Equine Parasite Control

Horses are commonly afflicted by parasites, primarily by a group of worms known as the strongyles. Most adult horses acquire little immunity to most of these parasites and are quite susceptible to infection and disease. Although the most common result of parasitism is ill thrift, parasites also are a major cause of colic. In Kentucky, institution of aggressive parasite control on horse farms consistently reduced the incidence of colics by nearly 90%. In Florida we reduced the annual incidence of colic at one boarding stable from 24 to 4 per year by instituting proper parasite control. However, in recent years the most common worms of horses have become resistant to many of our wormers. It now appears that our worming practices will have to change if we are to continue to have good parasite control in our horses.

The most important equine parasites are the large strongyles (particularly *Strongylus vulgaris*), small strongyles (bloodworms or cyathostomes), and ascarids (large roundworms). Under most circumstances these are the parasites that **must** be controlled in Florida horses. The strongyles are seasonally transmitted, so treatment programs will be coordinated with time of the year, whereas ascarids are transmitted year-round, with season having very little effect. Less important, but not to be ignored, are bots, pinworms, threadworms, and tapeworms.

Mature horses are susceptible to all of the above except ascarids and threadworms, whereas foals are not likely to harbor adult large strongyles until they are at least 6 months old. The large and small strongyles are acquired primarily by grazing and are dependent upon horses having access to grass. Tapeworms are similarly dependent upon the presence of grass to support the tiny mite that spreads them. These parasites are not transmitted in drylots, barns, stalls, etc., where grass is not available. In contrast ascarids and pinworms can be acquired from grassy or non-grassy environments. Indeed, pinworm transmission is especially rapid in stabled horses where the delicate eggs are concentrated and protected from direct sunlight.

Cyathostomes (“Small Strongyles”)

These are by far the most common and abundant of the major parasites of horses, with infections often exceeding 100,000 worms in a horse. Damage to the horse’s gut by developing larvae of these worms can lead to ill thrift, diarrhea and colic.

Adult cyathostomes live in the gut of horses, and infected horses shed cyathostome eggs in their manure. The eggs then hatch into larvae that feed on bacteria in the manure for a week or two before migrating out of the manure onto nearby blades of grass. Horses then acquire the larvae from the pasture as they graze. Once swallowed, larvae develop in the wall of the horse’s gut for about 4-6 weeks before maturing to egg laying adult worms, although some can remain dormant in the gut wall for a year or more without maturing.

In cool climates, cyathostome transmission is fairly straightforward. A “spring rise” in worm egg output in the manure of horses results in a dramatic rise in the number of infective worm larvae on pastures by late summer and autumn. Horses become heavily infected by grazing during this time. In Florida the situation is reversed. Although worm egg counts remain high in horse manure year round, the infective larvae of these worms survive poorly on grass during the hot summer months. The net result is that most parasite transmission takes place from November to April, when horses ingest larvae that developed from eggs shed onto pasture from September to March.

Two important features of cyathostomes, (1) their short life cycles as compared to the large strongyles

and (2) their propensity to develop resistance to commonly used wormers, must be taken into consideration when designing parasite control programs.

In Florida, and most of the Deep South, treatment at 2 month intervals with ivermectin (Eqvalan), 3 month intervals with moxidectin (Quest), or monthly intervals with most other wormers from September through March will control most cyathostomes, as will continuous daily treatment with Strongid-C during this time. In cold climates, these treatments should be given late spring through summer.

Unfortunately, many horses are infected with cyathostomes resistant to the benzimidazoles (BZDs), the largest class of wormers. Since there is cross-resistance throughout the BZD group, this means that wherever resistance occurs, products containing febendazole (Safeguard®, Panacur®), oxfendazole (Benzelmin®), and febantel (Rintal®) are not effective. One drug of this group, worms are much slower to develop resistance to oxibendazole (Anthelcide®), thus it may be effective when worms are resistant to the other BZDs. BZD-resistant worms are fully susceptible to ivermectin, pyrantel, or moxidectin, and these wormers should be used wherever BZD resistance has been identified. In a recent study in Florida cyathostomes on 10 out of 11 farms were highly resistant to fenbendazole. A recent study done jointly by the Universities of Florida, Georgia, Kentucky and Louisiana State University showed that, in addition to widespread resistance to the benzimidazoles, cyathostomes have now developed resistance to pyrantel (Strongid) throughout much the southeastern U.S. In contrast, resistance is not yet a problem with ivermectin or moxidectin.

Strongylus spp. ("Large Strongyles")

Strongylus vulgaris is by far the most deadly of the equine worms — by obstructing the arteries supplying blood to the gut, migrating larval stages of this worm are a significant cause of colic. The life cycles of *Strongylus* spp. are similar to those of the cyathostomes except that the larvae of these worms migrate in the horse's body for some 6 months before maturing to adults. With *S. vulgaris*, larvae prefer to migrate within the arteries supplying blood to the gut before returning to the gut to become egg-laying adults about 6 months after the infective larvae were ingested from pasture.

