CFAES

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Equine Internal Parasites

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Internal parasites can cause significant medical problems in horses and ponies with the potential for large economic expenses for medical care. Traditional recommendations of rotational treatment with dewormers, also known as anthelmintics, at regular intervals that were recommended in the past have contributed to parasite resistance. Initially, rotational treatment was developed for control of *Strongylus vulgaris*. As *Strongylus vulgaris* has nearly been eradicated in the United States, concerns have shifted to preventing parasite resistance to dewormers. Parasite resistance to dewormers has been detected in both cyathostomes and ascarid species. Now, new strategies are recommended as a more nuanced approach to parasite control that focuses on management strategies and strategic deworming protocols for individual horses. This strategy involves:

- Use of fecal egg counts **(FEC)** and fecal egg count reduction testing **(FECRT)** (more information in the "Equine Parasite Control Methods " factsheet).
- Properly timed treatments at the appropriate time of the year.
- Knowledge of equine susceptibility to different parasite species.
- Knowledge of what parasite life cycle stage is treatable with the dewormer.
- Maintaining the animal in optimum health, including appropriate nutrition, and at an optimum body condition score **(BCS)**.
- Having a Veterinary Client Patient Relationship **(VCPR)** in place.
- Pasture management: manure management, co-grazing pastures with other livestock species, and possibly rotational grazing (more information in the "Equine Parasite Control Methods" factsheet).
- Proper animal management on pasture, including decreasing stocking density or limiting time on pasture, can lower FEC.

Most equine internal parasite life cycles have a stage in which eggs or larvae are found in manure. Prompt removal of manure from the pasture may reduce the need for dewormers in many cases and should be considered as a pasture management tool. This management practice can be facilitated more easily given that horses generally defecate in consecrated areas.

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The overarching goal of parasite control is to keep horses healthy. The goal is not to completely eliminate parasites from horses or from pasture. Maintaining a susceptible population of parasites, also known as refugia, is essential to prevent dewormer resistant genes from becoming universal among internal parasites. Avoiding parasite resistance to dewormers is critical for effective control (USDA, 2010; Kirkland, 2021).

The primary parasite species of concern in horses include large strongyles, small strongyles (cyathostomins), ascarids, tapeworms, pinworms, and bots. Using FEC tests, equine owners can quantify the number of strongyle-type eggs and ascarid eggs that individual horses are shedding in their manure. Small and large strongyle eggs cannot be differentiated through the FEC test, but an overall number of strongyle-type eggs per gram **(EPG)** can be obtained for each horse.

Treatment protocols should be developed working with your veterinarian and based on FEC and FECRT tests.

Life Cycles of Major Equine Internal Parasites

The horse is a host to a variety of internal parasites and the degree of parasitism can be influenced by pasture management strategies. While total elimination of parasite burden is unlikely, strategies to reduce parasite populations and egg shedding are beneficial to the well-being of the horse and the owner/manager. Parasites feed on the host tissues or the host feed, creating a variety of issues, such as reduced nutrient absorption, reduced immunity, decreased growth rate, anemia, or colic. From the owner/manager perspective, slow-growing horses or hard keeping horses will require an increased level of nutrition for a longer period of time, thus increasing cost of maintaining the horse.

Large and Small Strongyles

Small and large strongyles fall under the nematode family *Strongyloidea*. They differ in their migratory patterns but have similar life cycles (Nielsen et al., 2014).

The *Strongylinae* subfamily includes three major large strongyle species that are detrimental to horses: *Strongylus equinus*, *Strongylus edentatus*, and *Strongylus vulgaris*. These species consume intestinal mucosa and migrate vast distances within the body (Figure 1). *Strongylus vulgaris* is the most pathogenic of the strongyles because of its migratory pattern. Horses ingest infective third stage larvae from pasture and the larvae enter the large intestine. They burrow into the walls of the intestine, where they will further develop and eventually enter the bloodstream. They migrate to the cranial mesenteric artery, which resides midway down the back of the horse. After spending several months traveling through the bloodstream of the horse, they eventually become lodged in small arterioles, through which they are unable to pass. The arterioles eventually burst, allowing the now stage 4 larvae to encyst in the surrounding tissues. They will molt once more before again migrating to the cecum and large intestine to reproduce.

