

# Understanding Equine Gastric Ulcer Syndrome: Equine Glandular Gastric Disease (EGGD) and Equine Squamous Gastric Disease (ESGD) – How are they different, and why does it matter?

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**W**hen faced with a case of suspected gastric ulcers, veterinarians often think about the impact on performance, decreasing elements of “stress” and treating ulcers with omeprazole. However, new information is helping us to better understand Equine Gastric Ulcer Syndrome (EGUS) and to further enhance diagnosis, treatment and prevention protocols in ways that better optimize the horse’s health and performance, improving our potential to positively impact patient outcomes.

EGUS is the term commonly used to describe gastric ulcers and erosive lesions in the stomach of the horse. To further distinguish between lesions of the squamous and glandular linings, nomenclature of Equine Gastric Ulcer Syndrome has evolved to describe the conditions separately as Equine Squamous Gastric Disease (ESGD) and Equine Glandular Gastric Disease (EGGD). The two conditions are distinct and separate entities as evidenced by differences in pathophysiology, prevalence, risk factors, and response to treatment.<sup>1</sup>

Equine Squamous Gastric Disease (ESGD) occurs when the squamous lining (which has little means of defense when saliva and feed are not present to act as buffers), is directly exposed to an acidic environment (generally accepted as a gastric pH < 4). Acid production occurs in the glandular region of the stomach on an ongoing basis in the horse, regardless of feeding patterns. Ulcers of the squamous surface occur when gastric acid from the ventral glandular stomach

contacts the unprotected dorsal squamous mucosa. This may occur when the stomach is left empty for extended periods of time (intermittent or infrequent feeding protocols), when gastric acid production is increased (as in times of stress), or under certain conditions of exercise (when abdominal pressure may be increased by engagement of abdominal muscles).

In comparison, the glandular mucosa inherently has several mechanisms to protect itself from the acid it is producing. These include mucus production, bicarbonate secretion, growth factors, and blood supply to allow healing as damage occurs. Therefore, Equine Glandular Gastric Disease (EGGD) results from disruption of these normal defense mechanisms, leaving the glandular tissue surface susceptible to gastric acid exposure. The factors that contribute to the breakdown of the barrier are yet to be well described in the horse, but in humans, *Helicobacter pylori* and NSAIDs are the predominant causes. Research in horses often focuses around bacterial infection and NSAID use as potential causes but without clear causal evidence.<sup>2</sup>

Risk factors for EGUS are most commonly associated with feeding practices and increased levels of stress, and are likely to vary amongst individuals and groups of horses, maintained across a spectrum of management and husbandry practices. Pasture turnout and feeding of alfalfa hay are considered practices that may help to reduce the risk of ESGD<sup>4</sup>, while an increased time between forage meals (>6 hours between

meals), intermittent access to water and intake of grain/starch at less than 6 hours between meals increases the likelihood of ESGD.<sup>3</sup> Risk factors for EGGD are still under investigation but may include Warmblood breeds<sup>5</sup>, frequency (but not intensity) of exercise<sup>6</sup>, and sensitivity to stress (as evidenced by increased cortisol responses to exogenous ACTH)<sup>7</sup>.

The prevalence of gastric ulceration varies with breed, use, level of training, as well as between ESGD and EGGD. The highest reported prevalence of ESGD occurs in Thoroughbred racehorses, with over 80% of horses affected within 2–3 months of race training.<sup>2</sup> Standardbred racehorses have a similar overall ESGD prevalence with up to 87% of horses in training affected, while up to 58% of show/sport horses are affected.<sup>8</sup> Endurance horses have an ESGD prevalence of 48% during the out of competition period that rises to 93% during the competitive period, with lesions most prevalent in elite horses.<sup>10</sup> Horses that are rarely competed and predominantly used in their home environment have the lowest ESGD prevalence of 11%.<sup>2</sup> EGGD was more prevalent than ESGD in a group of competitive polo ponies, with 69% having glandular lesions, and 54% having squamous lesions and the incidence of EGGD was inversely correlated to the experience of the horse.<sup>11</sup>

