Strategic Control of Internal Parasites

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Overview

- Equine Internal Parasites
- A Deworming Program for Florida Horses
AAEP Parasite Control Guidelines

- [http://www.aaep.org/info/parasite-control-guidelines](http://www.aaep.org/info/parasite-control-guidelines)
- Published in 2013
- Committee of researchers, DVMs, and industry representatives worked together to establish
- Available online

Recommendations Based On:

- Small strongyles (cyathostomins) have become the parasite of primary concern, large strongyles now rare
- Anthelmintic resistance is highly prevalent in cyathostomins and round worms
- Adult horse vary in their susceptibility to infection and require individual attention
- Horses < 3 yo are more susceptible to infection and have distinct recommendations
- The goal is zero clinical disease, not zero parasites
Equine Internal Parasites

- Over 150 species can affect the horse
- The most common are:
  - Large Strongyles
  - Small Strongyles
  - Ascarids (roundworms)
  - Tapeworms
  - Bots
  - Pinworms
  - Lungworms
  - Threadworms

Management and Internal Parasites

- Parasites can cause extensive internal damage
- Effects range from dull hair coat and unthriftiness to weight loss, colic, and death
Life Cycle of Parasites

- Eggs
- Larvae (immature worms)
- Adults (mature worms)

Life Cycle of the Parasite

- Eggs or larvae are deposited on the ground in the manure of an infected horse.
- The eggs develop in the environment and are swallowed while the horse is grazing.
- Larvae mature in the horse’s digestive tract where most of them become egg laying adults.
Clinical Signs of Internal Parasites

- Dull, rough hair coat
- Loss of condition
- Poor performance
- Unthrifty
- Lethargy/depression
- Colic
- Diarrhea
- Pot belly (young horses)
Major Internal Parasites

- **Small Strongyles (Cyathostomes)**
  - Seasonally transmitted
  - Winter in Florida
- **Large Strongyles**
- **Roundworms (Ascarids)**
  - Year round infection
- **Tapeworms**

Minor Parasites

- **Bots**
- **Threadworms**
- **Pinworms**
- **Lungworms**
Small Strongyles

- Internal parasite of highest concern
- >100,000 worms/horse
- Transmission: November – April
- Very short life cycle- 4 to 6 weeks
- Resistant to many dewormers

Resistance

- When a greater frequency of individuals in a population can tolerate doses of a compound than in a normal population of the same species and is heritable

- Treatment with dewormers selects for resistant genetic alleles over time (because susceptible worms die)
Refugia

- Critical to limit resistance

- Refugia are the parasites not exposed to the drug at the time of treatment (eggs and larvae on pasture), certain stages in treated horses (depending on drug/dose) and those in untreated horses

- Provide a pool of sensitive parasites

Resistant Small Strongyles on SE horse Farms (Kaplan et al 2004)

- 1274 horses tested from 44 large farms in GA, SC, FL, KY and LA
- Resistance testing only for small strongyles

- Percent of farms found to harbor resistant worms:
  - 97.7% for fenbendazole
  - 0% for ivermectin
  - 53.5% for oxibendazole
  - 40.5% for pyrantel pamoate
Small Strongyles

- Colic
- Diarrhea
- Ill-thrift, loss of body condition
- Subclinical disease is more common and may result in greater economic losses

Small Strongyles- Treatment
Large Strongyles

- Historically, most deadly worms affecting horses
- Can migrate into blood vessels in the intestine and cause colic
- Treatment with ivermectin or moxidectin at least 2 times per year
- Rarely see significant infestations now

Life cycle of the Strongylus vulgaris

1. Eggs in fecal material
2. Second-stage larvae (in soil or feces)
3. Third-stage larvae (ingested from water films on vegetation, walls, mangers, etc.)
4. Fourth-stage larvae (migrate from the large intestine to the anterior mesenteric artery where they cause inflammation)
5. Adult S. vulgaris (attached to the mucous membrane of the cecum and large colon)
6. The infective stage develops in about one week and can remain infective for up to a month or longer depending on conditions.

http://www.extension.org/mediawiki/files/8/8e/svulgaris.gif
Large Strongyle

- Treat every 6 months
- Use ivermectin or moxidectin

Large Strongyles (Strongylus vulgaris)
**Large Strongyles**

- Excellent efficacy of modern dewormers has reduced the prevalence of large strongyles
- Shift toward small strongyle infection

**Roundworms (Ascarids)**
Roundworms
- Common in foals – can cause impactions and colic
- Adult horses develop immunity
- Eggs live for years in contaminated soil

Deadly for young foals

Ascarid Life Cycle
Endoscopy of Small Intestine

Ascarids (Round worms)

- Common in foals, adults develop immunity
- Can impact in foals and cause colic
- Deworm foals more frequently (every 4-8 weeks depending on ERP)
- Historically sensitive to most dewormers (Safeguard®, Panacur®, Strongid®, Ivermectin, etc), but resistance is developing (ivermectin/moxidectin, others)!!
Tapeworms

- Previous studies have shown 82% of Florida horses have tapeworms
- Young and older horses most susceptible
- Difficult to detect on fecal exam
- Deworm twice yearly with product containing praziquantel (Quest Plus®, Equimax®, Zimecrtin Gold®) or double dose of Strongid T®

[Image: http://www.thehorse.com/images/content/tapewormlifecycle.jpg]
Tapeworms (*Anoplocephala*)

- Cause Colic
- Live at ileo-cecal valve
- Disrupt motility
- Use praziquantel

Tapeworm in Cecum
Bots (*Gasterophilus*)

