Management of Irish equine endoparasites

Equine endoparasites can cause a variety of clinical signs and conditions ranging from a dull coat to colic and even death in severe cases. Implementing an effective endoparasite control strategy for each individual horse is paramount in achieving optimal horse welfare, writes Laura Clifford BSc VN RVN, Bridge House Veterinary, Dundalk

Photo: Karen Dunne, vet practitioner

INTRODUCTION

Traditional methods of parasite control in horses have become insufficient in controlling cyathosomins, which are now the prevalent parasite of Irish horses. Optimal management of horse parasites should include faecal egg counts and anthelmintic resistance monitoring using faecal egg count reduction tests. Environmental measures are also vital in endoparasite management and should be incorporated into each control plan.

As the entirety of the equine population is susceptible to parasite infestation, it is important to adequately understand endoparasites in order to give accurate management and control advice to clients. Low numbers of endoparasites do not cause harm to the host equine, however heavy burdens can cause serious illness. The aims of parasite control strategies are not to eradicate endoparasites completely, as this would prove impossible, but rather to minimise the risk of parasitic disease, control parasitic egg shedding and to maintain the effective nature of drugs by limiting anthelmintic resistance. The most common endoparasites occurring in Irish horses will be discussed along with identification methods and treatment protocols based on recent developments in optimal parasitic control strategies.

ANTHELMINTIC RESISTANCE

In the past, it was recommended to carry out routine and frequent dosing with alternating broad spectrum anthelmintic treatments quarterly, for all equine patients. This method of blanket dosing was devised to prevent infection from *Strongylus vulgaris*, which is now rare in Ireland (Rendle, 2015). However, this recurrent use of anthelmintic treatments has led to the increasing prevalence of

Table 1: Common endoparasite in Irish equines.

Genus/species	Lifecycle	Infective stage	Final site in the host equine	Pre-patent period	Identification
Trichonema spp – Cyathostomins (small redworm)	Direct	L3	The large intestine	Two to four months	Standard flotation techniques and faecal egg counts. Easily identifiable as small, red worms in the faeces
Strongylus spp – Strongylus vulgaris (large redworm)	Direct with a migratory route	L3	Large intestine	Six to 12 months	Larval culture of the faeces and positive identification of the infective L3
Parascaris equorum (roundworm)	Direct	L2	Small intestine	Two-and-a-half to three months	Standard flotation techniques – eggs densely pigmented with a thick shell
Anoplocephala perfoliata (tapeworm)	Indirect lifecycle with the orabatid mite being the intermediate host	Metacestode	Ileo- caecal junction	One-and-a-half to four months	Hard to identify due to intermittent shedding of the eggs. Administer a cestocide and monitor for the appearance of eggs
Strongyloides westeri (threadworm)	Indirect lifecycle (transmammary infection, transcutaneous or ingestion)	Only the adult female is parasitic	Large intestines	Five to seven days	Standard flotation technique

anthelmintic resistance amongst certain parasitic nematodes in the equine – *Cyathostomin spp* and *S vulgaris* (Reinemeyer, 2009). In order to prevent further resistance, anthelmintic treatments should only be administered at the relevant time of year when the epidemiological lifecycle of a parasite favours infection. Furthermore, these treatments should only be administered to horses with a high worm burden, or those showing clinical signs of endoparastitic infection (American Association of Equine Practitioners, 2013).

CYATHOSTOMINS

In the past, cyathostomins (small strongyles) were not considered an important equine pathogen as they were overshadowed by the effects of *S vulgaris* (American Association of Equine Practitioners, 2013). However, now that situation has changed and Cyathostomins are considered a primary equine parasite pathogen (Love et al, 1999). Cyathostomins are ubiquitous to the equine population. Although they are relatively mild pathogens with no migratory route, younger foals are more susceptible to infection.

