Equine

Internal Parasites

by Dr James Meyer BSc(PV) DVM • July 2019

Everybody worms their horse right? You buy a wormer from the stock feeder and give it to your horse. You do it every 8-12 weeks… actually, let's be honest, you do it when you remember. Parasites aren't a big deal but you continue to do it because everyone recommends it. So what if I told you parasites can be deadly? Or that your horse might be immune to parasites? A little surprised? Let's take a look at what this means.

Parasite species

We'll start with the obligatory background on equine parasites. This article will focus on internal parasites, those that infect the internal organs, and not those that affect the skin. There are four main internal parasites of horses, and these are:

Large strongyles (*Strongylus vulgaris*, blood/red worms)

Small strongyles (cyathostomes)

Roundworms (*Parascaris equorum*, ascarids)

Tapeworms (*Anoplocephala perfoliata*)

Large strongyles were the main parasite of concern in horses five to six decades ago. As their common name suggests, they like blood, and these little suckers liked to lodge in the mesentry artery. This artery supplies the intestines with their blood. Eventually the strongyles would become large enough, and numerous enough, to rupture the artery and cause the horse to bleed out. Such cases were the stimulus for research into equine dewormers.

Time out!

Dewormer? That's not what it's called! Well actually… you don't give your horse worms, do you? Therefore, you don't 'worm' your horse! You 'deworm' it. From here on out we'll use the terminology 'dewormer' to commonly describe the drugs used to treat internal parasites in our horses. Now, let's resume our scheduled program.

Parasite species continued

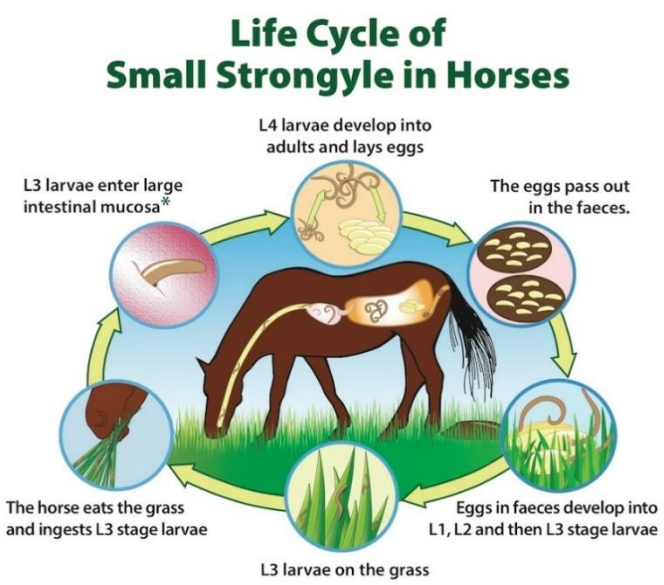
Small strongyles, otherwise known as cyathostomes, are the most common parasite in adult horses. They are a small parasite (almost impossible to see in manure) and, like large strongyles, migrate through the internal organs. After burrowing through the intestine they enter the bloodstream and travel to the liver, lungs, heart, etc. Essentially all horses have cyathostomes to some degree and our interest lies in how big the parasite burden is.

Ascarids, otherwise known as roundworms, are our second most common parasite. They are a large parasite (see above picture) and most commonly infect young horses. These large parasites can end up creating blockages (impactions) in the intestines, which can lead to sepsis and rupture of the gut.

The final parasites of significance are the tapeworms. Similar in action to tapeworms of other animals, they hang out in the intestines and often result in diarrhoea. To understand control of all these parasites, we must first understand their life cycle and transmission.

The circle of life

We'll use the strongyles as our example as all the intestinal parasites follow a fairly similar life cycle. Strongyles are



transmitted primarily on pasture. Stall habitats are not optimal for parasite growth. The horse picks up the larvae of the strongyle and swallows it while grazing. The larvae do their burrowing adventure and then return to the intestines as full adults, seven to eight months later.

These adults lay eggs which are passed out in the manure, and subsequently hatch into larvae and the cycle starts again. Eggs hatch and infective larvae (L3's) develop between 7°C and 30°C. Below this temperature larvae become dormant; there's no such thing as a 'killing frost'. Larvae must rely on stored energy, and when temperatures exceed this range they develop more rapidly and as a consequence, will also die more rapidly.

Due to these temperature restrictions, Autumn and Spring are the best seasons for transmission; Winter is often too cold for eggs to develop, while Summer causes larvae to die too quickly before they can be re-ingested.

Ingestion of these larvae on pastures is influenced by grazing behaviour of horses. Horses at pasture practice faecal avoidance behaviour. This means they graze away from manure, and naturally segregate pastures into 'roughs' and 'lawns'. 'Roughs' are tall, overgrown areas where horses defecate, but do not graze, while 'lawns' are short, heavily grazed areas where horses do not defecate.

Strongylid larvae are concentrated in the pasture 'roughs', 15 times more than the 'lawns'. Overgrazing increases transmission via less forage, forcing horses to graze farther into the 'roughs'.

