

AGE-RELATED PARASITES

PARASITE PRIMER—PART 11

Scourges of Foals and Young Horses

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For the past 10 months in this series, we've examined a host of issues relating to equine parasites and their control. Now it's time to get down to the nitty-gritty: How to ensure that parasites have the minimum impact on your horse's health and well-being. Let's start with young horses, because parasite populations in immature animals are often quite different than those found in adults. Some kinds of worms, in fact, prefer young horses so strongly that they're almost never found in equines past a certain age. Infections with threadworms, roundworms, and pinworms, for example, are found almost exclusively in horses less than six months, 18 months, and 24 months old, respectively. Because of the age distribution of these worms, parasite control recommendations for immature animals are necessarily different than those followed for adults.

Susceptibility of Youth

Most of the common nematode (roundworm) parasites of horses are transmitted by ingestion, so the risk to young foals is diminished somewhat while they're nursing rather than grazing. But as curious colts and fillies investigate



ANNE EBERHARDT

Weanlings and yearlings on pasture are particularly susceptible to parasitic disease because unlike their dams, they don't yet have the advantage of acquired immunity or resistance to some types of parasites

their environments, they inevitably come into contact with, and swallow, infective stages of various parasites, including large and small strongyles, roundworms, pinworms, tapeworms, and possibly threadworms (see “Parasites Affecting Juvenile Horses” below).

Weanlings and yearlings on pasture are particularly susceptible to parasitic disease because unlike their dams, they don’t yet have the advantage of acquired immunity or resistance. And foals that are under stress from shipping, weaning, or environmental changes, to name only a few, can suffer from immune system suppression, making them more susceptible to infectious diseases and interfering with optimal response to vaccination or anthelmintics.

Parasites Affecting Juvenile Horses

COMMON NAME	SCIENTIFIC NAME
Pinworms	<i>Oxyuris equi</i>
Roundworms (ascarids)	<i>Parascaris equorum</i>
Large strongyles	<i>Strongylus spp.</i>
Small strongyles (cyathostomes)	<i>Numerous species</i>
Tapeworms	<i>Anoplocephala perfoliata</i>
Threadworms	<i>Strongyloides westeri</i>

Although we’ve talked about the specific parasites listed in the table in earlier installments of this series, let’s review the major targets of parasite control programs for the juvenile horse, in the approximate chronological order they are encountered by a foal.

Threadworms

Strongyloides westeri, the equine threadworm, is usually the first parasite a foal encounters. It is commonly transmitted

from mare to foal through nursing when larvae in the body tissues of mature mares migrate to the mammary glands when signaled by the hormones of pregnancy and lactation. Threadworms are so well-adapted for this mode of transmission that they’re often present in the colostrum mares produce immediately after birth, and in the first few days of milking.

Threadworm infections also can be acquired from the environment, so foals should not be exposed to wet pens or muddy paddocks.

Adult horses infected with *S. westeri* suffer no clinical signs (unthriftiness, scours) because the threadworms live in the horse’s tissues. In foals, once the larvae find a home in a naïve host, they mature rapidly in the small intestine. Within 10 to 14 days after birth, foals begin to shed eggs from the parasite. Historically, threadworms in foals were thought to be the cause of diarrhea, but research has shown that this is inaccurate. The majority of foals show no clinical signs when infected. Heavy infections of threadworms in foals can persist for 10 weeks, and lighter infections can last two to three times as long.

Controlling *Strongyloides* infections can take a two-pronged approach. The first is to treat the foal early with an anthelmintic that is effective against threadworms. Ivermectin is labeled for this application and probably provides persistent protection against re-infection for a week or two following treatment. Some practitioners suggest treating foals with ivermectin within a few days of birth.

The second plan of attack is to treat the mare with ivermectin within 24 hours of foaling. This treatment kills migrating larvae in the mammary tissues of the mare, thus removing the immediate source of infection for her foal.

It can also be helpful to examine the manure of foals routinely at two to four



JOHANE JANELLE

Threadworms are commonly transmitted from mare to foal through nursing when larvae in the body tissues of mature mares migrate to the mammary glands when signaled by the hormones of pregnancy and lactation.

weeks of age and treat accordingly if positive (ivermectin or oxbendazole at 15 mg/kg). Any foal with diarrhea that is due to *Strongyloides* will always have numerous eggs in the manure. Therefore, fecal exams should always be conducted on any foal that develops diarrhea prior to weaning.

The good news is that the current prevalence of *Strongyloides* in foals is fairly low, and the damage done by infection is usually not severe. So, a wait-and-see approach is probably justified for most breeding operations.

