EQUINE DISEASE QUARTERLY

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IN THIS ISSUE

COMMENTARY

A Note from the Editors of the Equine Disease Quarterly

Over the last several years, the Equine Disease Quarterly (EDQ) has inevitably become a more fluid publication with multiple behind-the-scenes changes in editors and staff, new sponsors—including Equus Standardbred Station and M & J Insurance, and of course, the move to an electronic format.

Since its inception, the EDQ has provided readers with an opening commentary, in which an expert provides opinions or thoughts on a timely topic, often related to the articles within the issue. We are excited to announce that beginning with the next issue, the opening commentary will transition into a University of Kentucky Department of Veterinary Science spotlight.

The goal of this new format expands on what the EDQ does best, communicating important scientific research and disease knowledge to the equine industry. With this upcoming change, we aim to provide our departmental faculty, staff, graduate students and collaborators the opportunity to highlight their research and display the department's dedication and enthusiasm to the advancement of equine science and health. We are very proud of the department's accomplishments and continued contributions to the global equine industry. We hope you enjoy this new addition to the EDQ.

INTERNATIONAL

First Quarter 2023

International report on equine infectious diseases.

The following report was composed with information provided by the University of Kentucky Veterinary Diagnostic Laboratory and Equine Diagnostic Solutions, Inc.(EDS)—both in Lexington, Kentucky, United States of America (USA); IDEXX Laboratories, Germany; the International Thoroughbred Breeders Federation; the International Collating Centre (ICC) in Newmarket, United Kingdom (UK); and by the American Association of Equine Practitioners' Equine Disease Communication Center (EDCC). This report is retrospective and does not claim to be complete. However, it provides an indication of heightened activity of relevant contagious or environment-linked diseases among equids. To further improve this data, it is encouraged to report laboratory-confirmed infectious diseases and toxicoinfections of Equidae to the ICC in Newmarket, UK. Reporting of equine diseases from the Southern Hemisphere and from most parts of Asia was scarce. A case of glanders (caused by *Burkholderia mallei*) was reported from eastern-central Russia near the Mongolian border. Uruguay reported a single case of equine infectious anemia (EIA) virus infection. North America and Europe, including the British Isles, consistently reported cases and outbreaks of strangles (caused by *Streptococcus equi spp. equi*). The numbers reported by EDCC and ICC corroborate the laboratory data from EDS and IDEXX, and detection of the pathogen in nasal swabs/pharyngeal or guttural pouch washes is widespread. However, it is difficult to interpret disease incidence from laboratory results, because some samples likely represent follow-up samples derived from an ongoing outbreak.

INTERNATIONAL

Equine influenza virus is currently circulating in Europe, including the British Isles (ICC report). EDS reported that approximately 10% of nasal swabs submitted for equine influenza virus testing were positive; swabs were submitted from most regions of the USA. Equine herpes virus (EHV)-4 or -1 respiratory disease was infrequently reported in the USA and more so from operations in the UK, Ireland and continental Europe. Few EHV abortions were reported from North America, and three EHV-1 abortions were reported from central Kentucky, USA. Noteworthy, there was not further propagation of virus within pregnant mares on those farms. We believe this is due to high vaccination rates combined with fast and effective management interventions. EHV-1 abortions typically occur in the last trimester of pregnancy. Therefore, it is not unusual that reported abortions have increased significantly for continental Europe and the British Isles compared to our previous (Q4) report. Equid herpes virus-associated myeloencephalopathy (EHM) also follows a seasonal pattern with the majority of outbreaks associated with the cooler times of the year (first, second and fourth quarters for the Northern Hemisphere). Close to 20 outbreaks with variable EHM prevalence were reported in North America, and about 15 outbreaks were reported in Europe, including the UK. Spain reported an EHM outbreak at an equestrian event that was similar in organization and setup compared to the Valencia-outbreak of 2021.

Heightened awareness of early stages of infection, a rapid response with testing of animals, and biosecurity management has shown to mitigate outbreaks effectively.

A seasonal increase in EHV-1 detection from nasal swabs was reported in the quarterly results of a commercial laboratory located in the Northern Hemisphere (**Fig. 1).**

Note, the 3rd quarter (July – September) of 2021 and 2022 consistently reported the lowest positivity rate for EHV-1 compared to the other quarters. Few cases of EIA were reported in N. America. A cluster of connected cases in the Southern USA was reported in connection with illegal horse racing activities ('bush' racing), where a form of blood doping is not uncommon. Single EIA cases were also reported from Hungary and Italy.

