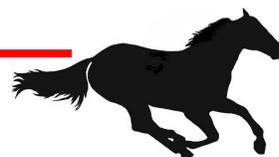




EquiPage



NUTRITION AND OTHER TOPICS OF INTEREST TO THE HORSE INDUSTRY.

Volume IV Issue 1

The Low Carb Craze

John Lew and Amy Parker

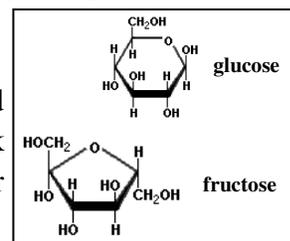
“Low carb” has become a common phrase in today’s society for weight loss and healthy living, first in humans and now in horses. But what does “low carb” really mean? Does a “low carb” diet even exist for horses? Do any horses need a “low carb” diet?

What is a carbohydrate?

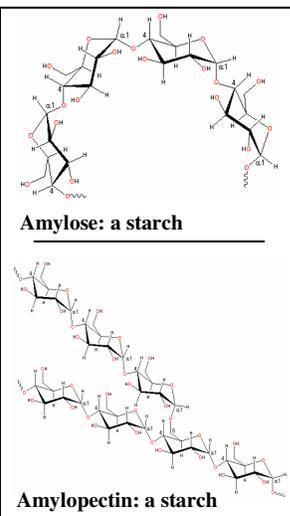
The word carbohydrate can be broken down as follows: carbo for carbon, and hydrate meaning water. Carbohydrates have very specific molecular structures with specific combinations of carbon, hydrogen and oxygen. The hydrogen and oxygen are in the same ratio as water (2 hydrogens to 1 oxygen). Therefore, carbohydrates include sugars, starches, and fiber (an umbrella term that covers many compounds such as pectins and cellulose).

The simplest carbohydrates are single sugars (monosaccharides), such as glucose and fructose. These sugars are the first products of photosynthesis in plants. Plants link these single sugars to build more complex carbohydrates. For example, table sugar (sucrose) is a disaccharide (2 sugars) made up of one glucose unit linked to one fructose unit. Longer chains of the single sugars form oligosaccharides (a few to 100 sugar units), such as fructans and glucans. Polysaccharides are chains of thousands to millions of sugar units. Starches (the storage form of glucose in plants) and cellulose (wood fiber) are polysaccharides and contain only linked glucose units. The only difference between starches and cellulose is the type of linkages between the glucose units.

The type of linkage gives rise to the different types of starch chains, which may be branched. Different chain lengths and branching of the chains combine to form many types of starch granules. The granules are specific to the plant, as well as specific to the part of the plant in which the starch is formed. For instance, oat starch granules are different in shape and size than corn starch granules. Within the corn plant, starch granules in the corn kernel can be different than those in the corn leaves.

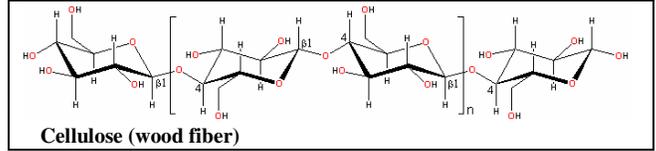


Source: <http://en.wikipedia.org>



Source: www.lsbu.ac.uk

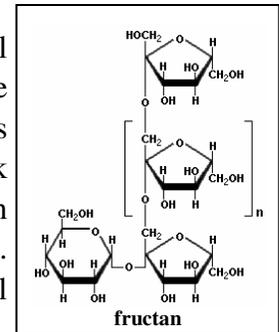
What is seen when looking at a plant is mostly cellulose: leaves, stems, stalks, etc. Looking at a grain (e.g., whole oat), the outer portion (hull) is mostly cellulose, and the inside (kernel) is mostly starch. Therefore, in equine diets, carbohydrates comprise most of what the horse eats, from grains to pastures and hays. For that reason, a “low carb” diet for horses does not exist. Instead, “low carb” equine diets are usually referring to a diet lower in sugars and/or starches.



Source: www.lsbu.ac.uk

Digestion of carbohydrates

In terms of digestibility, the type of linkage and the size and shape of the chains will largely determine where in the gut the carbohydrate is broken down. This is because each linkage type requires a specific enzyme to break it. For instance, enzymes secreted in the small intestine will break the linkage in sucrose, but would not break the linkages in fructans. In the horse's small intestine, polysaccharide digestion varies from mostly digested, such as oat starch, to barely digested, such as cellulose. Within the starches, oat starch is the most efficiently digested in the horse's small intestine, while corn is only partially digested and wheat starch is poorly digested in the horse's small intestine.



Source: www.scientificpsychic.com

The product of carbohydrate digestion in the small intestine is mainly glucose, which is absorbed into the bloodstream resulting in an initial rise in blood glucose levels. This triggers the release of insulin. Insulin facilitates the transport of glucose from the blood into the body cells; therefore blood glucose levels will decline, eventually returning to baseline levels. This is the normal sequence of events.

