Equine internal and external parasites: identification, treatment and improving compliance

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ABSTRACT

Redworms, roundworms, pinworms, tapeworms and many other internal and external parasitic agents are ubiquitous in grazing horses and can adversely impact equine health and welfare. Besides non-chemical “biological” approaches – such as evidence-based deworming practice, sound pasture management and feeding grazing horses nematode-trapping fungi – equine parasite control programmes have always been supported by the prophylactic use of anthelmintics. However, options for anti-parasitic chemotherapy can be limited by the rapid emergence of drug-resistant parasites. The situation is worsening because of insufficient development of new ways to combat the problem.

Engagement is key to getting horse owners to be interested – and actually become more committed – in adhering to the prescribed parasite control protocols and in avoiding using blanket treatment of their horses. Veterinarians are the most important advice source and can play an important role in horse owners’ education, which can lead to an increased rate of success in managing parasite infections. In this article, the author discusses the most common equine parasitic infections and the current options for their management, with emphasis on the importance of horse owner education and engagement.

A great deal of internal and external parasites can infect horses and are capable of causing ill-thrift, clinical disease and even death.

Common equine parasites

Figure 1. Photomicrograph of infective larvae of small redworms (cyathostomins).

Roundworms (ascarids, *Parascaris equorum*)

These intestinal worms, up to 50cm long, are commonly found in foals and younger horses, and are more problematic because older horses develop immunity. Clinical signs associated with adult ascarids are weight loss, diarrhoea and colic. Migrating stages can cause coughing and nasal discharge. Ascarid eggs can remain viable in the soil for many years. Benzimidazoles are effective for controlling these worms.

Pinworms (*Oxyuris equi*)

Pinworms inhabit the colon and are not thought to be harmful. However, pinworms can cause pruritus incited by the egg-laying behaviour of the female worms and by the sticky egg masses in the perianal region when drying, which can result in scratching and damage to the tail. Because pinworm eggs are not normally found in dung samples, diagnosis is normally made by microscopic examination of sticky tape preparations taken from around the anus. Pinworms are sensitive to benzimidazoles, hydropyrimidines and macrocyclic lactones (Cleale et al, 2006).

Stongyle nematodes

Large strongyles (large redworms, *Strongylus* species).

The larvae of large redworms migrate through the abdominal arteries, causing weight loss, severe damage and colic. Some species damage the liver and other internal organs. These worms are not currently a problem because they are easily killed by anthelmintics.

Small strongyles (small redworms, cyathostomins).

These are the most common equine worms, with a prevalence rate that can reach 100% of horses. The larvae (**Figure 1**) burrow into the gut wall, where they lie dormant as encysted larvae. Subsequently, they mature and emerge from the gut wall in early spring, causing inflammation, diarrhoea, colic and death in up to 50% of affected horses. Since these encysted larvae are not mature and cannot produce eggs (**Figure 2**), they do not show up on a standard faecal egg count (FEC). A serological test based on IgG responses to cyathostomin larval antigens is available and can be used for the detection of these encysted larvae, complementing FECs.

A new blood test for assessing the larval burdens of cyathostomins is being developed at the Moredun research institute in collaboration with Austin Davis Biologics. The test can detect antibodies in the blood of infected horses, with a subsequent aim to develop a saliva-based test to simplify the sample collection process for horse owners. Availability of such sensitive and specific techniques capable of diagnosing prepatent stages (encysted cyathostomins) of redworms can allow targeted and parasite-specific treatment, and will prevent the unnecessary use of anthelmintics in horses with low or no infection. The only two active ingredients licensed to treat small strongyles are a single dose of moxidectin or a five-day course of a fenbendazole-based dewormer. It is worth mentioning, even if FEC is negative, it is still useful to treat for encysted cyathostomins before early spring (preferably in early winter) so horses are protected from these serious parasites.

