

Adult tapeworms (Cestodes) do not normally cause disease but treatment is necessary for?

- 1) Public health reasons and Zoonosis control (Cysts can form in brain)
- 2) Prevent disease due to larval stages
- 3) Minimize carcass inspection losses
- 4) For Aesthetic reasons in dogs and cats

Albendazole and Netobimin are
effective against?

All adult stages of Fluke

Anticestode use of Pyrantel (also a Tetrahydropyrimidine antinematode drug) can be used in Horses at?

2X concentration used for
Nematodes

Bithionol is effective against?

- is a chlorinated bis-phenol with bactericidal and anthelmintic action
- Active against Adult fluke

Bromofenofos is effective against?

- Is a derivative of Bithionol
- Active against adult fluke

Clinical Indications of Praziquantel

- For control of Tapeworm in
Horses, Sheep, Cats, Dogs

Clorsulon is effective against?

Adult fluke in cattle

Clostridium is effective against?

Adult and Immature flukes and
some nematodes and nasal bots

Contraindications of Praziquantel

Don't use in young animals

Diagnosis of a Tapeworm infection
is often difficult because?

It relies on chance observation of a passed segment in the feces. This segment can then be viewed via microscope to determine which spp is offending.

Diamphenethide is effective
against?

- Exceptional activity against
IMMATURE fluke

but activity decreases as fluke ages.

- No activity against adult Fluke

Dichlorophen and Nitroscanate

- Both good against: *Taenia* and *Dipylidium* spp but have limited efficacy against *Ecchinococcus*

Drugs for Fluke are called?

Antitremadol drugs

Epsiprantel

- Is closely related to Praziquantel
but has a lower margin of efficacy
against immature Cestodes

Fasciola hepatica infection usually results in _____ or _____ disease.

When do these form of disease traditionally present themselves, what developmental stages are responsible, which part of the liver do they destroy.

Acute, Chronic

Acute disease presents: Autumn/Early winter

Chronic disease presents: Late winter/Early spring

Acute disease caused by the IMMATURE fluke migrating across the liver PARENCHYMA and damaging it.

Chronic disease is caused by ADULT flukes in the BILE DUCTS. Causes thickening of the Bile ducts.

Fasciola hepatica is endemic in many wet regions of Scotland and the UK and mainly effects?

Ruminants (sometimes horses but
w/o CS)

How are cats usually infected with
Tapeworm?

- By eating wild rodents

How are dogs usually infected with
Tapeworms?

- By eating undercooked sheep, horse or rabbit meat or visera contaminated with tapeworm segments

Indications for Dichlorophen

Dipylidium and Taenia spp only in
Dogs and Cats

MOA of Benzimidazoles?

- 1) Irreversibly binds parasite tubulin and prevents microtubulin formation. Once microtubules absent for 6-24 hours parasite stops reproducing and starves also.
- 2) Inhibits parasites mitochondrial Fumarate Reductase System, which blocks Citric Acid cycle
- 3) Reduces Glucose absorption
- 4) Uncouples oxidative phosphorylation and deprives parasite of Energy

MOA of Clorsulon?

- Inhibits 3-phosphoglycerate kinase and phosphoglyceromutase effectively blocking Glycolytic pathway in flukes
(ei Is a competitive inhibitor of enzymes important for energy metabolism in flukes)
- Is a Sulphonamide (ei antibiotic but also effective in fluke control)

MOA of Closantel (Salicylanides)?

- Proton ionophores and also uncouples oxidative phosphorylation and deprives parasite of energy
- Also since it binds strongly to plasma proteins, its use is restricted to nematodes that suck blood

MOA of Diamphenthide

Deacylation in the Liver into Active metabolite, which concentrates in the liver Parenchyma where the young fluke live for up to 7wo.

MOA of Niclosamide

- Acts by uncoupling oxidative phosphorylation and thus interferes with ATP production
- Does not work against all Cestodes
- Usually only used in Amphibians

MOA of Nitroxylin

Uncouples oxidative phosphorylation and deprives parasite of energy

MOA of Praziquantel

- Acts by inducing a Ca^{2+} influx across the muscular tegument and causing an immediate muscular spasm.
- The tegument is also disrupted making it more easily disrupted by host proteolytic enzymes
- Result: Entire worm is rarely passed in the feces, instead it is degraded. Partially digested segments may be seen.

Nitroxynil is effective against?

Adult flukes

At Higher Doses Immature flukes
and some Ruminant Nematodes.

Oxyclozanide is effective against?

