

Athletic Animals

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The Equine Stomach – Why Do Horses get Ulcers?

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Why does this happen? The answer can be very complicated scientifically, but in very simple terms the cause is bad management of the horse; and primarily bad feeding management.

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Anyone with a horse with gastric ulcers will not want to hear that, but it is a simple fact.

[Feeding](#)

Horses are grazing herbivores – they graze almost continually when left in pastured areas, and the small stomach (only 8-15 litres capacity) is ideally designed for small, regular meals, as will happen when horses graze for long periods. Horses are also designed to consume large volumes of forage (roughage), and to obtain the bulk of their energy intake from the breakdown of fibre and roughage into available energy, under normal circumstances.

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Food passes through the stomach quite rapidly, often in about 15 minutes, and then progresses through the small intestine quite rapidly as well. It is common for food to arrive at the large intestine (the site of most fermentation and digestion of fibre and roughage) in as little as 1.5 - 2 hours. This leaves little time for nutrients to be absorbed from both the stomach and small intestine, and any alteration to the passage of food through the gut by altering the natural diet can significantly reduce gut function and efficiency.

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The real problem for horses arrives when they have their eating and chewing time restricted (by stabling horses and restricting feed times to one or two large meals daily), and then by further stressing digestive function by undergoing regular hard exercise (often on an empty stomach).

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You can rightly ask why that should make a difference. The answer is quite simple:

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Horses salivate only when they are chewing and eating. Under normal circumstances horses will produce up to 30 litres a day of saliva because they graze and chew fibrous material so much. Saliva is an acid buffer. It contains high levels of bicarbonate and other alkaline buffers to neutralise the acid in the stomach, as well as to lubricate the food.

On top of this, horses constantly produce stomach acid, even if the horse is not eating.

So a normal grazing horse will chew and graze for up to 16-20 hours daily, almost constantly producing saliva to neutralise the stomach acid which is constantly being produced.

Normal meals high in fibre tend to absorb much of the stomach acid produced (remember that stomach acid is there to begin to digest and break down fibrous materials in the meal immediately after the food is chewed, broken up, and swallowed).

Normal meals high in fibre also tend to stay in the stomach for longer periods than watery, or non-fibrous foods (including grains and mashes). The actual emptying time of the stomach is governed by the size of the meal – so a large meal will empty faster than a small meal. Similarly, a predominantly grain or concentrate meal will empty rapidly.

If the stomach empties quickly, there are long periods when acid is being produced, yet there is no food in the stomach, especially when horses have restricted feeding times because they are stabled and fed to a stable routine once or twice daily.

Now, have a think about current performance horse [feeding practices when horses are stabled and working](#).

We confine the horse so that it receives very little, if any, grazing opportunity. Under these circumstances the horse can only eat when it is fed under the stable routine. This may be once, twice, or at most three times daily. There are very long periods when the horse will have an empty stomach under these stable conditions – yet it still produces gastric acid, while producing very little saliva.

On top of this, we usually provide a diet that is low in roughage, because we want to provide lots of energy producing food to cater for the increased demands for energy when horses are training and competing. There is only so much feed volume a horse can eat in a day, and performance horse diets can often be too bulky unless concentrated energy or grain diets are fed.

These high grain and concentrate /low fibre diets commonly fed to performance horses have several real problems: the high grain/concentrate component requires very little chewing time before swallowing, so it is often not well broken up (you know how much grain a horse can pass in its faeces). If the horse has only a very short time to chew this type of food, it naturally produces very little saliva to neutralise the stomach acids. Worse, the grain and concentrate has little fibre in it, so it passes through the stomach quite rapidly.

Grain and concentrate diets allow for very reduced chewing time, thus very little saliva production. They then pass through the stomach rapidly, leaving an empty stomach still producing acid until the next meal is presented.

This acid in the empty stomach is what causes gastric ulcers. The stomach is designed to have small, regular meals so there is always a little fibrous food inside, as we have previously mentioned.

Free acid acts as a potent irritant on the mucosal lining of the stomach, rapidly eating away the mucosal surface, and creating ulceration.

What makes this worse, is then exercising horses (usually on an empty stomach). The increased pressure created in the abdomen when horses are exercising appears to force the acid levels further up onto the unprotected mucosal layer in the stomach, exposing highly sensitive regions of the stomach lining which normally would not be exposed to corrosive acid, to acid activity.