Anthelmintics

As could be expected, horse deaths from large strongyles was of great concern to owners and veterinarians alike. So in the 60's, researchers got together and developed the first dewormers, or more correctly 'anthelmintics' to combat these parasites. They were targeted at the L3 larvae and adult worms while in the body of the horse.

Three classes of dewormer were developed, and they were:

Macrocyclic lactones ('mectins', i.e. ivermectin, abamectin, moxidectin)

Benzimidazoles (i.e. oxfendazole, fenbendazole)

Pyrantel salts (i.e. pyrantel, morantel)

Dosage intervals were based on the Egg Reappearance Period (ERP). This was the time between deworming and parasite eggs reappearing in manure (detected with a Faecal Egg Count – but more on that later). These were 6-12 weeks for the 'mectins', and 4 weeks for the other two classes.

When these were developed they had quite a specific spectrum of parasites that each of them covered, so it was recommended to 'rotate' the active ingredient at each deworming to ensure complete parasite coverage throughout the year.

A decade or so later researchers began to ponder the risks of parasite resistance (similar to antibiotic resistance) to the dewormers. They considered that the current rotation program should stop parasites being over exposed to any one type of dewormer, but never followed up with any formal research. And hence the 'recipe' was born. Rotational deworming every 8-12 weeks. And on we went for 40 years.

Superbugs

It's unfortunate that rotational deworming was never critically evaluated as regrettably what it's actually done is hasten resistance. So how can that be? What did all the researchers miss? Well as we always do as humans, we underestimated biology.

Within any population of organisms there is a diversity of genetics. When exposed to a chemical designed to kill them, there will be some members of the population that has natural resistance to said chemical. Now this may only be a small percentage of the population, but these parasites are the ones that go on to replicate and spread their genetics.

By deworming every 8-12 weeks with every class of chemical for the last 40 years we have massively overexposed parasite populations to dewormers. As such we are now seeing an explosion of parasite resistance, and the resurgence of parasites once thought eradicated, such as large strongyles. Now, there's almost complete resistance to the benzimidazoles, around 50% resistance to the pyrantels, with only 'mectins' still largely effective.

The way forward

If we continue the way we are going, we will end up with no effective chemicals, and parasites that can kill our equine companions. Given these startling revelations researchers have gone back to the drawing board and found that 8 out of 10 horses (80%) have natural immunity to internal parasites, and don't need deworming. So how do we work out which ones these are? Well we have a convenient, quick, cost effective test to tell us.

This test is the Faecal Egg Count (FEC) that I eluded to earlier. As it sounds, the test counts the number of worm eggs present in a horses' manure sample, and gives us a result in eggs per gram (epg) of faeces. This number is classified into one of three levels:

Low shedder (less than 200epg)

Moderate shedder (200-400epg)

High shedder (greater than 400epg)

Consistently low shedders are considered naturally immune to parasites, and do not need routine deworming for the main internal parasites. These horses may still need treating for other equine parasites such as pinworms and bots.

Moderate shedders need at least two tests to see whether they are increasing, decreasing or staying level. Depending on the other factors for the horses (i.e. stocking density, etc.), moderate shedders may also not need to be dewormed.

High shedders are considered the 20% that don't have natural immunity, and these horses need to be routinely dewormed. But before we can start a deworming program, we need to know if there is any parasite resistance on-farm, before we can select which dewormers to use.

To determine which products are still effective we need to perform a Faecal Egg Count Reduction Test (FECRT). This might sound fancy but essentially it's two FEC's with a dewormer in-between. A dewormer is administered after the first test and followed by the second test two weeks later.

A reduction of the number of parasite eggs by 90-95% (depending on the product) signifies that anthelmintic is still effective. Anything less than this reduction suggests parasite resistance, and there is no use using that product in that horse and/or farm. Ideally we would use benzimidazoles first, followed by pyrantel salts, and leave the 'mectins' in reserve if possible.

When designing a management protocol for a property, the final thing to consider is how the horses are grouped. Horses should be treated according to their paddock group, rather than individually, and as such should be treated according to the highest shedder in the paddock.

This would mean that (for example) in a group of 4 horses, if one is a high shedder, they all need to be treated as a high shedder. Due to the large number of parasites shed by the one horse, all of the horses will be exposed to high levels of parasites.

The plan

So we've worked out which of our horses are high shedders, and need to be dewormed. We've worked out which dewormers are still effective in these horses. And we know that the Summer months are too hot for parasites, and transmission is reduced. Once we have all this information, you can treat your horse correctly.

Ideally low shedders are not dewormed at all, and can be maintained on an annual testing program. Once we have confirmed their immunity, an annual test monitors their egg shedding to ensure no major changes. Testing can be done very easily, all we require is 2-3 faecal balls in a zip lock bag, dropped in to the clinic. Test results will be back to you within 48 hours and you're on your way.

