

# 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>
- Published in 2013
- Committee of researchers, DVMs, and industry representatives worked together to establish
- Available online

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## 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

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## 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



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## Management and Internal Parasites

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



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## Life Cycle of Parasites

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



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## 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

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## Clinical Signs of Internal Parasites

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



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## Clinical Signs of Parasitism



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## Major Internal Parasites

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

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## Minor Parasites

- Bots
- Threadworms
- Pinworms
- Lungworms



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## 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

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## 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

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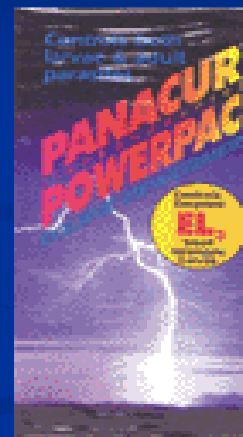
## Small Strongyles

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



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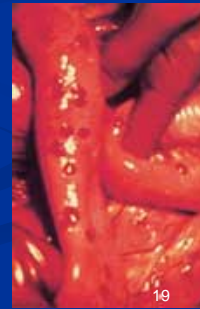
## Small Strongyles- Treatment



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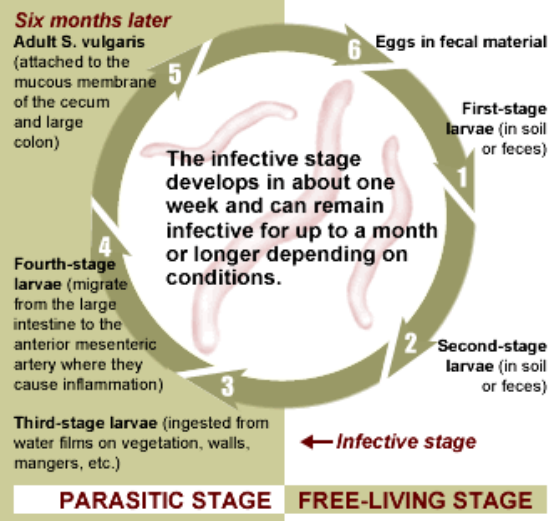
# Large Strongyles

- 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



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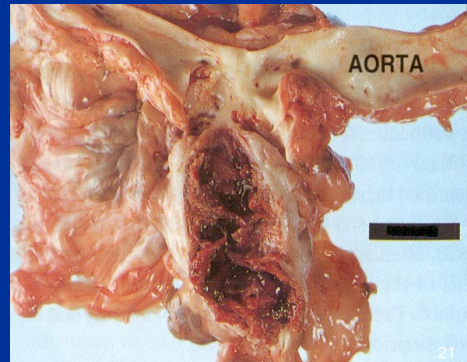
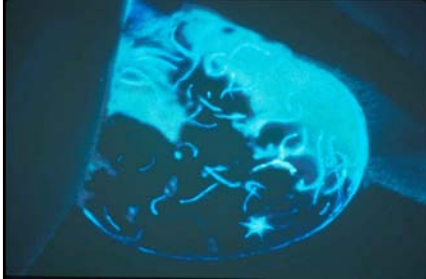
## Life cycle of the Strongylus vulgaris



<http://www.extension.org/mediawiki/files/8/8e/svulgaris.gif>

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## Large Strongyle



## Large Strongyles (*Strongylus vulgaris*)

- Treat every 6 months
- Use ivermectin or moxidectin

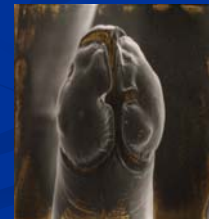


## Large Strongyles

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

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## Roundworms (Ascarids)



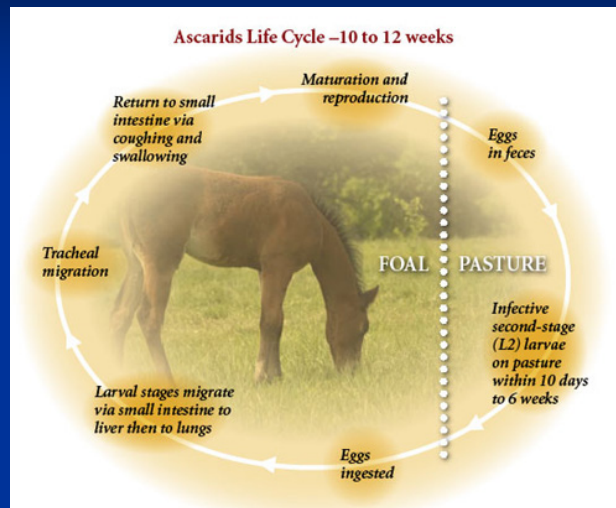
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# Roundworms

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



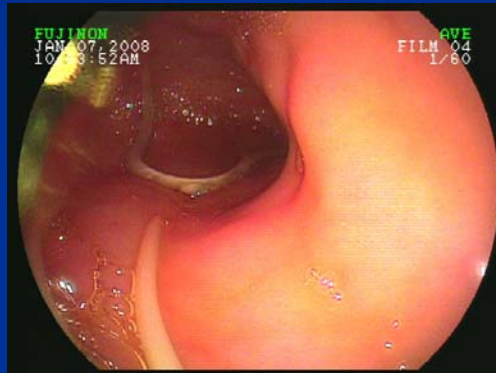
# Ascarid Life Cycle



[www.foalcare.com](http://www.foalcare.com)

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## Endoscopy of Small Intestine



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## 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)!!

