

# Results of a Large-Scale Necroscopic Study of Equine Colonic Ulcers

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**Overview:** Although Equine Gastric Ulcer Syndrome (EGUS) has been extensively studied over the last few years,<sup>1,2</sup> very little is known about colonic ulcers. Partly this is due to the difficulty of doing colonoscopies on horses, whose lives are actually endangered by the lengthy evacuation necessary to prepare for a colonoscopy.

Nevertheless, due to a high prevalence of subclinical anemia<sup>3</sup> and the extraordinary fact that colic is the number one killer of horses,<sup>4,5</sup> it behooves us to learn more about both gastric and colonic ulcers with an eye to prevention and remediation.

The goal of this study was to determine the incidence of gastric and especially colonic ulcers in horses. To that end, a large-scale necroscopic examination of the colons of 545 horses was conducted. A high incidence of colonic ulcers was discovered, up to 63% in some cohorts.

**Methods:** In the first study, 365 horses of mixed breed and function, (including riding, range, race and show horses) were necropsied at a large abattoir in Texas. For this study, the digestive tract was removed and the stomach and colon were tied off for separate examination. The stomach was split open and a longitudinal incision was made along the entire length of the colon so they could both be laid out for observation.

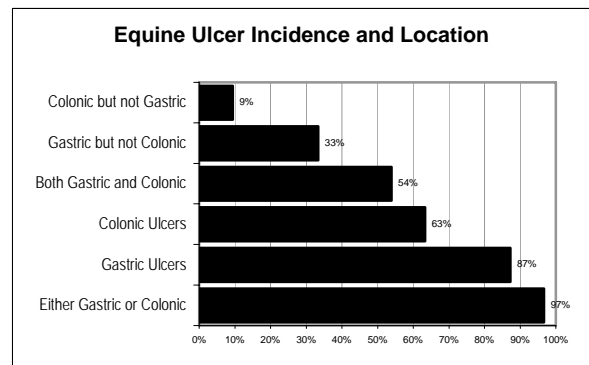
The initial design of the experiment called for using a guaiac spray to bind to ulcers and subsequent application of hydrogen peroxide to dye any lesions blue. However, the ulcers proved to be easily visualized on gross examination of the gastric and colonic surfaces and the spray was deemed unnecessary. It is possible, as a consequence, that smaller ulcers and petechiae may have been missed, and the resulting percentages in this study should be interpreted as a lower bound.

The second study of 180 horses was conducted similarly, but also included a quantitative measure of gastric ulcer severity.

**Results:** In the first group of horses, a 55% incidence of gastric ulcers was observed, which is slightly lower

than recorded studies of show horses (58%)<sup>6</sup> and far below that recorded for thoroughbreds (94%)<sup>7</sup>. However this first study included many range horses that are thought to be less stressed and largely ulcer-free, skewing the totals downward. Nevertheless, even in this presumably lower stress group, a 44% instance of colonic ulceration was observed.

The second group of horses included 180 race, show and performance sport horses. These animals are presumed to be more stressed than their free-ranging brethren, and are generally known to be heavily afflicted by gastric ulcers. This study corroborates that viewpoint: 87% of this group of horses suffered from gastric ulcers. In addition, a surprisingly high 63% incidence of colonic ulcers was noted. In all, over 97% of the horses necropsied displayed some type of ulcer (Figure 1).

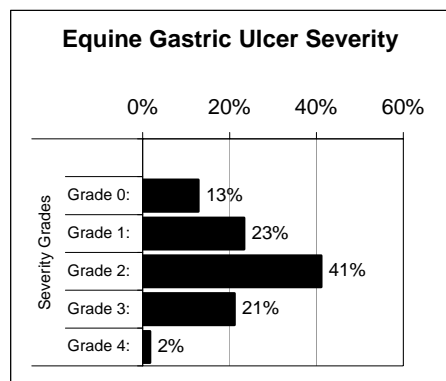


**Figure 1.** Frequency and location of ulcers.

Gastric ulcers can be classified into grades:

- Grade 0: Normal, unulcerated tissue. The epithelium is intact and there is no thickening or abnormal coloring.
- Grade 1: The mucus lining is intact, but there are areas of thickened, discolored tissue.
- Grade 2: Small, single or multiple ulcers present.
- Grade 3: Large, single or multiple ulcers.
- Grade 4: Extensive, deep ulcers.

The grade was noted for each of the gastric necropsies. As expected, these data displayed a roughly Gaussian distribution (Figure 2).



**Figure 2.** Grades of gastric ulcer severity.

Since gastric ulcers can be inspected by endoscopy, any correlation between gastric and colonic ulcers could be valuable. Unfortunately, no strong correlation existed for this sample. The accuracy of gastric ulcers as markers for colonic ulcers was only 57%.

**Discussion:** The stomach of an adult horse can hold 3-5 liters of food. Glandular tissue at the bottom of the stomach provides acids to aid in digestion, while the upper part of the stomach consists of scaly squamous cells. It is postulated that in typical grazing horses, the stomach contents are always partially filled and buffered with fibrous foods like grass and hay, and low levels of exercise keep those contents safely in the mucous-covered glandular portion of the stomach.

Modern stabled horses, on the other hand, are typically fed high carbohydrate feed twice a day so their stomachs are often empty. Unlike humans who secrete digestive juices on demand, horses continuously secrete stomach acids from the glandular tissue at the bottom of the stomach, even on an empty stomach. The acidic mix forms a pH gradient from a harshly acidic pH of 1.5 in the lower glandular region up to a milder pH 6.5 near the top of the stomach. But extensive training can slosh some of the harsher acids up onto the less-protected upper lining of the stomach, which may erode the tissues there.

Thus, both the diet and exercise requirements of performance horses have been postulated by researchers, such as Dr. A.M. Merritt, to be a major cause of gastric ulcers.<sup>8</sup>

Due to the difficulty of examining live animals for colonic ulceration, much less is known of its etiology. This necroscopic study shows that, particularly in performance horses, there is a high incidence of colonic ulceration. Ulcers can lead to loss of blood, irritability and poor absorption of nutrients. This may negatively impact the performance of exactly those horses which are expected to perform at peak efficiency, including show horses and especially race horses.

This study demonstrates that almost all performance horses have some kind of ulcer, and that at least 60% of them have colonic ulcers. These findings raise questions about the causes of colonic ulcers, the effect of colonic ulcers on performance, and their role as a primary cause or as a contributing factor in colic. Further research is warranted.

## References

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