

Causes, Risk Factors and Management Responses for Gastric Ulcers in Performance Horses

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Gastric ulcers are an increasing problem in equine athletes which results in performance and economic losses. Research studies suggest that 50 to 90% of horses within various disciplines may suffer from ulcers. Stomach anatomy, feed ingredients, management practices and horse temperament are some of the factors cited as causes for the high incidence of stomach ulcers. Understanding equine stomach anatomy and ulcer risk factors will help identify potential management responses to resolve gastric ulcers in horses.

Equine Stomach Anatomy

Approximately 80% of equine gastric ulcers occur in the proximal (front part) stomach, which is less resistant to digestive acids than the distal, or latter, part of the horse's stomach. The distal stomach has a bicarbonate-rich mucus layer for protection, an extensive capillary network and a rapid ability for healing.

Causes of Gastric Ulcers in Horses

The equine stomach constantly secretes digestive acids, and the continuous exposure to the acids is the primary cause of gastric ulcers in horses. Bacteria residing in the stomach ferment readily hydrolysable carbohydrates (starch), and in turn secrete volatile fatty acids (VFA). The VFA are absorbed by cells lining the stomach, which then swell, die and finally ulcerate. The combination of hydrochloric acid (HCl), a low stomach pH, organic acids from fermentation, and the protein-digesting enzyme pepsin act together to cause gastric ulcers.

Risk Factors

Exercise intensity

A research study indicated that horses running on a treadmill had increased abdominal pressure and decreased stomach volume. Stomach contractions may push gastric acid from the distal part to the less-protected, proximal region of the stomach. Consequently, frequent exercise would regularly bathe the proximal stomach in acids for destruction of the stomach lining. Ulcer incidence and severity rises as exercise intensity increases.

Intermittent Feeding

The horse's digestive tract is designed for grazing and the continual feeding and flow of saliva and ingesta to buffer the stomach. Intermittent or irregular feeding reduces saliva flow and allows the stomach to "sit empty" for various periods of time, resulting in a drop in gastric pH and exposure of the stomach lining to a more acidic environment.

Feed

High-starch diets are partially fermented in the stomach by bacteria, resulting in VFA, which combined with low-pH conditions in the stomach can damage the gastric lining. A research study compared a high-protein, high-calcium diet of alfalfa and grain to a low-protein, low-calcium bromegrass and grain diet for ulcer incidence. Horses fed the alfalfa and grain diet had a higher stomach pH, resulting in fewer and less severe gastric ulcers compared to the horses receiving the bromegrass and grain diet.

Transport Stress

Transportation increases the incidence of gastric ulcers in horses. Horses risk dehydration, immune suppression, respiratory or digestive illnesses and other challenges while being transported. Water and feed deprivation lower stomach pH. Transport stress interacts strongly with the other risk factors, including heat stress.

Housing

Stall confinement changes a horse's sociological behavior and feeding pattern. Exposure to other horses can have a calming effect with most horses. The risks from intermittent feeding have been previously discussed.

Nonsteroidal Anti-inflammatory Drugs (NSAID)

The NSAID decrease mucosal blood flow, decrease mucous production and increase HCl secretion. This combination of factors leads to a stomach lining less able to protect itself in a lower pH environment.

Helicobacter Species

The role of *Helicobacter* species in gastric ulcers is well-documented in humans, yet less certain in horses. The use of antibiotics to control these bacteria may result in undesired complications due to shifting of the bacteria population in favor of antibiotic-resistant bacteria.

Management Responses

Feeding frequency and diet type

Grazing increases saliva production and allows ingesta to be present in the stomach to absorb gastric acids. When grazing is impractical, more frequent feeding throughout the day may produce similar results. A shift to a high-forage diet will reduce starch fermentation and acid production in the stomach, as well as have a more fibrous ingesta residing in the stomach. High-protein, high-calcium diets based on alfalfa hay have reduced ulcer incidence in some studies. Forage quality should be considered to help meet the horse's energy needs and yet provide enough fiber for proper digestive function. Chewing long-stem hay increases saliva flow to aid in buffering the stomach contents and lining. Research studies suggest that supplementing vegetable oil may provide a protective lining to the stomach, while also reducing the amount of starch fed to the horse.

Transport and Housing

Frequently transported horses need periodic rest stops to encourage water and feed consumption along with reducing transportation stress. The diet fed prior to transporting may reduce the incidence of ulcers. Social behavior has implication for transport and housing decisions to manage ulcers.

Probiotics (Direct-fed microbials)

Veterinarians, trainers and horse owners indicate that probiotics, or known as direct-fed microbials, have reduced the incidence of ulcers in various situations. Probiotics encourage forage utilization to enable the feeding of a higher-forage, lower-starch diet. Reducing the amount of starch fed can lower VFA production in the horse's stomach.

Starch digestion in the horse's small intestine results in glucose absorption and potentially has a negative effect on its behavior. A horse's behavior or calmness has been correlated to ulcer incidence. The higher-forage diet would result in fibrous ingesta remaining in the stomach for a greater proportion of the day, which could moderate stomach pH.

Summary

Gastric ulcers occur in a high proportion of horses in various disciplines. Managing the risk factors for gastric ulcers can improve a horse's performance and well-being and reduce economic losses. Probiotics can be a management tool to moderate diet and behavior factors leading to ulcers.

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