Clinical signs include anaemia, poor growth and diarrhoea (Rendle, 2014). Acute colitis may also occur due to mass eruption of the larval stages of the parasite from hypobiosis. This disease is termed acute larval cyathostomosis and has the potential to be life threatening (Merial Equine Health, 2014). Clinical signs of acute larval cyathostomosis include ventral and distal limb oedema, a high temperature, diarrhoea and colic. Stage three larvae and stage four larvae, which have undergone hypobiosis, are only susceptible to moxidectin or a five-day course of fenbendazole at a dose rate of 10mg/kg (Klei et al, 1993). Cyathostomes may be observed as <2cm bright-red larvae in faeces, however Cyathostomin eggs cannot be distinguished from large strongyles on a faecal egg count.

PARASCARIS EQUORUM

This parasite is commonly known as the large roundworm. It is of little clinical significance in adult horses however it is one of the most significant and potentially dangerous parasites that a foal will confront in the first year of life. McCue (2009) mentions that the medical implications of parasite burdens with P equorum include damage to the lungs and liver secondary to larvae migration, which in turn may lead to pneumonia and possible obstruction.

Clinical signs which can be noted in an affected foal may be poor weight gain, rough hair coat, a pot-bellied appearance, nasal discharge and mild to severe colic. However, in an article by Rendle (2014) it is stated that low levels of intestinal infection, <50 eggs per gram (EPG), are generally well-tolerated amongst foals. High levels of infection (>100 EPG) with this parasite are encountered at around five to eight months of age. Acquired immunity is developed by yearlings at around 18 months of age (Merial Equine Health, 2013). However, some horses remain vulnerable to low levels of infection and may act as a reservoir for excretion of the parasite eggs into the environment (Rendle, 2014).

Optimal treatment of infection is by the use of benzimadizoles as this anthelmintic class has efficacy against the adult parasites and as well as larvacidal properties (Rendle, 2014). The eggs of this parasite can also survive in the environment for up to 10 years (McCue, 2009) so paddock rotation is vital where youngstock are grazed.

Table 2: Levels of resistance of anthelmintics (American Association of Equine Practitioners, 2013).

Anthelmintic	Percentage at which there is either suspected resistance or resistance
Pyrantel	≤90%
Ivermectin/ Moxidectin	≤98%
Oxibendazole / Fenbendazole	≤95%

Table 3: Anthelmintic treatments available on the Irish market.

Class of wormer	Mode of action	Spectrum of activity
Macrolytic lactones – ivermectin and moxidectin	Bind to receptors in the nematode (and arthropod) nerve cells resulting in an influx of chloride ions. This results in paralysis of the pharynx, body walls and uterine muscles of the parasite which allow for its expulsion	Effective against many immature nematodes and some hypobiotic larvae
Tetrahydropirimidines – Pyrantel embonate, pyrantel tartrate and morantel tartrate	Mimics the action of acetylcholine and causes spastic paralysis of the nematode	Broad spectrum, active against adult stages of ascarids, large and small strongyles. When administered as a double dose, pyrantel also kills A perfoliata
Benzimidazoles – fenbendazole and mebendazole	Deplete reserves of energy within the parasite resulting in starvation of the nematode by the inhibition of glucose uptake	Effective against a range of adult and some immature nematodes. Repeated dosing is required for L3 and L4 small and large strongyles which have undergone hypobiosis
Isoquinolone – pyrozines and praziquantel	Causes spastic paralysis within the parasite	Narrow spectrum for tapeworm only

TAENIA SPP

Anoplocephala perfoliata and *Anoplocephala magna* (also known as tapeworms) are often associated with colic and should be monitored for at the end of the grazing season. In general, tapeworms are not considered to be clinically significant unless a large number are present or the host is immunocompromised.

Treatment of A perfoliata generally includes routine treatments once or twice a year. Foals should be treated

Table 4: Levels of contamination (American Association of Equine Practitioners, 2013).

Contamination level	FEC	Percentage of adult population
Low shedder	0-200 EPG	50-70
Moderate shedder	200-500 EPG	10-20
High shedder	>500 EPG	20-30

within the first autumn/winter of their birth (Rendle, 2014). Either a single dose of praziquantel or a double dose of pyrantel embonate (pyrimidine class of wormers) should be used.

