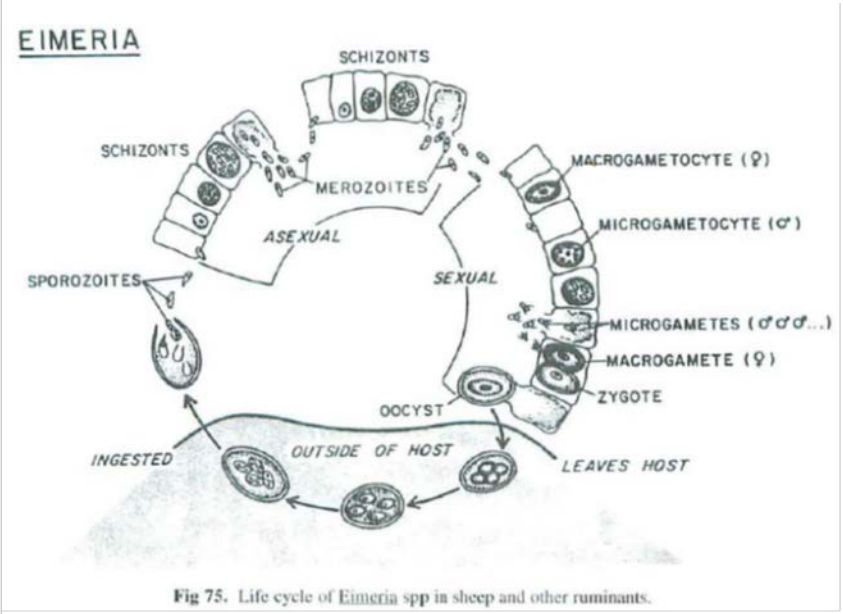


Fig 75. Life cycle of Eimeria spp in sheep and other ruminants.

Georgis' Parasitology for Veterinarians 10e, Bowman ed, Saunders 2014

Foreyt WJ 1997 Veterinary Parasitology Reference Manual 4th ed SCAVMA

Eimeria spp. - Coccidiosis

- Many *Eimeria* species!
- Host specific – direct lifecycle
  - No transmission between host species
- Site specific
  - Develop within certain portions of the intestine
- Symptom Severity varies between species
- Immunity to each coccidia species develops with exposure – mild exposure best for first exposure
- Intensity of disease dependent upon number of oocysts ingested
- Avoid sudden exposure to large amounts of infected feces

Eimeria spp. - Coccidiosis Symptoms

- Damages small and large intestinal lining causing **malabsorption**
- Suspect when calves, lambs or kids get **diarrhea after 3 weeks of age** (before that, usually bacterial or overindulging on milk)
- "mucky butt" in lambs
- Spread through infected feces (contain oocyst), decomposing feces in soil and bedding

Eimeria spp. - Coccidiosis

- Disease of crowding
- Sporulation happens 1-2 days!
- warmth and moisture permit sporulation
- Warmth from fecal decomposition can cause sporulation Even when ambient temperatures below zero
- Can build up in soil, easily survives 2-3 mo. to even 1 year in optimum conditions
- Killed by direct sunlight and low humidity (<25%)

Severe coccidiosis causes many small white foci in the intestinal wall – absorption impaired

- raise dairy calves, lambs and kids away from adults
- If possible, separate young animals by age, ideally only a 2 weeks spread in age in a group
- milk is protective, WEANING is a very high risk time for coccidiosis

Facilities

- Clean, dry, sunlight
- Avoid sudden exposure to feces, →

especially at weaning

Conventional flocks or herds may use coccidiostats as additives in the feed, salt or water to help prevent:

- Especially in pregnant females starting 1 month before parturition until weaning of their young. Continue in young animals after weaning.
- Lasalocid (Bovatec®)[1,3] – non-lactating only
- Monensin (Rumensin®)[2,3]
- Dequinate (Deccox®)[1,2] – non-lactating only, Deccox M in milk?
- Amprolium (Corid®) in water or milk?