Until more is known about the epidemiology of *S. vulgaris* in the southeastern states, year-round treatment for this parasite is probably required. Given the long time required for this worm to mature in horses (6-months) and the high efficiency of ivermectin and moxidectin for this parasite, treatment at a minimum of 6 month intervals with these wormers would theoretically prevent the shedding of eggs onto pasture and greatly suppress transmission. In cold climates, aggressive treatment spring and summer will stop transmission of this parasite. Since the appearance of ivermectin on the US market, this worm has become much less common and, indeed, has been eradicated from many properties. Also, resistance to our antiparasitic drugs has not been a problem with this worm. As a result, what was once a common and deadly parasite of horses has now become a rarity on most farms.

Ascarids ("Large Roundworms")

Parascaris equorum, the large roundworm of horses, can be deadly to foals in their first year of life. After that time sufficient immunity develops to provide strong protection. Transmission is direct and non-seasonal—infected horses contaminate their environment by shedding large numbers of ascarid eggs, which are subsequently ingested by other horses. Because ascarids shed a very tough egg that can survive in the environment for several years, and only hatches after being swallowed by a horse, transmission of that worm is non-seasonal and not affected by vagaries of climate. On most breeding farms, the majority of eggs ingested by this year's foals were passed by foals on the same farm during the preceding year.

Since this parasite requires some 11-15 weeks to mature in foals, worming foals at 2-month intervals throughout their first year of life should provide adequate control and prevent a build-up of eggs in the environment that would infect the next year's foal crop. The BZDs, pyrantel, ivermectin and moxidectin all are effective, and drug resistance has not been a problem with this worm.

Bots

Bots are flying insects somewhat related to houseflies. However, their larval (maggot) stages live in the stomachs of horses. Before the appearance of ivermectin, bots were very common on horses. However, they often were overrated in their ability to cause disease. Nevertheless large numbers of bot larvae in a horse's stomach can lead to ill thrift and, on rare occasion, death.

The bot life cycle begins when the adult bot fly deposits eggs on the horse's coat, usually on the forelimbs for the most common species of bot seen in Florida. Horses become infected by licking the eggs. After a brief period of migration in the gums between the horse's teeth, immature bots live in the stomach for several months. Eventually they pass out with the manure, whereupon the bot burrows into the soil and pupates. The adult botfly emerges from the pupa several months later.

Adult botflies are highly seasonal in their activities. Although they have been observed flying every month of the year in Florida, adult botflies are most abundant, and most egg laying occurs, in November and December, with a second small peak of botfly activity occurring in May and June. Bot fly activity may be continuous from fall until spring in southern Florida. In colder climates than Florida, bot flies are most active in the spring and summer, with activity ceasing entirely after the first hard freeze of the autumn.

The most important time to treat for bots in northern Florida is in January, after the first freeze of the winter has greatly reduced bot activity. A second treatment is probably needed after the spring peak in egg laying is past. A supplemental treatment in November may be needed in especially bad years or on farms with heavy bot activity. In southern Florida treatments may need to be continued through the winter. In colder climates, treatments are given in summer and early autumn based on the amount of local botfly activity, with a final clean-out treatment given after the first hard freeze of late autumn. Ivermectin and moxidectin are the preferred treatments. Good grooming with a bot knife will remove many eggs before they hatch, but be careful, hatched bot larvae have been known to infect the eye of humans! The practice of forcing bot eggs to hatch prematurely by wiping them with a warm moist cloth is especially dangerous in this regard. Wash your hands with warm, soapy water, and be sure not to touch your face, after handling horses that are contaminated with bot eggs.

Miscellaneous Parasites

Tapeworms are common in horses, and owners frequently complain of seeing tapeworm segments in manure. For the most part these worms are harmless although heavy infestations may cause colic. Infection is acquired when horses accidentally swallow a small mite while grazing. These mites, which feed on decaying organic matter in the environment, become infected by eating tapeworm eggs shed in the manure of infected horses. Treatment is best done with an ivermectin-praziquantel (Zimecterin® Gold, Equimax™) or moxidectin-praziquantel (Quest® Plus) mixture. Alternatively, a double or triple dose of pyrantel in its single dose formulations (Strongid-T® or Strongid-P®) or daily treatment with the continuously fed form of that same drug (Strongid-C®) may work. Little is known about seasonality of tapeworm transmission or the effects of climate on this parasite (although tapeworm infections seem to be most abundant in the autumn), and drug resistance does not seem to be a problem.

Pinworms are nuisance parasites whose ill effects are generally limited to itching and hair loss around the rump and tail head. Infection is more common and severe in stabled horses than horses at pasture because eggs survive longer out of direct sunlight. Adult pinworms live in the lower bowel of horses. At night female pinworms stick their heads out of the anus of infected horses and glue their eggs to the skin. The glue is irritating, which causes the backsides of affected horses to itch. Horses are infected by swallowing pinworm eggs, which are lightweight and often will float briefly in the air, contaminating every surface of a stable. Pinworms are easily killed with most equine wormers and usually are controlled as a side effect of programs designed to control cyathostomes. If necessary, pinworms usually can be eliminated from stables by aggressive sanitation and two anthelmintic treatments 1 month apart. Benzimidazoles, pyrantel, ivermectin and moxidectin all are effective.