Insect vectors are active year-round in regions bordering the Gulf of Mexico. Single cases of Eastern equine encephalitis were reported in Florida and South Carolina, as well as a West Nile virus (WNV) case from Florida. Another WNV encephalitis case was identified in Libya, Northern Africa.

Equine rotavirus was identified in 49 samples in the USA. Most samples were positive for rotavirus type B, and with few exceptions (Oklahoma, New York), most samples were derived from central Kentucky.

Miscellaneous: Contagious equine metritis: Three cases of *Taylorella equigenitalis* infection were reported from Germany. It is currently unknown whether these cases were epidemiologically connected.

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EQUINE DISEASE QUARTERLY

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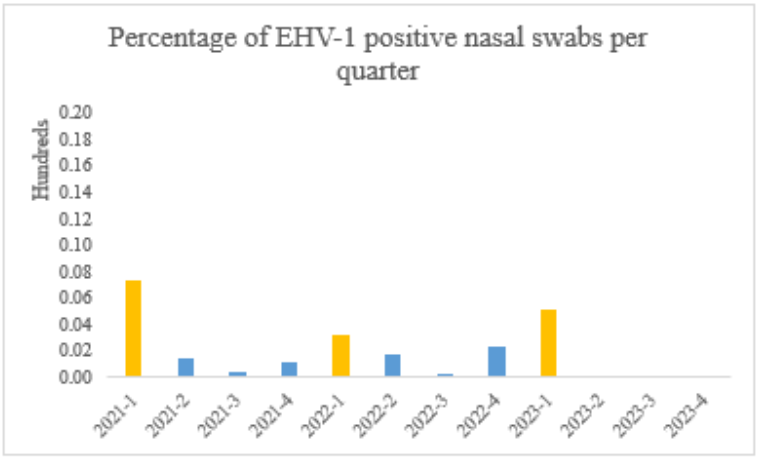

Figure 1: Percent positive nasal swab results for EHV-1 derived from a single diagnostic laboratory sorted by 3-month periods (quarterly) for 2021-2023 (to date).

Managing and feeding the orphaned or rejected foal from birth to four months of age.

Each foaling season, foals are orphaned, rejected, or born to mares that have no milk. This article details a highly successful program for raising these foals, which has been implemented at several universities, veterinary hospitals and horse farms. This feeding program is designed for those who are managing healthy foals that are orphaned, rejected, or born from mares without milk or were weaned early. Foals raised on this program grow and mature the same as non-orphans.

Foals must ingest colostrum or be provided with antibodies for immune protection. Colostrum, or the mare's first milk, contains high levels of whole protein antibodies to protect the foal from disease. Mares normally secrete colostrum up to 24 hours after foaling. All newborn foals need colostrum, ideally, within the first hour after birth. A 100 lb foal should receive 250 ml (approximately 1 cup) of colostrum each hour for the first six hours after they are born. This is a total of 1500 ml, or about 3 pints of colostrum per 100 lb of body weight. Therefore, breeding farms should have a minimum of 3 pints of frozen colostrum in storage. When needed, it should be removed from the freezer and thawed at room temperature or in a warm water bath. Never microwave colostrum because that will destroy the antibodies and render them useless.

Following colostrum consumption, foals are taught to drink milk replacer from a bucket. Foals should start drinking from a shallow plastic bowl or a bottle with a lamb nipple attached, depending on the foal's aggressiveness. Most foals will learn to drink from a shallow bowl or bucket very quickly. A method to help foals learn to drink involves placing a finger in their mouths to stimulate the suckle reflex. While they are sucking, raise the bowl containing the milk replacer to their muzzle. After they begin to drink, slowly remove the finger from the foal's mouth. Repeat until they keep drinking by themselves. Always bring the milk up to the foal; do not force the foal's head down. The first few days, warm the milk replacer to 101.5° F to encourage consumption. This is the same temperature as milk from the mare. When the foal is drinking independently, hang a bucket at the foals' shoulder height and provide the milk replacer at room temperature. The bucket should be a contrasting color to the wall to make it easy for the foal to find.

