



Rhinebeck Equine, L.L.P.

A Lifetime of Caring

26 Losee Lane, Rhinebeck, NY 12572
845-876-7085/ 845-876-8611 FAX
www.rhinebeckequine.com

New Approaches to Controlling Internal Parasites: Targeted Deworming Strategies

Why Worry About Parasites?

Internal parasites (“worms”) can cause unthriftiness, weight loss, colic, diarrhea and even death. Heavy worm burdens can cause lowered resistance to disease and infections due to weakening of the immune system, loss of nutrients, and organ damage from larval migration and presence of large numbers of adult parasites in the bowel. It is impossible to eliminate all internal parasites, but they can usually be well controlled.

Life Cycle of Internal Parasites:

Eggs or larvae are passed into the environment in the manure of infected horses. These eggs or larvae develop in the environment, and are then ingested by the horse, usually by grazing. Larvae mature in the digestive tract of the horse; some migrate through the body tissues before returning to the GI tract as adults. Adults then produce eggs, and the cycle continues.

Why Do We Need a New Approach?

Widespread use of dewormers has led to the development of resistant populations of parasites. In the South this is very common. In the Northeast it is less common, but with so many horses travelling, it is only a matter of time before these resistant populations arrive here. Without the development of new deworming medications, internal parasites will become a serious problem as our current dewormers lose effectiveness. Because of this, we must work diligently to preserve the effectiveness of the dewormers we currently have. It is therefore imperative that we use all dewormers carefully and thoughtfully. Most importantly, we should NOT be deworming horses that have little to no worm burdens. In order to prevent resistance in our area, we must:

- Know which parasites we are targeting
- Use a product that is effective against the parasites we are targeting
- Don't deworm horses that have minimal parasites
- Perform fecal egg counts regularly

Fecal Egg Counts (FEC):

To have a fecal egg count performed, you should submit two fecal balls to our office that are fresh within 24 hours. You should be sure to refrigerate the sample after collection, and avoid extremes of heat and cold during the time you are transporting them to our office (e.g. don't leave the sample on your dashboard in the summer sun). Fecal samples should generally be taken 10-12 weeks after the last deworming was given. The exception to this is when a FEC is performed to check resistance to a dewormer; samples are then submitted two weeks after deworming. The results are reported in eggs per gram of feces. The fecal egg count (FEC) will allow a targeted deworming strategy for your horse to be developed with your veterinarian. Horses with few eggs will be dewormed differently than those with high egg counts. Some horses have an innate immunity to parasites, while others are high shedders of eggs throughout their lifetimes despite frequent deworming. A FEC will help us determine the best approach for each horse.

- Horses with egg counts below 200 eggs/gram are considered essentially “negative”
- Horses with egg counts between 200-400 are considered low shedders
- Horses with egg counts between 400-600 are considered moderate shedders
- Horses with egg counts above 600 are considered high shedders
- Egg counts above 1000 eggs/gram are considered very high

Types of Internal Parasites:

The most important types of intestinal parasites (worms) are **large strongyles, small strongyles, ascarids** (roundworms), **tape worms and pinworms**. All parasites have life cycles with multiple stages of development- eggs, larvae of several types, and adults. The larvae are generally responsible for the majority of the damage done, because they migrate through the tissues and organs of the body, leaving scar tissue behind. Adults can cause poor condition due to competition for nutrients.

Large Strongyle larvae are picked up from the grass in early spring, and do their damage mostly to the arteries supplying the intestinal tract. This can result in life threatening colic. Larval migration through the arteries that supply the intestine causes scar tissue to form, which can lead to impaired circulation to the intestine, changing motility and function over the long term. This scarring can also lead to slowed blood flow, resulting in clot formation and a showering of emboli that can cut off the blood supply to a portion of the gut. This catastrophic loss of circulation causes death of the intestine, with colic, shock, and ultimately, death of the horse from overwhelming toxicity and peritonitis (infection of the abdominal cavity). There is little that an owner can do to change the damage done in earlier years, but careful attention to deworming can prevent additional injury.

Small strongyle larvae, also ingested orally while grazing, “hibernate” in cysts in the walls of the large colon, and are not killed by most of the dewormers while encysted. Encysted strongyles can cause extensive edema (swelling) and hemorrhage when the cysts burst to release the larvae for development into adults, resulting in severe inflammation and damage to the absorptive surface of the intestine. The larval encysted forms can remain in hibernation for extended periods due to arrested development. When released from the cysts, these small strongyle larvae can cause diarrhea, weight loss, chronic colic, and in severe cases, death.

