



# USE OF LUCERNE AND IT'S EFFECTS ON GASTRIC HEALTH

We have all heard over and over again that fibre is important in a horse's diet. But, what might surprise you is that this capacity of fibre to protect and support a healthy digestive tract, from the stomach to the large intestine, is the basis behind almost every aspect of sound equine nutrition.

It is commonly known, accepted, and promoted in the equine nutrition and veterinary world that the capacity of feeds and forages to counteract changes in gastric pH (stomach acid) plays an important role in the prevention of gastric ulcers in horses. This ability to resist changes in pH is called buffering capacity. Lucerne hay and chaff has been shown in multiple studies to reduce the severity of ulcers in horses by providing superior buffering capacity compared to other forages.

Gastric ulcers are very common in performance horses, affecting more than 90% of racehorses and 50 to 70% of competition horses. The occurrence of ulcers is related to work, reduced forage intake, meal feeding (no grazing), and high starch (from grain) intake. The high incidence of ulcers seen in performance horses is a man-made problem resulting from the way we feed and manage these horses, since ulcers, are much less prevalent in unexercised horses maintained solely on pasture.

Most ulcers occur in the upper portion of the horse's stomach which is comprised of non-glandular squamous epithelium. Ulcers are primarily the result of prolonged exposure of this tissue to gastric acid. Unlike the lower, glandular portion of the stomach, the upper half of the equine stomach does not have a bicarbonate-rich mucus layer. The only protection this portion of the stomach has from gastric acid comes from saliva production and the buffering capacity of feed.

Many horses with ulcers have no clinical signs. However, typical signs include poor performance, poor appetite, mild colic, behavioural changes, loose manure, and weight loss. Ulcers can lead to physiological changes that can reduce performance. Gastric ulcers are safely and effectively treated by vet medications, although expensive, and there are many preventative supplements on the market that buffer stomach acid and support digestive health including probiotics and prebiotics, mineral mixes, and various yeasts.

Horses evolved as grazing animals with digestive tracts designed for continual consumption of forages. Meals of grain or extended periods of fasting lead to excessive gastric acid output and inadequate saliva production.

Horses secrete stomach acid continuously whether or not they are fed. The pH of gastric fluid in horses withheld from feed for several hours has consistently been measured to be 2.0 or lower (highly acidic). Horses that received free-choice grass hay for 24 hours had average gastric pH readings that were significantly higher. High pH readings (less acidic) in hay-fed horses is expected since forage consumption stimulates saliva production which naturally buffers acid.

American researchers measured the amount of saliva produced when horses ate either hay, pasture, or a grain feed. When fed hay and fresh grass, horses produced twice as much saliva compared to when a grain-based meal was offered.

The type of forage fed to horses has a significant impact on acid neutralization and the incidence of gastric ulcers. In 2000, researchers at the University of Tennessee reported a study in which six horses with gastric cannulae were fed both lucerne hay and grain, or grass hay without grain supplementation.





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The lucerne hay and grain diet was predicted to produce more ulcers due to the grain contributing to the production of volatile fatty acids (VFA) in the stomach and less saliva production compared to when the horses were fed only grass hay. Surprisingly, these researchers found that feeding lucerne hay and grain increased the pH of gastric fluid and reduced the number and severity of gastric ulcers compared to feeding the diet of grass hay. Saliva production was not measured in this study, but it was suggested that the buffering capacity of the alfalfa and/or concentration was greater than for grass hay.

A 2007 study at Texas A&M University on 24 Quarter horse yearlings suggests that the differences seen in the Tennessee study were related to the type of hay fed. In the peer-reviewed study conducted by Texas researchers, the incidence of ulceration was compared in horses fed a pelleted grain concentrate along with either grass hay or lucerne hay. Results of the study showed that relative to feeding grass hay, feeding lucerne hay reduced ulcer severity scores in horses with gastric ulceration and prevented ulcer development in 92% of the horses fed lucerne hay that did not have ulcers, whereas only 25% of the horses without evidence of ulceration fed grass hay did not appear to develop ulcerations. When horses with ulcers were put onto lucerne hay for four weeks, the ulcers healed naturally.

Lucerne provides greater buffering capacity compared to grass forages for several reasons. First, lucerne contains higher levels of protein and calcium, both of which buffer gastric acid. Also, lucerne cell wall contains indigestible compounds such as lignin that gives it a greater buffering capacity than grasses.

In the early 1980s, researchers showed that the cell walls of lucerne plants have a much higher buffering capacity than the cell walls of either timothy (grass) plants or oats when titrated with hydrochloric acid. A few years later, other researchers measured the in vitro buffering capacity of 52 feeds to determine the buffering capacity range among feed types. Buffering capacity was lowest for energy feeds, intermediate for low-protein feeds and grass forages, and highest for high-protein feeds and legume forages.

The buffering capacity of feed and forage is an essential component in the prevention of gastric ulcers in horses. Lucerne has been shown to be effective in reducing the severity of ulcers in horses by providing superior buffering capacity compared to grass forages. Unfortunately, high levels of lucerne hay or chaff may not be desirable for some horses due to its high calorie, protein, and calcium levels. Always have an equine nutritionist review your horses' diets to ensure the best combination of feed and forage for their age, weight, breed, and workload.



Horses are designed to eat fibre. Fibre is provided by roughage sources such as hay, chaff, pasture, and beet pulp. Pasture turn-out and free-choice hay is best.



Adequate fibre intake is vital for a healthy digestive tract in all horses. Barastoc recommends feeding at least 1% of a horse's body weight in fibre per day, and ideally 1.5%. A 500 kg horse should be offered 5 to 7.5kg forage.



For horses suspected of having ulcers, it is recommended to have a veterinarian diagnose the problem with an endoscope and treat using a proven ulcer medication. Once the ulcers are treated, aim to prevent their recurrence by correct feeding management. This includes reducing the size of grain meals (feed smaller meals more often), adding fat supplements, feeding adequate fibre, allowing some grazing time, and not working horses on an empty stomach.



Barastoc recommends that horses are fed a small amount of lucerne hay or haylage before a workout to put a fibre mat over the acidic stomach contents and reduce acid splash.



To help reduce the starch intake yet still supply enough energy for work, it is beneficial to add energy from fat supplements.



Horses at risk of gastric ulcers would benefit from the addition of lucerne forage (hay, and/or chaff) to their diet due to superior buffering capacity over grass forages.