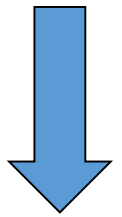
1 - FDA-approved for sheep
2 - FDA-approved for goats
3 - TOXIC to EQUINES!!!!!!

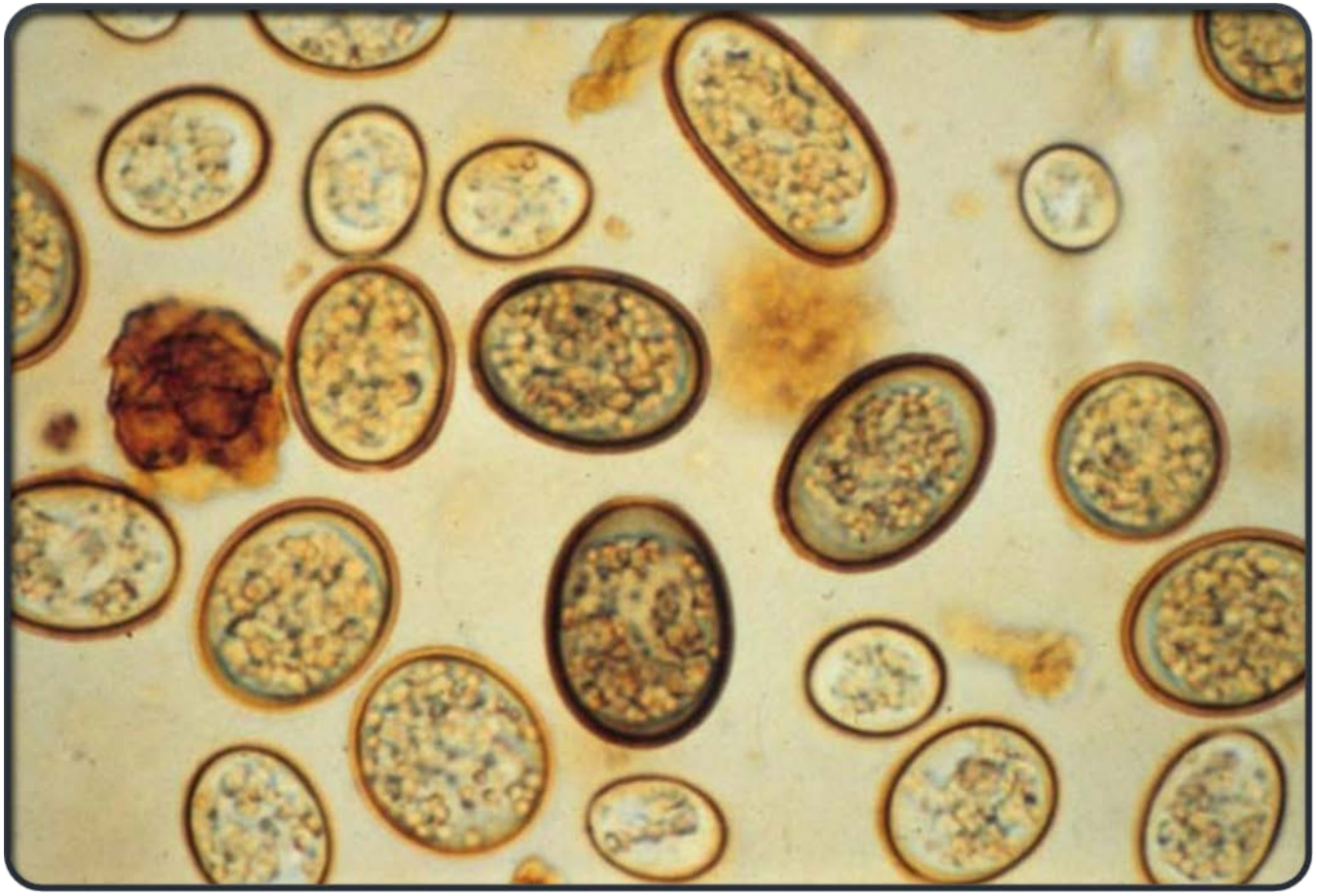
Chemical treatment of coccidiosis

- oral sulfonamides –Sulmet, Albon, etc.
- Veterinary Feed Directive- new legislation requiring vet prescription to use and may not be able to be prescribed use in milk.
- Amprolium 25-50 mg/kg per day for 5 days = 1 ml Corid 9.6% per 8 pounds
- can add to water (milk?) or directly drench
- Adequate selenium for immunity
- Electrolytes, supplemental nutrition
- Alleviate stress