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Bots

- Flying insects that lay eggs on the leg hairs
- Horses inadvertently swallow eggs and larvae hatch and attach in the stomach
- Remove bot eggs from hairs
- Ivermectin or moxidectin will kill bots
- Don’t remove eggs and rub your eyes – can infect human eyes

Pinworms (*Oxyuris equi*)

- Cecum, colon, rectum
- Tail rubbing

Threadworms (*Strongyloides*)

- Young foals
- Contamination through milk
- Immunity quickly developed
- May cause diarrhea
Diagnosis of Internal Parasites

- Fecal Egg Counts (FEC) can be very helpful!!
  - Negative fecal does not always mean no parasites
- FECRT (Fecal Egg Count Reduction Test)
  - Monitors response to dewormer, recheck fecal 14 days after deworming – should be reduced >90% if parasites are sensitive to dewormer
- Monitor multiple horses on farm at same time
- Some parasites are difficult to diagnose - tapeworms

What do Fecal Egg Counts Mean?

- FEC <200 epg – low egg shedder, horse less likely to have any ill effects of parasite
- FEC 200-500 – moderate egg shedder
- FEC >500 epg – high egg shedding into environment
- FEC do NOT correlate directly with actual intestinal worm burden, but does give an estimate of how much horse is contaminating the environment.
- 20% of your horses shed 80% of the worm eggs!
Dewormers

- None are 100% effective
- Work by starving the worms or paralyzing the worms
- Use a broad spectrum product as basis for control (ivermectin, moxidectin)
- Be sure to treat for tapeworms 1-2 times per year
  - Double dose Strongid®
  - Product containing praziquantel

Dewormers

- Avermectins (cause flaccid paralysis, cannot eat/swallow)
  - Ivermectin (Eqvalan®, Zimectrin®, Equimectrin®)
  - Moxidectin (Quest®)

- Tetrahydropyrimidines (cause rigid paralysis of worm)
  - Pyrantal (Strongid®, Rotation 2®)

- Benzimidazoles (interfere with energy metabolism)
  - Fenbendazole (Panacur®, Safeguard®)
  - Oxibendazole (Anthelcide®)

- Praziquantel (disrupt the integument of worm)
## Dewormers

<table>
<thead>
<tr>
<th>Drug</th>
<th>Common Brand Name Products</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Ivermectin</td>
<td>Eqvalan®, Zimectrin®, Equimectrin®, Rotation 1™, Iver Care™</td>
<td></td>
</tr>
<tr>
<td>Moxidectin</td>
<td>Quest®</td>
<td>Must be &gt; 6 months old</td>
</tr>
<tr>
<td>Oxibendazole</td>
<td>Anthelcide EQ®</td>
<td>Many parasites resistant</td>
</tr>
<tr>
<td>Fenbendazole</td>
<td>Panacur®</td>
<td>Many parasites resistant</td>
</tr>
<tr>
<td>Pyrantel pamoate</td>
<td>Strongid P®, Strongid T®, Rotation 2™</td>
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<tr>
<td>Pyrantel tartrate</td>
<td>Strongid C®, Strongid C2X®</td>
<td></td>
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<tr>
<td>Ivermectin/praziquantel</td>
<td>Equimax®, Zimecterin Gold®</td>
<td></td>
</tr>
<tr>
<td>Moxidectin/praziquantel</td>
<td>Quest Plus®</td>
<td>Must be &gt; 6 months old</td>
</tr>
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## Deworming

- Consult your veterinarian
- Rotating dewormers too frequently will promote resistant parasites
- Don’t neglect management!
Parasite control

Manure removal at least 2x/WEEK
Spread manure in hot weather
Rotate pastures

Parasite Control - Management

- Compost manure away from fields where horses are grazing, do not spread on pasture if possible
- Group horses by age to reduce exposure to certain parasites
- Use a feeder for hay and grain
- Remove bot eggs from the hair
**FL Parasite Control Program**

- **Oct 1** - Perform FEC on ALL horses. Treat all horses with Ivermectin or moxidectin (+praziquantel)
- **Dec 1** – Treat horses that were treated with ivermectin in October with oxibendazole and/or pyrantel. All horses with FEC > 500 epg. +/- treat horses with FEC 200-500 epg.
- **Jan 1** – Treat ALL horses regardless of FEC, use ivermectin/praziquantel or moxidectin/praziquantel; perform FEC all horses

**FL Parasite Program Cont’d.**

- **April 1** – Treat only high shedders if moxidectin was used in January. Treat with oxibendazole, pyrantel, or power pack
- **May-September** – NO TREATMENT necessary. Too hot for transmission.
- Monitoring FEC is critical for this program
Recommendations for Foals and Yearlings (< 2 yo)

- Treatment based on FEC not recommended
- Minimum of 4 treatments in 1st year, starting at 2-3 months old (use benzimidazole first)
- Treat again before weaning. Perform FEC to determine if round worms or strongyles are primary
- Treat again at 9 mo and 12 months.
- Perform yearly FECRT to determine efficacy of treatment.

Recommendations for Foals and Yearlings (< 2 yo)

- Critical to perform FECRT on all drugs used in foals and monitor egg reappearance
- Ivermectin or moxidectin at least every 6 months for large strongyles
- For roundworms – resistance has been documented to ivermectin/moxidectin
  - Start treatment at 2-3 months old with benzimidazole, pyrantel
  - Monitor ERP – may be as short as every 4-6 weeks and require retreatment.
- Larvical treatment for small strongyles between 6 mo – 2 yrs in late spring
Any Questions?