



How and when to deworm a horse depends on the individual

Parasite Control

EXPERTS NOW RECOMMEND FECAL EGG COUNTS TO GUIDE DEWORMING

By AMANDA DUCKWORTH

RESEARCHERS AND veterinarians have long worried about the risk of overreliance on dewormers for horses, and more of their warnings have come true in the past year. Few of us, if any, enjoy thinking about worms, but the approach to dealing with them has become a growing concern due to an increasing resistance to available products on the market.

Many horses are still treated on a rotational basis, meaning they are automatically given dewormer at set points on the calendar. As time has gone by, researchers argue, this has become a more costly

and ineffectual approach. The parasites of concern have changed: They have become increasingly resistant to various treatments. However, there are now better ways to test what individual horses need for parasite control. The American Association of Equine Practitioners (AAEP) explains the changing landscape in its “Internal Parasite Control Guidelines.”

“Traditional parasite control programs involving rotational treatment with anthelmintics at regular intervals are commonly recommended by veterinarians,” it explains. “However, this approach

is based on concepts and strategies developed more than 50 years ago when *Strongylus vulgaris* (large strongyle bloodworm) was the most important parasitic pathogen of horses.

“It is noteworthy that cyathostomins (small strongyles), were not considered important pathogens at that time, as their pathogenic potential was overshadowed by *S. vulgaris*. However, that situation has changed, and currently cyathostomins (small strongyles) are recognized as a primary equine parasite pathogen.”

Instead of rotational treatment, researchers and veterinarians advocate doing fecal egg counts (FEC) instead. In addition to determining the needs of an individual horse, these tests will also reveal which dewormers are still effective in a given herd. The test is a fairly straightforward event. A fecal egg count is performed, and if a horse is shown to be a high or moderate shedder, it is given a dewormer. Two weeks later the count is repeated, and if the product is still effective, there should be a 90%-100% drop in the fecal egg count.

While this approach takes more time than simple rotational deworming, its advocates point to the fact that it is often cheaper in the long run. Giving entire herds of horses dewormers that are no longer effective is a waste of money, and different horses require different frequencies of deworming.

“Although horses grazing together share the same parasite population, they demonstrate huge differences in their levels of strongyle egg shedding,” explains the AAEP. “Within any group of mature horses, strongyle egg counts are highly concentrated in certain horses, such that 15–30% of adult horses usually shed approximately 80% of the eggs. This distribution of parasite egg shedding among hosts is common to all species and is referred to as overdispersion.

“This characteristic for a horse is very stable over time, when it is otherwise in

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good health, pasture management practices are sound, and the horse has not recently moved from one farm to another. Thus, a healthy pastured horse with a low egg shedding potential will tend to always have a low FEC while a healthy pastured horse with a high egg shedding potential will tend to always have a high FEC.”

The concerning news when it comes to deworming, however, is that benzimidazoles (fenbendazole, oxbendazole), tetrahydropyrimidines (pyrantel), and macrocyclic lactones (ivermectin, moxidectin) are the only three drug classes of dewormers available for horses, and parasitic resistance to them continues to grow.

“It is a global phenomenon, and it’s been found in many kinds of equine in-

dustries and different breeds,” Dr. Martin Nielsen, Schlaikjer Professor of Equine Infectious Disease at the University of Kentucky’s Maxwell H. Gluck Equine Research Center, told *BloodHorse* in spring 2020. “Two out of three drug classes are not working anymore in a large majority of locations, so we often only have one left, and to that one, we are also beginning to see signs of emerging resistance. So, we are getting really close to the edge of that cliff.”

By the end of last year, Nielsen and his fellow researchers could show that emerging resistance was even closer than many might have realized. That research is documented in “Importation of macrocyclic lactone resistant cyathostomins on a U.S. Thoroughbred farm,” published

by the researchers from the University of Kentucky in the December 2020 issue of the *International Journal for Parasitology: Drugs and Drug Resistance*.