Roundworms

Parascaris equorum, the well-traveled equine roundworm, finds its way inside young foals as they begin to sample pasture grasses. The infective eggs, once swallowed, release their larvae in the small intestine, and the larvae then invade the gut wall and travel to the liver, either via the circulatory or the lymphatic system. After a one-week sojourn, they hitch a lift in the bloodstream and migrate to the lungs, where they work their way from the terminal air sacs called alveoli, up through the bronchioles, and eventually to the trachea. When the migrating ascarids reach the back of the throat, they’re swallowed and return to the small intestine, where they finally settle, become mature, and start to reproduce. Female ascarids generally start to lay eggs within 10-12 weeks after infection.

It’s almost inevitable that foals on any breeding farm will be exposed to roundworm eggs. Since these parasites have

COUNTING EGGS

Fecal Exams for Juvenile Horses

What can you expect to see under the microscope in routine fecal examinations of foals, weanlings, and yearlings? The eggs of threadworms might appear in the manure of foals by two weeks of age, but the infection will disappear permanently by five to six months. Ascarid eggs first appear in manure as early as 70 days following infection, and an infected weanling can pass several million eggs per day. Roundworm infections are generally controlled by acquired immunity, and it is unusual to see ascarid eggs in a fecal sample from any horse older than 18 months. Pinworm eggs are rarely observed during fecal examination because the females lay their eggs on the skin around a horse’s anus, rather than mixed in with the manure like other parasitic nematodes.—Karen Briggs

What Kills Ascarids (Roundworms)?

DRUG ACTIVITY	CHEMICAL NAME
Adulticidal	Fenbendazole (10mg/kg) ¹
	Ivermectin
	Moxidectin ²
	Oxfendazole
	Oxibendazole
	Piperazine
	Pyrantel pamoate
	Pyrantel tartrate
Larvicidal	Ivermectin
	Fenbendazole (10 mg/kg) daily for 5 days ³

¹ The dosage of fenbendazole required for efficacy against ascarids is higher than the dosage recommended for removal of other worms.
² Although very effective, moxidectin is not approved for use in foals less than six months of age.
³ Although shown to be effective in research studies, there is no label claim for activity against migrating *Parascaris*.

significant pathogenic potential, roundworms are the main target of parasite control programs for immature horses. The goals of ascarid control are twofold—to kill worms (thus minimizing the negative effects on health and performance), and to prevent the maturation of worms so eggs are not shed into the environment.

Anthelmintics that are effective against ascarids fall into two broad categories: Those that kill adult and juvenile worms in the small intestine, and those that are also effective against roundworm larvae migrating through the liver and lungs of a foal (see “What Kills Ascarids?” above).

Depending on the type of drug used in foals, the timing of scheduled treatments can be tricky. It takes about two to three weeks for larval worms to complete their migration and reach the intestine, and another eight weeks or longer for the worms to mature and begin shedding eggs. Therefore, if adulticidal drugs are used, the first treatment should be given when the

foal is approximately 60 days of age. If ivermectin is used for the initial treatment, it can be given as early as 45 days because it is larvicidal. Thereafter, treatments should be administered at 60-day intervals.

Delaying treatment for intervals longer than 70 days could allow ascarids to mature and contaminate the environment with eggs. Remember that roundworm eggs can survive for a decade or longer, so one break in protocol can have very long-lasting consequences with ascarids. Bi-monthly treatments should be continued

until horses eventually acquire immunity at 15-18 months of age.

Many veterinarians suggest deworming foals at 30-day intervals, and some recommend ivermectin exclusively. The rationale of this program is prevention of pneumonia associated with larvae migrating through the lungs, but this practice apparently has had some negative consequences.

Within the past two years, some breeding farms in Canada and the United States have reported strains of *Parascaris* that are resistant to ivermectin—one of the first

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FOAL DEWORMING POLL

Q: At what age do you begin deworming your foals?

- 1-2 months**50.54%** (47)
- 3-4 months**25.81%** (4)
- 5-6 months**11.83%** (11)
- After weaning**9.68%** (9)
- 7-8 months**2.15%** (2)

* Answers from TheHorse.com poll

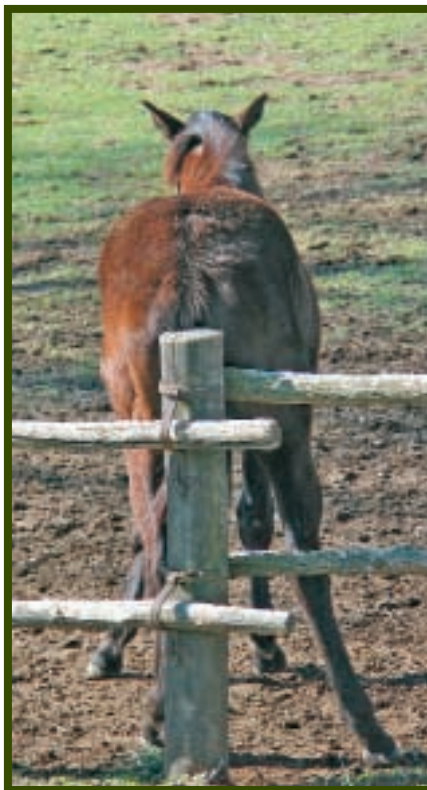
documented cases of ivermectin resistance in horses. The evidence suggests that this resistance evolved in the face of 30-day treatments.