Coccidia *Eimera sp.* (species-specific)

- many *Eimeria* species, host specific
- **immunity** to each species of coccidia develops with exposure – mild exposure best at first
  - Avoid sudden exposure to large amounts of infected feces
- Vulnerability – stress and age related! Young animals and geriatric animals most susceptible, also orphans, weaning, moving to new home, young mothers
- STOCKING RATE related – low density of animals

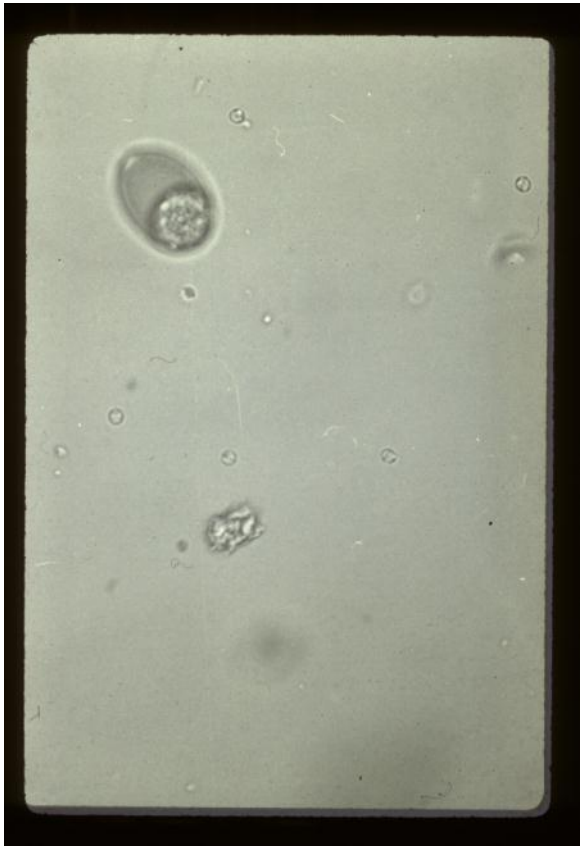




Eimeria macusaniensis
E. mac

Considered highly pathogenic in naïve animals - Llamas

Cryptosporium spp

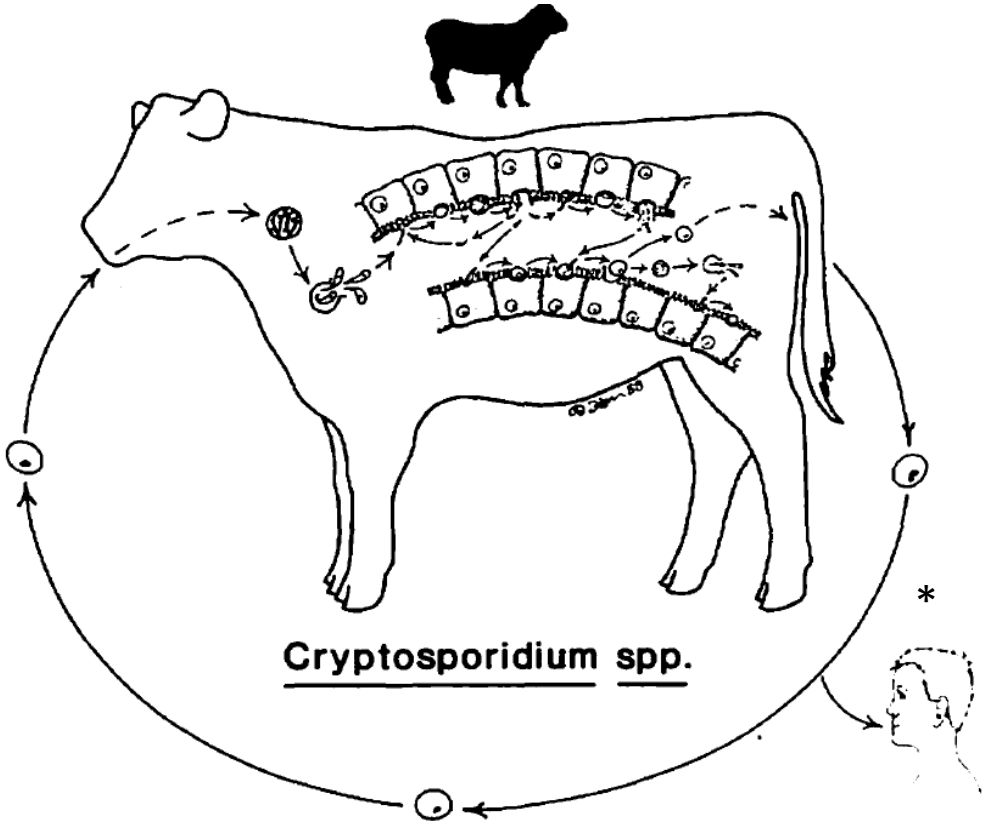


Cryptosporidium xiaoi

- Sheep parasite
- Lambs also get
  - *C. parvum* *
  - *C. ubiquitum**
  - *C. ryanae*
- neonatal diarrhea

Direct lifecycle – immediately infectious

*zoonotic – infectious to humans



Cryptosporidium

- Oocysts survive for several months in cool and moist conditions
- Oocysts are resistant to most disinfectants
- Oocyst infectivity can be destroyed by ammonia, formalin, freeze-drying, and exposure to temperatures <32°F (0°C) or >149°F (65°C). Ammonium hydroxide, hydrogen peroxide, chlorine dioxide and 5% ammonia are effective in destroying oocyst infectivity.
- Infectivity in calf feces is reduced after 1–4 days of drying.
- Inactivated with UV exposure (dose 4000 -8000 mJ/cm2)
- NO TREATMENT just fluids / electrolytes

Toxoplasma gondii

Intermediate hosts = ★

(do not shed eggs in feces, pass disease through tissue exposure)

