Parasite Management for Small Ruminants

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Part 1.
Know the problem

Brown Stomach Worm (Ostertagia)

- Used to be considered most serious parasite of sheep in cool climates
- Worm develops in gastric glands of stomach (abomasum) and destroys the glands as they grow
- Affects appetite, digestion and nutrient utilization
- Clinical signs – diarrhea, reduced appetite, weight loss

Haemonchus contortus

The Barber Pole Worm

A blood-sucking parasite that pierces the mucosa of the abomasum (ruminant “stomach”), causing blood plasma and protein loss to the sheep or goat.

- short generation time, heavy egg producer; 5,000-10,000 eggs/worm/day
- can infest and kill host in 4 weeks
- Each worm can consume 0.05 ml blood per day

Haemonchus (Barber pole worm) and other strongyles

- pasture and barnyard problem - especially if pasture is small and damp
- few larvae picked up in barn – ammonia gas from bedding pack discourages larvae survival
- infective larvae in dewdrops on grass

On  .

- Eggs in feces, fall from animal to ground
- Requires warmth (may be as cool as 50°F but lots of response by 60°F) and humidity to hatch into first stage larvae, L-1. Occurs in 1-6 days.
- L-1 eats bacteria in feces and grows, molts (sheds skin like a snake) and becomes L-2
- L-2 also eats bacteria in feces and then molts

On Pasture -

- Direct sunlight can heat fecal pellet to 155° F and sterilize pellet – **This is an excellent time to mow a pasture short to aid in drying the fecal pellet**
- Diatomaceous earth may help pellet to dry out and reduce viability of larvae?
- Shade trees and tall, dense grass increase humidity and protect fecal pellets from the sun
  à increase problem

Infectious Larvae on Pasture – L3

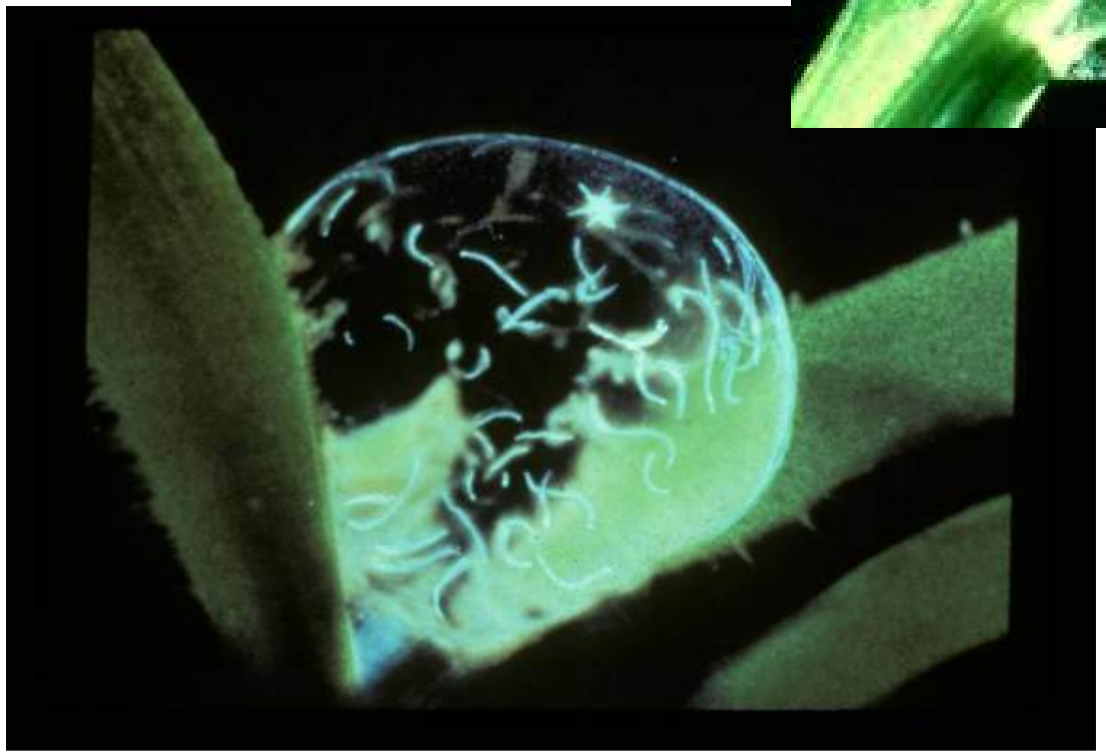
- L-2 molts to L-3. However, the cuticle (skin) is not shed, so the L-3 has 2 layers of cuticle. **This makes the L-3 much more resistant to drying out.**

- However, the L-3 cannot eat, because his mouth is covered. He must live off his stored reserves.

- Since he is cold-blooded, his metabolism speeds up when it is hot. He can only live about 30-60 days in hot weather or 120-240 days in cool weather. He can not survive freezing.

