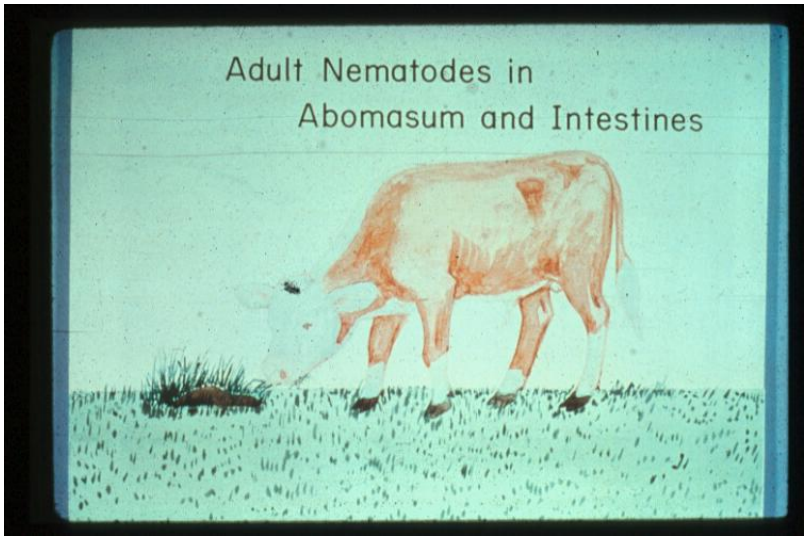
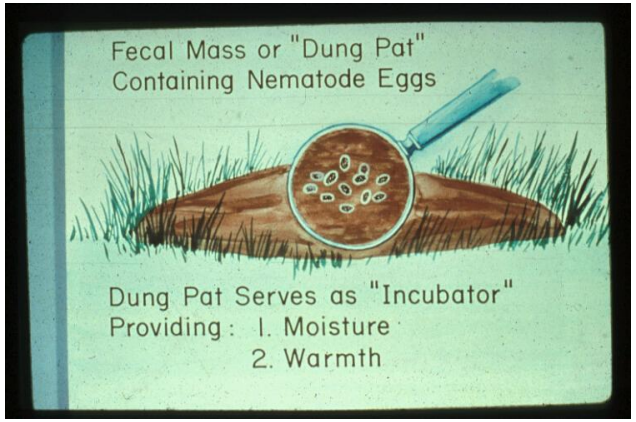
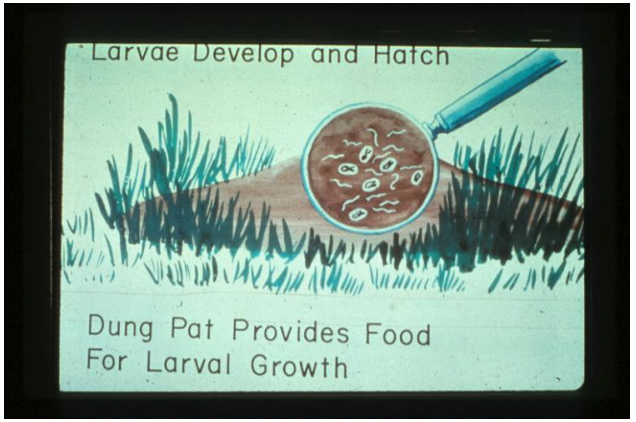
Source of infection = Pasture

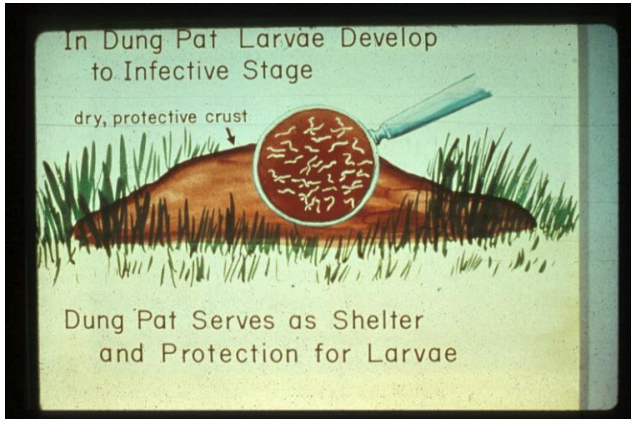
- Adult worm population inside grazing hosts determines number of eggs shed on pasture.