Tapeworms (cestodes)

Three species of tapeworms can infect horses and can cause spasmodic colic and intestinal blockage. The main sites for colonisation of tapeworms are the caecal wall and the ileocaecal junction. FECs are not reliable for the detection of tapeworms. Thus, either an antibody-based blood test or the relatively new saliva-based test, both with comparable sensitivity and specificity, can be used to determine the level of exposure in individual horses. The saliva test – EquiSal Tapeworm (**Figure 3**) – has been developed by Austin Davis Biologics and has just come to market (Lightbody et al, 2016). A double dose of pyrantel pamoate and praziquantel are both effective in treating tapeworms.

Sweet itch (pruritus)

This condition is caused by midge bites, leading to itching, scratching or rubbing at the skin along the mane, back and tail in affected horses. Topical treatments can help soothe these horses, and fly avoidance can play a big role in reducing clinical signs. Steroids are often successfully used to combat the irritation, but unless they are accompanied by treatment of the primary cause of the pruritus, a relapse is likely to occur. Soothing emollient shampoos, solutions and sprays can also be used. Prevention requires using good midge repellent, keeping horses stabled from 4pm to 8am, using insect-proof mesh on the windows and door of stables, and keeping a horse’s skin covered using an ear-to-tail rug.

Less-common parasites

Eye worms (*Thelazia lacrymalis*)

These inhabit the tear ducts and cause excess tearing, light sensitivity and conjunctivitis.

Parasitic roundworms (*Onchocerca* species)

These small worms are transmitted by biting flies and live in the neck ligaments and skin tissues, causing itchy immune reactions in some horses.

Lungworms (*Dictyocaulus arnfieldi*)

Donkeys and mules are mainly affected, but horses pastured with them may become infected.

Stomach worms (*Habronema muscae*)

Transmitted by flies, these are responsible for summer sore.

Threadworms (*Strongyloides westeri*)

Often the first parasites to infect foals, these parasites can cause diarrhoea.

Botflies (*Gasterophilus* species)

These deposit tiny ova on the hairs of the horse’s legs. Ova hatch and larvae enter the mouth when the horse licks at them, they are then swallowed and attach to the stomach wall, where they develop into grubs (bots, larvae of the bot fly) that pass out via the faeces. Once expelled, the larvae develop into adult flies and the life cycle restarts. Bots can cause pathological damage to the mouth, gums and stomach lining.

Drug resistance in equine parasitology

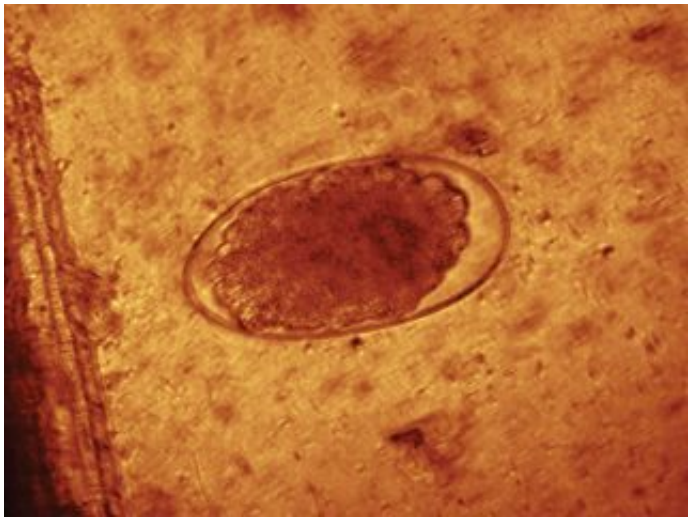

Figure 2. Photomicrograph of a typical egg of equine small redworms.

Resistance occurs when parasites become tolerant to a drug used to kill them. It is an inherited trait that develops in response to selection pressure favouring survival of worms with the genetic ability to survive chemotherapy. Recent reports have suggested the possibility of resistance of pinworms to macrocyclic lactones in Europe, the US and New Zealand (Reinemeyer et al, 2010; Reinemeyer, 2012; Rock et al, 2013; Wolf et al, 2014). More worryingly, drug resistance of small strongyles to all classes of currently available anthelmintics has been reported, particularly to benzimidazoles, such as fenbendazole, and tetrahydropyrimidines, such as pyrantel salts (Nielsen et al, 2014).

