EQUINE MEDICAL UPDATE

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Anthelmintic Resistance in Horses

With respect to equine parasite control, many of the older ideas are no longer valid. Large strongyles have been eradicated from most horse farms. Small strongyles (cyathostomes, cyathostomins) are now the most significant pathogenic internal parasite of horses in North America.[1,2] Larval stages of cyathostomes encyst in the colonic mucosa and may cause pathology upon emergence from the mucosal cyst.[1,3] The damage to the bowel from larval emergence is magnified when large numbers emerge simultaneously.

Unfortunately, resistance of emerging cyathostomes to commonly used anthelmintics has become increasingly documented in North America. Resistance occurs when there is a larger pool or number of parasites that can tolerate therapeutic doses of an anthelmintic compound than seen in normal populations of the same species of parasite.[3,4] Resistance to dewormers by cyathostomes is an unfortunate, but logical outcome given the overuse of anthelmintics. When a horse is administered an anthelmintic, it is unlikely it will be 100 percent efficacious. Thus, when the horse is dewormed, the parasites not killed by the deworming agent survive and reproduce. Therefore, some parasites survive, which results in the modification to the parasite gene pool within that horse, as well as on the farm. The more frequently the animal is dewormed with a particular class of anthelmintic, the greater potential for survival of an increased number of parasites that are not killed by that particular agent. Thus, a genetic shift or selection for parasites not killed by the particular class of dewormer occurs. On a farm, if all animals are dewormed frequently, then parasite resistance in all or most horses on a particular farm may occur.

Researchers at the University of Georgia[1] found, that in horses sampled from southern states (GA, SC, FL, KY, LA), resistance to fenbendazole, oxibendizole, and pyrantel was 97.7%, 53.5%, and 40.5%, respectively. Others have also shown decreasing efficacy and greater resistance in small strongyles in North America to pyrantel[1,5,6,7] and fenbendazole.[1,5,8] These Georgia workers[1] found no resistance to ivermectin among horses they examined. However, researchers from the University of Kentucky found strongyle fecal egg counts began returning to higher levels approximately twice as quickly after being dewormed with ivermectin as they had in the 1980s.[9] Many parasitologists believe this faster parasite Egg Reappearance Period (ERP) suggests selection of the resistance phenotype in certain species of cyathostomes.[1,5,9] To date, no cyathostome resistance to moxidectin (Quest®) has been documented in horses in North America.

Obviously, parasites should be controlled when they negatively affect the horses' health. But the formulas of the past (monthly or bimonthly administration of anthelmintics), although historically effective, have contributed to the level of anthelmintic resistance that now threatens modern horse production.[1,5,9]

The proportion of the population of a specific species or classification of parasites that are not selected by drug or anthelmintic treatment is termed "refugia". The refugia provides a pool or reservoir of drug susceptible genetics in a species of parasites that allows for dilution of resistant genes in parasites on a farm. This resultant biodiversity in a species slows the onset of anthelmintic resistance to a particular class of anthelmintic. Maintaining a large group of parasites that are not exposed or have reduced exposure to an anthelmintic class (large refugia) is the single most important factor in horse management, which aids in delaying the onset of anthelmintic resistance.

To maintain this refugia, parasite selection pressures must be reduced. This can be accomplished by less frequent deworming[1,3,4,5,6,7,8] or by using an anthelmintic less frequently and only giving it to a portion of the horse population on any given farm or facility. (The portion of the horse population on that farm receiving treatment would be based upon fecal egg counts). For example, using moxidectin (Quest/Quest® Plus), which have a long ERP of approximately 90 days, would result in less frequent administration of this anthelmintic.[1]

As moxidectin is administered to foals 6 months of age and older, this group of pre- and post-weaned foals can serve as a source for refugia, which remains sensitive to moxidectin. And because ascarid control is paramount in the foal and other classes of anthelmintics (benzimidazoles) can be used effectively for this parasite, moxidectin use and effectiveness can then be focused on cyathostome control after 6 months of age.

The need for less frequent treatments due to the very long ERP for moxidectin (Quest) may aid in a slower onset of a resistant population of small strongyles on a horse farm.[1] By performing fecal egg counts (McMasters technique), horses can usually be placed into one of three categories: high (>500 eggs), moderate (200-500 eggs), and low (<200 eggs). By identifying low shedders and reducing the number of treatments in this group, another source of refugia may be created. The clinician can then implement a more aggressive parasite control program for horses in the higher shedding categories.

Although fecal egg counts do not correlate directly with luminal worm burdens, Kaplan[1] suggests horses with counts of fewer than 200 EPG are unlikely to have ill effects from cyathostomes. Thus, treating adult horses in this low egg shedding group with only two treatments of moxidectin yearly (spring and fall) should result in effective parasite control and allow for a source of refugia on the farm. Conversely, treating horses in the high egg count class (>500 EPG) more aggressively should result in effective parasite control and reduced pasture contamination. Coupled with moxidectin's long ERP (~90 days) and reduced need for excessive anthelmintic administrations, greater refugia is created and a slower onset of moxidectin resistance occurs.

With the growing evidence of anthelmintic resistance, the clinician should be cognizant of these and other methods to not only control parasites, but maximize the long-term effectiveness of anthelmintics, which are still effective. We at Fort Dodge Animal Health are dedicated to the maintenance of horse health, and aiding practicing veterinarians in this endeavor.

1 Kaplan RM, et al (2004). Prevalence of anthelmintic resistant cyathostomes on horse farms. *JAVMA* 225:903-910.

2 Love S, et al (1999). Pathogenicity of cyathostome infection. *Vet Parasit* 85:113-121.

3 Prichard R, et al (1980). The problem of anthelmintic resistance in nematodes. *Aust Vet J* 56:239-251.

4 Kaplan RM, et al (2004). Equine cyathostomins. *Vet Parasit* 125:203-220

5 Tarigo-Martinie JL, et al (2001). Prevalence and clinical implications of anthelmintic resistance in cyathostomins of horses. *JAVMA* 218:1957-1960.

6 Chapman MR, et al (1996). Identification and characterization of pyrantel pamoate resistant cyathosome population. *Vet Parasit* 66:205-212.

7 Brazik ED, et al (2006). Pyrantel pamoate resistance in horses receiving daily administration of pyrantel tartrate. *JAVMA* 228:101-103.

8 Lyons ET (2001). Continuance of studies on populations benzimidazole-resistant small strongyles in a shetland pony herd in Kentucky; effect of pyrantel pamoate (1992-1999). *Vet Parasit* 94:247-256.

9 Lyons ET, et al (2008). Field studies indicating reduced activity of ivermectin on small strongyles in horses on a farm in central Kentucky. *Parisitol Res* 103:209-215.

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