

Ulcers...For Life?

There's no cure-all for equine gastric ulcer syndrome, but proper management and prevention methods can help

BY DR. JANICE L. HOLLAND
ANNE M. EBERHARDT PHOTOS

What could the following three situations all have in common?

1. You return home from the track after a disappointing race. You had high hopes for your elite runner and he didn't hit the board. He occasionally looks at his sides and appears uncomfortable.

2. You have a young, excitable filly that was recently weaned. A normally robust and outgoing foal, she is now standing in her stall, uninterested in either interacting with humans or eating her grain.

3. Your mature gelding that lives on lush pasture recently went through a mild bout of laminitis. He's always been a stoic fellow and rarely shows when he's in pain. Now, his hair coat is dull, and he seems to be "depressed."

What might be surprising to some is

that while these clinical signs could point to a number of problems, all three of these horses could be diagnosed with the same condition: equine gastric ulcer syndrome.

History and Signs

Equine gastric ulcer syndrome includes not only ulcers found within the stomach (usually in the esophageal region, or upper portion), but also ulcers found at the duodenal part of the small intestine, which is the portion closest to the stomach. Ulcers occur when the pH of these gastrointestinal tract areas becomes too acidic, and cells of the lining are damaged. The primary acid of digestion in the stomach, hydrochloric acid, is produced and released continuously into the stomach of the horse, unlike in humans, where it is pro-

duced only when food is present. Horses produce almost 1.5 liters/hour of this acid because they have evolved as continuous eaters, or grazers.

Ulcers can occur in horses of all disciplines and management situations, although horses in higher stress environments do appear to be more susceptible, according to veterinarians and researchers. A variety of studies have been conducted on gastric ulcer incidence in horses competing or training in different disciplines; some of these results are shown in the chart (see page 3004).

A definitive diagnosis can only be made by a veterinarian who performs gastroscopy on the horse. This involves placing an endoscope (a tubular optical instrument) into the stomach of the sedated horse to view the stomach lining. However, there are some signs that a horse owner or farm manager can watch for that might be indicative of a horse experiencing gastric ulceration. Some of these, on their own, might not indicate a problem, but owners should be concerned when they observe more than one at a time.

Foals suffering from gastric ulcers, for instance, might show poor appetite (anorexia), bruxism (teeth grinding), excessive salivation, diarrhea, and lying on their back (to relieve some of the pain). Mature horses might show some of the same signs, such as anorexia, but they might also exhibit weight loss/poor body condition, a dull or rough hair coat, an attitude or behavior change (especially toward training), poor or decreased performance, a tendency to lie down, and mild, chronic, or intermittent colic (Buchanan and Andrews, 2003).

Causative Factors

A variety of factors can predispose a horse to ulcers. Some can be managed, while others, such as genetic predisposition, are more difficult or impossible to control. The three most commonly mentioned causes of gastric ulcers are summarized below.

The feeding regimen, including type of feed offered and how often, is one of the most common factors related to ulcer incidence (Reese and Andrews, 2009). Horses that are fed only a few meals a day, with grain or concentrate feeds that are high in soluble carbohydrates and comprise a large percentage of their diet, are most susceptible. Since the stomach empties fairly quickly after a meal, usually within 30-60 minutes, the cells lining the stomach can be exposed to the acids that are secreted for several hours before the next meal. So, horses that graze continuously or that are



Some horses are more prone to ulcers due to management, performance, or temperament

fed free-choice hay tend to have a lower ulcer incidence. Feeding grains such as corn, barley, oats, and wheat products might also contribute to a higher ulcer incidence, related to increased levels of a hormone called gastrin that stimulates stomach acid production.

Training and exercise might also contribute to an increased incidence of gastric ulcers. Horses involved in strenuous exercise have a higher incidence of gastric lesions, as shown in the table, and intense exercise might cause a serum gastrin in-

crease similar to that observed in horses consuming high-grain diets.

Decreased blood flow to the stomach during exercise, as well as increased abdominal pressure, might also be a cause (Orsini et al., 2009). Studies have shown that external pressure on the stomach during exercise forces the liquid contents of the lower portion of the stomach upward, exposing the sensitive mucosa of the gastric wall to the stomach acids and inducing ulcerous lesions. Another training factor that might contribute to ulcers is increasing the physical demands on the horse too rapidly. This might lead to an increased physiologic stress level, which can in turn increase acid production, and decreased mucosal blood flow, which can delay gastric emptying.