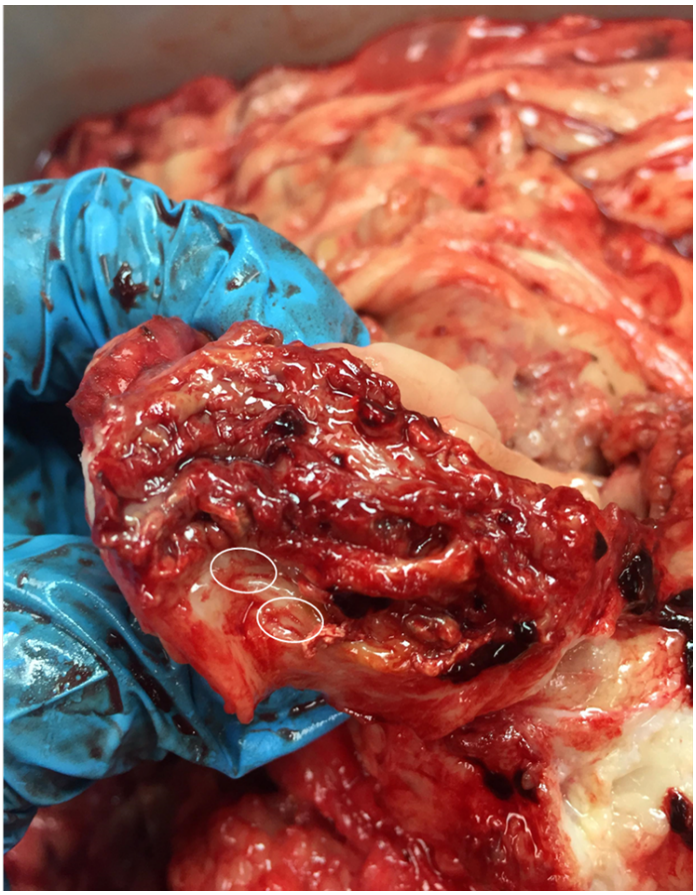

Figure 1. *Dissected cranial mesenteric artery with migratory tracks from S. vulgaris. Photo by Haley Zynda.*

Cyathostominae species (Figure 2) are similar to their large strongyle counterparts in that the infective stage of larvae is also the third stage. Horses ingest the larvae while grazing and the larvae travel through the gastrointestinal tract until they reach the cecum and large intestine. Over 40 species of cyathostomes have been identified, and several species can infect an individual horse at one time. The third stage larvae encyst into the mucosal layer of the cecum and colon (Nielsen et al., 2021; Zynda et al., 2019) and do not migrate any further. The larvae develop into the fourth stage, causing severe inflammation of the hindgut in heavily infected horses. The encysted larvae can arrest development for up to 2 years before maturing into adult worms with the ability to reproduce.

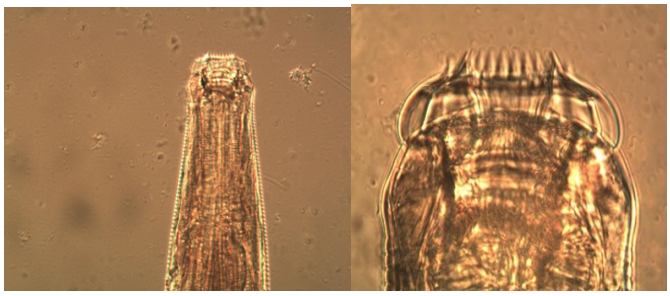

Figure 2. *Cyathostome (left) under a microscope with close up view of the buccal capsule (mouthparts) (right). Photo by Steffanie Burk.*

Ascarids

Parascaris spp., better known as ascarids (Figures 3-6), are the largest roundworm species of the horse, affecting foals and young horses (Bowman and Lynn, 1999; Kirkland and Smarsh, 2021). Ascarids have an involved lifecycle, starting with the foals ingesting the very resilient ascarid egg. From there, the egg will hatch in the gastrointestinal tract and burrow through the walls of the small intestine, where it will eventually reach the liver. After spending time in the liver, the larvae will travel through the bloodstream into the pulmonary artery and reach the lungs. It will leave the bloodstream and develop into a fourth stage larvae in the lungs, and then is coughed up and swallowed into the stomach. It will travel through the gastrointestinal tract to the small intestine, where it will mature into adulthood and reproduce, producing eggs that will be shed in the feces.

Figure 3. *Ascarids (Parascaris spp.) the largest equine roundworms. Photo by Haley Zynda.*

Figure 4. *Female ascarid (left), male ascarid (right). Photo by Steffanie Burk.*

Figure 5. *Ascarid larva hatching from egg under a microscope. Photo and video by Steffanie Burk.*