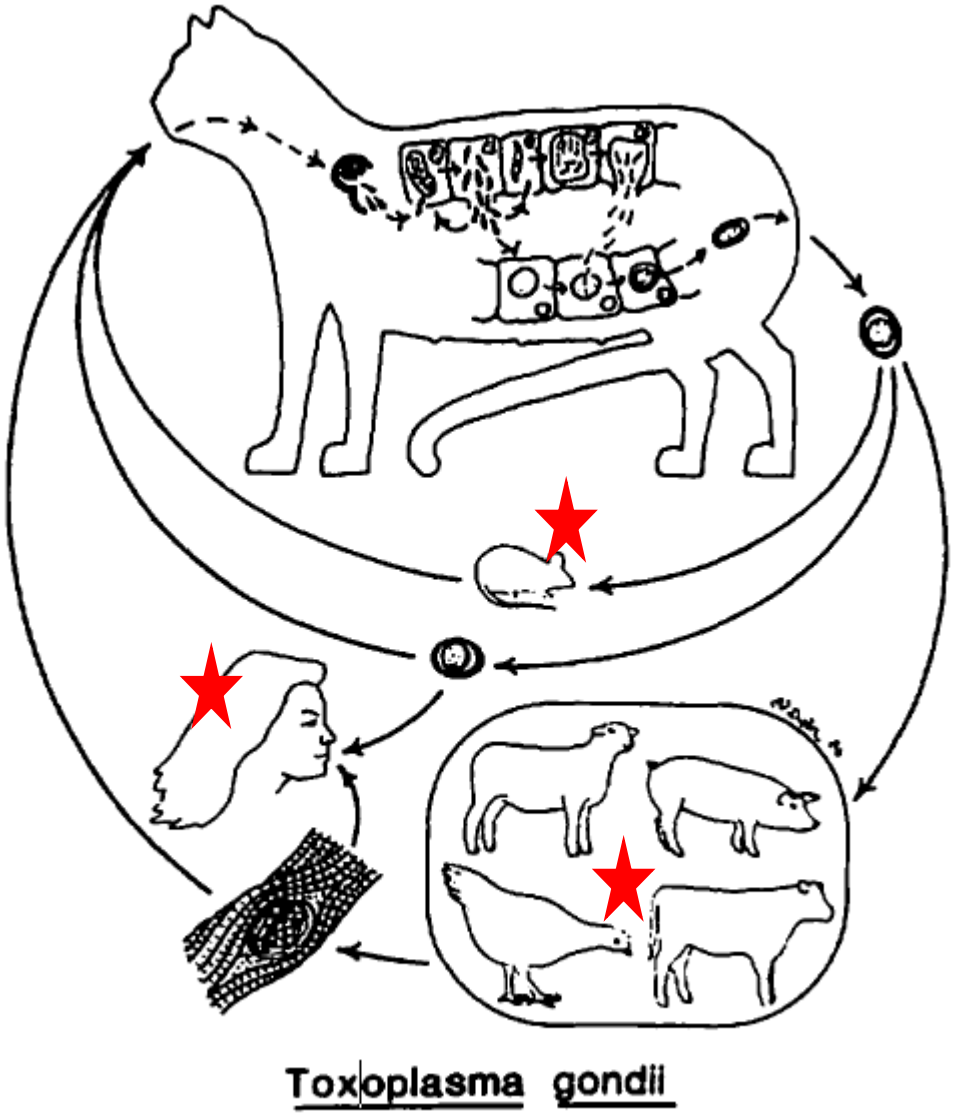


Fig 76. Toxoplasma gondii

Toxoplasma gondii

- Intermediate (required for development) hosts:
  - Sheep
  - Humans
  - Mice
  - Horses
  - Pigs
  - All mammals!
- Vertical transmission- crosses the placenta!
- Eggs resistant remain viable for several months
- Tissue cyst susceptible high heat cooking

Toxoplasma gondii

- Infection acquired during pregnancy by naïve animal
  - Effect on pregnancy depends on gestation stage when the infection occurs

    <45-55 days, unobserved abortion and expulsion

    55-90 days, abortion

    90-120 days, fetal infections; no abortion
- Typical clinical findings
  - Infection in early or mid-gestation results in fetal death with reabsorption or mummification.
  - Occasionally lambs infected in mid-pregnancy survive to term but are stillborn or are weak and die shortly after birth.
  - A fetus infected in late pregnancy develops an immune response and is born live, infected, and immune.
  - **Infected ewes & does rarely show clinical signs and do not abort in subsequent pregnancies.**

Toxoplasma and Humans

- Healthy people (non-pregnant) who become infected with *Toxoplasma gondii* often do not have symptoms because their immune system usually keeps the parasite from causing illness.
  - More than 40 million men, women, and children in the U.S. (~20%) carry the *Toxoplasma* parasite, but very few have symptoms because the immune system usually keeps the parasite from causing illness. However, women newly infected with *Toxoplasma* during or shortly before pregnancy and anyone with a compromised immune system should be aware that toxoplasmosis can have severe consequences.
- Mother-to-child (congenital)
  - Generally if infected longtime prior to pregnancy unborn child is protected by mothers immunity
  - If infected just prior to pregnancy or during pregnancy the mother can pass the infection to the child with deleterious effects ranging from ocular disease, encephalitis, mental disabilities, seizures, miscarriage or still born.
- Toxoplasma antibody titer

Not picking on Cats
Here's Dog Parasite of concern:

Echinococcus granulosus

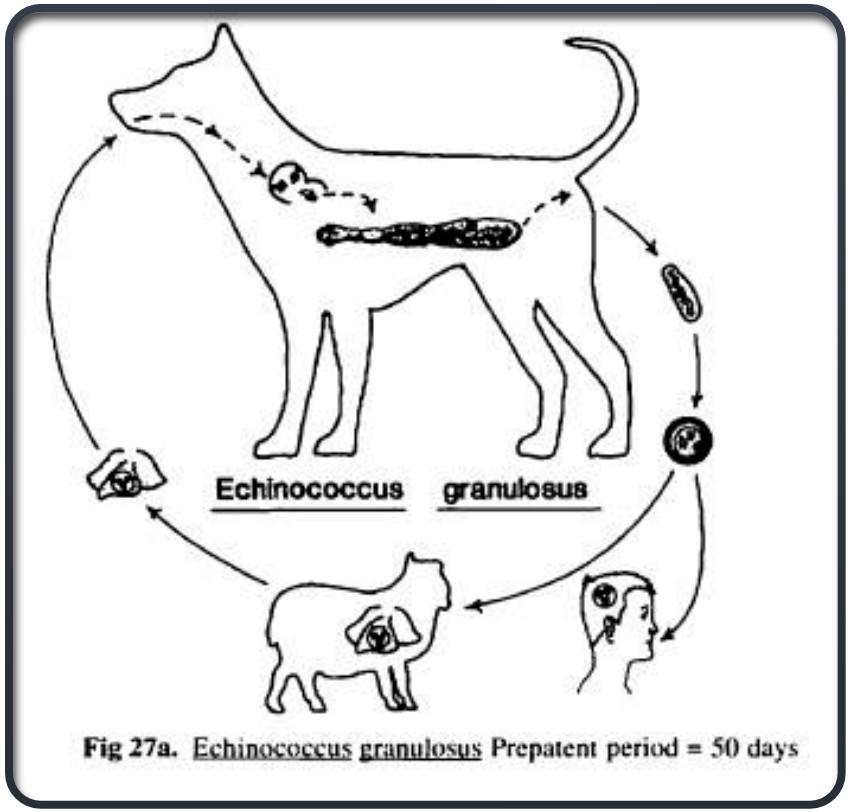
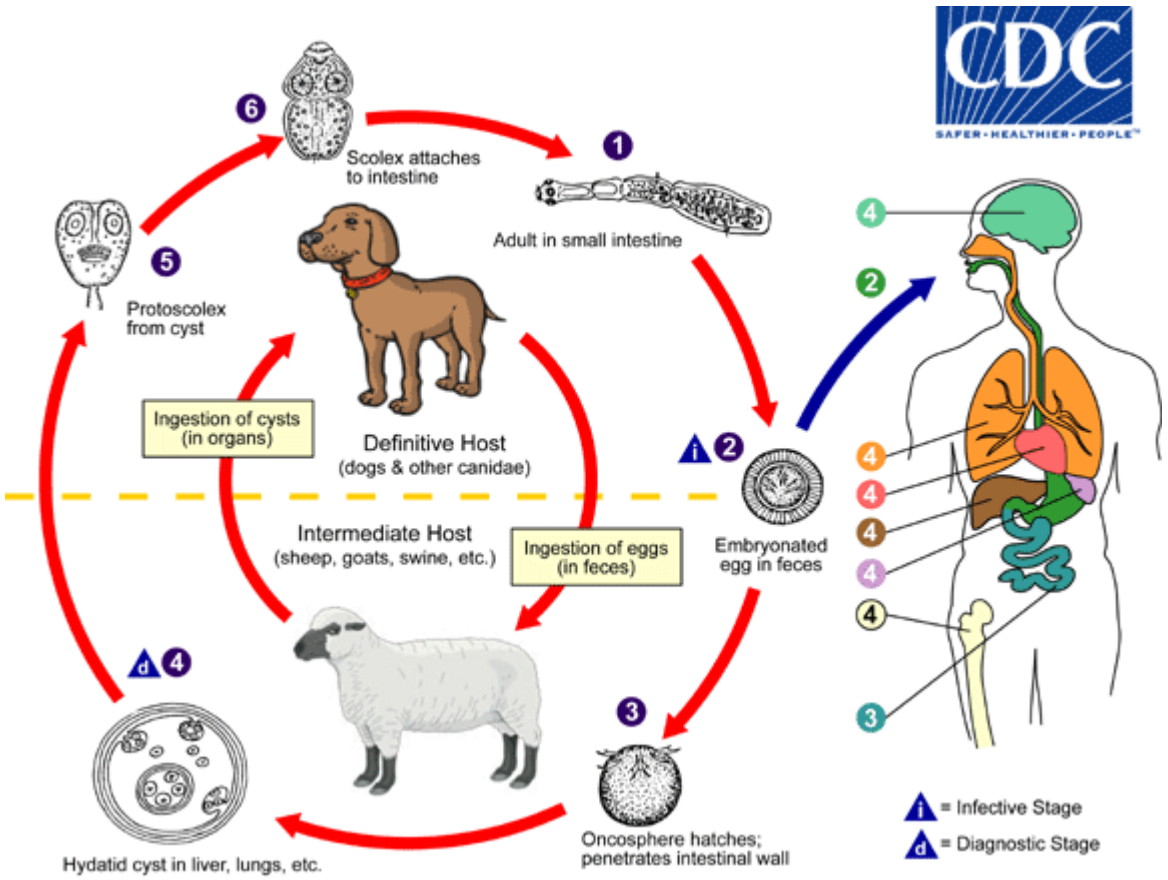