Appropriate conditions (moisture, warmth, O_2) allow eggs to hatch and L_1 become L_3

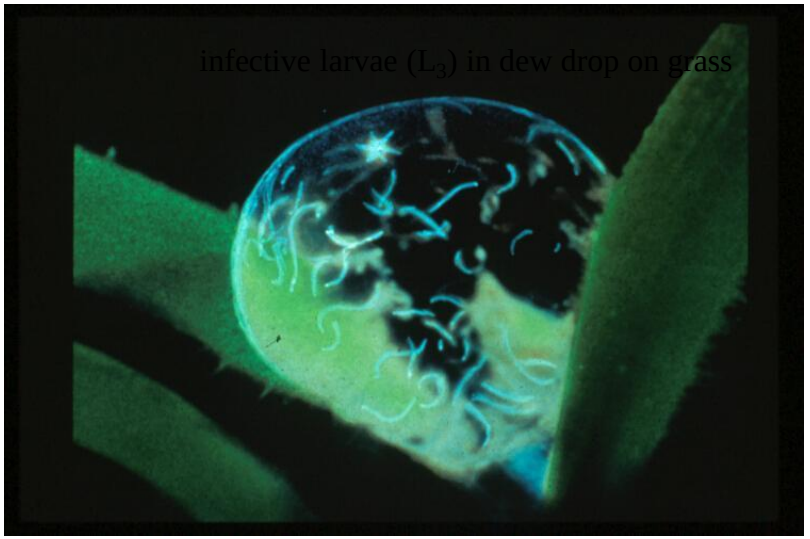






Source of infection = Pasture

- How is a large adult worm population generated? Remember adult worms do not replicate.



Source of infection = Pasture (cont.)

- How is a large population of L_3 established on pasture?
- Type I ostertagiasis: when L_4 do **not** arrest, they emerge and become egg laying adults in 3 weeks. Calves show clinical signs in the Fall in cool temperate regions; or, in the Spring in hot, semi arid regions. Why?

Source of infection = Pasture (cont.)

- When larvae in arrested development in abomasal mucosa emerge they can be a source of adults producing eggs to contaminate pasture and cause of disease.
  1. Type II ostertagiasis - long yearlings (grazed the previous season) develop adult worms that contaminate spring pastures with ova in the North. Southern grazed calves moved to feedlots (anywhere) in the Fall have potential for Type II disease.

Source of infection = Pasture (cont.)

- 2. Periparturient haemonchosis in ewes. Emergence of L_4 stimulated by parturition. Adults develop and produce eggs to contaminate pastures for lambs to ingest L_3. Ewes debilitated by large adult worm burden.

Control

- Tactical treatments - when susceptible animals are on heavily contaminated pastures must treat repeatedly due to reinfection or treat and move.
- Strategic treatments - soon after uninfected animals are put on pasture and become infected they are treated to prevent adult worm from generating eggs to contaminate pasture (sustained release or repeated macrolid drug). Infected animals are treated before being put on pasture. Spring and Fall.

Control: Strategic

- In the cool temperate regions: treat calves with repeating or long lasting adulticide in spring when put on pasture; treat re-stocking calves with adult and L_4 killing drugs in late fall.
- In subtropical regions: treat calves, long-yearlings in early fall (wet season) with adulticidal drugs; treat calves in late spring/early summer at start of dry season with adult and L_4 killing drugs.

Control of trichostrongyles

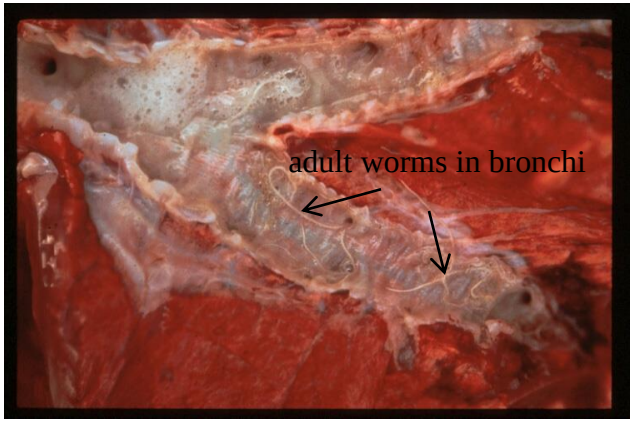
- To get optimal milk production, first lactation cows are treated just before calving.
- To prevent disease and minimize pasture contamination ewes and goats are treated before parturition.

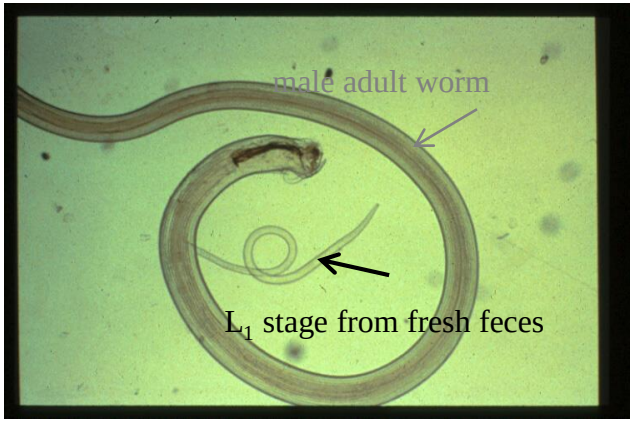
Control: Sustainable Approach with Minimal or no Drugs

- Selective treatment for small ruminants based on FAMACHA to reduce drug resistance development.
- Growing concern about drug-resistant *Cooperia* and *Haemonchus* in cattle.
- Rotational grazing and reduced herd density. Requires a lot of fencing (many individual pastures) and moving the herd frequently.
- Unlike small ruminants, mature cattle are very resistant to large worm burdens and clinical disease. Use them to remove infective larvae and reduce exposure to young calves.