Although some evidence of reduced efficacies of macrocyclic lactones have been reported in Europe and the Americas, moxidectin is still the most effective compound against cyathostomins (Molento et al, 2012).

To preserve the efficacy of the currently effective anthelmintics, the use of the same anthelmintic class, the rapid rotation of anthelmintics and sub-dosing should be avoided. In a pre-emptive measure to combat drug resistance, Denmark was the first country to restrict anthelmintics to prescription-only usage, followed by Sweden, the Netherlands and Finland (Neilsen et al, 2013).

Equine parasite management

Traditionally, control of parasites in horses has relied on regular treatment with anthelmintics. However, with the increasing evidence of drug resistance parasite control, strategies relying solely on anthelmintic use have become non-sustainable. Therefore, biological (non-chemical) interventions, such as removal of faeces from paddocks and grazing rotation, are aimed at preventing or reducing pasture contamination and the spread of parasites between horses. Measures such as these can effectively support chemotherapeutics by keeping parasite burdens below levels that cause disease.

Pasture management

Pasture hygiene has been recognised as one of the most effective means of preventing worm larvae spreading on to pasture and limiting exposure of horses to worm infections. The management of pastures by rotational grazing, lowering animal numbers (that is, increasing grazing pasture size to 1 to 1.5 acres per horse), resting paddocks for at least three months and cross-grazing with different species, such as sheep to “mop up” infective larvae of cyathostomins and other worms from the pastures, have been recommended. Nematodes are generally species-specific, so this approach can be effective. The exception is *Trichostrongylus axei*, which is infective to both equines and sheep. Sound pasture management also includes removal of faeces from paddocks (daily or at least twice weekly), composting muck away from the grazing area and harrowing pasture, especially in hot and dry conditions.

Biological control

An alternative approach using the predatory activity of nematophagous fungi to reduce infective larvae of the equine nematode *S westeri* has been reported (Araujo et al, 2010). Also, when nematophagous fungus *Duddingtonia flagrans* was fed to horses, results showed a reduction in cyathostomin-infective larvae (Paz-Silva, 2011). Indeed, this approach can limit the number of infective larvae the horse can be exposed to by reducing pasture contamination, which, in turn, reduces the frequency of treatments with anthelmintics and can be valuable when dealing with anthelmintic-resistant strains.

Refugia versus resistant parasites

Refugia represent the parasite stages not exposed to the drug at the time of treatment and includes encysted larvae and larval stages on pasture. These stages escape the effects of the drug and, therefore, are not under selection for resistance. The amount of refugia in horses can be large and can dilute resistant parasites that survive the treatment.

Therefore, lack of refugia means the parasites containing the allele for resistance will build up, eventually creating a resistant population within the animal. Maintaining refugia will not only impede the building of a resistant population, but will also dilute the same resistant population and delay its development.

Selective treatment

The mantra of selective therapy or targeted selected treatment has defined the past two decades of deworming strategies. This approach is based on screening all animals with an appropriate parasite diagnostic tool (for example, a FEC) followed by treating horses exceeding a predetermined cut-off egg count value (for instance, more than 200 eggs per gram of faeces), and leaving the remainder of the herd untreated to maintain refugia.

The usability of this approach has been shown in adult horses, where the overall cyathostomin egg shedding can be controlled by treating about half the horses. However, it is unknown whether this approach can be effective in controlling other intestinal worms, such as ascarids, large strongyles or tapeworms. More research is needed to evaluate the specific health benefits associated with selective therapy, and to assess the extent resistance development can be delayed with this method.

