

# The Effect Of Feed On Gastric PH In The Exercising Horse

Stephanie Bond, The University of Queensland –Two Year Grant

**This study will determine the effect of different pre-exercise feed protocols on gastric pH during exercise, to inform optimal regimens and reduce the risk of equine squamous gastric disease.**



Equine Gastric Ulcer Syndrome (EGUS) is the most common disease of the horse's stomach, particularly in athletic horses. A subcategory of EGUS is Equine Squamous Gastric Disease (ESGD). The upper portion of the stomach is lined with squamous mucosa, which lacks natural defense mechanisms against gastric acid and is normally exposed to a pH of 6-7. The development of ESGD is associated with the exposure of squamous mucosa to acidic gastric fluid (pH less than 4), similar to gastroesophageal reflux disease in humans. Multiple risk factors have been identified for EGUS including exercise, diet, and housing. Treatment centers around reducing gastric acidity, primarily with acid-suppressive medications such as omeprazole, and management strategies are also important.

One significant risk factor for acid exposure is exercise, as increased intra-abdominal pressure during exercise causes gastric contraction, leading to acid splash. It is widely accepted that feeding prior to exercise creates a fiber mat within the stomach which reduces acid splash. Although feeding at least 300g of hay has been shown to provide a buffering effect in resting horses, this effect has not been demonstrated during exercise.

Previous research in exercising horses measured gastric pH using nasogastric pH probes, but the location of this probe within the stomach is not known and they are prone to displacement. Therefore, these results might not accurately reflect the local pH of the mucosa where acid splash occurs. The methodology by which gastric pH is measured is important due to the normal pH gradient present in the horse's stomach, which creates regional differences in pH. Therefore, precise measurement with a known, fixed measurement location is crucial to obtain data which accurately reflects local dynamics.

A wireless capsule was developed in human medicine which attaches to the esophageal or gastric mucosa for continuous pH measurement in people with gastroesophageal reflux disease, allowing non-invasive recording with a known fixed location. In recent research by our group, the capsules were successfully used to obtain continuous wireless gastric pH readings in the resting and exercising horse.

This study aims to investigate the effect of different pre-exercise feeding protocols on gastric pH during exercise using wireless pH capsules. Horses will undergo three different protocols (no feed, chaff, and hay) prior to overground exercise, in a randomized crossover design, and gastric pH will be continuously recorded.

**Importance to Industry:** EGUS is a significant welfare and economic concern in the equine industry, with reported clinical signs ranging from poor performance and behavioral changes to inappetence, colic and weight loss. Gastric ulceration is reported to varying degrees across an array of breeds and disciplines, from donkeys to Western Pleasure Horses to Thoroughbred racehorses.

The prevalence of ESGD ranges from 37-52%, 38-56% and 48% in Thoroughbred, Standardbred and endurance racehorses respectively when out of training, increasing up to 100%, 72-88% and 57-93% respectively during training. The risks are multifactorial, but exercise plays a significant role, including duration, intensity and frequency of exercise, and timing of exercise relative to feeding and drug administration. Thus, management strategies are important to reduce risk, particularly for ongoing prevention.

The results of this study could be used to inform optimal pre-exercise feeding regimens to reduce squamous mucosal acid exposure and thus the risk of ulceration.

This is particularly relevant for racehorses, where administration of medications on race day is prohibited, and therefore the horses may be subject to significant acid splash during exercise.

Additionally, there is growing concern regarding overuse and potential adverse effects of acid suppressive medications in humans and horses, so preventative strategies should be identified to reduce reliance on medications. This technique provides a safe, minimally invasive, and reliable method to measure intragastric pH under exercising conditions, which could be used to inform management decisions in owners and trainers of racehorses and performance horses.