L3 - Takes about
5 -14 days from fresh fecal pellet to L-3 à

Pasture becomes infective at this time



Most L3s do not get more than about 2 inches high on grass blade.

L3 – on pasture

- The L-3 must escape from the fecal pellet to infect an animal
- The L-3 can only live about a week or two inside a fecal pellet if it is hot and dry.
- Pellet must be broken up by rain (2 inches in a month's time) à then the larvae scoots on a film of water (from rain or dew) and gets under fallen leaves or other debris OR scoots on a film of water 2-3 inches up onto fresh forage .

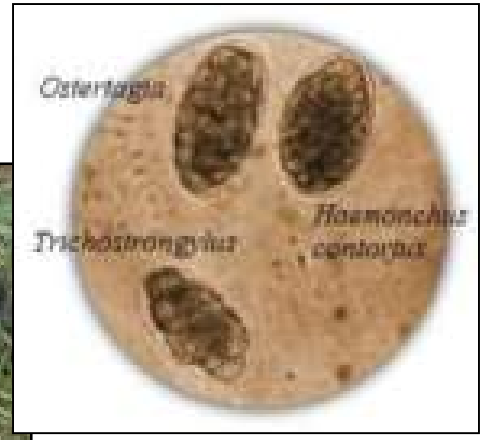
L3 continued (barber pole worm life cycle)

- Maybe only 2-10% of eggs end up as L-3 larvae on forage.
- L-3 must be eaten by a goat or sheep to continue development - **Cattle and horses can “vacuum up” L3 larvae from goat pastures and stop its life cycle**
- Used to think L-3 could not survive outside in NE winters – however studies at Univ. of Maine indicate NE barber pole worms can tolerate 10° F for up to 3 to 6 days before dying although SE barber pole worms only tolerate ~20 – 25° F
- Once the L-3 is inside the goat it leaves its sheath and molts to L-4 and can over-winter in the goat in **suspended animation**

Other Strongyles tend to disrupt digestion

- Direct life cycles
- Burrow into the wall of the abomasum or intestines.
- <u>Symptoms</u>: scouring, weight loss, rough hair coat, ill thrift

Nematodirus – very large egg
Trichostrongylus spp.
Ostertagia circumcincta
Cooperia spp.
Oesophagostomum spp.



Strongyloides

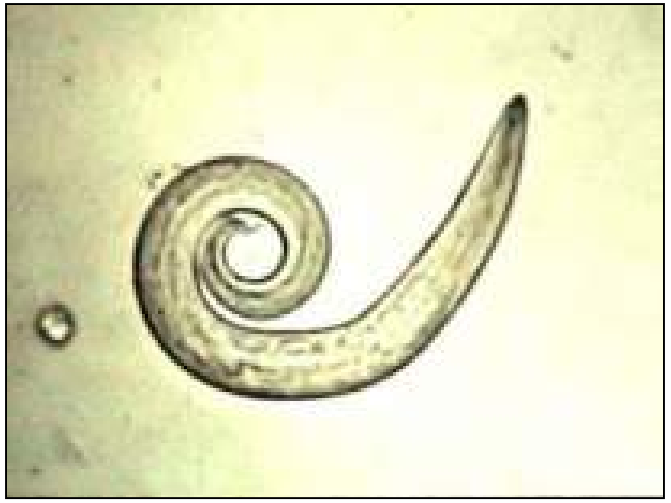
- threadworm, pinworm
- Unlike cat and dog species,

the livestock species do not infect people

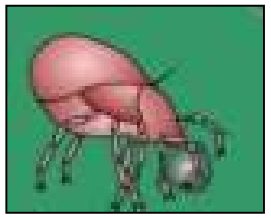
- Complicated life cycle – reproduce sexually & asexually
- Infects animals:
  - By ingestion – pasture, from dam's milk if larvae migrate to her udder
  - Through the skin!! (i.e. hairline above the hoof in muddy, infected pasture, shed or barn)
  - Prenatally if larvae have migrated to placenta
- Larvae are sensitive to cold and dryness
- Symptoms – diarrhea, coughing → pneumonia if lungs infected by migrating larvae

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.



Pasture mite →



Tapeworms

<u>Life Cycle</u>

- Worms live in small intestines.
- Eggs pass out through feces.
- The egg is eaten by a pasture mite.
- The egg hatches.
- The mite is eaten by the sheep or goat.

- Light loads of tapeworms tend not to be a problem, but <u>severe</u> infestations can cause problems.

Coccidiosis

- Single-cell protozoa that damage lining of small intestines.
- **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, decomposing feces in soil and bedding

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

Life Cycle of Eimeria spp.

