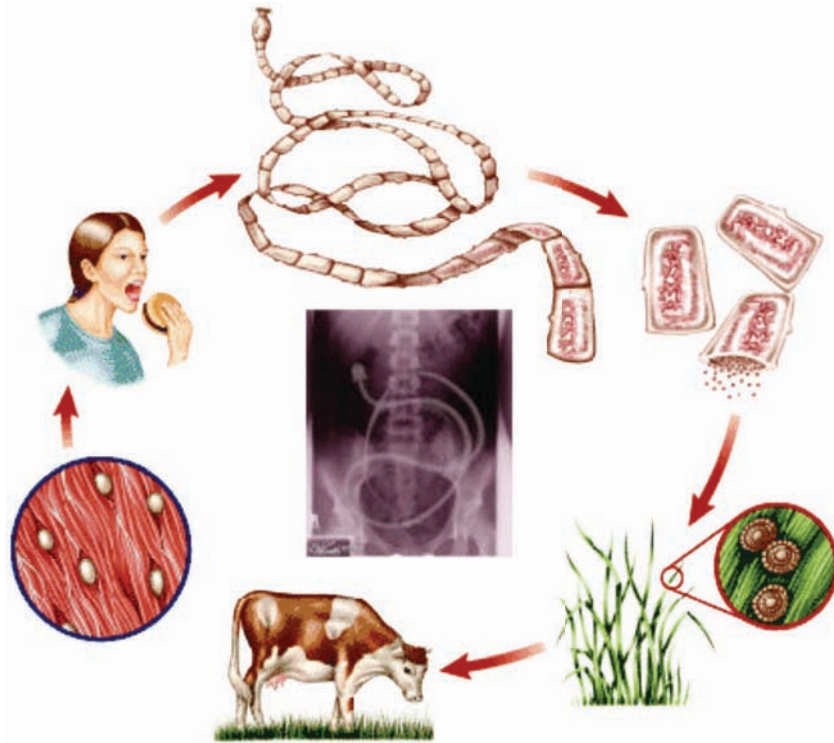

Internal Parasites

Nia O'Malley BSc

Parasitism



Parasitism is where the parasite benefits at the expense of the host by either living within the host (Endoparasites) or on the host (Ectoparasite)

Effect of Endoparasites

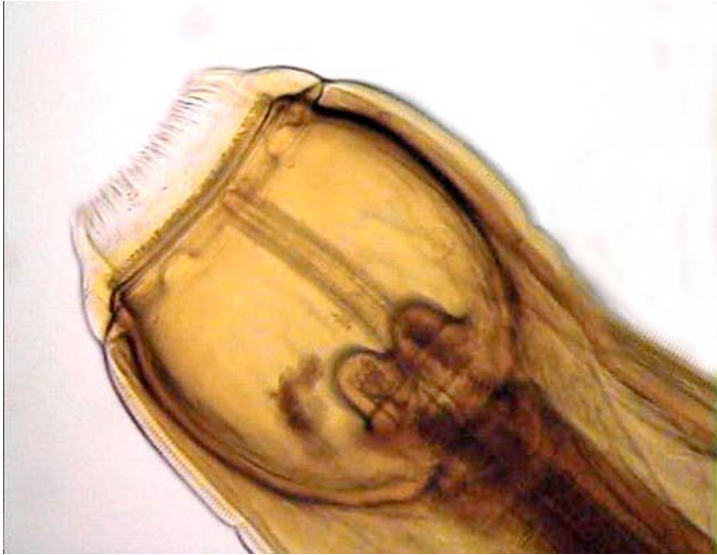


- Endoparasites continue to be a significant threat to the health of the horse
 - Parasite infection causes loss of nutrients or blood from the host and serious economical and medical problems in managing horses
 - Depletion of nutrients and blood can cause severe loss in condition, decrease growth and reduce reproductive and athletic performance
-

