

# *The Link Between Carbohydrates and Performance*

Presented by Nutrena, makers of SafeChoice™.

SafeChoice™ is a nutritionally balanced safe-energy feed designed for horses in all stages of life and proven effective in reducing the risks of colic, developmental orthopedic disease (DOD), laminitis, and tying up.

Nutrition affects all vital aspects of our horses' health and performance. Recent discoveries in the medical world have linked carbohydrates to many digestive disorders including colic, laminitis, hyperactivity, Developmental Orthopedic Disease (DOD) and Cushing's disease. The relationship between carbohydrates and disease needs to be clarified in order for us to determine whether this energy resource is a help or hindrance to the equine diet.

## **Understanding the Digestion Process**

Horses are referred to as continuous grazers, and will often forage for up to 16 hours per day. Because their stomachs are exceptionally small and comprise just 7% of their digestive tracts, horses are limited in their ability to absorb nutrients from large quantities of food at one time. Because of a horse's eating pattern and its stomach's restrictions, the process is completed quickly, in only 30 to 90 minutes.

The stomach begins the digestion process by secreting hydrochloric acid (HCl) and pepsin to break down materials before passing them on to the small intestine. The small intestine is where the majority of the nutrients, including protein, some carbohydrates and fat are digested and where many essential vitamins and minerals are absorbed. From here, most of the matter and liquids continue on to the hind-gut (large intestine), which digests fiber (insoluble carbohydrates) and the remaining soluble carbohydrates (starches and sugars), utilizing specialized bacteria and protozoa in a fluid

environment. In the hind-gut, minerals are absorbed and many vitamins are synthesized using microbial action. Finally, the undigested material is eliminated through the rectum and anus as feces or manure.

## **Understanding Carbohydrates**

There are six main categories of nutrients necessary to a horse's survival – water, carbohydrates, protein, fats, vitamins, and minerals. While energy isn't considered a category unto itself, almost 90% of nutrient intake is required to fulfill this critical requirement. Although the densest forms of energy are found in fats, it is carbohydrates (both soluble and non-soluble) that are used as primary dietary energy sources.

### **Soluble Carbohydrates**

Soluble carbohydrates, such as starches and sugars, are defined by their ability to break down into simple sugars (called glucose), which is then absorbed by the small intestine and assimilated into the blood stream. Insulin continues the process by transferring glucose to the liver and muscles where it is stored for utilization on demand. This energy reserve, termed glycogen, is the resource that provides immediate power bursts essential to physical activity. The starch from corn, oats, barley, and molasses are most commonly equated with soluble carbohydrates. Horses involved in intense anaerobic activities such as racing must have adequate soluble carbohydrates in their diet to maintain adequate muscle glycogen levels.

### **Insoluble Carbohydrates**

Insoluble carbohydrates are derived from the fiber source, cellulose, which is digested by microbes in the cecum and large intestine. Insoluble carbohydrates take over 24 hours to process and are transformed into volatile fatty acids. These acids are eventually absorbed and held by the liver in reserve as

an additional energy source. The nutrients found in forages such as hay, grass, beet pulp, and soybean hulls are the main suppliers of insoluble carbohydrates.

## **Balancing Carbohydrates**

Feeding excess amounts of soluble carbohydrates present in grain often cause the most trouble. The starches, when broken down in the stomach and small intestine, are thought to release a surplus of glucose and insulin into the blood stream. Excessive starch and sugar intake can lead to metabolic upsets in both the young developing horses and older animals. High levels of starch and sugar have been associated with hyper-excitability and behavioral problems; when residual starches enter the cecum and are left to ferment, colic and associated gastro-intestinal disorders can result.

Insoluble carbohydrates (fiber), on the other hand, are fundamental to an efficient digestive system, and therefore should not be compromised in an effort to reduce starches and sugars in the diet. A general guideline is to feed at least one to two pounds for every 100 pounds of body weight per day. For example, a 1,000 pound adult horse would need an estimated 10 –20 pounds of hay and may be fed even more depending on its workload and condition. It is recommended to only feed the amount of concentrates necessary to maintain sufficient body condition and balanced nutrient levels.

Dietary research indicates that by increasing dietary fiber and fat while reducing soluble carbohydrate intake will benefit overall health of the horse and reduce the risks linked with starch overload. Fat, especially, is shown to be effective in helping to control the rate at which glucose is released into the system.