Ascarids, a danger primarily to foals, produce millions of sticky eggs that adhere to practically any surface and survive repeated cycles of cold and drying. These eggs are ingested orally as the foals explore their environments, and the larvae develop and migrate through the liver and lungs. They are then coughed up, swallowed, and develop into adults in the intestine. The damage to the lung tissue predisposes the foal to pneumonia. In addition, heavy infestation with ascarid adults can cause a physical obstruction within and rupture of the intestine.

Tapeworms are ingested through a secondary host, the oribatid mite, a tiny pasture mite that is inadvertently eaten while grazing. Adult tapeworms are commonly found at the junction of the small intestine and cecum, and cause ulceration, inflammation, and intussusception - a condition where the bowel telescopes in on itself.

Pinworms crawl out of the horse’s anus and lay eggs on the skin nearby, which causes itching and rubbing of the tail and anus. They are primarily a cause of discomfort and unsightly tail rubbing.

Types of Dewormers: Not All Are Still Effective

In our area of the Northeast, there are four dewormers that are still generally effective. Unfortunately, other areas of the country have recently seen significant resistance developing, and with the frequent movement of horses, it is only a matter of time before resistance patterns emerge in our area. New dewormers are not expected to be available for 8-10 years in this country. It is therefore imperative that we use all dewormers carefully and thoughtfully. **Most importantly, we should NOT be deworming horses that have little to no worm burdens.**

In our area, currently effective dewormers for large and small strongyles are **ivermectin** (e.g. *Eqvalan*, *Zimectrin*), **pyrantel pamoate** (e.g. *Strongid*), **oxybendazole** (e.g. *Anthelcide*), and **moxidectin** (e.g. *Quest*). Some of them also have some effect against ascarids. However, some premises may develop resistance patterns related to the population of horses that reside there, and where those horses have travelled to or originated from. Use of a FEC two weeks after deworming can be useful to determine if resistance is developing.

Ivermectin has efficacy against adults as well as most larval forms, but it will not eliminate encysted small strongyles. Because ivermectin is highly effective against larval forms, its use is an excellent strategy in the spring when larvae are lying in wait on the grass waiting to be ingested, Ivermectin is also the safest dewormer effective against stomach bots (a larval form of the bot fly, which lays small yellow eggs on the horses’ hair). **Moxidectin** is effective for adults and larval forms, as well as encysted forms, so it is a very important part of our deworming arsenal. Please note it

must be used with care because the margin of safety is relatively small. The moxidectin chemical is distributed to body fat, so if the horse lacks sufficient fat tissue, too high a blood level may result, leading to neurologic damage. Because of this, **moxidectin should never be used in foals less than 1 year old, or thin, debilitated or elderly horses.** However, moxidectin is very safe for use in adult horses of normal body condition.

An annual dose of moxidectin or five-day course of a double dose **fenbendazole** (e.g. *Panacur Powerpac*) to eliminate any encysted small strongyles is recommended, and may be most appropriate in the spring as this is when the encysted forms generally emerge and cause inflammation. Rotation with **oxybendazole** (e.g. *Anthelcide*) and single dose pyrantel (**Strongid**) at other times of the year is appropriate when deworming is needed.

Fenbendazole (e.g. *Panacur, Safeguard*) in a single dose generally has poor action against strongyles due to the development of resistance, despite label claims of effectiveness. You should avoid its routine use, despite the low cost. However, in our area, **fenbendazole, when used at a double dose, is the most effective dewormer against ascarids.** Foals should be dewormed at a double dose with this product regularly in rotation with ivermectin and pyrantel pamoate.

Horses with clinical signs of chronic parasitism and high fecal egg counts may benefit from administration of a daily dewormer, such as *Strongid C*, which will remove all the newly emerging small strongyle adults as they appear, as well as treat new exposures.

A dose of ivermectin or moxidectin with **praziquantel** is recommended on an annual basis for tapeworms and should be given in the winter or late fall, after a summer of exposure to the tapeworm-carrying oribatid mites on pasture. Products on the market combine ivermectin with praziquantel (e.g. *Equimax, Zimectrin Gold*), or moxidectin with praziquantel (e.g. *Quest Plus*). Praziquantel has been proven to be extremely effective in eliminating equine tapeworms, and has an impressive safety record. Previously the only effective dewormer for tapeworms was pyrantel pamoate (e.g. *Strongid*) given at a double dose. Because of praziquantel's superior action, we recommend its use rather than pyrantel.

Pinworms have recently developed some resistance to orally administered ivermectin in some areas. If this occurs, pyrantel pamoate (e.g. *Strongid*) can be applied topically and rectally.

Deworming Schedules:

Many of you ask about **appropriate deworming schedules** for your foals and horses. Individual circumstances at farms affect the frequency with which your horses need to be dewormed. Horses kept in small areas of pasture or in dirt lots often need more frequent treatment, as higher levels of contamination of the available space may occur. In contrast, a small number of horses on a large pasture may pick up very few parasites.