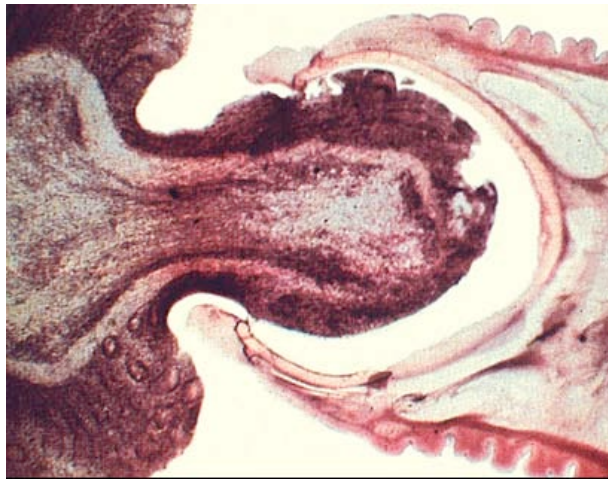
Prevalence of Endoparasites

- More than 150 types of internal parasites are known to infect horses
 - The five most significant ones are *strongyles*, *ascarids*, *pinworms*, *tapeworms* and *bots*
 - It is important to understand the life cycle of these parasites as successful prevention and control programs are effective because they interrupt the life cycle of parasites
-

Nematode Structure

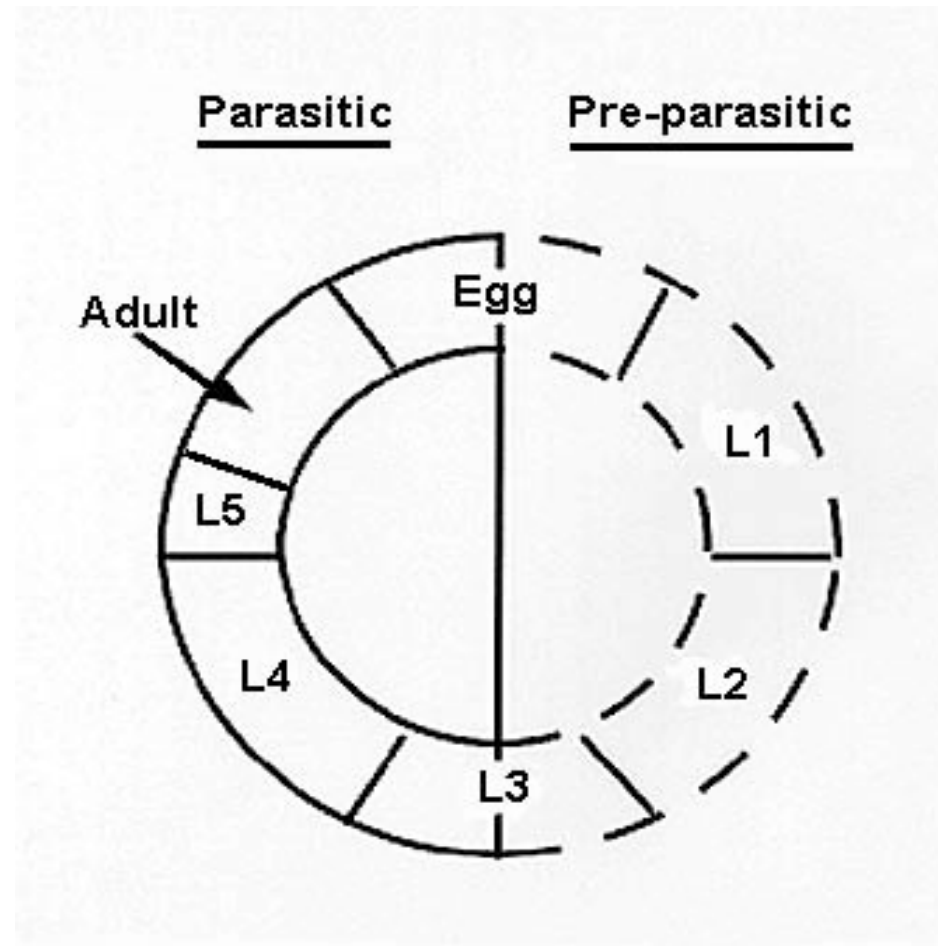


- Cuticle:
 - A protective outer skin
 - Resistant to host digestive enzymes
- The basic nematode body consists of an outer tube enclosing an inner tube
- No vascular system
- Circulation of nutrients is assisted by body movements and locomotion



