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Nutritional Management for Avoiding Equine Laminitis

With the arrival of the spring season, equine laminitis is on the minds of many horse owners. Equine laminitis is a disabling and painful disease that ultimately affects the hoof, rendering the animal unsound. Although laminitis has many causes, nutritional related laminitis is thought to be associated with high intakes of nonstructural carbohydrates (NSC). There is no treatment for equine laminitis, so avoiding the disease through feeding a low NSC diet is recommended for predisposed individuals. A basic knowledge of NSC in forages and feeds is necessary for the nutritional management of horses and ponies at risk for developing laminitis.

Nonstructural Carbohydrates (NSC)

Nonstructural carbohydrates are simply defined as the sum of starches, sugars and fructans in a feed or forage. The primary source of starches is cereal grains. The primary source of sugars and fructans is forages (Table 1).

Table 1. Types of NSC, sources and examples.

NSC component	Source	Example
Starch	Cereal grains	Corn, oats, barley
Sugar	Forages (pasture & hay)	Cool season and warm season grasses
Fructan	Forages (pasture & hay)	Cool-season forages

Feed Selection

Horses and ponies that are at risk for laminitis should not be fed cereal grains. Cereal grains such as oats and corn contain high amounts of NSC in the form of starch (50 to 70% dry matter). It's important to note that the amount of molasses added to a feed (ie. "sweet feed") does not increase the NSC content significantly; it's the starch from the cereal grain(s) that make it high in NSC. Ration balancer products are ideal for feeding easy keepers prone to laminitis because they provide protein (amino acids),

vitamins and minerals to compliment forages without adding the extra starch and calories to the diet. Horses that are at risk for laminitis, but require calories to maintain weight, should be fed a low starch feed or diet. Nearly all feed manufacturers today offer a “low starch” feed where calories are provided by fat and fiber. Fat (vegetable oils, rice bran, etc.) are the safest way to add calories to the equine diet.

Forage and Hay Selection

In general, forage NSC content ranges from less than 10% to around 30% (on a dry matter basis). The concentrations of NSC (primarily sugars) in forages vary widely due to a number of variables including plant species and stage of growth, and environmental factors including day length, sunlight, drought, frost and humidity. Since forage NSC is so variable, forage analysis is essential to selecting hay for equine predisposed to laminitis. The NSC of hay also depends on the time of day the forage was cut and drying conditions. Hay that is cut in the afternoon and dries quickly will be higher in NSC compared to hay that is cut in the morning and takes a long time to dry under humid conditions. The laboratory used by UT Extension does not provide analysis of NSC in forages at this time, but samples can be submitted directly to a commercial laboratory such as Equi-Analytical Laboratories. The terminology used for NSC analysis varies between laboratories so it’s important to make sure you know what components are being measured and reported. Most equine researchers and veterinarians refer to Equi-Analytical Laboratories terminology (Table 2). For more information on collecting and submitting forage samples see the July 2011 Tennessee Equine Report.

Table 2. Carbohydrate terminology used by Equi-Analytical Laboratories.

Term	Components Analyzed
Starch	Starch only
Ethanol soluble carbohydrate (ESC)	Sugars only
Water soluble carbohydrates (WSC)	Sugars + Fructan
Nonstructural carbohydrates	Starch + Sugar + Fructan

Pasture and Grazing Management

It’s usually not practical for horse owners to collect and submit pasture forage samples for NSC analysis because they are so variable. Instead, horse owners can manage turnout times to avoid grazing pastures when environmental conditions favor accumulation NSC in forage plants. The NSC content is highest in forages in the afternoon to early evening hours during the growing season, especially on sunny spring and autumn days that follow a cool night. The NSC content will be lower in forages located in shaded areas or on overcast or rainy days. Turnout should also be limited when pastures have been stressed from drought or frost. If horses cannot be confined to dry lots (preferably) or stalls, grazing muzzles can be used. Grazing muzzles are excellent tools because they restrict grazing while allowing exercise, and they can be left on 24/7.

How much NSC is safe?

There are no clear “cut-off” values for a “safe” amount of NSC for horses at risk for laminitis. In general, horses or ponies considered at high risk for laminitis should receive a diet that is less than 10% NSC per day. Horses or ponies at a moderate risk should receive a diet that is less than 15 to 20% per day (on a dry matter basis). Keep in mind, a low NSC diet may not be necessary for all horses, only for those at risk for laminitis. Feeding programs should be designed based on the individual horse or pony’s nutrient and energy requirements. Aside from limiting NSC intake, keeping horses and ponies at an ideal body condition score (BCS 5-6) and exercise will improve the overall health of the animal and decrease the risk of laminitis.