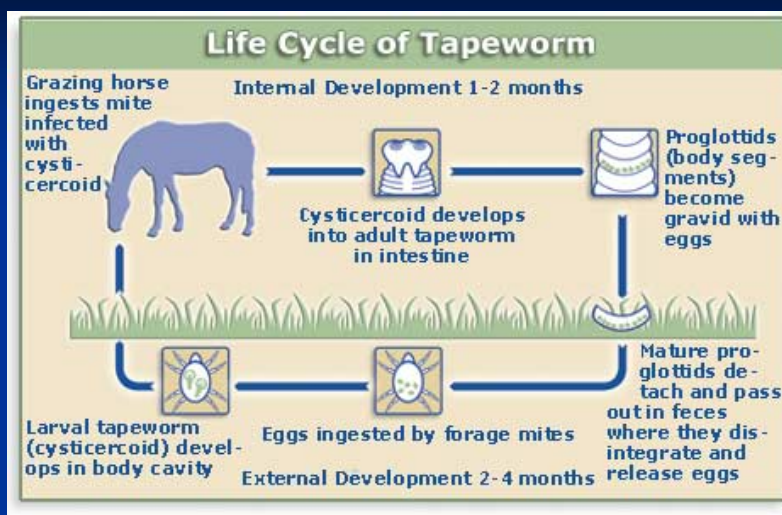


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# Tapeworms

- 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®, Zimectrin Gold®) or double dose of Strongid T®

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<http://www.thehorse.com/images/content/tapewormlifecyle.jpg>

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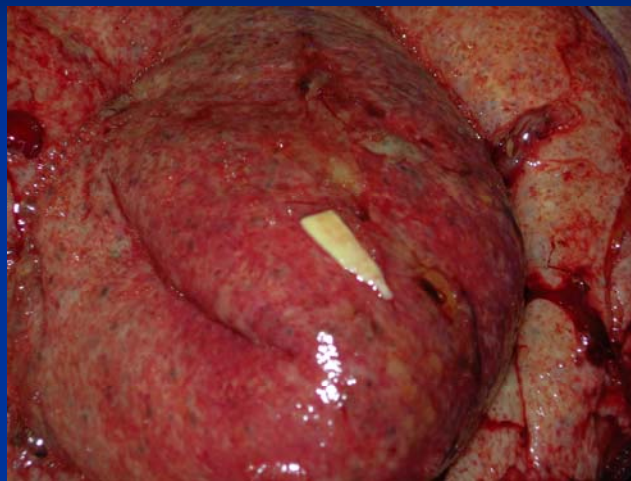
## Tapeworms (*Anoplocephala*)

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



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## Tapeworm in Cecum



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## Bots (*Gasterophilus*)



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## Bots (*Gasterophilus*)



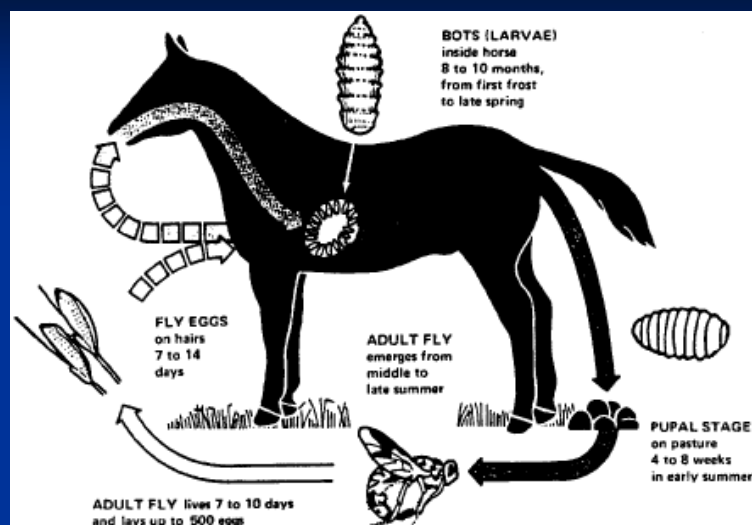
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# Bots

- 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

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# Bots



<http://www.ag.ndsu.edu/pubs/ansci/horse/eb55-18.gif>

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## Pinworms (*Oxyuris equi*)

- Cecum, colon, rectum
- Tail rubbing



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## Threadworms (*Strongyloides*)

- young foals
- contamination through milk
- immunity quickly developed
- may cause diarrhea



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## 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

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## 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!

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## 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

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## 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)

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## Dewormers

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

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## Deworming

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



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# Parasite control

Manure removal at least 2x/WEEK

Spread manure in hot weather

Rotate pastures



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## 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

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## 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

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## 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

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## Recommendations for Foals and Yearlings (< 2 yo)

- Treatment based on FEC not recommended
- Minimum of 4 treatments in 1<sup>st</sup> 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.

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## 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.
- Larvacidal treatment for small strongyles between 6 mo – 2 yrs in late spring

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Any Questions?



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