Strongylus edentatus adult (no teeth) drawing a plug of mucosa into its buccal cavity

General Life Cycle

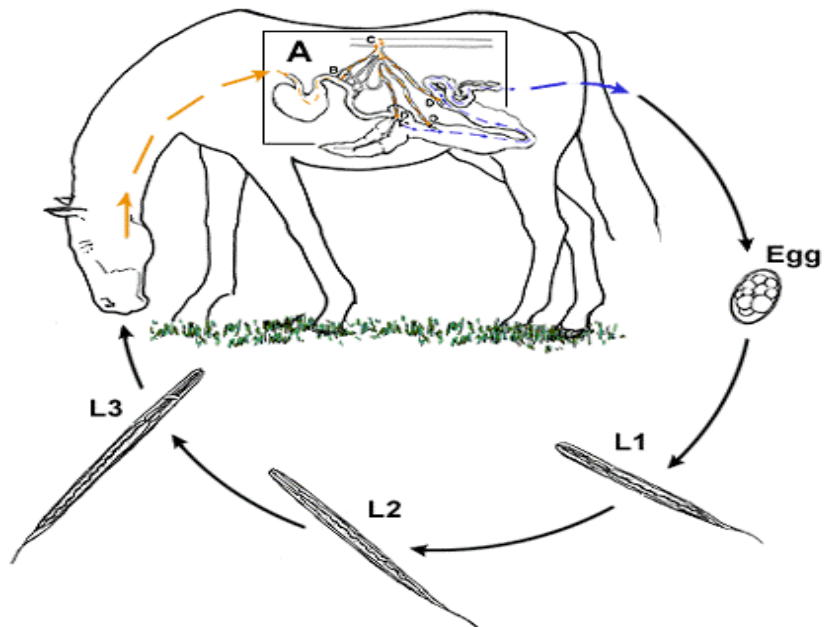


Strongylus vulgaris

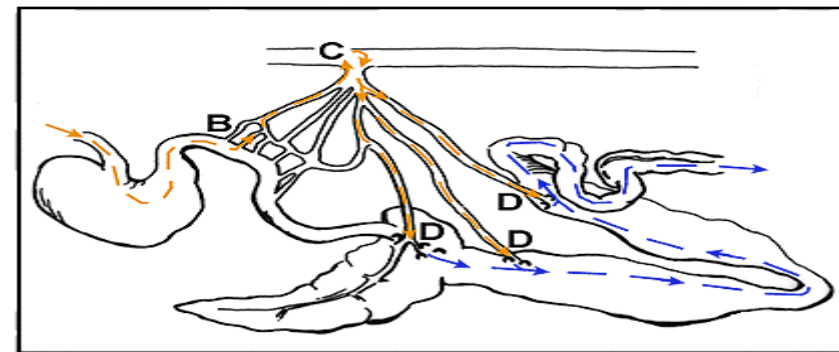
- Infection is by eating of the immature worms (L3) with grass followed by migration to the small intestine (A) and penetration of the intestinal wall (B)
7 days approx
 - Penetration of arteries (C) and migration to the large intestine arteries (D)
14 days approx
 - Stay here for 3 months and form nodules in the wall of the intestine (D)
 - Rupture of these nodules releases the young adult parasites L5 into the lumen of the intestine (*6 to 8 weeks to mature*)
 - Mature adults mate and produce eggs that are passed with faeces
-