“Anthelmintic resistance in equine cyathostomins is both widespread and highly prevalent in the benzimidazole and tetrahydropyrimidine classes; however, reports of resistance to macrocyclic lactone (ML) drugs are sparse and sporadic,” they explained. “This study reports a case of clear ML resistance in a group of Thoroughbred yearlings imported from Ireland to the U.S. in 2019.”

All of the yearlings involved in the study were kept at the same farm in Kentucky and were born in 2019. One group consisted of 25 fillies and 33 colts, which were born in Ireland but sent to the

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United States in October 2019. The other group consisted of 26 fillies and 29 colts, all of which were born on the farm in Kentucky. The yearlings were then organized into six groups (three American-bred groups and three imported groups) and kept separate from each other, including no overlap of paddocks or barns.

In February 2020, researchers found that the fecal egg count reduction (FECR) following the administration of ivermectin was 100% in the American yearlings, but that did not hold true for the three groups of imported yearlings, which demonstrated a 93.5%, 70.5%, and 74.5% reduction, respectively. Of those, the two former groups were then re-treated with ivermectin, yielding FECRs of 33.8% and 23.5%, respectively.

“Horses from these two groups were then assigned randomly to two possible treatments; moxidectin or a triple combination of moxidectin, oxbendazole, and pyrantel pamoate,” researchers explained. “The groups treated with moxidectin had FECRs of 90.2%, 57.3%, and 50.0% while the triple combination had a 100% FECR in all treated groups.”

In June 2020, the efficacy of ivermectin was reevaluated, and it showed FECRs of 99.8%, 87.7%, and 62.0% in the three imported groups while the three groups of American yearlings all remained in the 99–100% range.

“This is the first study to clearly demonstrate ML resistance in cyathostomins and to confirm the suspicion through reassessment,” researchers concluded. “These data demonstrate that ML-resistant cyathostomins were imported from Ireland and serve to illustrate that the global movement of horses has the potential to quickly spread ML-resistant parasite isolates around the world. The



Researchers found that yearlings responded differently to dewormers, depending on the horses' origins



AN ALTERNATIVE CONTROL REGIMEN FOR DRUG-RESISTANT PARASITES IS COMBINATION DEWORMING.”

— INTERNATIONAL JOURNAL FOR PARASITOLOGY

equine industry is strongly encouraged to routinely monitor anthelmintic efficacy, so occurrence of ML resistant cyathostomins can be detected and appropriate interventions implemented as early as possible.”

Because the yearlings used for the study were bred to be racehorses, researchers also discussed the implications of continued spread through the inevi-

table travel that is part and parcel of a racehorse's life as well as steps that should be considered as a result.

“Some of these imported yearlings were sold at the 2020 September yearling sales while the majority were retained by the owner and sent away for training,” researchers noted. “Thus, they likely brought their ML-resistant cyathostomins with them and would almost certainly be introducing these to the new facilities. With a high degree of national and international movement of horses and the general lack of quarantine testing, this population of ML resistant worms will quickly spread to numerous locations, and, given the heavy reliance on ML anthelmintics across the world, resistant populations will be quickly selected for.

“Taken together, these yearlings are likely to introduce ML resistant cyathostomins to their new facilities, and despite the reduced levels of parasite transmission that are typical of the management used for Thoroughbred horses in training, spread of infection to other horses and properties is likely. Thus, it would be pertinent to recommend quarantine testing of ML efficacy for any yearlings newly acquired at a sale.”

There are no new dewormers in the pipelines, so fighting these parasites by combining existing products is something that is being researched, as is demonstrated by the aforementioned study and others. “Dealing with double trouble: Combination deworming against double-drug resistant cyathostomins” was published in the *International Journal for Parasitology – Drugs and Drug Resistance* in April 2020.

“An alternative control regimen for drug-resistant parasites is combination deworming, where two drugs with different modes of action are administered

simultaneously to target the same parasite,” researchers explained.

For the research, both a field study and two computer simulations were conducted to examine the effectiveness of a moxidectin-oxibendazole (MOX-OBZ) combination against the same cyathostomin population. Anthelmintic treatments were given in the field study when 10 horses exceeded 100 eggs per gram, and FECT and evaluations were performed every two weeks.