Regardless of the anthelmintics used, fecal exams should be performed on a representative sample of the juvenile population at each deworming interval to monitor the ongoing efficacy of the resident control measures.

Large and Small Strongyles

Strongyles (bloodworms) are considered the most dangerous equine parasite, and the most prolific. There are dozens of species of large and small strongyles, but only three or four large strongyle species are commonly found in North America. Horses infected with either large or small strongyles will shed eggs in their manure almost constantly, re-infecting their environment with the next generation of parasites.

Although youngsters can become infected with strongyles, controlling them is most important in adult horses, so we'll focus on them next month when we discuss parasite control programs for mature animals. The methods recommended here for controlling ascarids in youngsters should be adequate for strongyles as well, although it's wise to introduce either ivermectin or moxidectin into your program for juveniles at least once every five months to help eradicate large strongyles from the herd.



PAULA DA SILVA

Many a luxurious tail has been destroyed as horses rub their hindquarters against any surface they can find in an effort to relieve itching caused by pinworms.

Pinworms

Oxyuris equi, the pinworm, is a common and fairly large parasite with a long, tapering tail (hence the name). Pinworms lurk in the large intestine, and the females

cement their eggs in masses to the skin around a horse's anus. As the eggs develop into the infective stage over four to five days, the cementing fluid dries and cracks, creating intense itching for the horse. Many a luxurious tail has been destroyed as horses rub their hindquarters against any surface they can find in an effort to relieve this itching.

Fortunately, nearly all equine dewormers are effective against pinworms, and the treatment intervals recommended for other parasites should control *Oxyuris* well.

Tapeworms

The only significant cestodes (flatworms) to infect horses, tapeworms are segmented at regular intervals. Each egg-containing body segment, or proglottid, is a separate unit, like the box cars that form a train. Single proglottids, or several linked ones, can break off from the body of the worm without killing the parasite, which remains attached to the intestinal wall.

Tapeworms have indirect life cycles, meaning they must develop within a different animal before they can be transmitted to their final host. Tiny oribatid mites, which live in vast quantities on many pastures, are the intermediate hosts for equine tapeworms; horses swallow these mites in the normal course of grazing, allowing the worms to grow and mature in the equine digestive tract over a six- to 10-week period.

CHEMICAL CLASSES

Which Dewormers Are Safe For Young Horses?

The list of dewormers available for use in foals is somewhat shorter than the one for adults. The labels of a few anthelmintics specifically indicate that they may not be used in foals less than five months (Zimecterin Gold) or six months of age (ComboCare, Quest, Quest Plus).

Many horse owners are unnecessarily concerned about the safety of dewormers used in foals. There is really no need to be anxious if the product is labeled for use in foals, and if it is dosed appropriately. Admittedly, it can be difficult to estimate the body weight of a foal, but an accidental overdose of any product labeled for foals is unlikely to cause adverse effects. Rare reports of deaths in young foals from moxidectin (Quest) treatment resulted from accidental administration of a full tube of dewormer intended for a 1,200-pound horse.

The only serious consequence of deworming that is more common in juvenile horses than in adults is the possibility of ascarid impaction (a colic that arises from large numbers of dead roundworms accumulating in the gut after treatment with a deworming drug). However, ascarid impactions should never occur in foals that have been on an effective control regimen.

If you suspect large numbers of ascarids have accumulated in a youngster's gut, whether from lapses in protocol or resistance to ivermectin (imagine, for example, you buy a pot-bellied weanling at auction and have no deworming history on him), the best approach is to treat the foal with a half-dose of fenbendazole (5 mg/kg) to kill some of the worms. Then, a second treatment with an effective adulticide (see "What Kills Ascarids?" on page 3) should be administered one week later to remove the

remainder of the population.

There is experimental evidence that the use of daily dewormers (pyrantel tartrate) in juvenile horses interferes with the development of acquired immunity to strongyles. However, we don't know whether this practice diminishes protection against ascarids as well. Acquired immunity normally develops against invasive or migratory larval stages, but daily regimens are designed to kill parasites before they enter any tissues. Arguably, a horse on daily preventive is protected as long as the program continues and the drug remains effective. Therefore, a horse raised on a daily dewormer could be at great risk for severe parasitic disease if the regimen were disrupted and the animal were exposed to high numbers of infective stages—something to keep in mind before you commit to a daily dewormer program.