Large Round Worm

Strongylus vulgaris - Life Cycle



Migration of *S. vulgaris* Larvae



After Ingestion of Ensheathed L3s

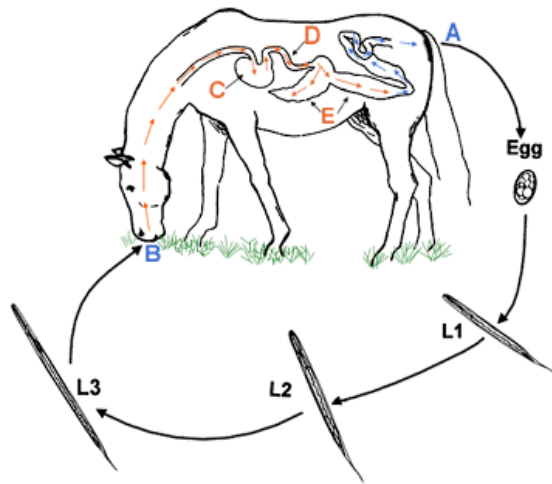
Clinical Signs

- Pale mucous membranes
 - Poor weight gains
 - Weight loss combined with dull, staring coats
 - Clinical signs are related to the feeding habits of adult worms
-

Small Round Worms

- Horses are infected by eating immature worms L3's while grazing

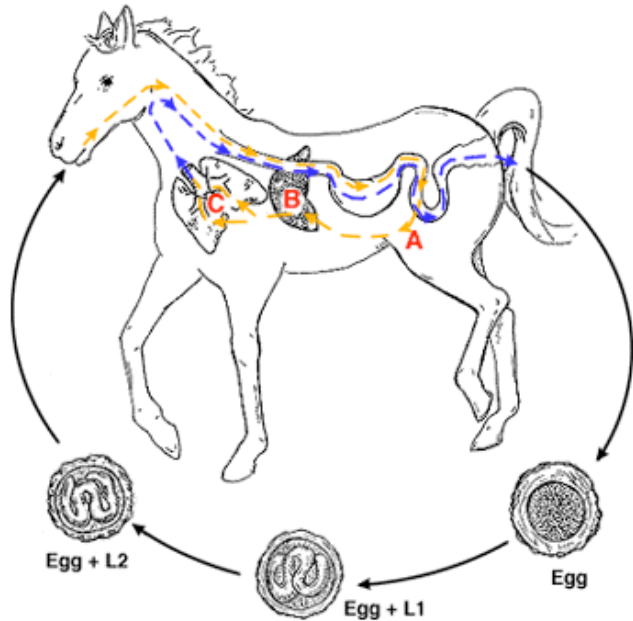
CYATHOSTOMES - LIFE CYCLES



- Pass through intestines to large intestine
 - Here, the larvae L4 burrow into the intestine walls and muscle and become encysted
 - Can stay here for a number of years
 - When conditions are right outside they emerge enmass
-

Acarids

Parascaris equorum - Life Cycle



Affects foals, adolescents develop immunity

Eggs are swallowed with feed, pasture or water

Eggs hatch, and the larvae burrow into the wall of the small intestine where they migrate into the veins

Next they travel to the liver, heart and subsequently to the lungs normally within 7-14 days

L3's are coughed up and swallowed

L4 - Adults mature in the small intestine

Eggs passed in 10 week old foals

Can remain infective for years

Clinical Signs



- Unthriftiness,
 - Pot belly
 - Rough hair coat
 - Slow growth
 - Depression
 - Cough and nasal discharge that does not respond to antibiotic treatment
-

Damage by Ascarids

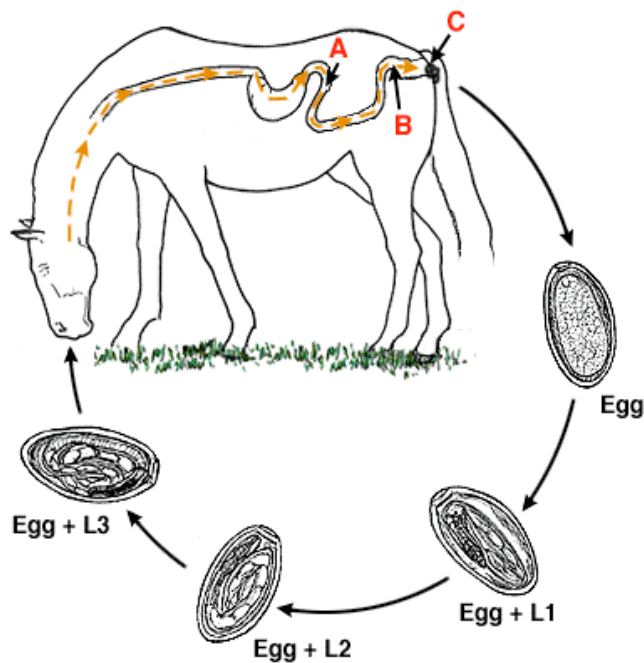
- Damage to the foal or young horse begins during this migration
 - Physical damage, inflammation and scarring of liver and lung tissue, are results of the migration
 - Damage from adult worms can range from slight digestive irritations and decreased feed absorption to intestinal blockage and subsequent colic
 - In heavy infections ascarids may be responsible for gut impactions and ruptures
-