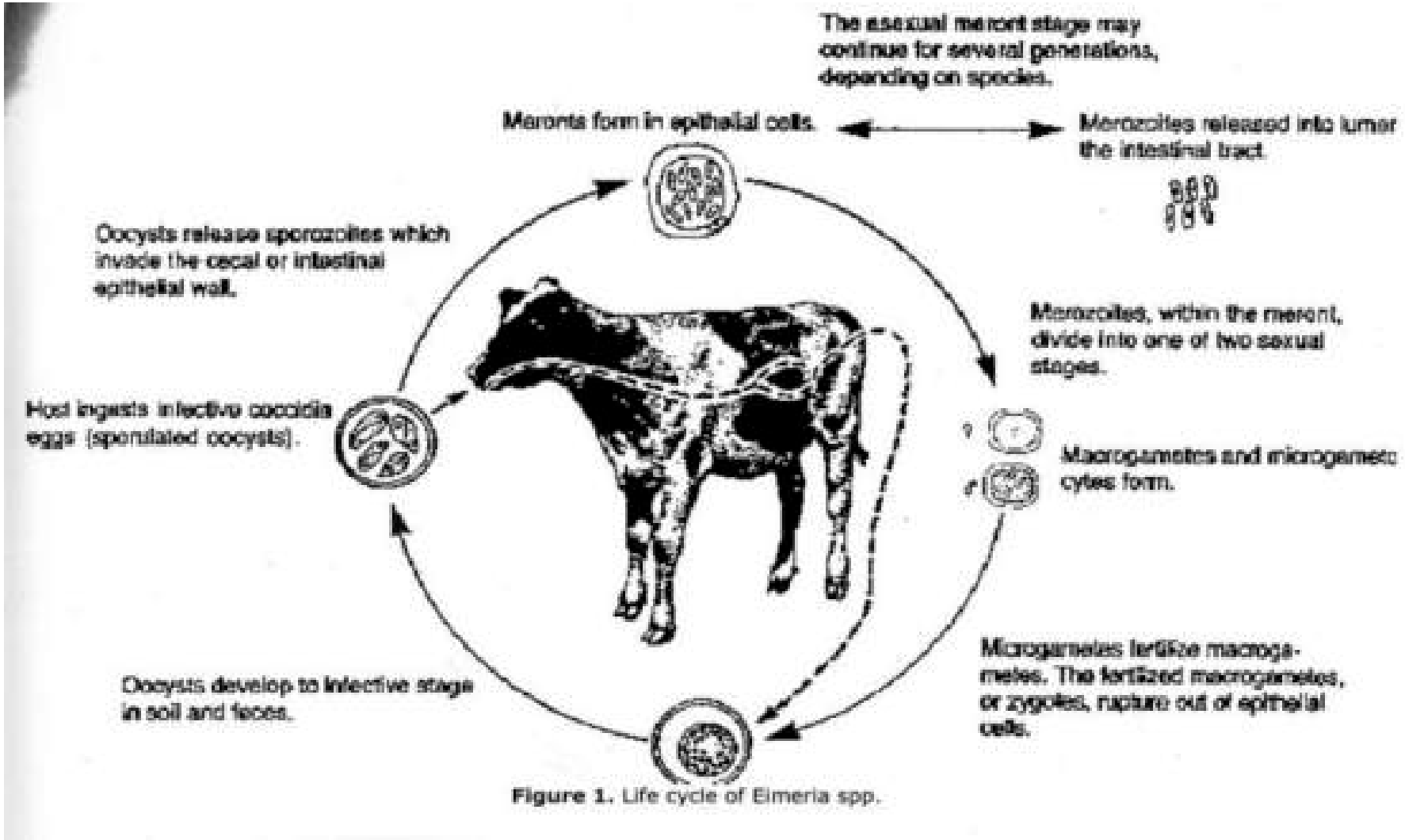


Figure 1. Life cycle of Eimeria spp.

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

Coccidiosis

- **warmth and moisture** permit sporulation
  - From Egg to infectious à 1-2 days
  - easily survives 2-3 mo. and can survive 1 year in optimum conditions

- **Killed by direct sunlight and low humidity (<25%)**

- 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

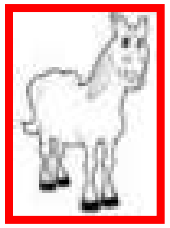
Facilities

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

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**.

