

Parasite Anthelmintic Resistance, Refugia and Strategic Deworming

By Suzanne Mund, DVM

The effects of parasite resistance in the equine population has become a hot topic in recent years. Similar to bacterial antimicrobial resistance, parasite resistance has developed as a result of imprudent use of anthelmintics (drugs that expel or destroy internal parasites). Conventional parasite management is no longer effective and may actually be contributing to the problem of parasite resistance. It is the responsibility of the horse owner and the veterinarian to ensure an appropriate targeted fecal egg count and deworming program for the farm that the horse resides at.

Anthelmintics first became available in the 1960s with the release of benzimidazoles. At the time it was required to have a prescription and for the anthelmintic to be delivered via nasogastric tube by a veterinarian. With the exception of moxidectin, no new anthelmintics have become available since the introduction of ivermectin in 1981. The availability of anthelmintics then evolved to be accessible to owners without a prescription and became available in easily administrable oral forms. Due to the high availability and ignorance of owners and veterinarians alike, the vast majority of horses were given blanket anthelmintics which has created the parasite resistant patterns the equine industry is battling today.

First of all, why is it important that we deworm our horses anyways? By definition, a parasite is an organism that lives in or on its host and benefits by deriving nutrition from its host. The average healthy mature horse is able to keep its parasite burden at low enough levels that it has little effect on its ability to maintain its condition and only needs minimal deworming. However, the greatest concern is for the very old, the very young, or the very sick horse populations that have an impaired immune system. Parasites that are resistant to anthelmintics are not necessarily more harmful than parasites that are

susceptible to anthelmintics. The major concern lies in the event that when an immunocompromised horse requires an anthelmintic, the anthelmintics available would not be effective for those horses that need them the most.

How does parasite anthelmintic resistance develop? When a horse is given an anthelmintic, it is unlikely that it will be 100% effective. A portion of the parasites will survive because they randomly have genetic characteristics that make them more likely to survive an insult by an anthelmintic. It is a common misconception that individual parasites are more likely to become resistant by exposure to the anthelmintic. Rather, parasites with randomly inherited traits that make them more likely to survive an insult by an anthelmintic will then breed with other parasites with favourable genetics for resisting anthelmintic treatment. As a result, the offspring may be even more resistant than the original parasites. And so a cycle will perpetuate if the population of parasites are regularly exposed to anthelmintics.

It is therefore important to maintain a population of susceptible parasites on the farm so they may breed with the resistant parasites and consequently reduce the rate of resistance of the parasite population on a farm. This concept is known as *refugia*. Literally translated, *refugia* is an area in which a population of organisms survive an oppressive event; in this case, death by an anthelmintic. This population of never-been-exposed parasites are essential to maintaining a susceptible population of parasites on your farm. So in a way, having parasites on your farm is a good thing!

In the past it had been encouraged to rotate different types of anthelmintics in order to prevent resistance to one particular type. Conversely, recent research has shown that rotating anthelmintics has little or no effect in preventing the development of anthelmintic resistance and in fact can contribute to resistance if used imprudently. It is instead recommended that fecal egg counts be performed regularly so that deworming may be performed strategically.

It is recommended that fecal egg counts are performed on all or a representative sample of horses on a farm every three months. This is done by collecting and examining a sample under a microscope for parasite eggs. Based on the fecal egg count and the type of parasite eggs, a deworming protocol can then be recommended for each individual horse or group. Horses that have greater than 500 eggs per gram are considered high shedders and those that have less than 200 eggs per gram are considered low shedders. High shedders comprise 20% of the herd and shed up to 80% of the eggs in a horse population. High shedders often appear healthy and tend to be high shedders their whole lives. It is these high shedders that contaminate the environment. It is important to identify these high shedders and give them an anthelmintic regularly as they serve as a source of parasite egg contamination for the rest of the herd. Low shedders only need to be given an anthelmintic every 6 to 8 months to prevent infestation with large strongyles. Otherwise low-shedders do not require any deworming and serve as a low shedding source of sensitive parasites for the rest of the population.

Many owners feel that fecal egg counts are costly and time consuming. However, fecal egg counts are often performed as a routine part of your veterinarian's wellness exam and can be actually be more financially sound if the horse needs to be given an anthelmintic only periodically. Other ways that owners can help control parasite populations on their farm is to pick or till feces on pastures, regularly rotate pastures, not overgraze pastures, keep weanlings separate from yearlings and mature horses, and do not feed directly on the ground.

In order to help control the parasite anthelmintic resistance crisis, both owners and veterinarians need to be more conscientious of their management and husbandry practices. Contact your veterinarian with any questions you may

have about parasite anthelmintic resistance and about developing a parasite control program specific to your farm.

Contact Brandon Equine Medical Center at 813-643-7177 or email info@brandonequine.com with any questions regarding this topic.

This article originally appeared in Horse & Pony magazine in November 2013 and is reprinted with their permission