Several recent studies have examined a potential connection between gastric ulcers and cribbing, when a horse chews on inedible surfaces such as wood

Listen to the Gut

THE STUDY OF **INTESTINAL MICROBIOTA** IN EQUINES IS A GROWING FIELD

By **AMANDA DUCKWORTH**

KEEPING A RACEHORSE in peak health is a multifaceted task, and a critical component to both potential athletic performance and overall well-being is a horse's gut health. Understandably, a horse dealing with gut issues will not be at its best, but research is gaining momentum in this area of study.

Understanding equine gut microbiota is a growing field, but there are still a number of questions concerning the topic. Top gut-related issues that can impact a horse include gastric ulcers, colic, colitis, and dysbiosis, and they can lead to things like diarrhea, weight loss, and abdominal pain. The worst-case scenarios can be deadly.

In February 2024, Animals (Basel) published the review "Current Understanding of Equine Gut Dysbiosis and Microbiota Manipulation Techniques: Comparison with Current Knowledge in Other Species."

"Research on equine gut microbiota has grown and gained significant interest in the last decade," explained researchers. "Abnormal alterations in the composition of the gut microbiota are called dysbiosis and have been linked to various gastrointestinal tract diseases and remote organs in human medicine, such as the brain and the lung. Strategies to restore the gut microbiota to prevent and treat such diseases are currently being investigated."

While the review highlights the importance of a horse's intestinal microbiota, it also is very clear that there is more work to be done.

"This review underlines the lack of data regarding the methods used to diagnose gut dysbiosis in horses and the lack of a definition for what constitutes an 'ideal' microbiota," the review concluded. "The studies evaluating the efficacy of microbiota manipulation techniques in horses are scarce compared to other species and yield conflicting results. Standard protocol guidelines for FMT should be evaluated by controlled studies to prove the potential efficiency of the procedure. The causal relationship between intestinal microbiota composition and several conditions and diseases in horses also awaits further investigation.

"Controlled studies with larger sample size populations are needed to determine the efficacy of microbiota manipulation techniques in the equine species. Finally, developing faster and quantitative methods to detect dysbiosis in horses could facilitate research in this field and be used in a clinical setting in the future."

One of the reasons this field of study is so critical is because a horse's gut health is vital from the very beginning of its life until the end. Recent research examined how early a Thoroughbred's gut health begins to impact its future success, and the results were telling.

In August 2024, Scientific Reports published "Early-life gut bacterial community structure predicts disease risk and athletic performance in horses bred for racing."

"Gut bacterial communities have a profound influence on the health of humans and animals," explained

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researchers. "Early-life gut microbial community structure influences the development of immunological competence and susceptibility to disease. For the Thoroughbred racehorse, the significance of early-life microbial colonization events on subsequent health and athletic performance is unknown."

In all, 52 Thoroughbred foals provided a total of 438 fecal samples and went on to complete the three-year longitudinal study. The foals were all born between February and May 2018 across five stud farms in the United Kingdom.

According to the researchers, fecal bacterial community structure was characterized at nine timepoints during the first year of life. For each foal, respiratory, gastrointestinal, orthopedic, and soft-tissue health events were tracked from birth to 3 years old.

A study focusing on Quarter Horses revealed a link between cribbing and the disruption of gut microbiome

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"Our data show that gut bacterial community structure in the first months of life predicts the risk of specific diseases and athletic performance up to 3 years old," researchers concluded. "Foals with lower fecal bacterial diversity at one month old had a significantly increased risk of respiratory disease in later life which was also associated with higher relative abundance of fecal Pseudomonadaceae. Surprisingly, athletic performance up to three years old, measured by three different metrics, was positively associated with higher fecal bacterial diversity at one month old and with the relative abundance of specific bacterial families."

Researchers also used the data collected to examine the impact of early-life exposure to antibiotics. They found that the exposed foals went on to earn less money as racehorses.

"This resulted in significantly lower fecal bacterial diversity at 28 days old, a significantly increased risk of respiratory disease in later life and a significant reduction in average prize money earnings, a proxy for athletic performance," researchers explained. "Our study reveals associations between early-life bacterial community profiles and health events in later life and it provides evidence of the detrimental impact of antimicrobial treatment in the first month of life on health and performance outcomes in later life."