Pinworms

- Adult pinworms lay their eggs around the anus of their host

- Eggs drop off and contaminate pastures, water, bedding and feeding areas

Oxyuris Equi - Life Cycle



- The infective stage of *Oxyuris equi* is an egg containing a third stage larva (Egg + L3)

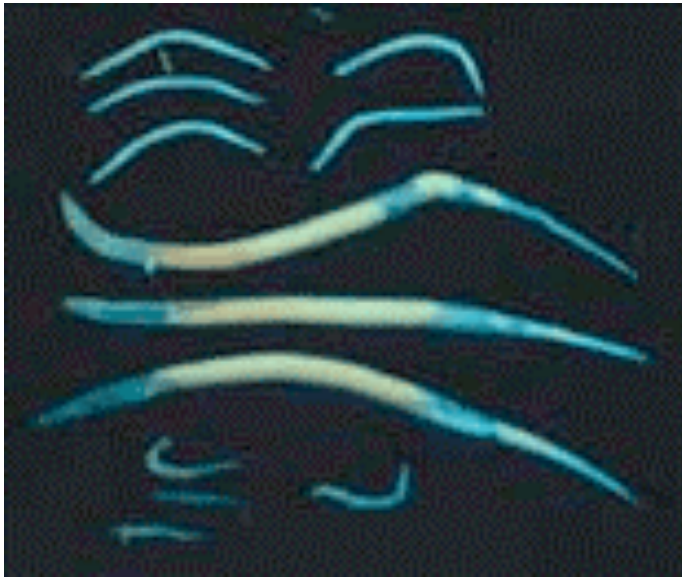
- Infected by ingestion

- Larvae (L3s) hatch in the small intestine, pass into the large intestine

- Here they molt to the fourth stage (L4) about 8 to 10 days after infection

- A lengthy maturation phase of about 100 days

Clinical Signs



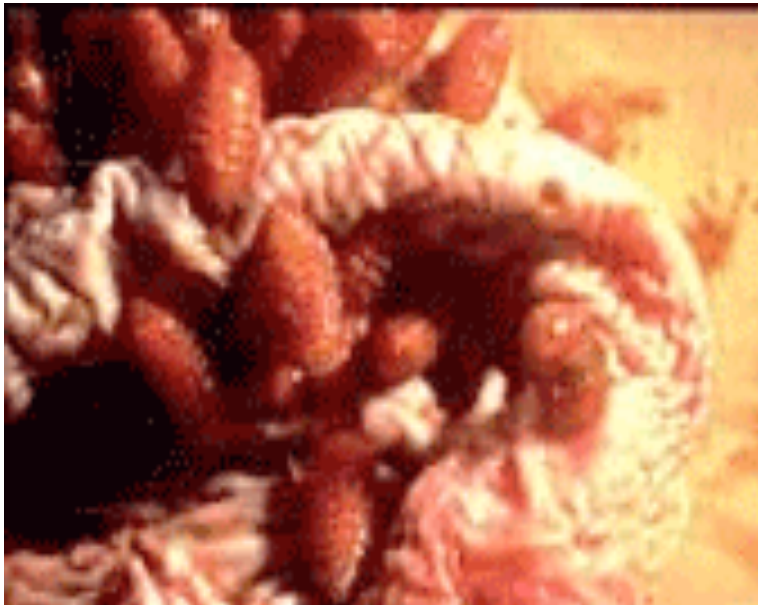
- Severe anal itching which causes the horse to rub its tail and the anal region
- The hind quarters of affected animals should be washed to remove egg masses before treatment