Gastroscopy is considered the “gold standard” when it comes to diagnosing gastric ulcers in horses, and is currently the only reliable means of monitoring treatment and recurrence.<sup>2</sup> When performing gastroscopy, it is essential to

examine the entire stomach, including the pylorus and proximal duodenum, as lesions in these areas will alter treatment recommendations and expected outcome. There is no relationship between the presence of ESGD and EGGD, as such the presence or absence of one cannot be used as predictor for the presence or absence of the other.<sup>1,2</sup>

Once squamous or glandular lesions are identified, assessment of the severity needs to be assigned according to description and/or location of the lesions. In the case of ESGD, a well-accepted, 0-4 grading system has been established based on repeatability and consistency. This Equine Gastric Ulcer Council 0-4 scoring system is outlined in the table below.

Table 1. Grading system for equine squamous gastric disease (adapted from 1999 EGUS Council<sup>13</sup>)

Grade	Squamous Mucosa Description
0	Epithelium is intact, no appearance of hyperkeratosis
I	Mucosa is intact, but there are areas of hyperkeratosis or gastritis
II	Small, single or multi-focal lesions
III	Large single or extensive superficial lesions
IV	Extensive lesions with areas of apparent deep ulceration

If lesions are identified in the glandular regions of the stomach, they should be described according to the anatomical location, distribution and appearance as per the following recommendations:<sup>1,2</sup>

- Anatomic location: cardia, fundus, antrum or pylorus
- Focal, multi-focal or diffuse
- Mild, moderate or severe
- Nodular, raised, flat or depressed
- Erythematous, haemorrhagic or fibrinosuppurative

Currently, there is no agreed-upon scoring system for glandular lesions as their relative severity and clinical importance is unknown.

### If the pathophysiology and nomenclature are different, what are the treatment recommendations for ESGD vs EGGD?

Suppression of acid production remains the cornerstone for treatment of both ESGD and EGGD. Until recently, recommendations for treatment of EGUS have not differentiated between the two diseases, but improved recognition of the difficulty in treating EGGD has resulted in modified treatment protocols. While it has been shown that Gastrogard® (omeprazole) paste at 4mg/kg for 28 days will effectively heal or reduce the severity of squamous ulcers in 92% of cases, new evidence suggests that only 9-32% of glandular lesions healed with a similar dosing regime.<sup>14,15</sup> The reason for poor response of EGGD to monotherapy with omeprazole is not well understood; however, given the assumption that mucosal barrier defects play a role in the pathology of EGGD, the use of mucosal protectants as a component of treatment is recommended. As evidence, the use of GASTROGARD at 4mg/kg PO once daily and sucralfate at 12mg/kg PO twice daily resulted in healing rates of 67.5% for EGGD of the pyloric antrum.<sup>16</sup>

Adjustments in management practices are also critical to the overall treatment outcomes. The presence of food within the stomach may inhibit the absorption of proton pump inhibitors (omeprazole) so it is essential that feeding patterns are modified to maximize bioavailability. Ideally, for treatment of gastric ulcers, horses should have omeprazole administered on an empty stomach, food should not be provided for at least 30 minutes, and ideally 60–90 minutes after treatment.<sup>2</sup> It is important to point out to owners that administration on an empty stomach is only to be during the treatment phase as regular forage consumption is important in the management strategy to prevent recurrence. To

optimize combination therapy of omeprazole and sucralfate, sucralfate should be administered at least 30 minutes after the administration of omeprazole, and the horse re-scoped after four weeks of daily treatment with both drugs. Owner expectations must be managed as often, horses with EGGD require treatment for at least 6-8 weeks. Considerations for polypharmacy applications to treat EGGD may also include misoprostol. Misoprostol is a prostaglandin analog that is a logical treatment for EGGD but has limited evidence of efficacy, and the potential to cause abortion in human handlers of the horse. Antimicrobials should not be used as a first-line treatment for EGGD as bacteria are not considered to be an important risk factor for EGGD in horses. They should only be used in refractory cases or those with histological evidence of bacterial infection.<sup>2</sup>

While continued research will further our understanding of the pathophysiology, diagnosis, treatment and prevention of ESGD and EGGD, focus on definitive diagnosis, appropriate pharmaceutical treatment, and adjustments in management and husbandry practices will help to alleviate the negative impact that ulcers have on our patients and on their performance.