A horse's gut health during its racing career also clearly has an impact on its performance, but understanding that in detail continues to be analyzed. In May 2025, NPJ Biofilms and Microbiomes published "Multiomic analysis of different horse breeds reveals that gut microbial butyrate enhances racehorse athletic performance."

"The gut microbiota of horses comprises bacteria, fungi, archaea, protozoa and viruses, which play important roles in host physiology, including the potential to improve athletic performance," explained researchers. "Growing evidence suggests that the gut microbiome profoundly affects the host's athletic ability. In this study, we aimed to investigate the functions and potential mechanisms of gut microbes contributing to the athletic performance of racehorses."

A total of 123 horses produced fecal samples for the study. Of that group, 58 were Thoroughbred racehorses, and 65 were not. The non-racehorse control group was made up of 35 Yili horses, 10 Tibetan horses, 10 Yunnan pony horses, and 10 Akhal-Teke horses. Researchers conducted combined gut metagenomic, metatranscriptomics, and metabolomics approaches to identify gut microbial structures and functions associated with athletic performance.

"Butyrate-producing bacteria and microbial butyrate synthesis genes were significantly enriched in the racehorse gut, and the GC-MS results confirmed this conclusion," researchers shared.

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Gut health research utilizing multiple breeds, including Thoroughbreds and Akhal-Teke horses (shown here), was part of a 2025 study by NPJ Biofilms and Microbiomes

TOP GUT-RELATED ISSUES THAT CAN IMPACT A HORSE INCLUDE GASTRIC ULCERS, COLIC, COLITIS, AND DYSBIOSIS, AND THEY CAN LEAD TO THINGS LIKE DIARRHEA, WEIGHT LOSS, AND ABDOMINAL PAIN. THE WORST-CASE SCENARIOS CAN BE DEADLY.

"Using a mouse model, we demonstrated that sodium butyrate is sufficient to increase treadmill run time performance. We also show that butyrate improves the host response to exercise, significantly altering muscle fiber type in skeletal muscle, and increasing muscle mitochondrial function and activity. In addition, in-depth analysis of the published data showed that the gene for the synthesis of butyrate was also significantly enriched in the gut microbes of human athletes.

"Overall, our study indicates that gut microbial butyrate improves run time via the gut-muscle axis, providing novel insights into gut microbial functions and paving the way for improving athletic performance by targeted gut microbiome manipulation."

Another area of interest in terms of improving equine gut health comes in the form of probiotics. In March 2025, the Journal of Equine Science published "Isolation and molecular identification of Lactobacillaceae bacteria and Bifidobacterium from horse feces."

"The equine large intestine harbors a diverse array of symbiotic microorganisms," explained researchers. "Disruptions in the gut microbiota can lead to various diseases in horses. Probiotics

offer promising avenues for enhancing equine health and performance. However, commercial formulations lack robust scientific validation.

"Although probiotics are widely available and widely used in horse husbandry, there is very limited scientific or peer-reviewed evidence for the formulation of commercial preparations. Since Lactobacillaceae and Bifidobacterium are not the most abundant species in the large colon of the horse, this observation suggests that these species have less influence on the gastrointestinal health of horses. Because of various arguments, it is important to collect probiotic strains and examine their effects in order to enhance the scientific evidence."

Researchers conducted the study in order to isolate and identify candidate microorganisms from the family Lactobacillaceae and genus Bifidobacterium from horse feces. A total of nine Thoroughbred geldings were used in the study.

According to researchers, the horses were fed timothy hay, oat hay, alfalfa, flaked barley, wheat bran, and a commercial concentrate. The feed did not contain probiotic bacterium/bacteria, and none of the animals were treated with antibiotics for at least six months before sampling. Fecal samples were then subjected to isolation procedures.

"The results revealed the isolation of Lactobacill-aceae strains, including Limosilactobacillus equigenerosi, Ligilactobacillus equi, Ligilactobacillus agilis, and a Bifidobacterium sp., Bifidobacterium pseudolongum," researchers concluded. "These findings contribute to the understanding of equine gut microbiota and offer insights into potential probiotic candidates."