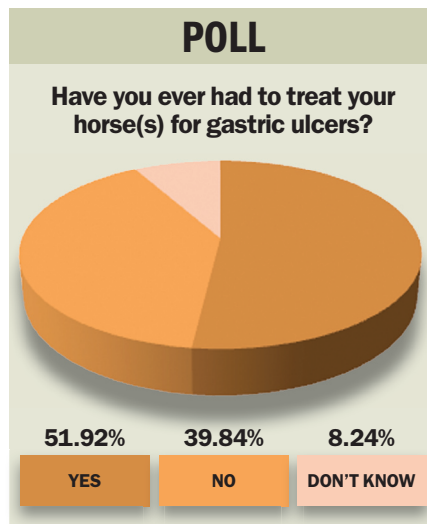
Stall confinement in performance horses could be a contributing factor as well, but ulcers might be more related to a horse's feeding schedule than confinement alone. A study conducted in New Zealand (Bell et al., 2007) found that racehorses that spent part of the day on pasture had the same incidence of ulcers (89%) as stall-confined racehorses.

Some medications are also recognized as causing ulceration. According to a 2009 study by Dr. Ricardo Videla and Dr. Frank M. Andrews, the most common group of medications implicated are non-steroidal anti-inflammatory drugs (NSAIDs), which can impair mucosal blood flow and also compromise the mucus-bicarbonate barrier of the stomach, a layer which generally would protect the stomach lining from the acid. The two most common NSAIDs used in horses are phenylbutazone (Bute) and flunixin meglumine (Banamine). The potential to cause ulceration is why these medications often are only given for a few days and then discontinued.

Treatment

A variety of medications can be given to treat ulcers. Some are available at the local feed store or in horse supply catalogs, while others are only available through a veterinarian.

Histamine antagonists (H2 blockers),



such as cimetidine and ranitidine, block hydrochloric acid secretion. Proton pump inhibitors (PPIs) such as omeprazole (Gastrogard) also prevent hydrochloric acid secretion and are longer-acting than the H2 blockers. Dr. Anthony Blikslager, professor of equine surgery and gastroenterology in North Carolina State University's Department of Clinical Sciences, recommends omeprazole as the best therapy for ulcers in horses. PPIs are very efficient at increasing the pH (decreasing the acid level) in the stomach but he says that it takes about three days for these to have the maximal effect of blocking the acid pump. Many veterinarians will recommend giving one of the H2 blockers concurrently with the PPI for the first few days because, although they do not decrease acid to the same extent, they will act more rapidly and can block secretion until the PPI takes full effect.

Veterinarians sometimes recommend antacids, which contain magnesium hydroxide or aluminum hydroxide. According to a study by CK Clark et al., these treatments can cause rapid increase in pH and might eliminate some clinical signs quickly. However, most of these medications only provide relief for a few hours.

Protectants such as sucralfate might be

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DISCIPLINE	PREVALENCE OF ULCERS (%)	RESEARCH GROUP
Dressage	63	Mitchell, 2001
Endurance	63	Nieto et al., 2004
Eventing	59-62	Knudson, 2009; 2010
Hunter/Jumper	58	McClure et al., 1999
Pleasure	37	Murray, 1989
Reining	76	Knudson, 2009
School horses	11	Chameroy et al., 2006
Standardbred racing	87	Rabuffo et al., 2002
Thoroughbred racing	up to 93	Murray, 1996
Western performance	40	Bertone, 2000

Gastric Ulcers and Weanlings: Effects of Diet Type

Gastric ulcers can affect horses of all breeds, ages, shapes, and sizes. Weanlings are among these: They are transitioning from a diet of milk to one of forages and concentrates, while also experiencing the stress of separation from their dams. So, what type of feed should an owner provide to ease the transition's impact on a weanling's GI tract? A team from the University of Illinois led by Dr. Kevin Kline, professor of animal science, recently completed a study in which they determined that a forage-rich diet caused the least amount of gastrointestinal (GI) problems.

Kline and colleagues evaluated the effects of three different diets (an all-alfalfa hay diet, a diet of hay cubes and grain, and one consisting of a pelleted complete feed) on the GI health of 16 Standardbred weanlings (six colts and 10 fillies). The weanlings were divided into two groups of eight (three colts and five fillies each).

