

Glycemic Index

You’ve probably heard this terminology at some point or another: glycemic index. This “buzz phrase” has been circulating among informed horse owners for several years now, but what is glycemic index? Why is it important in equine nutrition?

Glycemic index is a **system used to rank carbohydrates based on their effect on blood glucose levels**. Devised by Canadian scientists in the early 1980s, the system compares available carbohydrates gram for gram in individual feedstuffs, providing a numerical, evidence-based index of postprandial glycemia (the level of glucose in the blood after a meal). Though originally developed for humans, the system been modified and proven reliable for horses.

Carbohydrates that break down quickly during digestion have the highest glycemic indices. On the opposite end of the spectrum, carbohydrates that break down slowly, releasing glucose gradually into the bloodstream, have the lowest glycemic indices. A lower glycemic index suggests a slower rate of digestion of sugars and starches in the foods. **A lower glycemic response is believed to create a lower insulin demand, better long-term blood glucose control, and a reduction in blood lipids.**

“In human studies, the measurement of blood glucose and insulin response is known as a suitable tool for assessing the effects of food processing on starch digestion,” said Ingrid Vervuert and Manfred Coenen in a paper titled “The Glycemic and Insulinemic Index in Horses,” published in *Advances in Equine Nutrition III* (J.D. Pagan, editor).

“In humans, starchy foods have been classified over the entire range from ‘restrained,’ or low glycemic and insulin response, to ‘rapid’ with respect to effects on blood glucose and insulin response after a meal. The resulting glycemic or insulinemic index utilized white bread as the standard source, and all foods were ranked accordingly.”

A similar ranking has been established for horses based on research performed at Kentucky Equine Research (KER) (Table 1). Both cereal grains and forages are included in the table. The values shown in

Table 1. Glycemic index (GI) of equine feeds and forages.

Feed	Glycemic Index
Sweet feed	129
Whole oats	100
Beet pulp and molasses	94
Cracked corn	90
Re-Leve ^{®1}	81
Beet pulp (unrinsed)	72
Orchard grass hay	49
Rice bran	47
Ryegrass hay	47
Alfalfa hay	46
I.R. Pellet ² and orchard grass hay	34
Beet pulp (rinsed).....	34
Bluestem hay	23

¹Re-Leve, KERx, Versailles, KY, 1-888-873-1988, www.kerx.com

²I.R. Pellet, KERx, Versailles, KY, 1-888-873-1988, www.kerx.com

Table 1 are estimates provided for the sake of comparison and may differ according to individual studies. Oats are used as the standard source among common feedstuffs. A feed with a value over 100 produces more blood glucose in a given amount of time than oats; one with a value under 100 produces less. **Of the cereal grains commonly fed to horses, oats are considered to have the most readily digested starch content. Corn is lower and barley has the hardest starch to digest.**

Interestingly, **processing certain cereal grains can dramatically alter glycemic response.** For example, Pagan and other researchers at KER studied the effects of corn processing on glycemic response and found steam-treating corn will increase the glycemic index significantly.

How is this knowledge transferred to everyday management? Because their digestive architecture prefers several small meals per day, as if they were grazing, **horses are healthiest when fed diets that can be digested and absorbed slowly.** Meals consisting of textured or pelleted concentrates often contain large amounts of starch. Overwhelming the gastrointestinal system with starch will inevitably cause spikes in blood glucose, which may cause problems in individual horses.

Another risk of feeding large concentrate meals revolves around the digestive capacity of the small intestine. Certain horses require large concentrate meals in order to maintain moderate body condition. However, it is sometimes impossible for the small intestine to properly digest the bulk of a large concentrate meal, **resulting in some starch passing undigested through the small intestine. This sets the stage for colic, laminitis, and hindgut acidosis.** Research at KER has found that hindgut acidosis can be managed with a protected sodium bicarbonate product (EquiShure, KERx, Versailles, KY, 1-888-873-1988, www.kerx.com).

Rations with a low glycemic index are becoming popular management tools for horses diagnosed with **metabolic conditions such as Equine Cushing's disease (ECD), equine metabolic syndrome (EMS), recurrent exertional rhabdomyolysis (RER), polysaccharide storage myopathy (PSSM), and osteochondritis dissecans (OCD).** Though horses with these syndromes all benefit from rations with a low glycemic index, the most appropriate form of energy supplementation depends on the disorder and the individual's energy requirement (Table 2).

Table 2. Variables related to feeding horses with different metabolic disorders.

Metabolic condition	Energy requirement	Insulin insensitive	Fat in feed	High laminitis risk
ECD	Low to high	Yes	Low to high	Yes
EMS	Low	Yes	Low	Yes
RER	Moderate to high	No	High	No
PSSM	Low to moderate	No	High	No
OCD	Low to moderate	No	Moderate	No

Horses with ECD are insulin insensitive and need a ration with a low glycemic index, but their **energy requirements may vary.** Some may be relatively easy keepers and benefit from mostly forage rations while others may need extra calories in the form of fat and fermentable fiber. EMS horses and ponies tend to be obese and easy keepers, and should be fed mostly forage rations with an appropriate low-inclusion balancer. Horses with ECD or EMS are prone to laminitis that can be triggered by access to lush pasture, so pasture intake should be carefully controlled.

Horses with RER and PSSM are not insulin insensitive, but both groups benefit from low-starch feeds. **Fat is an important supplement for both groups,** but their energy requirements are different. RER horses tend to need moderate to high energy intakes while PSSM horses typically require fewer calories. OCD may be triggered by high-glycemic feeds, but there is no evidence that young growing horses need feeds with extremely low glycemic indices. In fact, a certain amount of starch in the ration is desirable for young horses, particularly during sales preparation. **Diets for young horses should have moderate glycemic indexes** and be fortified to promote optimal muscular and skeletal development.



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