Introduction

The “normal” parasite burden of horses should be put into perspective, relative to the burdens of the other farm animals and man (Figure 1). If man has one worm, that’s probably one too many. Chickens generally host worm totals rarely exceeding 300. Cats and dogs harbor worms of 10 or more species, with total worm loads averaging about 500. Turkeys host average worm burdens of approximately 1,000 (all of only one species). Sheep, cattle and horses graze pastures. Therefore, by virtue of diet, these animals consume the source of their parasites on a continuous basis and carry extremely large worm burdens as a result. Of these herbivores, horses usually harbor the largest worm burdens, with worms from 40 or more species well represented. And, if the worms aren’t enough, horses also serve as hosts to “bots,” insect larvae that live in the horse’s mouth and stomach during their parasitic existence prior to exiting the horse for a short life as flies. Finally, in a recent publication from Louisiana State University, it was documented that despite the availability of excellent parasiticides for the past 25 years (e.g., the avermectins), our horses have the same parasites and at the same levels they did 20 years ago.
The Parasites of the Horse

As stated previously, horses harbor worms and fly larvae from approximately 40 different parasite species. Dismissing some of the less important parasites and grouping many of the others, we can come up with 8 categories of parasites that account for more than 95% of the parasite presence in horses. These groups are presented in Table 1.

Horses will always play host to parasites due to a number of factors, which include:

- The adult horse immune system is not 100% effective in preventing or eliminating most parasite populations.
- Horses are constantly exposed to new parasites since all horse pastures reservoir infective stages.
- No dewormer is 100% effective or protective against parasite infections.

Each of the parasites listed in Table 1 can be severely pathogenic but are usually not. Most parasites are subclinical in their detriment, meaning that they adversely affect the horse but not so much that it is visible to the horse owner. In addition, most of the parasites listed have restricted incidences – only occurring in significant levels on some farms but not others, in certain age groups but not others, etc.

However, one group of parasites, the small strongyles, are most deserving of discussion because they are in every horse and on every farm and regarded by all horse parasitologists as the most important group of horse parasites.

Parasite Control Measures

Basically, parasite control measures encompass two broad objectives:

- To minimize levels of exposure to parasites.
- To minimize the level of parasites maintained by the horse.

Generalized procedures for accomplishing the above objectives include both managerial and chemical means of control:

1. Collect and compost as much fresh horse manure as possible prior to its dispersal onto the pastures. Prevent fecal contamination in feed and water troughs.
2. Keep pastures in good shape. The closer horses graze to the ground and old stool piles, the more worms they get. Rotating pastures can be an effective management tool.
4. During fly season, remove bot eggs daily from leg and body hairs.
5. Keep horses healthy. Although immune responses aren’t adequate to completely protect horses from parasite burdens, a healthy horse will ward off more parasites than an unhealthy horse. Plus, healthy horses are better at repairing tissue damage caused by parasites.
6. Use an effective and strategic parasite treatment program (Figure 2).

Table 1. The major categories of horse parasites.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Barnyard Name</th>
<th>Site of Infection</th>
<th>Comment</th>
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| Gasterophilus spp instars | Bots | Mouth and stomach | • 100% incidence  
|                  |                |                   | • Ivermectin is drug of choice  
|                  |                |                   | • Treat after second killing frost |
| Habronema, Draschia and Trichostongylus | Stomach worms | Stomach | • More of a problem as summer sores than internal infection  
|                  |                |                   | • Trichostongylus is “shared with” cattle |
| Parascaris equorum | Roundworm | Liver and small intestine | • Of foals only  
|                  |                |                   | • Heavy infections require careful treatment |
| Strongyloides westeri | Threadworm | Small intestine | • Primarily in foals  
|                  |                |                   | • Can penetrate skin plus come in “on” the colostrum |
| Anoplocephala spp | Tapeworms | Small intestine | • Can be a concern on some farms but usually of minor importance  
|                  |                |                   | • Requires a free-living mite in the life cycle |
| Oxyuris equi | Pinworm | Large intestine and anus | • Not all that common  
|                  |                |                   | • Excessive rear-end rubbing is a sign |
| Onchocerca cervicalis, Setaria equina and Thelazia lacrimalis | Filiarids | Neck ligament, abdominal cavity and eye, respectively | • Usually not a problem but skin and eye lesions are possible  
|                  |                |                   | • Avermectins should effect removal |
| Strongylus spp and small strongyles | Strongyles | Large intestine and cecum | • Strongylus spp (large strongyles) are, for the most part, gone  
|                  |                |                   | • Small strongyles are the most important group of parasites in the horse |
Over the past five years, we conducted field trials on the efficacies of pyrantel (® Strongid), fenbendazole (® Safe Guard, ® Panacur), oxibendazole (® Anthelicide), ivermectin (® Eqvalan, ® Zimectrin) and moxidectin (® Quest). In addition, a study was completed in 2003 on moxidectin combined with praziquantel. As an abbreviated conclusion:

- Pyrantel is good, at least for initial parasite egg count suppression.
- Fenbendazole and oxibendazole lack efficacy because of extensive resistance by small strongyles to benzimidazole anthelmintics.
- Ivermectin treatment results in good egg count suppression for approximately 60 days.
- Moxidectin treatment results in significant egg count suppression for approximately 120 days.
- Moxidectin with praziquantel proved highly effective against both small strongyles and tapeworms.
- All the above were safe and without adverse effects when given according to label specifications.

Life Cycle of Small Strongyles

One key to any parasite control program is to interrupt the life cycle of the parasite. The life cycle employed to some extent by all of the 40 or 50 small strongyle species is presented in Figure 3. Six different life cycle stages are completed by each species, with all stages accomplished in as short as 70 days or as long as 2½ years. A number of factors are involved in dictating the speed of the parasite’s rate of development.

The life cycle can be divided into three segments:

- The environmental phase (eggs and larvae on pasture)
- The luminal phase (adults in the intestinal contents)
- The tissue phase (larvae in the intestinal wall)

Given the many stages, phases and reservoirs involved in the life cycle of small strongyles, it is readily apparent that this disease complex is impossible to remedy completely. Rather, one must reduce parasitisms to a level that allows for optimal horse health.
Treatment Schedule

With information gathered during the field trials mentioned previously, we propose the treatment scheme as presented in Figure 2. This scheme is for adult horses of good health and addresses parasite challenge by our major parasites (i.e., bots, tape-worms and most importantly, small strongyles).

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