Dictyocaulus sp.

- Lung worm of cattle (*D. viviparus*), sheep and goats (*D. filaria*), equine (*D. arnfieldi*)
- Adults found in bronchi and trachea are up to 80 mm long and thin.



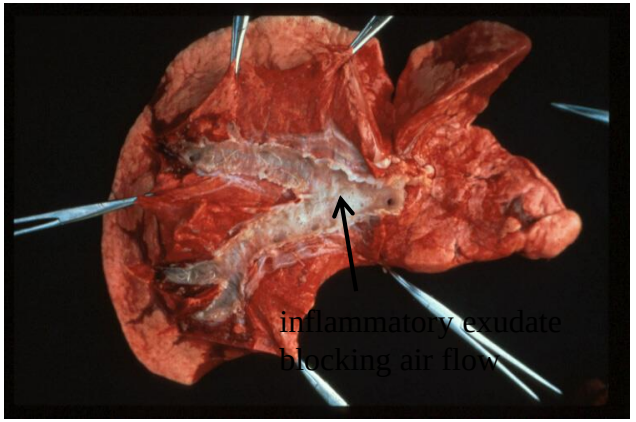


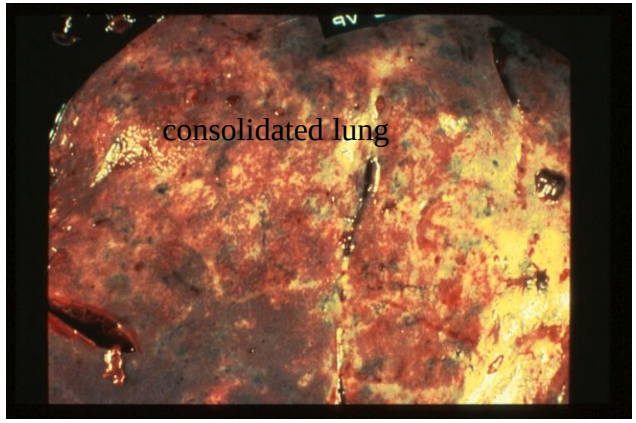
Dictyocaulus sp.

- Life cycle predicts onset of clinical signs and when to treat:
  a. 7 days after ingestion of L_3 from pasture, first season grazing calves begin showing respiratory signs.
  b. adult worms present in bronchi at 3-4 weeks after ingestion of L3, severe pneumonia. Results in strong immunity.

Dictyocaulus sp.

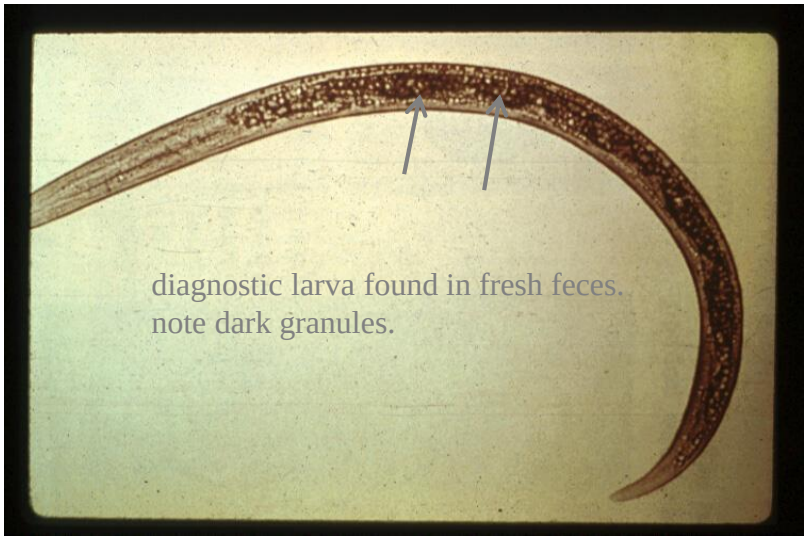
- Pathogenesis: worms and inflammatory exudate block air flow.





Dictyocaulus sp.

- Clinical signs: young animals on pasture first year showing rapid breathing and coughing. **L_1 in feces** (not eggs).



Dictyocaulus sp.

- Treatment and control: treat at first signs of coughing (about one week after put on contaminated pasture). Avoid low, wet pastures. Local foci of contaminated pastures. Problem for mountain pastures, snow cover protects L_3 over winter.
- Do not co-graze donkeys and horses.