Adult fluke

- is also easily distributed to the liver, kidney, and intestines
 - Excreted in the bile

Pharmacokinetics of Praziquantel

A - Injectable, oral, topical, and spot ons
- Well absorbed orally but has a high first pass metabolism, which result in only a small amt actually reaching circulation. So is primarily applied topically.

D - $T_{1/2} \sim 0.8-1.5$ hrs

M- via the Liver

E - Via the Kidney

Quick review of tapeworm lifecycle

- All tapeworm have an Indirect lifecycle and control measures often include control in both the intermediate and final host. Anoplocephala infection in Horses (final host) cause by eating infested Mites (intermediate host) on pastures. - this is a common cause of colic.

Moniezia infection in Lambs and Calves (final hosts) caused by eating infested Mites (intermediate host) on pasture grasses - No ill effects are seen

Dipylidium, Taenia (and Eccinococcus) in cats (and dogs) caused by fleas and lice.

Rafoxanide is effective against?

- Is a salicylanide
- Active against both Adult and Immature flukes aged +6-8 weeks

The risk of fluke disease varies from year to year and month to month. Because of this we have intensive monitoring systems in place to assist farmers in choosing the appropriate anthelmintic and level of control. Why is choosing the appropriate antitrepanatodal drug so important?

- Because few antitreumatodal drugs will work against all the various developmental stages of fluke.

SE for Dichlorophen

Salivation

Vomiting

Anorexia

Hyperaesthesia

Hindlimb ataxia

SE of Praziquantel

Has a wide margin of safety but rarely see

- Localized tissue sensitivity where spots or injectables were applied
- Transient hypersalivation if licked off

Spectrum of Praziquantel

All Adult Cestodes
All Intestinal forms of
Ecchinococcus

To prevent fasciolosis?

- All animals should be treated regularly depending on the type of fluke, geographic area, prevalence in that area, and the climatic conditions (wet or dry year)
- Can also restrict access to high risk areas during high risk periods such as autumn and winter
- Can control molluscs in wet areas via:
 - 1) Molluscides
 - 2) Fencing off or Draining wet areas

Treatment for tapeworm occurs?

~ Every 6 mths but also need to provide adequate Flea and Tick control or will need to treat more often.

- In endemic areas, tx dogs every 6 wks to ensure no infective segments or eggs are passed

- Pet Travel Scheme demands treatment 24-48 hours prior to travel from the UK.

Triclabendazole is effective
against?

- All stages of Fluke (Immature and adult stages), which has contributed to Triclabendazole-resistant flukes starting to become prevalent on UK farms

Tx of Fluke

- Can be prophylactic or therapeutic tx
- For young animals with Acute dz, we traditionally repeat the dosage after 5-6 wks

Various Benzimidazoles (Fenbendazole, Albendazole, etc)

Can also be used to control
tapeworm in Ruminants, Dogs,
and Cats

What are compound
endoparasitocides?

Drugs formulated to target multiple types of internal parasites at one time.

Ei contains both an antitreumatodal drug + a antinematodal drug, OR antinematodal + anticestodal drug.

What are the advantages of compound endoparasiticides?

Targets multiple parasites in one application (nematodes, cestodes, trematodes)

What are the Antitrematodal drugs used to treat fluke infestations?

Some Benzimidazoles (Albendazole, Netobimin)
Triclabendazole - is a Benzimidazole used ONLY
for fluke control
Salicylanides (Closantel, Oxyclosanide,
Rafoxanide)
Nitroxynil
Clorsulon
Diamphenethine

What are the disadvantages of compound endoparasitocides?

- Should only be used on a Ad Hoc basis (ei during the particular season in which the parasites you are targeting actually infest the animal.)
- If used at any other time, are redundant and contribute to resistance.

What are the drugs used to treat cestodes?

PRAZIQUANTEL (aka Droncit, Drontal, Milbemax, etc)

Then also :

Epsiprantel

Dichlorophen

Nitroscanate

Pyrantel (which is a Tetrahydropyrimidine)

Various Benzimidazoles

Niclosamide

What are the two types of Flukes
we are most worried about in the
UK?

Fasciola hepatica
Lancet fluke (Dicroileum
denticatum?)

What is the intermediate host for
Fasciola Hepatica?

Lumnea Truncata (mud snail)

Which forms of the dz present in
sheep?

Which forms present in cattle?

Does fasciola hepatica effect
horses?

Both Chronic and Acute Acute

Horses are more resistant to fluke
but occasionally will show CS of ill
thrift

Why do we formulate compound endoparasiticides?

To extend the range of activity of a
single application of drug