Fig 27a. Echinococcus granulosus Prepatent period = 50 days

- Cysts can become large and displace huge amounts of liver tissue.
- Source of infection is taeniid (*E. granulosus*) eggs in dog or wild canid feces
- Once extremely rare to non-existent in USA except in wolves and elk, *Echinococcus canadensis*, however, concern that may be seeing the introduction of the domestic species *E. granulosus*
- Disease can be severe, and treatment requires surgery



No Eggs in feces of intermediate hosts: sheep, goats, swine, cattle, horses, camels, humans

1. The adult *Echinococcus granulosus* worm resides in the small intestine of the definitive hosts (dogs, other canines).

2. Proglottids release eggs, which are passed in the feces.

3. After ingestion by an intermediate host (usually, sheep, goats, swine, cattle, horses, camels, or humans), the egg hatches in the small intestine and releases an oncosphere, which penetrates the intestinal wall and migrates through the circulatory system into various organs, especially the liver and lungs.

4. In these organs, the oncosphere develops into a cyst, which enlarges gradually; protoscolices and daughter cysts form within the cyst. The definitive host becomes infected by ingesting the cyst-containing organs of the infected intermediate host.

5. After ingestion, protoscolices evaginate and attach to the intestinal mucosa.

6. They develop into adult stages in 32 to 80 days.

Image from the Centers for Disease Control and Prevention Image Library.

Hydatid in a sheep

Reports in Deer in NY

- **Recently the Wildlife Pathology Unit identified the hydatid cysts of *Echinococcus granulosus* in the lungs of a hunter-killed deer from Franklin County.**

- **This is the third case that we have identified since 2005.**

- **The first was in a deer from Sullivan County in 2005, and the second in a moose from Jefferson County in 2006.**

- **It appears that *E. granulosus* is an emerging parasite in New York.**

- **The meat of *E. granulosus* infected cervids (deer and moose) is safe to eat.**
- **The hydatid cysts found in cervid intermediate hosts are not infective to humans.**
- **Sheep or goats tend to suffer no ill effects and after initial exposure their resistance generally prevents new cysts from forming.**
- **Treatment of sheep or goats for *Moniezia* tapeworm will have no effect on the hydatid cysts in the liver or lungs.**
- **Dogs should not be allowed to consume uncooked cervid viscera as they are also suitable definitive hosts for *E. granulosus.***
- **Infected dogs are the principle source of eggs for human infections worldwide.**

Thanks!