In summary, not keeping food in the stomach at all times, irregular feeding patterns, hard exercise, and high grain/concentrate diets with low levels of roughage, all compound to allow gastric acid to create ulcers very rapidly. It's no surprise that up to 90% of thoroughbreds will have some degree of gastric ulcers during preparation.

Why, then, do pleasure horses not usually have such severe gastric ulcers? Again, the answer is quite simple. Pleasure horses generally have far more access to grazing, and can thus eat more continuously. They are also not generally fed the very high grain and concentrate levels seen in thoroughbred diets, and they generally have more access to roughage in the daily diet. On top of this, pleasure horse work programs are not generally as intensive as for thoroughbreds.

Some Facts:

Horses are continuous eaters. When left to its own devices, the horse will eat on a continuous basis, which means it never has an empty stomach, and it never completely fills its stomach either. Horses in these conditions are normally occupied eating for almost 20 hours daily, and their diet is rich in fibre but low in carbohydrates. Fibre requires adequate chewing, so horses produce copious flows of saliva manufactured during this intensive chewing. Food intake naturally is slow and protracted, so the stomach receives only small portions at a time, yet remains partially filled all of the time.

Horses have small stomachs. Size varies from 8-15 litres only – adapted for small, continuous meals.

Horses secrete gastric acid continuously, even when the stomach is empty, and when fasting.

Horses only salivate when chewing and eating. Saliva buffers gastric acids. They produce 10-30 litres of saliva daily. Saliva is rich in the acid buffer, bicarbonate. Here, the type of feed used is important – twice as much saliva is produced when horses eat hay or grass compared to grains and other

concentrates. Thus high grain/low fibre diets will decrease saliva flow and result in lower gastric acidity – a risk factor for gastric ulcers. High roughage diets tend to stimulate production of bicarbonate-rich saliva which buffers gastric acid.

Horses of all breeds and uses can develop gastric ulcers. The prevalence of lesions is influenced by the management and use of the horse. Horses at pasture or on very light work have normal stomachs, or very mild erosions. In contrast, horses in stalls or trained intensively have a high prevalence (up to 90%) gastric lesions.

Racing horses and [horses in training](#) have high levels of gastric ulcers (estimates from 66% to over 90% by different authors)

Pleasure horses generally have lower levels (37%) and lower severity of ulcers

The prevalence and severity of gastric ulcers increases with duration of race training.

Gastric Ulcers are caused by an imbalance of stomach mucosal aggressive factors (hydrochloric acid, bile, pepsin) and mucosal protective factors (bicarbonate and mucous)

Management factors involved in gastric ulcer formation are type of diet and eating behaviour. Restricting access to roughage, or feeding large amounts of concentrates, reducing the amount of time a horse has to eat roughage, all increase stomach acidity. High roughage diets tend to stimulate production of bicarbonate-rich saliva which buffers gastric acid.

The type of feed has a dramatic effect on speed of ingestion (or eating time required), and thus the amount of saliva produced. Horses will take about 40 minutes to eat 1kg of hay. When grains and concentrates are substituted in the diet to provide additional energy for performance, the total time feeding is very significantly reduced – 1kg oats can be eaten in less than 10 minutes. This means that a mixed hay and grain diet could reduce feeding time by as much as 2-3 hours.

If a horse is stable fed (say, twice daily), the stomach is empty for long periods, and acid production occurs continuously. The same can be said when travelling horses.

The aim is to keep food in the stomach as much as possible, to take up the excess gastric acid.

The type of ration influences the time food spends in the stomach- meal size, feed type and exercise all have a role to influence transit time in the stomach. Large grain meals result in less time chewing and eating, and fast gastric emptying – resulting in less digestion of available starch. Pelleted and ground feeds (smaller feed particles) also tend to move faster through the stomach and small intestine than do fibrous feeds such as hay and grass. Exercise also results in speeding up of transit times for food.

Larger meals pass more quickly than small meals, since stomach emptying is controlled by meal volume. Passage time through the stomach may be as short as 15 minutes when a large meal is eaten. If a horse is fasted, it can take 24 hours for the stomach to clear. Traditional once or twice daily feeding of stabled horses tends to make the horse eat large meals which don't stay long in the stomach. In addition, the high grain or concentrate component in most stable horse rations tend to reduce actual time spent eating and chewing even more, resulting in less saliva produced, and more gastric acid action on stomach mucosa.

These are the primary factors that cause gastric ulcers in performance horses. In future articles we will look at what can be done to treat ulcers, and examine the important issue of gastric ulcers in foals.