Equine internal parasites: their types and management

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Katie Snalune BSc, MA, VetMB, CertEM (Int Med), MRCVS, explains the types of worm burdens horses face and how to manage them

ALL horses host a wide range of internal parasites. It is important to realise that often these worms, present in low numbers, are well tolerated and cause no detectable harm. Occasionally, however, a small proportion of horses develop heavy worm burdens. These are at risk of suffering from problems such as colic, weight loss, diarrhoea and even death.

The main internal parasites of importance to horses are small redworms (cyathostominae) and tapeworms *(Anoplocephala perfoliata)*. Other important parasites include large redworms (*Strongylus* spp), large roundworms (*Parascaris equorum*), bots (*Gasterophilus intestinalis*), pinworms (*Oxyuris equi*) and threadworms (*Trichostrongylus axei*).

Small redworms

Cyathostominae are the most common endoparasite and there are more than 50 species known. Adults living in the large intestinal lumen lay eggs that are passed in the faeces. The egg hatches and develops through three larval stages. The third larval stage is infective and if ingested by the horse, migrates to the intestinal wall, where it undergoes a period of inhibited development.

The encysted larvae play a pivotal role in cyathostominassociated disease, as large numbers of larvae can accumulate and subsequently reactivate simultaneously to cause extensive damage to the intestinal lining and a severe inflammatory enteropathy of the large intestine. Once in the large intestine, these larvae mature to adults that lay eggs, so completing the life cycle.

Tapeworms

Anoplocephala perfoliata is a short, flat, triangular worm that attaches to the lining of the gut by four suckers. It attaches at the ileocaecal junction. Infected horses shed proglottids containing eggs. The eggs are eaten by orbatid mites that are present in pasture and develop into an intermediate infective stage, the cysticercoid.

Grazing horses inadvertently ingest the mites, releasing the cysticercoid, which continues to develop into an adult tapeworm inside the horse. The adults attach in clusters to the lining of the gut at the ileocaecal junction and release eggs, thereby completing the lifecycle.

Roundworms or ascarids

Parascaris equorum are usually only problematic for foals and young horses. Roundworm eggs can remain viable in soil for many years and horses ingest them as they graze. The eggs hatch in the intestine. Larvae migrate through the intestinal wall into veins where they are transported to the lungs via the bloodstream. In the lungs, they are coughed up and swallowed, passing back into the small intestine. These larvae then develop into adult roundworms. They can grow up to approximately 50 cm long and lay eggs, passed in the faeces.

Bots

The female *Gasterophilus intestinalis* lay small, sticky yellow eggs on the horse’s coat. The eggs hatch and enter the horse’s mouth when they lick their coat. These larvae are then swallowed. The bot larvae attach to the stomach lining. They are eventually passed through the gastrointestinal tract and out in the faeces. Once expelled, the larvae develop into adult bot flies.

How internal parasites affect horses

Parasites are unevenly distributed throughout a population of horses. Only a small proportion of horses in a population will be heavily infected. It is only heavily infected animals that are likely to suffer from parasite-related disease. Also, horses are not equally susceptible to infection and the horse’s innate immunity may play a role in this.

Research has demonstrated that small redworms and tapeworms are associated with colic. One study showed a significantly increased risk of spasmodic colic in horses with a tapeworm burden. Tapeworms can also cause ileal impaction, which requires surgical correction. Horses with a high tapeworm burden are up to 20 times more likely to suffer this type of colic (Proudman et al,1998).

Small redworms accumulate in the intestine over the grazing season, and the larvae hibernate in the intestinal wall. The simultaneous reactivation of large numbers of larvae cause extensive

damage to the large intestinal lining and causes a syndrome known as larval cyathostomiasis. Some horses will suffer general malaise, poor condition and failure to thrive, and some will develop severe diarrhoea and die despite intensive care. There is a higher incidence in young horses and severe cases carry a high mortality rate.

Parasite management

For effective parasite control, a combination of both pasture management and worming drugs (anthelmintics) must be used. There is no single, blanket recommended worming protocol for all circumstances. Individual protocols must be tailored to the environment, whether it be a stud, livery yard, single horse or dealer’s yard, etc.

Pasture hygiene

The principle of pasture hygiene is to prevent pasture contamination, thereby stopping the parasite from completing its lifecycle in the host. Factors that increase the daily infective dose of parasites to a horse include high stocking density, heavily grazed pasture, presence of horses with high parasite burdens, presence of young horses and warm, damp weather.