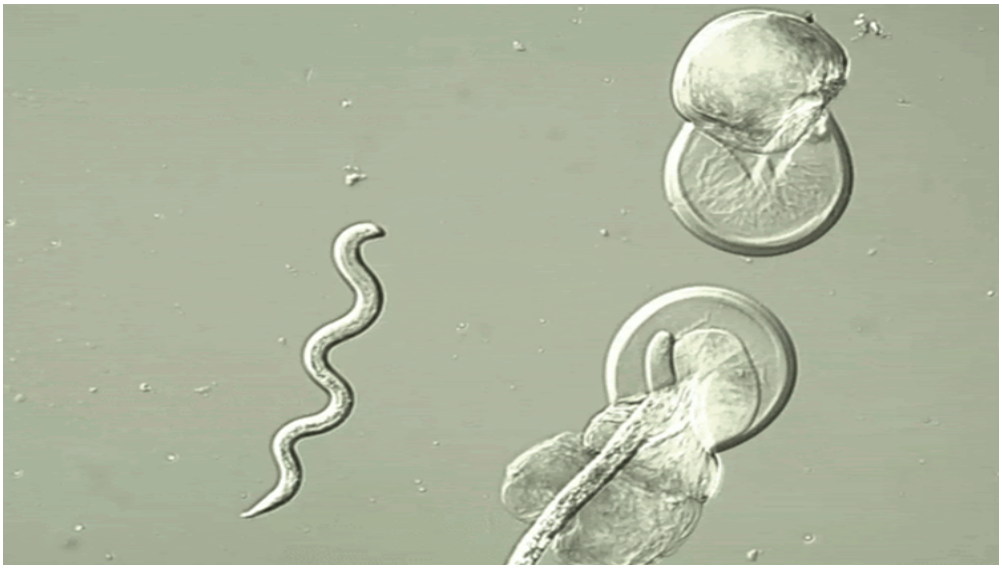

Figure 6. *Hatched ascarid larva under a microscope. Video by Steffanie Burk.*

Tapeworms

The most common species of equine tapeworm, *Anoplocephala perfoliata*, attaches itself to the intestinal wall in the cecum or near the ileocecal valve (Bowman and Lynn, 1999) with its scolex (sucker) organ (Figure 7). Tapeworms are segmented worms, with the segments nearest the scolex being the most immature, and those furthest from the scolex being reproductively mature and filled with eggs. The distal segments separate from the rest of the worm and release the eggs in the large intestine, eventually leaving the body in the horse's manure. In the manure, the eggs are ingested by an intermediate host, oribatid mites. These mites live in pastures and other vegetation and depend on feces for their source of nutrients. The incidentally ingested eggs develop to the infective larval stage within the mite, known as the cysticercoid stage. Horses can ingest the infected oribatid mites from eating fresh pasture, causing a reinfection with *A. perfoliata.*

Figure 7. *Tapeworms (A. perfoliata) attached to the colon. Photo by Carey Williams.*

Botflies

Gasterophilus intestinalis is both an internal and external parasite of the horse. The mature adult stage is a fly (Figures 8 & 9), but it only lives long enough to reproduce and lay eggs (Figure 10) on the legs and other body areas of horses on pasture (Kirkland and Smarsh, 2021). The horse ingests the eggs by itching or scratching at its legs with its mouth. The larvae hatch immediately and burrow into the mouth of the horse. They will develop and be swallowed as second stage larvae, developing to the third stage in the stomach. They reside in the non-glandular portion of the stomach for up to a year, dropping off and exiting the horse in the feces. They will pupate in the soil, maturing to adulthood to start the cycle again.

Figure 8. *This botfly is depositing eggs onto a horse's legs. Different species of botfly have different preferences for body areas on which to lay eggs. Video by Sara L. Mastellar*

Figure 9*. Eggs expelled from crushing a gravid botfly female. Photo by Sara L. Mastellar.*

Figure 10. *Botfly eggs (left) and their removal using a grooming block (right). Photo and video by Sara L. Mastellar.*

Threadworms

Also known as threadworms, *Strongyloides westeri* is often the first internal parasite that affects foals. The equine threadworm adults live in the small intestine of foals, and eggs exit in the feces, appearing around 2 weeks of age (Bowman and Lynn, 1999). The eggs (Figure 11) hatch in the feces and develop into adulthood where the free-living adult threadworms will sexually reproduce to create a new parasitic generation. The new generation only develops to the third larval stage, infecting horses by burrowing through mucous membranes or skin. In pregnant mares, the larvae migrate to the mammary gland, where they will be passed to the offspring in milk, starting the cycle again.

Figure 11. *Strongyloides westeri egg under a microscope. Photo by Steffanie Burk.*

Pinworms

Oxyuris equi (pinworms, Figure 12) can cause intense pruritus (itching) on the hindquarters, tail head (Figure 13), and perineum. This itching can spread the pinworm eggs into the environment where they can persist for long periods of time. The life cycle involves ingestion of an embryonated egg which matures from the larval stages to the adult stage in various parts of the intestinal tract (Nielsen, 2019). Female pinworms migrate through the colon and out the rectum to lay eggs onto the skin of the perineum. Skin irritation is caused by the substance the female uses to attach the egg masses to the horse's skin.

Figure 12. *Immature pinworm tail under a microscope. Photo by Steffanie Burk.*

External Parasites

The topic of external parasites is outside the scope of this Factsheet, but information on ticks can be found in Factsheet HYG-2073 . Information on fly management is available on the Pennsylvania State University Extension website .

Figure 13. *Tail rubbing is evidence of discomfort of some kind, such as a dirty sheath or udder, parasites (e.g., pinworms or ticks), or some other irritant. Photo by Sara L. Mastellar.*

Useful References

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