The chosen milk replacer should be an all-milk product. To assure the equine milk replacer powder is 'all-milk,' look at the percentage of fiber listed on the feed tag. It must be less than 0.2% crude fiber or less than 0.4% acid detergent fiber. All milk replacers containing 1.0% crude fiber or higher, will contain a protein source that is less expensive, but not as digestible to the newborn foal. Any protein source other than milk can cause loose stools or diarrhea in the young foal, depending on how much is consumed per day. The selected ingredients in a foal's food are based on the foal's ability to digest them and help maintain the natural pH level in their digestive system. Make sure to follow the mixing directions, to make a 10% solution, equivalent to mare's milk. (One pound of milk powder to one gallon of water.)

Mares produce 3.0% - 3.5% of their body weight in milk per day, as a 10% milk solid solution. This means a 1,000 lb (454 kg) mare will produce 30 to 35 lb (14 to 16 kg) or about 4 gal (18 L) of milk per day. Table 1 can be used to determine, based on the size of the dam, the amount of milk the mare would have produced. Begin by providing half the recommended amount on the first day. Gradually increase the amount over seven to 10 days, but no faster than one-half gallon or 2 L per day, until the recommended amount is being consumed. Once the foals are drinking the recommended amount, mix one half of the daily amount, and make it available free choice, AM and PM. Allowing the foal to drink small amounts as often as it wants, will result in fewer digestive upsets, improved milk digestibility, optimal weight gain and improved overall foal health. Each time new formula is mixed, discard remaining milk, and clean the bucket before adding fresh milk replacer. When fed at room temperature, acidified milk replacers will have a tart taste which discourages a foal from drinking too much at one time when offered free choice. For the first 30 days, foals will drink seven to ten times per hour. Feeding milk replacer free choice allows the foal to drink as often as it would if a mare was present. Free choice feeding also greatly reduces the chance of digestive upsets by preventing them from becoming too hungry and over drinking. If they run out of milk for over one hour, they will drink too fast at the next feeding. This should be avoided as it may cause colic and/or diarrhea.

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After the foal drinks the liquid milk replacer before the next feeding, add a handful of milk-based pellets into the same bucket. The pellet may be milk or milk based with the starch in the milk-based pellet rolled oats rather than other cereal grains. Using the same bucket makes the foals more comfortable consuming this new feed. At the next liquid feeding, discard any remaining pellets. Repeat this process until the foal eats the pellets, at this time pellets are provided in a separate bucket and can also be offered free choice. Please note, a weanling feed formulated with cereal grains, fat and fiber, with the added minerals is not recommended yet. During the first two months of age, the foal will have very small amounts of the enzymes needed to breakdown nonstructural carbohydrates in weanling feed. Feeding these feeds too early can lead to diarrhea, malabsorption and colic. The digestive system changes according to their age, not their size. So age, rather than height and bodyweight, will determine when additional feed should be introduced.

When the foal is eight weeks old, begin reducing the liquid milk replacer by one gallon (4.5 L) the first day and replace it by adding one additional pound of milk-based pellets. Once the foal consumes the added pellets, reduce an additional gallon/day of liquid, and provide another pound of the pellets per day. Continue until the pellets replace all the liquid solution. This transition should take about one week. This gradual change will reduce the chance of digestive upset.

To anticipate the amount of milk replacer (powder) and pellets needed, it is useful to calculate the expected consumption over the first four months of life. Foals weighing 100 lb at birth, should consume four gallons per day and therefore will need (200 lb) of foal milk replacer until weaned from liquid milk at two months of age. They will also need 600 lb of the milk-based pellets to be fed free choice from the first week to four months of age. If the foals are larger or smaller, the amount of foal food will change accordingly

If the foal is over three weeks old when orphaned, provide just the milk-based pellets free choice. At this age their molars are in and they can chew and swallow the pellets. Provide the pellets free choice up to four months of age. Between three to four months of age, begin mixing the milk-based pellets with a weanling feed by subtracting one pound of the milk-based pellets and adding one pound of the 'weanling' feed, every other day. The weanling feed should be fortified with the level of nutrients needed to support the young weanling's skeletal development and complement the protein (amino acids) and minerals in the type of forage (hay/pasture) your foal is now eating. It should also state on the feed tag, "formulated to be fed to weanlings". Check the feeding directions on the tag or bag, to find out how much is recommended to be fed per day to meet the foal's nutrient needs according to their age and size, i.e., bodyweight, for optimal skeletal and soft tissue development.