Stomach Bots

- Stomach bots are the larvae of a bot fly
- The females lay eggs on the hairs of horses legs
- Licking stimulates hatching
- Attach to the tongue and burrow into the tissues of the mouth
- Three weeks, a second stage larvae emerges, is swallowed and attaches to the lining of the stomach



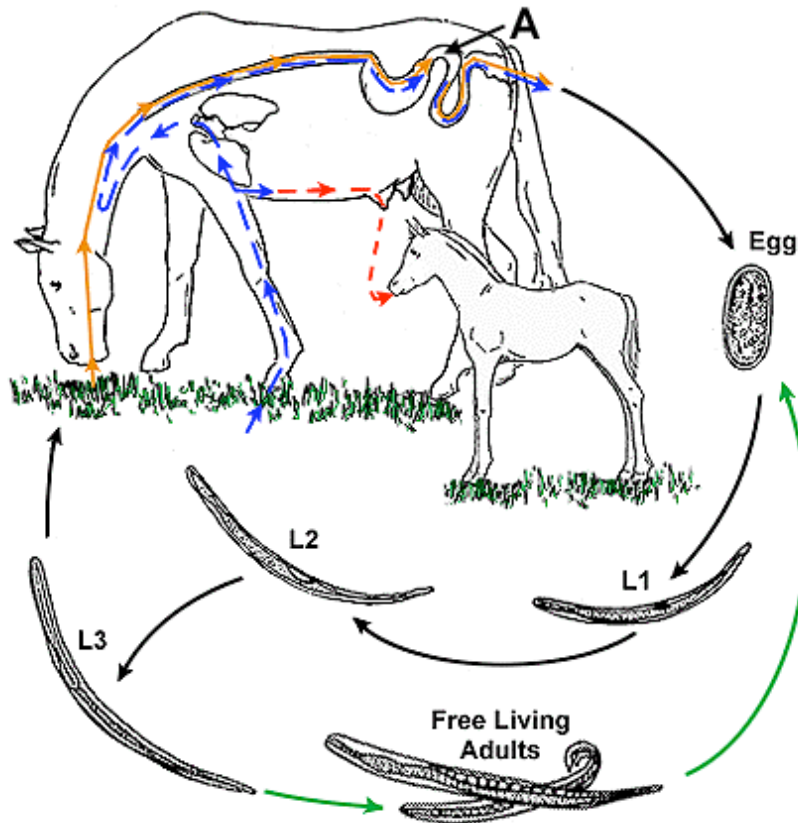
Stomach Bots



- Over wintering in the stomach, they pass out in the manure in spring and develop into adult flies
 - The adult flies are active from late spring to the killing frost in late fall
 - Treatment for bots should be scheduled from mid to late-summer and again after a killing frost
 - This schedule renders winter treatments unnecessary
-

Thread Worms

Strongyloides westeri - Life Cycle



- Young foals 4–47 days old
- Capable of both parasitic and free-living reproductive cycles
- After hatching, larvae may develop through four larval stages into free living adult male and female worms
- Foals infected by ingesting larvae in the dam's milk or by penetration of the foal's skin by infective larvae in the bedding
- The larvae migrate through the lungs and the small intestine causing injury while passing

Threadworms



- The life cycle can be completed in less than two weeks
 - Foals quickly develop immunity to these parasites
 - The main problem caused by these parasites is diarrhoea, which may not respond to treatment
 - Some foals with threadworms may become dehydrated and develop other problems related to chronic diarrhoea
 - Threadworms infections may accompany, but are not the cause for “foal heat” diarrhoea
-

Tapeworm



- Tapeworms occur in horses of all ages
- Transmission requires an intermediate host, the oribatid mite which exists on pastures
- Horse ingests the mite from pastures, and it takes about two to four months for the tapeworm to mature in the horse
- Mature worms first occur in weanlings and yearlings
- Large numbers of tapeworms can cause ulceration in the large intestine and caecum, colic, and a severe form of intestinal blockage