Researchers fed each group of horses a different diet during three 28-day periods. Both groups of weanlings were fed the all-alfalfa hay diet for the first 28-day period. Then researchers fed one group the hay cubes and grain diet and gave the other complete feed for 28 days. The groups switched diets for the final 28 days.

At the end of each 28-day period each weanling underwent an endoscopic examination to determine the number and severity of gastric ulcers present in the stomach. The veterinarian performing the endoscopic exams was blinded to the weanlings' most recent diets, except for the first round of exams in which all the horses were on the same diet.

"After Period 1 on the all-hay diet, the horses were found to have low ulcer numbers and severity scores, supporting the importance of a high-forage diet in young growing horses," Kline said in the study.

After the next 28-day cycle when the horses began consuming their new diets, the team noted that regardless of whether the weanlings ate the hay cubes and grain diet or the complete feed diet, the number and severity of the ulcers in the weanlings' stomachs had increased by 30%. There was no statistically significant difference between the ulcer scores among horses on these two diets, they added.

On the final endoscopic exams (after the third 28-day cycle), the hors-

es' gastric ulcer scores were nearly three times higher than their base scores. The team said these results suggest the weanlings did not adjust well to the high concentrate diets.

"This suggests that the gastric ulceration seen in the young horses in this study was a progressive, active pathology extending throughout the 56 days of both high grain diet treatments," Kline noted in the study.

The team hypothesized that "the finely ground pelleted feed required less chewing and might therefore have resulted in reduced saliva production."

Because saliva (an alkaline) has a buffering effect on the stomach (an acidic environment), the team believes this imbalance likely contributed to ulcer formation in the stomach.

Previous study results indicated that alfalfa hay also has a buffering effect on adult horses' stomachs. Saliva can't be produced if the horse is not eating; thus, large amounts of time spent with an empty stomach (i.e., between feedings with little to no forage provided) can encourage ulcer development in horses. Therefore, most veterinarians and equine nutritionists recommend continual forage intake for horses.

Find more answers to your questions about raising young horses in *Understanding the Foal*, a comprehensive reference for the novice breeder.

Kline suggested that if young horses must be pushed to grow and gain weight, then the feeding of additional processed concentrates should be divided into several small feedings throughout the day and accompanied by plenty of good-quality forages.

Providing a pre-weaning creep feed that contains a high concentration of forage in addition to grain products can help weanlings adjust to consuming some grain before they are weaned. Starting with high-quality forage provides weanlings with most of their nutrient requirements, according to the researchers, reducing their need for additional concentrates.

The study, "Effect of Feed Processing Method on Average Daily Gain and Gastric Ulcer Development in Weanling Horses," was published in the March 2011 issue of the *Journal of Equine Veterinary Science*. The abstract is available online.

By Erica Larson

useful in combination with other therapies. These medications form a gel within the stomach that coats and binds to the surface of the ulcers and promotes healing. Blikslager believes sucralfate can be a useful "third line" of treatment in combination with PPIs and H2 blockers, depending on the severity of the ulcers.

Foods that are high in amino acids L-glutamine and L-threonine, such as green cabbage, might also aid in gastric ulcer treatment and prevention, suggest some researchers. These amino acids help repair and nourish the cells lining the stomach and intestines (Hagen et al., 2009).

While manufacturers of several natural treatments such as aloe vera juice and papaya claim to help treat ulcers, Blikslager cautions that these alternative therapies have not been examined in clinical studies of horses, so their effectiveness has not been proven.

Changing the Diet

Diet modification also is recommended for horses that are predisposed to gastric ulcers. Diets that are higher in forage content and lower in grain should promote

the appropriate pH within the stomach and small intestine. In addition, having

small amounts of feed present in the stomach for most hours of the day, mimicking