Evidence-based practice

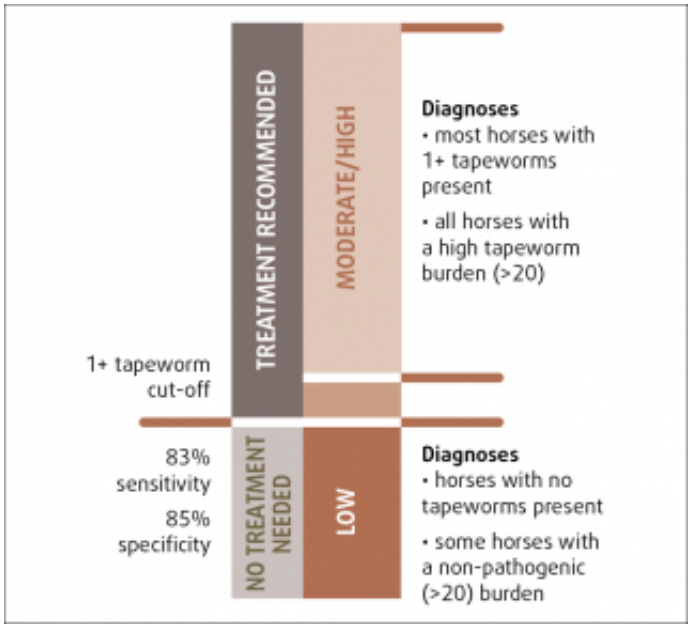

Figure 3. Schematic diagram of EquiSal Tapeworm diagnosis illustrating the accuracy of a 1+ tapeworm cut off, together with treatment recommendation.

A consensus now exists among equine clinicians and parasitologists that to slow resistance all deworming should be based on evidence of infection. Against this recommended practice, more than a third of horse owners never perform FECs, according to the British Riding Clubs' 2014 horse health survey. This is disappointing because FEC-based deworming reduces the unnecessary treatments and, therefore, helps to slow down resistance. FECs also identify individuals that are shedding high numbers of faecal worm eggs, thus allowing targeting of treatments on these individuals. Further, FECs can help horse owners check the anthelmintic efficacy if FEC is done pre and post-treatment. Educational campaigns should be conducted to encourage horse owners to adopt the concept of regular parasite surveillance to avoid the unnecessary use of anthelmintics.

Responsible owners should carry out FECs every two to three months throughout the grazing season and treat with appropriate anthelmintics as required. Most horse owners do not realise a standard FEC will not pick up tapeworms, encysted cyathostomins, pinworms or bots. For these, a

proper anthelmintic should be used on a strategic basis, usually in autumn and spring for tapeworms and early winter for encysted cyathostomins. In foals and yearlings, deworming is likely to be required more frequently than in adults. Some horse owners still do not weigh their horses before deworming. Horses should have their weight calculated before being dewormed or at least once a year, to ensure the correct dose is administered. Under-dosing can cause worms to develop resistance to anthelmintics.

Empowering horse owners, enhancing adherence

National Equine Health Survey (NEHS) 2015 results showed many horse owners were not deworming correctly. About one third of people who thought they had treated for encysted cyathostomins had used an unsuitable product, while around 7% used a product that resistance had been reported on, indicating some horse owners still did not know how to effectively control worms. According to the survey, racehorse trainers who sought veterinary advice about anthelmintic products were more likely to conduct FECs compared with those who did not seek veterinary advice (Rosanowski et al, 2016).

This shows the importance of vet-client engagement and the role vets can play in communicating best parasite control practice. Equine clinicians need to ensure clients are well-informed about anthelmintic use and drug resistance. Horse owners can also benefit from online educational materials, explaining the threat of encysted cyathostomins, which have been developed by animal health industries (for example, www.esrw.co.uk). Owners can then test their knowledge with the quick quiz and download a leaflet, before discussing the best treatment options with their vet.

Looking forward

The escalating problem of drug resistance presents a host of challenges for equine clinicians and could impact on how parasite infections are managed in the future. Indeed, these challenges have shifted the paradigm of tackling the problem from curbing drug resistance to managing resistance.

While the veterinary profession acknowledges the potential of anthelmintics to control parasite burdens in horses, other complementary methods are needed, and some are already in use. The management of parasitic nematodes has progressed to a level where potentially effective alternative methods of parasite control have been investigated. An interesting example is the predatory activity of nematophagous fungi against nematode larvae, which, if used along with sound grazing management, evidence-based practice and selective treatment, can achieve an integrated approach of parasite control.

Finally, engaging horse owners and trainers will make them more interested and more committed in adhering to the prescribed parasite management protocol. It is imperative for horse owners to discuss the worm control plan with their vet or SQP and use the right product at the right time to protect their horses’ health.

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