The milk-based pellet is formulated for the young foal and is fed free choice until they are four months old, or their BCS exceeds 5.5 (on a 1 to 9 scale). After four months of age, it is not necessary to feed milk, because the foal can begin digesting some non-structured carbohydrates from a weanling feed in their foregut, and soft, immature hay, i.e., structured carbohydrates in their hindgut. This orphaned or rejected foal and early weaned feeding and management program, promotes optimal growth, health, and nutrient absorption, while reducing the chance of digestive upsets and skeletal anomalies. Following it will allow the owner/manager to provide appropriate nutrition for the foal's normal developmental and compensate for the changes that normally occur in the foal's digestive system.

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Mare's body weight		Milk replacer volume	
250 lb	113 kg	1 gal	4.5 L
500 lb	227 kg	2 gal	9.0 L
1000 lb	454 kg	4 gal	18.0 L
1500 lb	681 kg	6 gal	27.0 L
2000 lb	909 kg	8 gal	36.0 L

Table 1: The amount of equine milk replacer needed daily based on the mare's body weight and expected production. Determine the size of the mare and then the amount of milk replacer in solution to feed daily.

Equine Respiratory Biosurveillance- What Have We Learned?

Since 2008, Merck Animal Health has conducted a voluntary equine respiratory biosurveillance program, in conjunction with private veterinarians, to study the prevalence and epidemiology of relevant viral and bacterial respiratory pathogens. This program has increased awareness of respiratory pathogens in the veterinary community, provided invaluable epidemiological information pertaining to common and less characterized respiratory pathogens and provided equine influenza virus sequence data to monitor how the virus is changing and to evaluate and improve vaccine efficacy.

As a veterinary profession, management of infectious disease is one of the most consistent challenges we face. Ongoing surveillance is an extremely important tool to monitor emerging trends, manage disease outbreaks and improve preventive strategies.

The voluntary equine respiratory biosurveillance program was born through the vision of two individuals and conversations that took place almost 17 years ago between D. Paul Lunn, BVSc, MS, PhD, MRCVS, Dipl. ACVIM—current Dean of the University of Liverpool's School of Veterinary Science—and D. Craig Barnett, DVM—retired Director of Equine Veterinary Professional Services at Merck Animal Health. In late 2007, a partnership was formed between Merck Animal Health and the University of California, Davis School of Veterinary Medicine that established UC Davis, led by Nicola Pusterla, DVM, DACVIM, AVDC-Equine, as the program's real-time PCR laboratory for sample submissions. In March 2008, the biosurveillance program came to fruition as the Infectious Upper Respiratory Disease Study. The goals of the study were four-fold. First, to provide participating veterinarians with a valuable diagnostic tool to assist in providing accurate and timely diagnosis to treat and manage infectious respiratory diseases. Second, to provide the equine industry with a better understanding of the prevalence and epidemiology of common respiratory pathogens. Third, to identify and monitor the current circulating strains of major equine respiratory pathogens. Lastly, to evaluate the efficacy of current vaccination protocols.

Today, this program has resulted in one of the largest equine infectious upper respiratory biosurveillance data sets. This comprehensive, ongoing national surveillance study monitors equine herpesvirus types 1 and 4, EIV, *Streptococcus equi subspecies equi (S. equi*; the cause of strangles) and equine rhinitis A and B viruses.

To date, more than 11,000 samples have been voluntarily submitted from veterinarians across the United States. To be included in the study, samples must have been obtained from a horse with a temperature greater than 101.5° F and that exhibited at least one of the following clinical signs: nasal discharge, cough, lethargy or central nervous system abnormalities. Submissions consisted of two nasal swabs collected from one nostril and a completed questionnaire. Samples were shipped overnight to the UC Davis laboratory for next-day quantitative PCR testing.

This dataset has generated several scientific publications and presentations. Additionally, the data has been used to provide biannual reports to participating veterinarians that bring new information to the forefront and provide timely updates to share with horse owners. Since 2008, results of this surveillance program have yielded insight into the prevalence and seasonality of these important respiratory pathogens. Of samples in which equine respiratory pathogens were detected, EHV-4 was the most common (representing 31% of positive samples) followed closely by EIV (29%) and *S. equi* (22%).

In the United States, EIV peaks annually in March with broad occurrence in winter and spring, and EHV-4 occurs more commonly in the fall from September to November. Most importantly, all diseases occurred throughout the year and should not be excluded due to seasonal expectations

It is critical for veterinarians and horse owners to understand the importance and value of identifying the pathogen(s) associated with respiratory outbreaks. Not only can this data lead to more effective treatments and biosecurity decisions, it helps the entire horse industry better prepare for future challenges.