—Karen Briggs

Tapeworms attach fiercely to the intestinal wall, which can cause severe inflammation at the attachment site. They're also associated with several types of severe colic, especially ileocecal intussusceptions in young horses. In an intussusception, the last one foot of the small intestine (ileum) telescopes into the first section of the large intestine (cecum), and swells, blocking passage of the gut's contents. It's also suspected that chemicals the tapeworms release can interfere with normal gut motility.

Horses acquire tapeworm infections while they are grazing infective pastures. Research conducted in Scandinavia indicated that foals are first exposed to tapeworm infection while still nursing, but most do not pass tapeworm eggs in the manure until seven months of age or older. Therefore, there is little need to incorporate drugs specifically indicated for treatment of tapeworm infection (those containing praziquantel) until after foals have been weaned.

It's only recently that parasitologists have begun to look seriously at equine tapeworms, so evidence-based recommendations for tapeworm control have not yet been generated. Based on the tapeworm life cycle, however, many experts recommend treating horses in spring and autumn.

General Recommendations

Some general management practices that are commonly recommended for parasite control in mature horses are equally applicable to their young offspring. These include reserving the cleanest pastures available for weanlings, yearlings, and mares with foals. Clean pastures include those that have been vacant for at least two months during the warm season of the year, fields that were used recently to produce hay, or pastures that were grazed by an alternate livestock species, such as cattle or sheep.

Wherever possible, horses should not be fed off the ground. Soil is an excellent reservoir for infective ascarid eggs, and the greatest concentrations of strongyle larvae occur near the roots of plants. Environmental hygiene should be practiced for young horses maintained in stalls or small "dry lot" paddocks. Stalls should be cleaned thoroughly and disinfected prior to any



PAULA DA SILVA

Recommendations for deworming foals start as early as 2 weeks of age.

introduction of new stock, manure should be removed from them daily, and all bedding should be stripped from stalls at regular intervals.

Deworming Recommendations

Threadworms—Using ivermectin, treat the mare within 24 hours before foaling or treat the foal during its first two weeks of life. Alternatively, if a fecal examination is positive for *Strongyloides* infection, treat the foal with ivermectin or oxbendazole (15 mg/kg). Fortunately, threadworms are controlled completely by acquired immunity in all foals older than six months.

Ascarids—Start treatments with pyrantel pamoate (a.k.a. Strongid) or benzimidazole paste (fenbendazole, oxfendazole, or oxibendazole; all 10 mg/kg) at 60 days of age. Or, if using ivermectin, treatment can be initiated at 45-60 days of age. Repeat subsequent treatments at 60-day intervals until the horse is 15-18 months old.

Rotation among benzimidazoles, pyrantel, and ivermectin can be practiced; after the foal is six months old, moxidectin can be used as well. Fecal exams should be performed on a representative sample of the juvenile population after each scheduled deworming to monitor effectiveness of the control program. Most horses develop excellent acquired immunity to ascarids by the time they reach 18 months of age.

Strongyles—No special program is required for juvenile horses, other than to use a macrocyclic lactone (ivermectin

or moxidectin) at least once every five months to help eradicate large strongyles from the herd. If the farm population of small strongyles is resistant to benzimidazoles and/or pyrantel, the efficacy against strongyles might be less than satisfactory whenever these products are used at 60-day intervals against ascarids. Horses remain susceptible to strongyle infection for their entire lives.

Pinworms—Proper implementation of the recommendations for ascarids should achieve effective control of pinworms. Horses develop acquired immunity against adult pinworms around the second or third year of life.

Tapeworms—After weaning,

treat juveniles during spring and/or autumn with a compound containing praziquantel. Some horses apparently develop immunity to tapeworms, some maintain small burdens if not treated, and about 10% of horses will harbor large numbers of tapeworms for life regardless of deworming.

In the next issue will be our final installment in our parasite series: A realistic look at parasite control programs for mature horses. 🐾

Foal Deworming Timeline	
ANTHELMINTIC	PARASITES OF CONCERN
1-2 weeks	
Ivermectin	Threadworms
2 months	
ANTHELMINTIC	PARASITES OF CONCERN
Pyrantel pamoate or benzimidazole	Ascarids and Pinworms
(subsequent treatments with rotational deworming every 60 days until 15-18 months old)	
5 months	
ANTHELMINTIC	PARASITES OF CONCERN
Macrocyclic lactone (ivermectin, moxidectin)	Strongyles
(and every 5 months thereafter)	
after weaning	
ANTHELMINTIC	PARASITES OF CONCERN
Praziquantel	Tapeworms