Chemical Control

- Many different commercial products are available to remove internal parasites from horses

 - These drugs are administered in several different ways:
 - Purge (killing of adults)
 - Paste
 - Via stomach tube (drenching)
 - Pellets every 8 weeks in feed
 - Continuous drug control program
 - Intramuscular injection (moxidectin)
-

Seasonal Influence

- De-worming programs work best if used when climatic conditions are favorable for hatching of eggs, development of larvae and transmission of infection
 - The annual cycle to control parasites should begin in early autumn (September) and continue through February or March
 - Research indicates that it is better to concentrate treatments in autumn and winter than to use the same number of treatments spaced evenly throughout the year
 - Although this program is somewhat different from the traditional de-worming schedules, there is increasing documentation for its effectiveness
-

Anthelmintics

- Ivermectin
 - Eqvalan
 - Eraquell

 - Moxidectin
 - Equest

 - Benzimidazoles
 - Panacur
 - Telmin

 - Pyrimidines
 - Strongid
 - Pyratape

 - Praziquantal
 - Equitape

 - Praziquantal & Ivermectin
 - Equimax
 - Eqvalen Duo
-

Ivermectin



- One of the most effective classes of dewormers
 - Kills everything except encysted small strongyle larvae & tapeworms
 - Since ivermectin became available, the incidence of large-strongyle-related colic has decreased dramatically
 - The use of ivermectin every five to six months should eradicate large strongyles on a farm in about two years
-

Moxidectin

- Kills 15% encysted small strongyles and bots and provides 84-day suppression of strongyle eggs
- One of the least safe commercial worm medicines currently in popular use
- There are reports of it killing horses who were in marginal condition, undernourished and/or a little weak, also foals



Benzimidazoles



- Telmin (Mebendazole) & Panacur (Fenbendazole)
- Given at double dose according to the horse's weight for five days in a row, or at eight times the dose will kill more encysted small strongyle larvae than moxidectin
- They are extremely safe when used alone x100
- Will not control bots and may require higher dosages to control ascarids
- Most resistance to wormer is found in this class

Pyrimidines



- Strongid, Pyratape
 - They are effective against ascarids, strongyles and pinworms
 - A double dose of the pyrimidines has been effective in controlling tapeworm
-