Gut health is often impacted by gastric ulcers, which are a constant worry in performance horses. According to the American Association of Equine Practitioners, ulcers are a man-made disease that affect up to 90% of racehorses and 60% of show horses. One possible undesirable result of gastric ulcers is cribbing. Potential connections have been examined, and several recent studies have been published.

A horse undergoes a gastroscopy, the gold standard for detecting ulcers, at Tryon Equine Hospital in North Carolina

In March 2024, the Journal of Veterinary Behavior published "Gut microbiome characteristics of horses with history of cribbing behavior: An observational study."

"Cribbing is an oral stereotypic behavior in horses," explained researchers. "Cribbing behavior (CB) has been associated with gastrointestinal (GI) dysfunction and gastric ulceration. This randomized crossover study aimed to evaluate the hypotheses that there would be differences in GI microbiota between horses receiving a gastric health support supplement or a placebo, as well as differences between cribbing horses (CBH) and noncribbing horses (NCBH)."

Eight adult Quarter Horses were used in the study. Four were cribbers and four were not. The control horses matched the cribbing horses in age, sex, and breed. They were randomly assigned to receive either a GI support supplement (TRT) or a placebo for 21 days, followed by a two-week washout period. Treatment groups were then switched, and horses were treated for an additional 21 days. Researchers collected feces and gastric fluid samples both before and after each treatment period.

"Fecal microbiota differed between CBH and NCBH, although microbiota re-

A case of severe non-glandular ulceration in a foal

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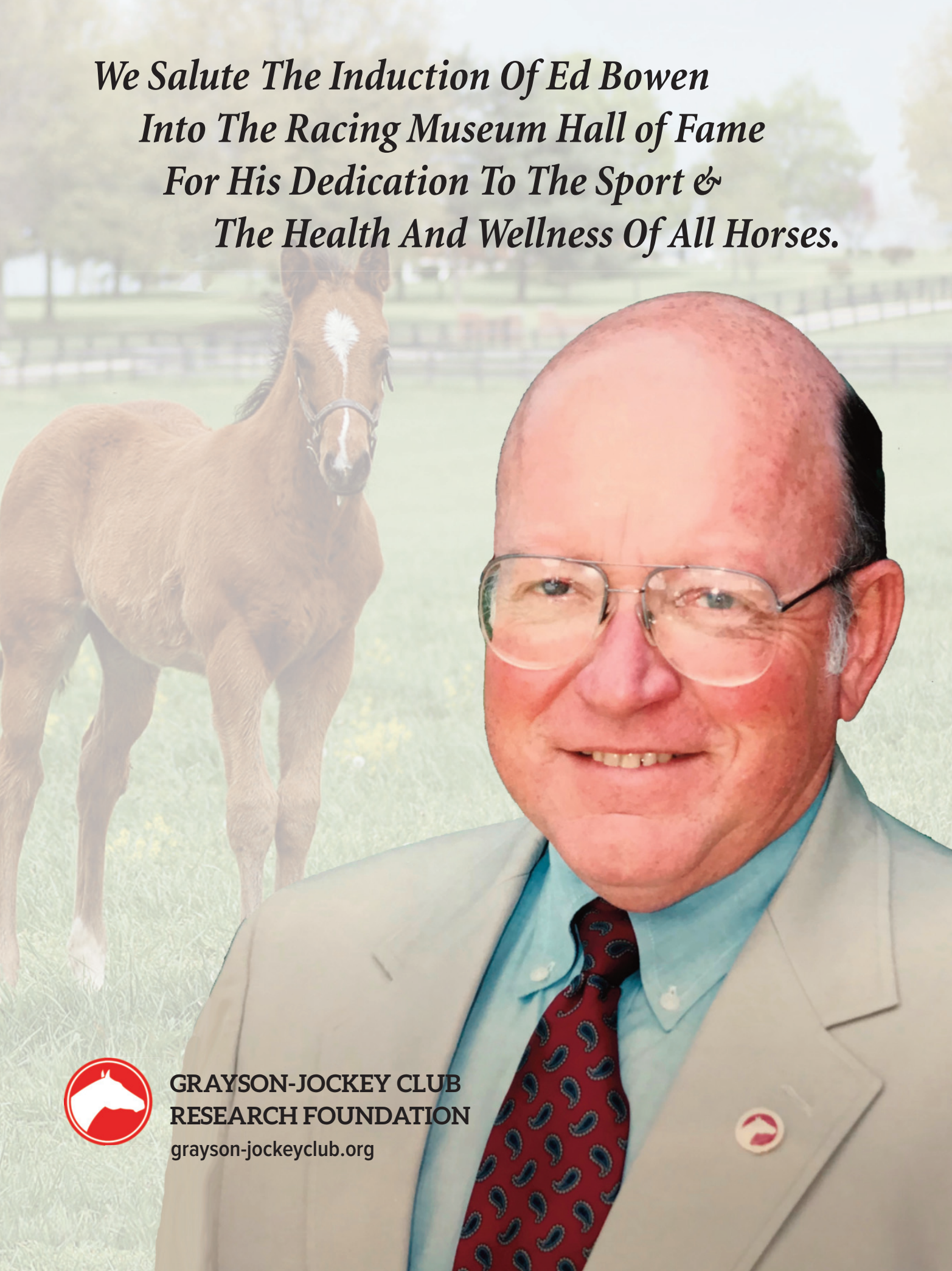