STRONGYLOIDES WESTERI

Strongyloides westeri is an intestinal threadworm which is clinically significant in foals more so than adults. Newborn foals are susceptible to infection by nursing milk from the mare, which may contain larvae (McCue, 2009). These larvae migrate from the dormant stage in the abdominal tissues into the mare's udder around foaling time.

In the majority of foals, infection with *S westeri* is asymptomatic. However in some cases diarrhoea, ill thrift, weight loss and anorexia may be noted. A study by DiPietro (1989) found that a very high level of exposure to the parasite was necessary for diarrhoea to manifest in the foal. Merial Equine Health Ltd (2011) discusses how migration through the lungs can cause extreme haemorrhage along with respiratory distress. As well as this, skin penetration may result in dermatitis and irritation in the foal. Larval and adult stages of *S westeri* are susceptible to fenbendazole and macrocyclic lactones – ivermectin and moxidectin.

SELECTIVE THERAPY

In recent years, selective therapy has become the treatment strategy of choice for horses over two years of age, as discussed by Reinemeyer (2008) and Nielsen (2013). This involves therapeutic anthelmintic treatment of high shedders – those animals whose faecal egg counts (FECs) are above 200 EPG of faeces, while treating those who fall below that cut off point less frequently or not at all (American Association of Equine Practitioners, 2014).

In contrast to older recommendations, this form of treatment delays the onset of further anthelmintic resistance by ensuring that there are adequate levels of refugia – parasites within an ecosystem which are not exposed to anthelmintics (Rendle, 2014).

However, this approach is not suitable for foals, weanlings and yearlings. This is because horses under three years of age have increased susceptibility to developing high worm burdens and thus require a more intensive worming programme than older horses (Equine Veterinary Services, 2014).

FAECAL EGG COUNT

Faecal egg counts are necessary to identify horses with high worm burdens. They also differentiate between ascarid and strongyle burdens in foals/weanlings, thereby facilitating selection of the correct anthelmintic (American Association of Equine Practitioners, 2013). Additionally, they are used to determine the efficacy of anthelmintic treatments through faecal egg count reduction tests (FECRT) .

Faecal egg counts however, do not reflect the presence of immature/larval stages of parasites in the horse. These include *Cyathostomin spp* undergoing hypobiosis and migrating endoparasite larvae (American Association of Equine Practitioners, 2013). The presence of tapeworms such as *A perfoliata* is often underestimated by using FEC, as shedding by these parasites is intermittent (Rendle, 2015).

In many horses receiving regular anthelmintic treatments, 99% of the eggs identified from a FEC, will be that of cyathostomins (Rendle, 2015). However, in horses who haven't received any anthelmintic therapy, up to 10% of the eggs may be from the larger, more pathogenic strongyles species (American Association of Equine Practitioners, 2013). A larval culture of the faeces must be performed in order to distinguish cyathostomin stage three larvae from large strongyle stage three larvae, as their eggs look identical during an FEC. Identification of large strongyles eggs, such as that from *S vulgaris*, require intensive anthelmintic treatments due to the invasive migratory lifecycle.

FEC REDUCTION TEST

For this procedure it is recommended to perform a FEC on at least six horses from the same farm who have not received anthelmintic treatments within the last eight weeks. The anthelmintic is then administered and 14 days later another FEC is performed. By using the equation below, the percentage of reduction of EPG is determined and compared to predefined, suggested cut-off values to establish if resistance is present.

ANTHELMINTIC TREATMENT DETERMINATION

A study by Neilsen (2009), established that typically, 20% of the horses present on pasture will remain responsible for 80% of pasture contamination throughout their lifetime. Selective therapy aims to identify these high shedders by performing an FEC after the egg reappearance period of any anthelmintic used, has expired. The test should then be repeated and the results compared to guidelines which help determine if the horse is a low, moderate or high-egg shedder (Rendle, 2014).

As discussed by Rendle, horses with a FEC of >200-500 EPG should be administered an anthelmintic and another faecal egg count taken a few months later, while those who fall below that threshold are treated less frequently. On a property where FECs are routinely performed and exposure is low/moderate then a single dose of moxidectin should be administered at the end of the grazing season to treat encysted larvae. A treatment of praziquantel should also be administered to target *Taenia spp*.