Praziquantel & Ivermectin

- Praziquantel:
 - Equitape



- Effective against tapeworms
- No efficacy against roundworms



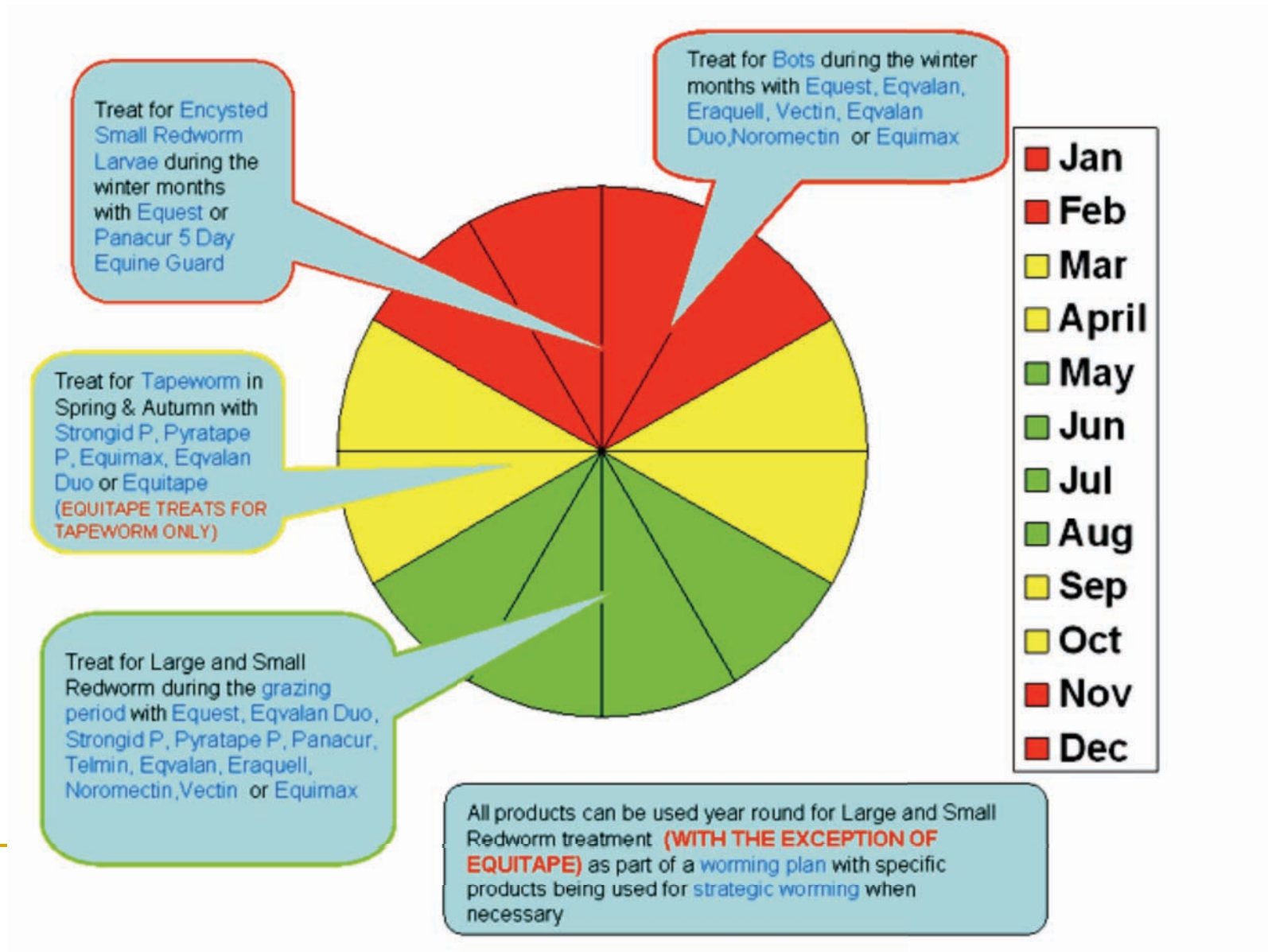
- Praziquantel & Ivermectin
 - Equimax
 - Eqvalan Duo



- High efficacy against tapeworms and adult small roundworms
-

Anthelmintic	Trade Name	Large Roundworm A L	Small Roundworm A L	Ascarids	Tape Worm	Bots
Moxidectin	<i>Equest</i>	+ +	+ +	+	-	+
Ivermectin	<i>Eqvalan</i> <i>Eraquell</i>	+ +	+ (+)	+	-	+
Pyrantel Embonate	<i>Strongid</i> <i>Pyratape</i> <i>Embotape</i>	+ -	+ -	+	+ (x2)	-
Praziquantal	<i>Equitape</i>	- -	- -	-	+	-
Ivermectin + Praziquantal	<i>Equimax</i> <i>Eqvalan</i> <i>Duo</i>	+ +	+ (+)	+	+	+
Mebendazole	<i>Telmin</i>	+ -	+ -	+	-	-
Benzimidazole	<i>Panacur</i>	+ +(x8)	+ +(x8)	+	-	-

Worming Calendar



Parasite Prevention

- Management programs which interrupt the life cycle of the parasite before infestation occurs are the key to successful control
 - Sanitation in stall areas is essential. Manure should be removed and placed in a compost pile or spread on cropland or pastures *not being grazed by horses*. The larvae in composted manure will be destroyed if sufficient heat is built up
 - Alternative grazing with ruminants and pasture rotation schemes will aid in disrupting the parasite life cycle
 - Vacuuming or collecting faecal material in pasture is expensive, but it can be very effective
-

Parasite Prevention

- Be sure to isolate and deworm all new arrivals to the farm
 - Feeding horses on the ground and not out of containers increases the risk of becoming infested with parasites
 - Check the efficacy of that program by evaluating faecal samples for parasite ova on an annual basis
 - Adopt a rotational treatment protocol, which alternates between classes of anthelmintics
-