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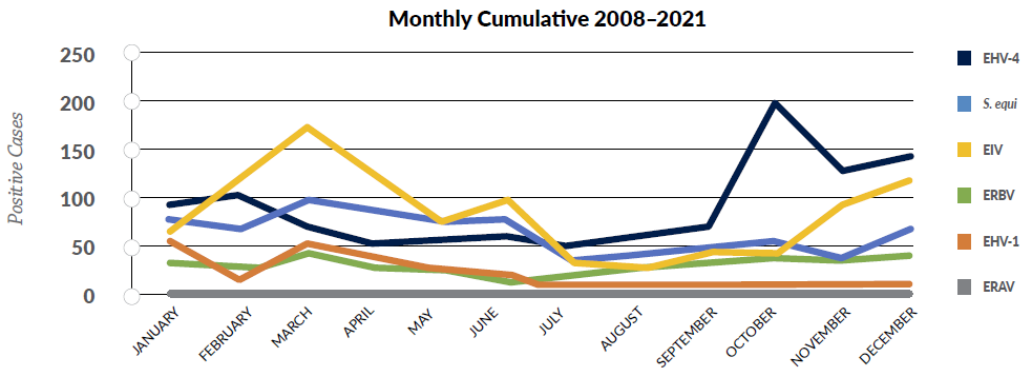
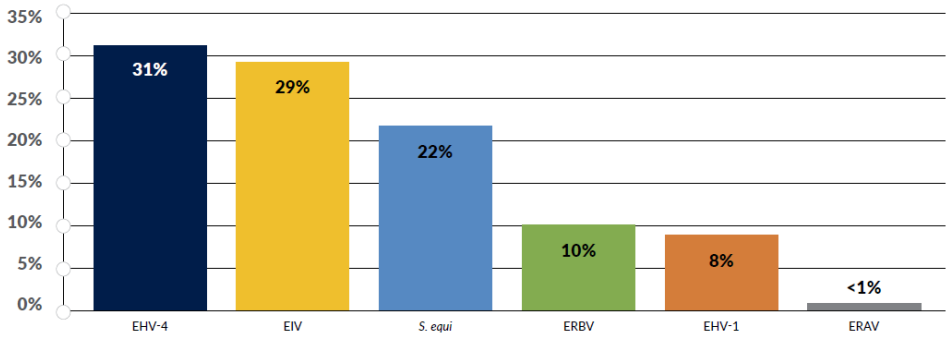


*The monthly cumulative depicts the **seasonal effect of respiratory pathogens** spanning nearly 14 years of surveillance. EHV-4 continues to be more prevalent in the fall months, in contrast to the other respiratory pathogens (especially EIV) that are more prevalent in the winter and spring months.*



Through December 2021, EHV-4 was the most diagnosed infectious upper respiratory disease, comprising 31% of all positive samples, followed closely by EIV at 29% and then S. equi at 22%.

Gastric Ulcers in Horses

Gastric ulcers are very common in horses with prevalence rates ranging from 50-90% depending on the population being evaluated. Gastric ulcers are found in all types of horses including broodmares, show horses, ponies and even wild populations. The clinical signs of gastric ulcers in horses can range from mild signs such as inappetence, decreased weight gain, poor performance, rough hair coat and occasional grumpiness, to more severe signs such as intermittent mild to severe colic, weight loss, and severe behavioral issues (especially under saddle). As a result, the diagnosis and treatment of gastric ulcers can be very important to the management of any performance or non-performance horse.

The equine stomach is composed of a non-glandular, or squamous, component as well as a glandular component **(image 1)**.

The squamous mucosa makes up approximately one-third of the stomach, has no glands and is typically responsible for mixing food. This portion of the stomach has very little protection from the acidic environment present in the lower portion of the stomach.

The glandular portion (lower portion) makes up the remainder of the stomach and contains specialized glands that secrete acid and other substances that breakdown food. The lower portion of the stomach contains numerous protective mechanisms to keep it safe from acid. Although both parts of the stomach can develop ulcers, occurrence in the non-glandular mucosa is more common. n the wild, horses spend most of their day grazing. As a result, the equine stomach has adapted to constantly secrete acid, which is then buffered by saliva from chewing as well as the feed -itself. In some man-made environments, feeding conditions are very different to that in the wild. This results in the stomach remaining empty for prolonged periods of time, exposing the vulnerable squamous mucosa to higher levels of acid. High-grain diets and stressors (such as transport and stall confinement) can also contribute to the development of ulcers. Long-term administration of medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) can lead to a decrease in protective factors and predispose horses to ulcers predominantly in the glandular mucosa. This class of drugs include common medications such as flunixin meglumine and phenylbutazone.