The products of digestion in the large intestine are lactate and volatile fatty acids (VFA). This is true regardless of the carbohydrate, whether it be single sugars, starches, fructans, cellulose, etc. Of course, absorption of lactate and VFA into the bloodstream does not cause a rise in blood glucose; therefore, no insulin response occurs.

Carbohydrate utilization

Glucose, lactate, and VFA provide the major energy sources for the body. However, glucose is more efficiently utilized than lactate or VFA. From an efficiency standpoint, having sugars and starches digested in the small intestine is most desirable. Furthermore, sugars and starches that by-pass the small intestine can cause problems (e.g., colic, laminitis, etc.) when processed in the large intestine. Thus, when normal, healthy horses need extra calories, sugars and starches that are largely digested in the small intestine are the best sources.

Do horses need a low sugar/starch diet?

Some horses need low sugar/starch diets due to certain medical conditions. These conditions include Equine Polysaccharide Storage Myopathy (EPSM or PSSM), insulin resistance, laminitis (foundered), Cushing's disease, and Equine Metabolic Syndrome.

- EPSM is a condition in which the horse cannot properly metabolize muscle glycogen (a polysaccharide; a stored form of glucose in animals). As a result, the muscle runs out of energy stores.

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- Insulin resistance is a condition in which the horse's cells become less sensitive to insulin. Consequently, glucose entry into the cell is impaired, and the horse's energy supply is limited.
- In the past, the cause of diet-induced laminitis has been commonly termed as a "carbohydrate overload". Strictly speaking, diet-induced laminitis is caused by an overload of sugars and starches to the large intestine.
- Other medical conditions may necessitate low sugar, low starch diets. For example, horses with Cushing's disease and Equine Metabolic Syndrome are often insulin resistant and are prone to laminitis.

Each of these conditions, while having different causes, calls for similar dietary management. Sugars and starches should be avoided. Instead, diets high in digestible fiber sources (e.g., hay and beet pulp without molasses) are necessary. Furthermore, calories must be balanced to maintain a healthy body condition. The addition of vegetable oil may be necessary when the energy requirements are high.

Summary

A "low carb" diet does not exist for horses. The term "low carb" is actually referring to lower sugars and starches in the diet. Certain medical conditions, such as EPSM, laminitis, insulin resistance, Cushing's disease and Equine Metabolic Syndrome require low sugar, low starch diets. As always, horses should be fed to maintain a healthy body condition, even if they require a low sugar, low starch diet.

Horses Making a Difference

The mission of Central Kentucky Riding for Hope is to enrich the community by improving the quality of life and the health of children and adults with special physical, cognitive, emotional and social needs through therapeutic activities using the horse. Since 1981, CKRH has proven highly successful in helping people with a wide range of disabilities to develop balance, strengthen muscles and increase coordination while building a sense of achievement and self confidence. Students and clients range from age three to adult. Participants have a variety of disabilities such as: ADHD, autism, cerebral palsy, Downs Syndrome, emotional/behavioral special needs, head trauma/brain injury, hearing/visual impairments, muscular dystrophy, multiple sclerosis, mental retardation, paralysis, spina bifida and stroke.



The heart of the therapy provided by CKRH is the horse, also known as the "equine therapists". This is what makes CKRH different from other types of therapy and recreational activities. Eighteen to 22 equine therapists provide services to the participants. These equine therapists range in age from 6 to almost 40 and have a diverse background. McCauley's products and dedicated staff fulfill a vital role in keeping the horse herd healthy. Many of the horses have nutritionally-challenging conditions, including laminitis (founder), aged, poor teeth, picky eaters, previously colicked and overweight. Therefore, most of the horses require specialized diets. Through quality products, hay analysis, monthly weighing and body condition evaluations, the educated McCauley's staff helps CKRH provide consistency in meeting the nutritional needs of the equine therapists.

For more information about Central Kentucky Riding for the Hope, visit their web site at www.ckrh.org.

ALAM[®]

The Product of Choice for the Nutritionally Challenged Horse

Nutritionally challenged conditions include, but are not limited to:

- Founder (laminitis) with poor body condition
- Cushing's disease
- Insulin resistance (glucose intolerance, Equine Metabolic Syndrome)
- Polysaccharide Storage Myopathy (PSSM or EPSM)
- Severely malnourished horses needing to safely and rapidly gain weight
- Compromised gut function due to surgery, colic, age, gastroenteritis, poor absorption in the small intestine, etc.
- Inability or difficulty in chewing due to poor or missing teeth, broken or damaged jaw and/or nerve damage
- Inability to consume adequate forage
- Common grain or hay allergies
- HYPP positive
- Respiratory problems (heaves, COPD, etc.)
- Equine Motor Neuron Disease
- Nervous or easily excitable
- Tying up
- Ulcers
- Insufficient water intake (feed as a mash)



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- A fully-fortified feed with minimal starches and sugars
- A feed designed to be fed with or without forage
- A feed with similar digestible calories as the highest quality oats
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