The easiest way of preventing a build up of numbers of eggs and infective larvae on the paddock is to regularly remove droppings. This also increases the grazing area available. The best policy is daily removal, although once or twice per week is also effective. Although strongyle eggs can overwinter and ascarid eggs can remain viable for years, resting and rotating pasture allows infective eggs to die before infecting another horse and reduces contamination.

Mixed-species grazing (cattle and sheep) is also extremely useful to decrease pasture contamination. These species act as “biological vacuum cleaners” by eating eggs and larvae that cannot survive in species other than the horse. Separating age groups with younger horses grazing pastures first is also useful, as older horses are a major source of infection, especially mares at stud. Ideally, one to two horses per acre is an acceptable stocking density. Increasing this number leads to horses grazing closer to dung piles and close-cropped grass.

Harrowing scatters faeces, together with infective eggs and larvae. If you live in a country with hot, dry weather, these conditions will dry out eggs and larvae and kill them. However, our mild, wet climate only serves to spread infective larvae, making horses more likely to ingest them, building up their worm burden.

Anthelmintics

The use of anthelmintics to suppress faecal egg output has been the mainstay of control for many years. These drugs can be used in a number of ways:

• **Interval dosing** – the administration of a specific drug at the manufacturer's recommended time interval throughout the year. Interval dosing encourages increased use of anthelmintics at lower risk times, such as winter periods, when horses spend increased amounts of time stabled. This is expensive and often unnecessary. Also, many horse owners use anthelmintics at inappropriate intervals. Over-use of anthelmintics can increase the risk of parasites developing resistance.

• **Strategic dosing** – the use of drugs at specific times of year to disrupt the seasonal cycle of transmission. This method has been widely and effectively used in farm animal practice. In horses, this regime falls down if abnormal weather patterns occur or if horses with a heavy parasite burden are added to a population.

• **Targeted strategic dosing** – faecal worm egg counts (FWECs) are measured prior to dosing. Only horses with FWECs more than 200 eggs per gram (epg) are wormed. Anti-tapeworm treatment can be targeted by an annual blood ELISA test to measure tapeworm antibody levels. At present, diagnostic limitations mean mucosal stages of cyathostomins cannot be detected by FWECs or blood test. Therefore, this regime should include a larvicidal treatment, usually given in November.

Diagnostic tests

Faecal worm egg counts

FWECs give a count of the number of strongyle eggs per gram, including ascarid eggs. A small faecal sample (5-10 g) is required and is useful for routine monitoring of parasite status, identifying infected horses for targeted treatment and investigation of the parasite status of a new horse. They are also useful for monitoring efficacy of a worm control programme and detecting resistance to worming drugs, by the use of a FWEC reduction test, performed at day zero and day 14 post-treatment. FWECs do not detect encysted stages of strongyle parasites.

Tapeworm ELISA antibody test

This measures the level of antibody to a specific tapeworm antigen. Elevated levels of antibody are associated with horses with a significant burden. The test is performed on serum and either serum or whole blood may be submitted. This test is also extremely useful in the investigation of acute and recurrent episodes of colic (Proudman and Trees, 1996a,1996b, Proudman et al, 1997).

Results are categorised into no or low tapeworm burden (0.6). This ELISA test is particularly good at detecting horses with high infection intensities (> 0.6), namely those horses at significantly increased risk of tapeworm-associated colic. However, results between 0.2 and 0.6 fall into a grey area and must be interpreted with caution. Horses in this range may have values related to immunological memory of a past infection. Therefore, the decision to recommend anti-tapeworm treatment at this level is more complicated.

The ELISA measures past as well as current infection and it is essential that the result is interpreted in light of relevant anthelmintic history. It may be sensible to follow up these results with a FWEC using a modified sedimentation/flotation technique capable of detecting tapeworm eggs, or by repeating the test in two months and identifying a rising titre, suggestive of reinfection (Abbott and Barrett, 2008).

Implementing targeted strategic worming

There are three key elements:

• good pasture management;

• anthelmintics to decrease faecal egg counts, used appropriately; and

• monitoring of parasite burden by FWECs and tapeworm ELISAs.