PASTURE MANAGEMENT

Pasture management is an important way in which exposure to endoparasites can be limited and the use of anthelmintic treatments can be reduced (Rendle, 2014). The most common method of parasite transmission to the horse is through the ingestion of the infective stage of the parasitic larvae, which have developed in the manure. Hence, clients who regularly remove faeces from their pasture greatly reduce the contact between the horse and the infective parasites (Merial Equine Health, 2014).

PASTURE CLEANING

The pasture should be cleaned at least twice a week with the majority of the faeces being removed – this can be up to 24kg of dung per horse. A study by (Herd, 1986) determined that twice weekly vacuuming of the pasture controlled parasite infectivity more effectively than routine anthelmintic dosing. Faeces removal can be achieved either by hand or by the use of a pasture vacuum.

COMPOSTING MANURE

Creating sufficient heat within manure can kill parasites, including ascarid eggs. The client should aim to compost manure and soiled bedding correctly in pile formation, in order to reach internal temperatures of up to 40°C. These temperatures will eradicate strongyle larvae and eggs within two weeks (American Association of Equine Practitioners, 2013). The client must ensure to turn the compost occasionally to eradicate a variety of different temperatures in the manure forming, as lower temperatures may be favourable to parasites survival.

MIXED GRAZING

This is a helpful step in limiting parasite burdens on the land however, it may not be viable for all clients. The majority of equine parasites are host-specific so introducing animals such as cattle or sheep will lead to them ingesting larvae and eggs and destroying them as the parasite cannot become established. Merial Equine Health (2014) review how all animals can be grazed together or various species can be rotated in separate paddocks. Sheep may also be allowed to graze the land over the winter months.

CONCLUSION

Equine endoparasite management is a common topic within large animal practice. Traditional methods of endoparasite control have been updated to account for the most predominant current parasite in Irish horses while also aiming to prevent anthelmintic resistance.

Veterinary practitioners and nurses play a pivotal role in advising clients on the optimal anthelmintic treatment for their animal, as well as discussing environmental management strategies in order to ensure prime horse welfare.

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Reader Questions and Answers

THE MOST PREVALENT SPECIES OF EQUINE ENDOPARASITE IN IRELAND IS:

A: Taenia spp
B: Strongylus vulgaris
C: Cyathostomin spp
D: Strongyloides westeri

THE TREATMENT OF LOW SHEDDERS SHOULD INVOLVE:

A: Routine administration of anthelmintic treatments in order to maintain a low FEC
B: Isolation from high shedders in the group
C: The performance of bi-weekly FECs in order to monitor for a change in shedder category
D: Administering a single dose of moxidectin and praziquantel to treat encysted cyathostomes and taenia spp. or only administering anthelmintic treatment if clinical signs arise

3. THE CONCEPT OF PARASITE REFUGIA DOES NOT PERTAIN TO WHICH OF THE FOLLOWING:

A: Encysted cyathostomins which are not susceptible to ivermectin
B: Endoparasites which have become resistant to certain anthelmintics
C: All free-living stages of endoparasites on the pasture
D: Endoparasites present in horses which were accidentally missed during dosing

IN REGARDS TO FECRTS, IVERMECTIN IS SAID TO BE RESISTANT OR SUSPECTED RESISTANT IF THE MEAN FECRT RESULT OF THE GROUP IS LOWER THAN OR EQUAL TO:

A: 87%
B: 95%
C: 90%
D: 98%

4: D – 98%

3: B – ENDOPARASITES WHICH HAVE BECOME RESISTANT TO CERTAIN ANTHELMINTICS

2: D – ADMINISTERING A SINGLE DOSE OF MOXIDECTIN AND PRAZIQUANTEL TO TREAT ENCYSTED CYATHOSTOMES AND TAENIA SPP. OR ONLY ADMINISTERING ANTHELMINTIC TREATMENT IF CLINICAL SIGNS ARISE

1: C – CYATHOSTOMIN SPP