The most effective way to determine the number of worms your horse is carrying and the appropriate deworming strategy is to have a fecal egg count performed by our office. You can drop off two fresh fecal balls any time our office is open, and results will be available within 48-72 hours. Due to the development of resistance and the impact of deworming chemicals on the environment (some pass through unchanged in the manure), minimizing their use through the use of fecal exams is essential. A fecal egg count should be performed at any time of the year when weight loss, diarrhea, or other signs of debilitation occur. Fecal exams will NOT show the presence of encysted small strongyle larvae or tapeworms. Once your horse's fecal egg count is determined, a deworming strategy can be developed with your veterinarian. **Over the first year of determining the shedding status of your horses, your deworming strategy may change. Consult your veterinarian.**

Category	FEC	April	May	June	July	Aug	Sept	Oct	Nov
Negative	0-200		FEC			FEC			MP or IP
Low	200-400		FEC I or M			FEC			FEC MP or IP
Moderate	400-600		FEC I or M			FEC P or O			FEC MP or IP
High	>600	FEC I or M		I	FEC	P or O		FEC I	MP or IP
Very High	>1000	FEC I or M	PP	P or O	FEC I	P or O	I	FEC	MP or IP

FEC=Fecal Egg Count I=Ivermectin M=Moxidectin P=Pyrantel O=Oxibendazole MP=Moxidectin/Praziquantel IP=Ivermectin/Praziquantel PP=Panacur Power Pac

Horses that are pastured together should ideally be separated into groups according to their shedding status, so that high shedders are not contaminating pastures where negative horses graze. In situations where this is impractical, the use of daily low dose pyrantel pamoate (e.g. *Strongid C*) is a choice. It can also be very useful in situations where overcrowding is unavoidable and contamination inevitable. Some of our clients choose to use daily dewormer with their young stock to ensure optimum growth. Horses with heavy small strongyle infestations manifesting clinical signs of weight loss, diarrhea and poor hair coats may show dramatic improvement after treatment with daily dewormer for 90 days especially following larvicidal deworming with moxidectin or double doses of fenbendazole, as prescribed by a veterinarian. However, it is imperative that FEC be assessed to be sure that no resistance to the daily dewormer has developed.

Deworming For Foals:

Foals are very vulnerable to the effects of ascarids, which are developing resistance to dewormers at a frightening pace. Some exposure to parasites is essential for the development of immunity, but significant health problems can develop if foals are heavily parasitized. Foals explore their environment and ingest many ascarid eggs. The eggs develop into larvae which migrate through the liver and lungs, then are coughed up and swallowed to develop into adults in the intestine. Unthriftiness, poor growth, pot bellied appearance, and pneumonia can result. Large numbers of adult ascarids can fill the intestine and cause colic and death.

Foals should be dewormed every 30 days beginning when they are 30 days of age, until they are 1 year old. This is the **single most important** thing you can do to ensure their good health and long life. Begin with a double dose of fenbendazole for months 1 & 2, then alternate single dose pyrantel pamoate, single dose of ivermectin, and double dose fenbendazole on a monthly basis. Ivermectin with praziquantel should be administered after a hard frost in the fall of the youngster's first year.

Sample Deworming Schedule for Foals:

1 month	Double dose fenbendazole (e.g. <i>Panacur, Safeguard</i>)
2 months	Double dose fenbendazole (e.g. <i>Panacur, Safeguard</i>)
3 months	Pyrantel pamoate (e.g. <i>Strongid</i>)
4 months	Ivermectin (e.g. <i>Eqvalan, Zimectrin, Equell</i>)
5 months	Double dose fenbendazole (e.g. <i>Panacur, Safeguard</i>)
6 months	Pyrantel pamoate (e.g. <i>Strongid</i>), Quantitative fecal test (FEC)
7 months	Ivermectin (e.g. <i>Eqvalan, Zimectrin, Equell</i>)

Continue rotation until 12 months of age, using Ivermectin + praziquantel (e.g. *Equimax, Zimectrin Gold*) in November of the year of birth.

Other Management Strategies:

- Remove manure from pastures regularly
- If you drag pastures, do it when it is hot and dry, then leave horses off the field for at least a week
- Rotational graze with other species if possible
- Reduce pasture density to minimize over grazing
- Submit a fecal and deworm all new horses with ivermectin before adding them to your pasture

Internal parasites are a leading cause of colic and unthriftiness in horses. Fortunately, much is understood about parasite control and strategies to minimize their deleterious effects. Please do not hesitate to contact our office with your questions.

Amy L. Grice VMD
drgrice@rhinebeckequine.com
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