In the first year of a targeted strategic worming programme, all horses should be tested every 12 weeks. As a pattern of infection develops, this interval can be extended to every six months. Tapeworm ELISA is recommended every one to two years.

Once results are obtained, individual horses with a zero/low parasite burden need not be treated and should be re-evaluated in three months' time. Horses with a FWEC more than 200 epg or a high tapeworm burden, are treated appropriately. Use of worming drugs on horses with very low levels of infection can speed up the development of drug resistance. It is sensible to tolerate low levels of worm infection, as they are not harmful to your horse and may stimulate its natural immunity.

There is currently no commercially available methods of diagnosing encysted small redworms. Therefore, a larvicidal drug is recommended annually at the end of the grazing season (November). The only products with labelled claims against inhibited and developing stages are Panacur Equine Guard (five-day course) and Equest (moxidectin).

A targeted strategic control programme may not be appropriate in all circumstances, for instance in a dealer's yard with a high throughput of horses of unknown parasite status. However, it is beneficial for numerous reasons, including:

1. It is cost effective, as anthelmintics are only used on horses with proven infection. The cost of the diagnostic tests is generally more than covered by the saving on wormers. Also, the owner has peace of mind knowing his or her horse does not have a harmful parasite burden.

2. It is environmentally friendly. Non-chemical means of parasite control and the targeted use of drugs limits the harmful effects these drugs with residual activity can have on the environment.

3. It minimises the risk of drug resistance. A targeted approach reduces the exposure of parasites to drugs and slows the development of resistance.

The future

Firstly, resistance to anthelmintics is a major concern. There is currently widespread resistance to benzimidazoles, developing resistance to pyrantels, but no resistance as yet to avermectins. In the future, it may mean that some or all of the drugs currently available to us will be ineffective. It is all our responsibility to help prevent this from happening through the responsible and sparing use of drugs. Research into the spread of anthelmintic resistance to cyathostominae is a very important future topic. Studies aimed at developing molecular methods for early detection of anthelmintic-resistant genotypes is now underway.

Secondly, there is currently no specific laboratory method to diagnose pre-patent cyathostomin infection non-invasively and coprological methods only allow a crude assessment of adult burden. In fact, horses with high mucosal burdens often have low or negative FWECs. Animals with larval cyathostominiasis often develop hypoalbuminaemia and neutrophilia, but there are no parasite-specific clinico-pathological features specific to the disease.

An immunodiagnostic test for mucosal larvae would have an immediate impact on the diagnosis of this devastating disease and would allow veterinarians to identify horses that require immediate larvicidal anthelmintic treatments. Recent work has led to the identification of two antigen complexes that have diagnostic potential for estimating mucosal larval burdens. Results of these studies indicate that an immunoassay based on the antigens present in these complexes could ultimately be used to differentially diagnose weight loss and diarrhoea cases, or used to aid in the selection of the type of anthelmintic treatment (Matthews et al, 2004).

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(Left) *Anoplocephala perfoliata* attached at the ileocaecal junction. (Right) Cyathostome larvae emerged from the intestinal wall into the lumen.

(Left) *Anoplocephala perfoliata* attached at the ileocaecal junction. (Right) Cyathostome larvae emerged from the intestinal wall into the lumen.

Treatment	Trade name	Large redworm A	Large redworm L	Small redworm A	Small redworm L	Ascarids	Tapeworm	Bots	Lungworm	Worming interval	Foal age at first worming
Moxidectin	Equest	+	+	+	+	+	-	+	+	13 weeks	4 months
Ivermectin	Eqvalan Bimectin Vectin Eraquell Panomec	+	+	+	(+)	+	-	+	+	8-10 weeks	6-8 weeks
Pyrantel embonate	Strongid-P Pyratape-P	+	-	+	-	+	Effective with double dose	-	-	4-6 weeks	4 weeks
Praziquantel	Equitape	-		-		-	+	-	-	6 months	8 weeks
Ivermectin+ Praziquantel	Equimax Eqvalan Duo	+	+	+	(+)	+	+	+	+	6 months	4 weeks 2 months
Mebendazole	Telmin	+	-	+	-	+	-	-	Increased dose for 5d	6 weeks	
Fenbendazole	Panacur Panacur Equine Guard	+		+	5 day course for larvae	+	-	-	+	6 weeks 6-12 months	4 weeks 4 weeks

Table 1. Worming drugs for use in horses