

Dietary Sugar Vs. The Hoof



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Q Can hoof problems be caused by my horse owner clients feeding too much sugar from grains or from forages?

By Dr. Shannon E. Pratt-Phillips and Buck McColl

More horse owners seem to be learning about the dangers of sugars with respect to hoof health. Sugar in a horse's feed, including that found in both cereal grains and pasture plants, can have both direct and indirect negative consequences on hoof health.

Digestive System Designed For Low-Quality Roughage

The horse's digestive tract is designed to handle a diet of relatively low-quality roughage, such as hay or sparse pasture. The large intestine is inhabited with billions of microbial organisms that ferment the fibrous portions of plants.

When horses are fed diets that contain too much starch and sugar that is

normally digested in the small intestine, the starch and sugar may overload the system and continue into the large intestine. In this area, the microbes that are used to ferment fiber will also rapidly ferment starch and sugar, which results in a disruption of the delicate dietary ecosystem.

This results in the production of gases, lactic acid and other compounds. Some of these toxic compounds may be absorbed into the bloodstream and cause laminitis. Therefore, it is very important for your footcare clients to know how much starch and sugar their horse has in its diet, so they can limit the amount fed in each meal.

Fructan Concerns

When analyzing feeds for sugar content, the term non-structural carbohydrate (NSC) is often used. This

classification includes all kinds of simple sugars and starches, along with a unique type of sugar called fructans, which are found in pastures.

Fructans are a little different because they are not digested in the same way as other simple sugars and starch. Instead, they're fermented in the horse's large intestine and can result in the production of several byproducts that may be detrimental to the horse's hoof health. To complicate matters, the NSC and fructan concentrations that are found in pasture plants are highly variable with the season and even the time of day.

Too much sugar in the diet can also wreck havoc on the horse's metabolism, which may also negatively affect hoof health. When large NSC meals are consumed, the horse's blood sugar rises, followed by another hormone, insulin. Insulin helps keep blood sugar concentrations stable by allowing sugar to move from the blood and into the tissues.

With repeated stimulation (such as following many high NSC meals), insulin's actions may decrease and the

A Guide To Sugars In The Equine Diet

Non-structural carbohydrates (NSC) includes starch and simple sugars

Feed Ingredient	% NSC
Legume hay (such as alfalfa).....	11%
Grass hay (such as timothy or orchardgrass).....	13%
Mixed pasture.....	13%
Barley.....	60%
Beet pulp.....	12%
Oats.....	49%
Corn.....	73%
Wheat.....	67%
Wheat bran.....	30%
Soybean meal.....	15%
Molasses.....	60%

—Data obtained from Equi-Analytical and represents an average value on a dry matter basis



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Feed Sugar Carefully

While sugar is an important energy compound, it should be fed to horses with great care. Too much starch and sugar in a horse's diet may directly (via digestive tract overload) or indirectly (insulin resistance) negatively affect your horse's hoof health and place the animal at risk for laminitis. **Q**

Coming In The May/June Issue

Next in the *American Farriers Journal* "Nutrient Strategies" series: "What Are The Most Critical Interactions Between Nutrients And Hoof Growth?"

animal may become insulin resistant. This causes the horse to produce more insulin in an effort to help regulate blood sugar.

However, both high blood sugar and high insulin concentrations in the blood are believed to have negative consequences on delicate blood vessels, such as those found in the laminae of the hoof. Thus, horses that are insulin resistant have a higher risk of developing laminitis.

Laminitis leads to the inflammation of the laminae, which are highly vascularized layers of tissue found between the hoof wall and the coffin bone. These blood vessels are highly sensitive to changes in metabolites (such as glucose and/or insulin), toxins and inflammatory compounds, all disruptions that can cause laminitis. Therefore, the direct absorption of toxins from digestive disturbances or indirect changes in metabolism due to habitual diet may result in hoof problems.

This scenario should be of value as you continue to help your clients understand some of the nutritional causes behind some hoof problems.

The digestive disturbances mentioned previously are very similar to the results seen with colic and founder. These digestive concerns also cause the release of toxins into the blood stream, which constrict the capillaries and prevent nutrients from flowing from the blood stream into the cells of the hoof. Proper feeding practices can help avoid some of these concerns.