Threadworms commonly infect young foals mainly via the mother's milk. This parasite appears to be relatively harmless, although large numbers of eggs may be shed in a foal's manure. Eggs shed in the manure of foals develop into infective larvae on grass. Immunity quickly develops, and adult worms do not develop in horses more than several months old. Instead, any larvae acquired from pasture migrate to the udder and wait for a new foal to begin nursing. If desired, treatment of the mare with ivermectin on the day of foaling is very effective in preventing transmission of threadworms to the foal.

Many other kinds of worms infect horses, and time does not permit me to cover them all. However, if you make an effort to control those worms listed above, you will have controlled 99% of the parasite problems in your horses.

Summary of Minimum Worm Control for Horses for Florida

Foals up to 1 year of age

Foals should be treated with drugs effective against ascarids at 2 month intervals beginning at 2 months of age. Depending upon the time of the year, treatment should include drugs effective against cyathostomes (see adult horses below). In Florida, this would generally be in the last half of a foal's first year of life assuming it was born on January 1 like all good thoroughbreds! Treatment for *S. vulgaris* should begin after a foal is 6 months of age, again depending on climate and season of the year, but most modern drugs used against ascarids and cyathostomes will kill *S. vulgaris* as well, so this point is moot.

Mature horses

Treat horses at 2-month intervals with ivermectin, 3-month intervals with moxidectin, continuously with Strongid-C or monthly with other wormers beginning in September and continued through March. This will control large and small strongyles. Be sure to use ivermectin or moxidectin with the January treatment to control bots. Treat again for bots in late June. By again using ivermectin or moxidectin at this time, you can insure continued protection from *S. vulgaris* and cyathostomes acquired in late spring. Supplemental bot treatment may be needed in November if heavy bot activity was noticed in September or October. This program was designed for climates similar to that of Gainesville, Florida. A similar treatment schedule should be followed for other warm climate locations although the exact timing may vary by a month or so.

Where pleasure horses owned by many different people are stabled together, it is imperative that all be treated — one horse left untreated can contaminate the environment for all. Where this is not done, owners can treat their horses daily with Strongid-C, which kills newly acquired worm larvae in the horse gut, thereby preventing infections from developing in spite of dangerously contaminated pastures.

Resistance to equine wormers

As mentioned above, cyathostomes have become resistant to many of our equine wormers other than ivermectin and moxidectin, and long term exclusive use of these two products will eventually lead to worms becoming resistant to them as well, which happened to sheep and goat producers in the southeastern United States. You therefore should be aware of several important points relating to cyathostomes becoming resistant to equine wormers:

1. Use of the same wormer (or related wormers) three or more times per year increases the risk for the development of resistance. However, many horses must be wormed at least three times per year, thus some sort of drug rotation becomes necessary.
2. A rapid rotation of between different wormers likely will induce multi-drug resistance in the worms, so one must not switch between different kinds of wormers at every treatment. Try instead to use the same wormer 2 or 3 times before switching
3. Switching between different wormers in the same family of drugs does not prevent resistance. You must switch to a different family of wormers. Currrently we only have three families of equine wormers available to us:
    a) Benzimidazoles
        i. fenbendazole (Safeguard®, Panacur®)
        ii. oxfendazole (Benzelmin®)
        iii. oxibendazole (Anthelcide®)
        iv. febantel (Rintal®, Cutter Paste Wormer®)
    b) Pyrantel Salts
        i. pyrantel pamoate (Strongid®-T, Strongid®-P, Rotectin-P®)
        ii. pyrantel tartrate (Strongid®-C)
    c) Macrolides
        i. ivermectin (Eqvalan®, Zymecterin®, Equimectrin®, Equimax™, Ivercide™, Iversol™, Phoenectin™, Rotectin®)
        ii. moxidectin (Quest®)
4. Under dosing horses greatly increases the likelihood that resistant worms will develop. A little extra is much better than too little.
5. Tube worming does not make a wormer any more effective or reduce the speed at which resistance will develop.
6. Good management practices reduce the build up of parasites in the first place, thereby reducing the need to administer drugs:
    a) Do not overstock pastures, The closer a pasture is grazed, the more worm larvae a horse ingests with each mouthful of grass.
    b) Rotate pastures, especially if pastures can be grazed by other livestock species during the interim. Cattle, sheep and goats share few parasites with horses and will help to clean up a wormy horse pasture.
7. Reducing the frequency and intensity of worming to the minimum necessary to control parasites reduces the rate at which resistance develops.
    a) Limit your worming efforts in adult horses to the peak worm season (fall, winter and early spring in Florida) rather than worming year round.
    b) Selectively treat adult horses (4 years and older) based on the amount of worm eggs shed in each individual horse's manure. Veterinarians in Scotland found that nearly 90% of the total worm eggs shed by a herd of horses were shed by only 20% of horses in the herd. If possible, identify the offending horses and target them for more aggressive worming (or sale) while reducing the frequency of worming for the remaining 80% of the adult horses in the herd.