Definitive diagnosis of gastric ulcers can only be made by direct visualization of ulcers using an endoscope, a technique known as gastroscopy. Although tentative diagnosis can be made based on clinical signs and, potentially, response to therapy, the location and severity of ulcers cannot be determined with this method. Gastroscopy is a quick and minimally invasive procedure that allows the veterinarian to visualize the upper airway, esophagus, stomach (both glandular and non-glandular portions) and the proximal small intestine. After assessment of non-glandular ulcers, a numerical grade is assigned which then can be used for comparative evaluation. Grade 0 is typically considered a normal horse with no evidence of ulceration, while a horse with grade 4 ulceration has deep, bleeding ulcers throughout the non-glandular mucosa (**images 2 and 3**). The mainstay of treatment is prolonged suppression of acid, the formation of a protective layer over the ulcerations and maintaining adequate blood flow to the site of ulceration. Omeprazole is currently the only Food and Drug Administration approved treatment for gastric ulcers, and it works by suppressing acid secretion in the stomach. Although there are many other products currently available, the formulation of this medication makes it the treatment of choice for gastric ulcers in horses. Another potential treatment for ulcers is sucralfate, which is a gastroprotectant that binds to ulcers and creates a protective barrier, thereby providing immediate (although relatively short-lived) relief. Glandular ulcers may require additional therapy if first line treatment does not result in improvement.

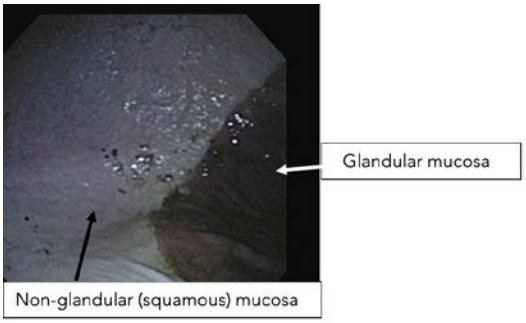


Image 1. Gastroscopy image. The stomach is composed of both glandular and non-glandular components.

In addition to pharmacologic intervention, management strategies are crucial to the maintenance of an ulcer free horse. By providing free choice access to roughage in the form of grass or hay, large changes in stomach pH can be minimized. Alfalfa hay, which tends to be slightly higher in calcium, can be a good option as its buffering capacity is above that of regular grass hay. In addition, limiting or controlling stressful conditions plays a major role in the treatment and prevention of gastric ulcers in horses. While there are many supplements on the market that claim to prevent or treat gastric ulcers, they may lack validation and are not considered effective. Although there is a lack of peer-reviewed scientific research regarding most supplements on the market, those containing pectin and/or lecithin may provide the most benefit.

Gastric ulcers in horses can be challenging to identify and, in many cases, challenging to treat. By using medication to modify the acidic stomach environment in combination with management strategies to maintain a more "natural" environment, we can help treat and prevent most ulcers in horses.

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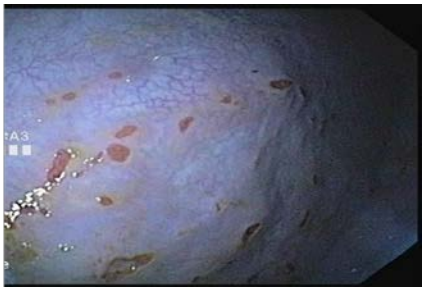

Image 2. Gastroscopy image. Over a dozen grade 3 ulcers are located in the squamous mucosa.

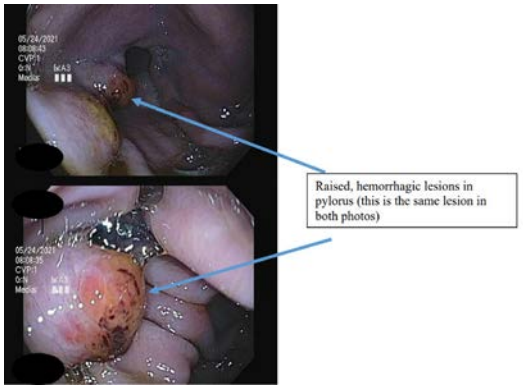

Image 3. Gastroscopy image. A hemorrhagic ulcer is located in the pylorus (the lower portion of the stomach that connects to the small intestine).