Of course we have to be mindful of our other parasites, and so these horses could be on a program of (maximum) twice yearly deworming. Autumn and Spring are the ideal times during peak transmission, and should be combined with a tapeworm treatment. Praziquantel is the active ingredient of choice for tapeworms, and can be found in combination with all classes of broad-spectrum anthelmintic.

Moderate shedders, those that fall in the 200-400epg range, should be managed as above with a possible additional dewormer in Winter. High shedders are as above, with another treatment in Winter (i.e. 4 treatments from Autumn to Spring). No treatments are necessary during the "off season", or Summer months, as parasite transmission is reduced.

Show me the money!

Now everyone's mindful of their hip pocket, and here I am recommending all of these 'tests', and I hear you ask; how much is it Doc? Well let's do a little comparison. The average online price for a dewormer at time of printing is $14.50 (however good luck getting that at a stock feeders). Given that most of you currently deworm around 4 times a year (when you get around to it), that's around $60 a year in chemicals.

Well the good news is that a FEC is only $30 and only needs to be done once a year. That's a saving of at least $30, per horse, per year. That could be a lifetime saving of $300-600 PER HORSE! Just imagine the blingy bridles you could buy with that money. So not only are we preventing parasite resistance, and decreasing the amount of chemicals in our equine companions, we're saving money at the same time.

Moooving parasites

Our arsenal of techniques to combat parasite resistance isn't just limited to testing rather than treating, however. There are a number of management practices that can also minimise pasture contamination with parasites.

These are all aimed at physical removal of parasites, or non-chemically killing them before horses have a chance to ingest them. One great way to achieve this is rotational grazing with ruminants. Ruminants, like sheep and cattle, are not affected by equine parasites and their digestive system kills off our common bugs. By rotating livestock through our horse paddocks we can 'clean' them of the majority of parasites.

Livestock, such as cattle, are not affected by equine parasites and can 'clean' parasites from pastures.

Stocking density, or the number of horses in a paddock, can also influence parasite transmission. More horses means more manure, and less manure free grazing areas. By decreasing the stocking density, it decreases horses having to graze the 'roughs' and pick up parasites. Resting paddocks will also result in parasites exhausting their energy reserves and dying off. Resting times will depend on the time of year; shorter during Summer, longer during Winter.

Harrowing has long been a recommendation for cleaning pastures, but a little thought must be given to timing. Harrowing involves 'raking' the paddocks which breaks-up and spreads the manure. If done in Summer, this exposes parasites to the heat, resulting in a quicker die-off. Harrowing in Winter however only spreads the manure from the 'roughs' to the 'lawns' and smears parasites over the whole paddock.

Dung beetle utilisation in small landholder settings is also gaining awareness. There are literally hundreds of species of dung beetles here in Australia, both native and introduced. The introduced species are usually better at managing our large animal manure, and there are both Summer & Winter active species. It's important to remember that some dewormers are also toxic to dung beetles. The benzimidazoles and moxidectin appear safe to use in horses on dung beetle pastures.

Dung beetles are a great, natural, way to clean pastures. Not only do they decrease parasite burdens, but they also reduce fly numbers who use manure to breed in.

Bioworma is a new product on the market that contains the fungus *Duddingtonia flagrans*. This fungus naturally predates the larval stages of the large & small strongyles, ascarids and pinworms. It's been recognised for decades but only recently have they been able to produce it in commercial quantities. Fed to horses, it passes through the digestive tract where it then consumes emerging larvae in the manure, interrupting the crucial re-infestation stage of the parasites' life cycle.

The fungus is safe, non-toxic, and residue-free. There are no negative side effects on non-target soil nematodes, earthworms, microarthropods, etc. As the fungus has a predator-prey relationship with equine parasites, there's no risk of resistance like we have with the chemical dewormers.

The final stalwart of non-chemical parasite management is of course manure collection. Picking up the eggy poo is the fastest, and most complete way, of removing parasites from pastures. It is however the least liked option of them all, as horses are the ultimate poo machine, and no one wants to collect 'em all.

Bioworma contains the fungus *Duddingtonia flagrans* which eats the larval stage of the parasite life cycle, interrupting re-infestation.

The final countdown

We all deworm our horses, but never really ask the question, why? "Everybody else does it, and it's recommended by all our friends. Horses don't get very sick from parasites, but better safe than sorry". These are all the reasons I commonly hear in association with the use of dewormers.

Well, sadly, horses CAN die from parasites it's just that we haven't seen such cases for decades. Our dewormer 'recipe' has begun resulting in widespread parasite resistance that is seeing the re-emergence of deadly bugs. If we continue to deworm at our current rate, we will start to see horses dying again.

Thankfully there is something we can do about it. 8/10 horses are actually immune to parasites and don't need to be dewormed. We can establish which horses these are by performing a faecal egg count and hence decrease or even eliminate chemical use in these horses. By reducing their use, we decrease their exposure to parasites and slow the resistance process.

By employing testing and other parasite management practices we can save money, decrease the number of chemicals in our horses, and slow parasite resistance.

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