**Important Safety Information:** The safety of GASTROGARD paste has not been determined in pregnant or lactating mares. For use in horses and foals 4 weeks of age and older. Keep this and all drugs out of the reach of children. In case of ingestion, contact a physician.

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1. Rendle D, Bowen M, Brazil T, Conwell R, Halowell G, Heppburn R, Heweston M, Sykes B. EGGD Consensus Statement: Recommendations for the management of Equine Glandular Gastric Disease. *UK-Vet Equine*; Jan/Feb 2018
2. Sykes BW, Heweston M, Heppburn RJ, Luthersson N, Tamzali Y. European College of Equine Internal Medicine Consensus Statement – Equine Gastric Ulcer Syndrome in Adult Horses. *J Vet Intern Med*. 2015; 29:1288-1299
3. Luthersson N, Nielsen KH, Harris P, Parkin TDH. Risk factors associated with equine gastric ulceration syndrome (EGUS) in 201 horses in Denmark. *Equine Vet J* 2009;41:625-630.
4. Nadeau J, Andrews F, Mathew A. Evaluation of diet as a cause of gastric ulcers in horses. *Am J Vet Res* 2000;61:784-790
5. Mönki J, Heweston M, Virtala AMK. Risk Factors for Equine Gastric Glandular Disease: A Case-Control Study in a Finnish Referral Hospital Population. *J Vet Int Med*. 2016; 30:1270-5
6. Habershon-Butcher JL, Hollowell GD, Bowen IM, Sykes BW. Prevalence and risk factors for gastric glandular disease in Thoroughbred racehorses in the UK and Australia (Abstract). *J Vet Int Med*. 2012; 26:731
7. Scheidegger MD, Gerber V, Bruckmaier RM, Der Kolk Van JH, Burger D, Ramseyer A. Increased adrenocortical response to adrenocorticotropic hormone (ACTH) in sport horses with equine glandular gastric disease (EGGD). *Vet J*. 2017; 228:7-12
8. McClure SR, Glickman LT, Glickman NW. Prevalence of gastric ulcers in show horses. *J Am Vet Med Assoc* 1999;215:1130-1133.
9. Niedzwiedz A, Kubiak K, Nicpon J. Endoscopic findings of the stomach in pleasure horses in Poland. *Acta Vet Scand* 2013;55:45.
10. Tamzali Y, Marquet C, Prymerko N, Lycazini F. Prevalence of gastric ulcer syndrome in high-level endurance horses. *Equine Vet J* 2011 Mar;43:141-144.
11. Macleod H, Windeyer C, Crosby C, Banse H. Prevalence and risk factors for gastric ulceration in polo horses (Abstract). *J Vet Intern Med*. 2015; 27:1244
12. Luthersson N, Nielsen K, Harris P, and Parkin, T.D.H. (2010) The prevalence and anatomical distribution of equine gastric ulceration syndrome (EGUS) in 201 horses in Denmark. *Equine Vet J* 2010; 41:619-24
13. Andrews F, Bernard W, Byars D, et al. Recommendations for the diagnosis and treatment of equine gastric ulcer syndrome (EGUS). *Equine Vet Educ* 1999;11:262-272.
14. Gastrogard® (omeprazole). Product insert, by Merial
15. Sykes BW, Sykes KM, Hollowell GD. A comparison of three doses of omeprazole in the treatment of gastric ulceration in the horse: A randomised, blinded clinical trial. *Equine Vet J* 2015;47:285-290.
16. Heppburn RJ, Proudman CJ. Treatment of ulceration of the gastric glandular mucosa: Retrospective evaluation of omeprazole and sucralfate combination therapy in 204 sport and leisure horses [abstract]. *Proc 11th International Equine Colic Research Symposium*. 2014, 108.