For the simulations, weather data were combined with the equine and parasite population parameters from the field study to predict what would happen over the course of 40 years. One simulation used the same treatment schedule as in the field study while the other evaluated efficacies of combination treatments



Treating herds with a rotational deworming program is no longer considered best practice

using selective therapy.

“In the field study, efficacies of MOX and both combination treatments were 100%,” researchers concluded. “The egg reappearance period for MOX was 16

weeks, and the two combination treatments were 12 and 18 weeks. The first (46.7%) and last (40.1%) OBZ efficacies were not significantly different from each other. In the simulation study, the

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combination treatment delayed MOX resistance development compared to when MOX was used as a single active. This occurred despite the low efficacy of OBZ. The second set of simulations identified combination treatments used with selective therapy to be the most effective at delaying MOX resistance.

“Overall, this study supports the use of combination treatment against drug-resistant cyathostomins, when one of the actives exhibits high efficacy and demonstrates benefits of this approach

edition of the *Equine Veterinary Journal*.

“Cyathostomins are prevalent and pathogenic intestinal helminths of horses, causing acute and chronic disease, including acute larval cyathostominosis, which has a mortality rate of 50%,” researchers explained. “Factors determining individual susceptibility to acute larval cyathostominosis are unknown. Investigation of these factors could lead to novel treatment and prevention strategies.”

For this particular descriptive case

ratio. Decreased alpha-diversity of the faecal microbiota and greater relative abundance of the genus *Streptococcus*, class *Bacilli*, order *Lactobacillales* and family *Streptococcaceae*, and family *Prevotelleceae* was found in clinically affected horses compared to their clinically normal cohorts.

“An increase in obligate fibrolytic bacteria was seen in the clinically normal group compared to the clinical group. Histopathological findings of the colon and caecum revealed a severe necrotizing typhlocolitis associated with cyathostomin larvae and bacterial overgrowth in the mucosa of the large intestine.”

These findings led researchers to conclude that acute larval cyathostominosis is associated with dysbiosis of the gut microbiota as well as the inflammatory stimulus of numerous emerging larvae leading to structural and functional pathology of the large intestine.

Ultimately, horses are going to have worms, and a resistance to all current treatment options is growing. Taking a more scientific-based approach might slow the resistance as well as save money, depending on an individual horse’s needs.

“All adult horses should benefit from a basic foundation of one or two treatments per year,” said the AAEP. “Low strongyle egg shedding horses with naturally strong immunity to cyathostomins will need no other treatments because the two treatments have covered the needs of the other parasites and these horses are generally protected naturally from disease caused by cyathostomins by their immune state.

“In traditional deworming programs, repeated treatment of low shedder horses every two to three months accomplishes little to improve their health, but it does promote drug resistance. Moderate and high egg shedders will need a third and sometimes a fourth treatment for cyathostomins. Any additional treatments would be given on an ‘as needed’ basis, depending on whether a specific parasitic infection or disease is diagnosed.” **BH**



Taking a more scientific approach to deworming could slow resistance and save money

despite substantially lowered efficacy of the other active ingredient.”

While it is simply a reality that cyathostomins infect basically any grazing horse, thankfully they are relatively mild pathogens. This means that they are only of true concern when they reach high levels, making them capable of producing disease. However, at high levels, they can prove deadly. The study “Outbreak of acute larval cyathostominosis — A ‘perfect storm’ of inflammation and dysbiosis” was published in the September 2020

series, researchers examined the results of an outbreak in November 2018 within a population of 23 mixed breed horses in Ireland. Of the herd, 14 horses were clinically affected. Of those 14, 12 recovered and two were euthanized.

“Common clinical signs included loose fecal consistency, weight loss, and pyrexia,” researchers found. “Consistent clinicopathological findings were borderline anaemia, leucocytosis, thrombocytosis, hyperfibrinogenaemia, hyperglobulinaemia and a reverse A:G