Liver flukes

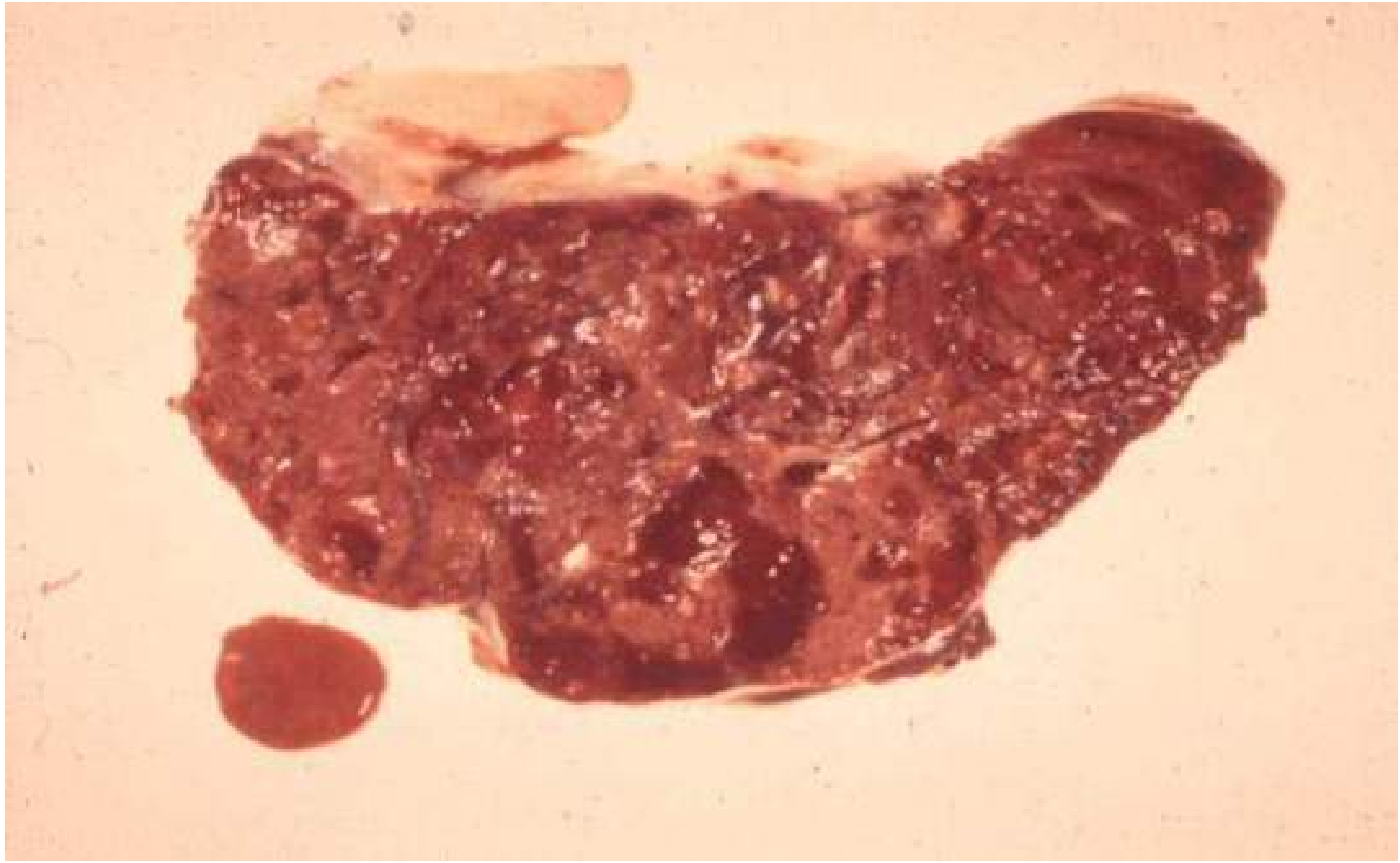
- Some farms in NE US have acute or chronic liver fluke populations
- Requires open water, snails (wet conditions)
- Can kill adult liver flukes with Albendazole (Valbazen®) or Ivomec® Plus)

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 cont.

Black Liver Disease (deadly) – liver damage from migrating juvenile flukes causes anerobic conditions which trigger spores of the bacteria, *Clostridium novyi B* (a relative of tetanus), to “wake up” and release toxins that destroy liver tissue. To try to prevent: 1)try to kill flukes and 2) administer a vaccine for such as **Covexin® 8** as soon as possible

Prevention/Treatment of liver flukes

- Fence off wet areas or graze them only under dry conditions
- Check with your veterinarian for dosages and withdrawal periods for dewormers that are effective against flukes (few of those available in US are effective against immature flukes)
- albendazole (i.e. Valbazen®) – 15 to 20 mg/kg live wt. has killed adult flukes, can cause abortion in goats/sheep especially in early pregnancy
- clorsulon orally (i.e. the “plus” in Ivomec® Plus)
  - adult *Fasciola at* 3.5 mg/kg sheep, 7 mg/kg goats
- clorsulon orally –
  - 8 wk. old *Fasciola at* 7 mg/kg sheep, 15 mg/kg goats
- clorsulon orally for *Fascioloides* – 21 mg/kg

- If you suspect your animals have been exposed to liver flukes, consider proactively vaccinating for Black Liver disease - *Clostridium novyi B* vaccination such as **Covexin® 8**