

### **Don't "Freak-Out" About Fructans by Dr. Vern Baron Agriculture and Agri-Food Canada Lacombe, AB**

Horse owners have become acquainted with fructans and their role in pasture laminitis over the past five years. Articles have been published in the popular horse-press, which tend to imply that a relationship between fructans and pasture laminitis is a new and unique discovery and is due to newly developed pasture grass species noted for high sugar content. On the contrary, pasture laminitis is the same pasture laminitis that horse-related cultures have dealt with since horses and humans have come in contact. It is closely related to the same laminitis that my Shetland pony suffered when she overloaded on grain after breaking into a grain bin when I was a kid.

Chemically speaking, fructans are non-structural carbohydrates made up of the monosaccharide fructose. Fructose makes up half of the table sugar molecule, sucrose. The difference is that in cool-season grasses, fructose units keep being added on to the end of sucrose. Sucrose and fructans are highly soluble in water, but the fructan that results is bigger than sucrose, smaller than its cousin starch and much more soluble.

Fructans are manufactured and stored in the vacuoles of all cool-season grass species or species which carry out C-3 pathways of photosynthesis. Because of our cool Alberta climate and adaptation of grass species to it, virtually all grass species, native or tame, found in Alberta pastures contain fructans. Fructans are necessary for plant growth and maintenance and are the storage carbohydrate which provides energy to maintain plants over winter and during drought conditions.

So we cannot escape fructans as long as we use cool season grasses, such as bromegrass, timothy, fescues, bluegrasses and ryegrasses as pasture and hay. Fructans are not found in legumes such as alfalfa and clover. Legumes use starch as their storage carbohydrate. Starch of course is also found in all of our feed grains. Because fructans are the storage carbohydrate of cool-season grasses and products of photosynthesis they accumulate when photosynthetic rates are high and growth slow due to relatively cool temperatures. The amount or concentration of fructan in the plant at any time is therefore higher in spring and during the afternoon as photo synthesis will hit peak rates during late morning and early afternoon. At these times there is likely to be maximum levels of all sugars, including fructans. These are the

some of the plant factors that we have to deal with in this horse-pasture scenario.

We know that some horses, but not all horses, are susceptible to colic and laminitis. Some of the cause and effect factors for colic and laminitis are well known, but all of the science relating to laminitis is not known. So as horse owners, we have to learn to manage the risk. The specific horse we own may not be susceptible to pasture laminitis at all. However, the time of year and pasture type most closely associated with laminitis is green grass in the spring. Several things in our normal horse management occur at this time. Horses have a change in feedstuff, love to eat lush green grass and may basically eat too much, resulting in gas build-up and laminitis, similar to grain overload. The lush pasture may well consist of legumes and grasses all of which do not contain fructose storage sugars. All pastures at this stage are very low in fibre, almost as low as grain. So, all of these factors contribute to laminitis risk. In addition some individual horses and horse-types and physiological conditions are important factors. Obese or fat horses and some animals within breeds have difficulty in clearing blood glucose, because of their inherent physiological make-up. Blood glucose level is one of the laminitis triggers. These horse individuals need to be identified and placed on a diet that limits non structural carbohydrate of any kind (fructan or starch, grass or grain) and introduced very gradually to any change in diet. Horses that are exercised regularly and horses having a healthy body condition between 4 and 6 (body condition score) or low body fat level are much less susceptible to pasture laminitis or any laminitis.

Moderation is the key to managing any livestock for their general health and well-being. Moderation manages laminitis risk. This means matching diet to physiological condition, level of fitness and activities. These factors regulate the end-use of the energy taken in and amount needed by the animal. All horses need to be placed on spring pasture gradually. If their activity level is maintenance, the daily intake on this type of pasture likely exceeds their minimum energy requirement. Introduce them to pasture a few hours at a time and have a small pasture or pen for holding. This will limit daily energy intake along with limiting fructan ingestion and save your feed-budget money for other horse activities. As the pasture season progresses three things happen. The horse's metabolism will gradually adjust to the change in feedstuff, the pasture sugar content will moderate and the fiber content of the pasture will increase, reducing risk of a laminitis situation. Then if you exercise and ride your horse, maintaining an acceptable body condition you will mitigate the risk of laminitis, further, while keeping your horse outside in a pasture where he belongs.