

# Nutritional Minute



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## Laminitis: What's Grain Overload Got to Do with It?

### What is laminitis?

Laminitis occurs when the tissues that connect the coffin bone to the hoof wall, called the laminae, become inflamed and the blood supply is compromised. Laminitis varies in severity depending on the amount of damage inflicted on the laminae. Mild cases usually result in very little permanent damage to the laminae, while the more severe cases can result in founder, or the sinking of the coffin bone. There are several factors that can lead to laminitis; one is over-feeding your horse large amounts of grain (also known as "grain overload").

### Straying from nature

Horses evolved as continuous grazers, meaning they are designed to consume small portions of forage throughout the day. (Think of it as snacking on veggies all day rather than eating a full-course meal.) These small meals consisted mainly of native grasses and plants with a content high in fiber and low in sugar, starch and fructans. Modern feeding practices have changed the way horses eat and what they eat. Horses today commonly receive large meals of grain 2-3 times a day. Grains are much higher in sugar and starch, and lower in fiber than the native forages horses were meant to eat. The high sugar and starch content of grain combined with large meal size can contribute to laminitis, but how?

### What happens in the digestive tract during grain overload

Large meals move much quicker through the digestive tract than small meals. When your horse consumes a large amount of grain, the grain spends less time in the stomach and small intestine because the rate of passage is much quicker than that of a small meal. This reduces the opportunity for the feed to be adequately digested. To top it off, researchers have found that horses have a limited capacity to digest large amounts of sugar and starch in the stomach and small intestine. When the sugar and starch content of feed is high, and large amounts of it are fed as in grain meals, it can overwhelm your horse's ability to break down the nutrients. Less opportunity for adequate digestion due to meal size and the high sugar and starch content of grain mean that undigested starch and sugar move on to the hindgut. This overflow of sugar and starch into the hindgut is where the trouble begins.

The hindgut of your horse contains a delicately balanced microbial population responsible for fermenting feedstuffs that are not digested by the stomach and small intestine. The byproducts of this fermentation are used by your horse to meet dietary requirements. When there is an overflow of starch and sugar, the microbial population changes. The bacteria that

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ferment starch and sugar flourish and produce the fermentation byproduct, lactic acid. The lactic acid lowers the pH in the hindgut.

The new acidic environment irritates the tissue lining of the hindgut and becomes detrimental to fiber-loving bacteria, causing a kill-off of these bacteria. The dead bacteria release endotoxins that are able to enter into the bloodstream due to the compromised tissue lining. These hindgut changes often lead to laminitis.

Many experts agree that grain overload and the changes it causes in the hindgut trigger laminitis. Exactly how these hindgut changes cause a restriction in blood supply and inflammation of the laminae in the hoof remains unknown. What we do know is that through smart management you can reduce the risk of grain overload in your horses.

## Reducing the risk of grain overload

Grains are a good way to increase calories in the diet, and when they are fortified, can provide a source of vitamins and minerals to your horse. The key is not to overdo it by providing large amounts of grain at one time. You can limit the amount of sugar and starch your horse is eating by keeping grain meals small. Nutritionists recommend feeding no more than 4 lbs of grain per meal. If your horse requires grain to maintain body condition, consider splitting the grain ration into several small meals throughout the day. Lastly, be sure to provide adequate amounts of forage in the diet. Experts recommend feeding 1-2% of your horse's body weight in forage every day. For a 1,000-lb horse, this is 10-20 lbs of forage per day. Always consult your veterinarian or equine nutritionist when making changes to your horse's diet.



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