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mained unaffected by TRT," researchers concluded. "No differences were found in the gastric microbiota between CBH and NCBH or between TRT and placebo. Administration of the supplement did not alter the GI environment of NCBH or CBH; however, a link between cribbing and fecal microbiota was found, suggesting that CBH may have a disrupted gut microbiome.

"The results of this observational study support an association between measures of GI health and the oral stereotypic behavior of cribbing. Specifically, the fecal microbial communities in CBH differed from NCBH, revealing that CBH may be colonized by more pathogenic bacteria in the lower GI tract than noncribbing animals."

The Journal of Equine Veterinary Science published "Fecal microbiome and functional prediction profiles of horses with and without crib-biting behavior: A comparative study" in November 2024.

"Crib-biting is a stereotyped oral behavior with poorly understood etiology and pathophysiology," explained researchers. "The relationship between the gut microbiome and brain function has been described in behavioral disorders such as schizophrenia, depression, and anxiety in humans. In horses, studies of behavioral problems and the microbiome are very limited. This study aimed to characterize the fecal microbiome and the predicted functional profile of horses with and without aerophagia."

"AS FOR OTHER ANIMALS AND HUMANS, THE HORSE GUT MICROBIOME IS SENSITIVE TO DIET, ESPECIALLY CONSUMPTION OF STARCH, FIBER, AND FAT. AGE, BREEDS, STRESS DURING COMPETITIONS, TRANSPORTATION, AND EXERCISE MAY ALSO IMPACT THE MICROBIOME. BECAUSE OF ITS SIZE AND ITS COMPLEXITY, THE EQUINE GUT MICROBIOTA IS PRONE TO PERTURBATIONS CAUSED BY EXTERNAL OR INTERNAL STRESSORS THAT MAY RESULT IN DIGESTIVE DISEASES ..."

—MICROORGANISMS, 2022

For this study, 12 Colombian Creole Horses were used. They were divided into two groups. The first had three female and three male cribbers. The second consisted of three female and three male non-cribbers. Researchers collected fecal samples from each horse in both groups.

"Community structure and differential abundance analyses revealed significant differences between the two conditions," researchers concluded. "Specifically, the fecal microbiota at the family level in crib-biting horses, showing a decrease in Bacteroidales and an increase in Bacillota and Clostridia, differed from that of healthy horses without crib-biting, consistent with findings from previous studies.

"Furthermore, metagenome prediction suggests metabolic profile changes in bacterial communities between both conditions in horses. Further studies are required to validate the role of the microbiota-gut-brain axis in the etiology of crib-biting and other abnormal and stereotyped behaviors."

While the importance of equine gut health is widely understood in a general sense, the specifics of how to achieve and maintain it continue to be a heavily studied area of interest that can have a far-reaching impact, especially as it pertains to racehorses. BH

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