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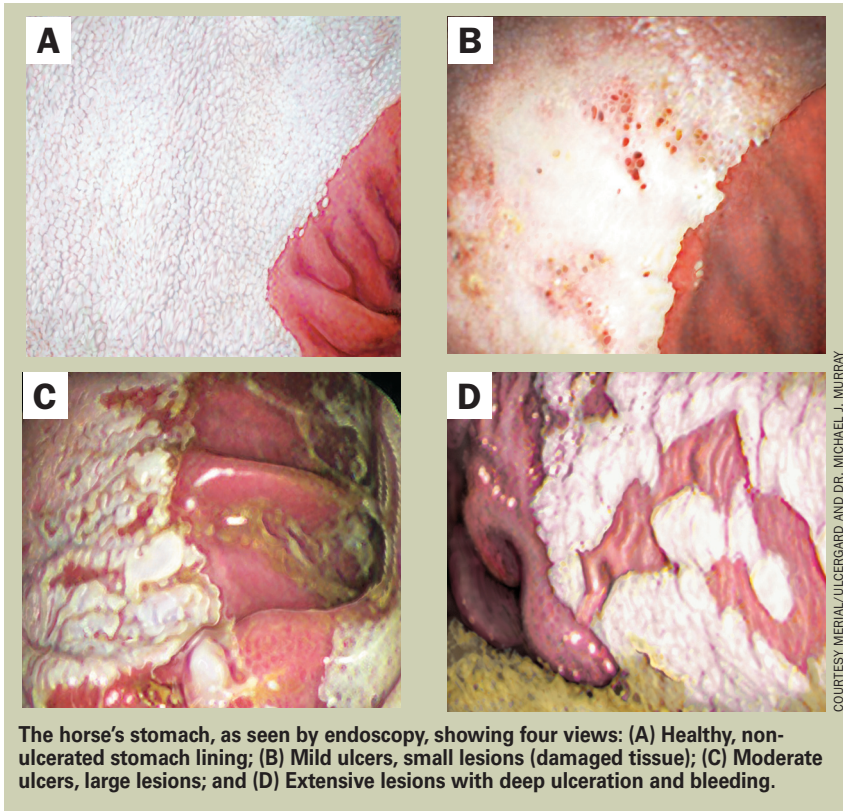
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The horse's stomach, as seen by endoscopy, showing four views: (A) Healthy, non-ulcerated stomach lining; (B) Mild ulcers, small lesions (damaged tissue); (C) Moderate ulcers, large lesions; and (D) Extensive lesions with deep ulceration and bleeding.

the natural feeding tendencies of the horse, can help buffer the acid. According to Blikslager, forage in the diet also essentially traps the acid in the lower portion of the stomach, thus protecting the upper regions that are more prone to ulceration.

Horses that require more calories than can be provided by forage alone—such as competition horses with high daily energy requirements—might need a diet with higher fat content. As well as decreasing the acidity in the stomach, some oils, such as oat oil and rice bran oil, contain polar lipids, which are water-soluble fats that help transport nutrients into the bloodstream and support a healthy gut lining (Frank et al., 2005). Due to its high calcium content, alfalfa might provide an effect similar to antacids (Lybbert et al., 2007).


Prevention

Ideally horses would be kept in a management situation where ulcers are not even a remote possibility, because ulcers are essentially a management disease. However, the reality is that even horses maintained under the most idyllic conditions can develop ulcers. For example, in a 2007 study Dr. Sarah le Jeune and colleagues evaluated ulcer incidence in 62 Thoroughbred broodmares that were kept on pasture. More than 70% of the mares, both pregnant and open (not in foal), had ulcers, and no one factor was isolated as causing the problem.

Some of the suggestions given to treat horses with ulcers can also be used to prevent ulcers from recurring, or even occurring in the first place. According to Blikslager, the best thing a manager can do to prevent ulcers is to provide maximal pasture turnout and develop/offer a forage-based diet. He also recommends dividing the horse's diet into multiple small meals throughout the day. For horses that must be confined to stalls for large portions of the day, Blikslager advises using the newer hay nets available that have smaller holes. The horses cannot eat all the hay at one time and will essentially "graze" all day while trying to get the hay out of the nets. He also recommends decreasing the stress of training or competition (e.g., providing a horse with ample time to adapt to a new environment and scheduling rest or downtime between periods of heavy training). If this is not possible, then your horse might require some of the medications mentioned in the treatment section.

Take-Home Message

Some horses are more predisposed to getting gastric ulcers, due to management, performance, or temperament. Nonetheless, horses can be managed, even in less-than-ideal conditions, to lessen the incidence. With proper medical treatment and removal of predisposing factors, ulcers can be healed, and horses can remain ulcer-free. However, ulcers will reoccur if diet, exercise, and management changes are not incorporated.

Horse owners and managers should use caution in deciding what methods to use to manage and/or prevent ulcers. As with all disorders, consult a veterinarian or equine nutritionist about syndromes that might be caused by diet or management. 

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