

Atkins for Equines?

Here's a deeper look at the role of carbohydrates in equine feeds.

by Ruth Bishop

Recently, carbohydrate nutrition has come under an increasing spotlight. Human health problems, such as type 2 diabetes, are linked to serious consumption of "high carb" diets (combined with little exercise). In a similar vein, the Atkins diet revolutionized human weight loss programs with a central theme of amazing weight loss on an exceedingly low carbohydrate intake, regardless of the amount of exercise taken. As a result, this has brought the issue of "carbs" right into focus: "high carbs" are bad and "low carbs" are good. There is even a "low carb" potato! (This is difficult as potatoes are virtually all "carb"!).

"Low carb" is now synonymous with a healthy lifestyle in humans, and the focus has now turned as to whether "low carb" can be good for horses as well. Whilst the term "low carb" has yet to be absolutely characterized for horses, this article will define carbohydrates, explain the benefits of restricting intake of particular carbohydrates, and look at the alternatives.

What is a "Carb"?

"Carb" is short for carbohydrate, and there are two common forms in our and our horses' diets: structural carbohydrates, derived from fiber, and non-structural carbohydrates (NSC) from starch and sugar.

Some nutritionists claim low starch as meaning low carb, whilst others cite "low carb" to mean low starch and sugar or low NSC. These latter two are the more accurate definitions, as a starch value alone does not give you, the horse owner, a guide as to the sugar content. However, since the main non-structural carbohydrate in equine compound feeds is starch, low starch can be effective shorthand for a "low carb" or low NSC feed, assuming it is not heavily molassed.

Horses are designed to eat diets rich in fiber (structural carbohydrate), which is then digested by microbial fermentation in the hindgut. This reflects the horse's evolution over millions of years as a grazing herbivore, consuming a fiber-rich diet of grass, shrubs and herbs. Starch and sugar (non-structural carbohydrates) are broken down by enzymes in the small intestine. The end-products of digestion (sugars) are rapidly available to the horse, and are often referred to as quick release or "heating" type energy and have been linked to why some horses become excitable on cereal-based feeds.

Starch and Sugar Overload

In their natural environment, horses graze 16 - 18 hours per day, consuming a fiber rich diet of grasses, shrubs and herbs, Given that the relatively short small intestine is the only part of the digestive tract where starch and sugar can be digested and absorbed, any that passes through undigested ends up in the hindgut. Here it will be broken down by microbial fermentation and not by the horse's own enzymes. This fermentation produces lactic acid, a strong acid that alters the gut environment making it more acidic, which can kill the microbes present.

Even a partial starch or sugar overload can precipitate a disruption to the hindgut fermentation, which can have a marked effect since the hindgut comprises such a large part of the digestive system.

Signs of starch overload range from mild symptoms such as loose droppings to the worst - colic, laminitis and exertional rhabdomyolysis syndrome. (See Figure 3)

"Low carb" diets (meaning low "non-structural" carbohydrate (i.e. low NSC) in equine nutrition can avoid the negative effects of starch overload. In addition to just avoiding starch and sugar overload, low NSC diets can benefit young, growing horses as well. New research has shown the source of energy to be as important as the amount because the source directly affects a hormonal cascade that directly influences the maturation of bone. A growing body of evidence suggests that carbohydrate-rich diets, such as traditional stud feeds, have a negative effect on cartilage maturation and may play a significant role in the development of certain developmental bone diseases.

Figure 1: This diagram demonstrates the digestion sites for the two types of carbohydrates in the horse's diet.

What's the Alternative?

If we wish to reduce the amount of starch and sugar the horse is receiving, what are the alternatives?

1. Dietary fiber (structural carbohydrates)

Dietary fiber describes those carbohydrates that give "structure" to plants

or protective coats to seeds such as plant cell walls and associated compounds. Fiber itself is made up of different complex carbohydrates such as cellulose and the hemicelluloses, which can only be digested using microbes in the hindgut in a fermentation process.

The horses' digestive tract has 65 percent of its volume dedicated to the fermentation and absorption of nutrients from fiber in the hindgut or large intestine. The end products of fermentation are volatile fatty acids (VFAs), an important energy source for the horse; a horse in light work will receive up to 75 percent of its energy requirements from VFAs.

As the process of fiber digestion is relatively slow when compared to non-structural carbohydrates such as sugars and starch, it is often termed a "slow release energy" source and therefore is less likely to cause excitability.

2. Fat

Fats and oils are concentrated sources of energy, containing typically 2-3 times the energy content of the same weight of cereal grains. Thus, they can be used effectively to replace the energy from cereals when more calories are needed for work or to maintain condition. Fat does not have the same heating effect as cereals.

However, remember that since fats are energy-rich, over-feeding them leads to weight gain, as it does in all animals, and they must be used with this in mind. Typically adding between 3 ounces to 1 pound per day is plenty for most working horses.

When to Feed Low Starch

Low starch feeds are effective for most classes of horses, but here are a few specific cases where they can especially provide great benefit:

1. Perfect if your horse has a history of laminitis, tying up or colic.
2. Indicated for young growing horses especially in the first two years of life - high starch and sugar diets have been implicated in the development of certain developmental bone diseases.
3. Beneficial for horses that drop condition - these feeds put weight and condition on without causing the horse to become nervous or over-excitabile.
4. Ideal for horses that need to work hard but calmly, such as dressage horses
5. Excellent for horses that receive a lot of grain for work - they will reap great benefits to health and performance.
6. Great for horses that need more energy than traditional low energy

feeds but become excitable when feed rates are stepped up.

7. Useful for any horse in work - these feeds supply sustained energy, appropriate for anything from trail riding to endurance.

8. Best choice of feed for horses on low or restricted forage diets. Such situations occur if the horse has poor teeth, if hay quality is poor, or if the horse is working hard on large quantities of short feed.

9. High fiber compound feeds are excellent for horses that have a dust allergy such as "Heaves" or Recurrent Airway Obstruction (RAO) (formerly known as COPD)

Typical Starch & Sugar Content of Horse Feeds

Laminitis

The most common cause of nutritionally induced laminitis is an overload of rapidly fermentable carbohydrate - either from starch found in cereals and plants or sugars and fructan found in grass. In addition to this direct effect, recent research has suggested that the long term feeding of sugar and starch based feeds may lead to changes in glucose metabolism resulting in insulin resistance, which has recently been identified as having a role in the development of laminitis.

The current advice on managing laminitis is to restrict access to pasture at times of rapid grass growth and avoid cereals and high cereal concentrates such as coarse mixes (even "cool" mixes).

Alternatively choose feeds based on fiber and fat with very low levels of sugar and starch.

Feeding Strategies

1. Never feed more than 4 pounds of feed at one time (less for ponies).

2. Keep starch intakes below 0.25 percent of bodyweight, equivalent to 2 pounds of starch per meal.

3. Choose low carbohydrate (low starch and sugar) compound feeds such as SPILLERS.

Starch contents below 20 percent reduce the likelihood of starch overflow into the hindgut at typical feed rates.