Triple Crown Carbohydrate Guide

At Triple Crown, we know that managing your horse's carbohydrate intake can be a real challenge. Carbohydrates provide energy and are needed for digestive health, but too many carbohydrates can cause colic, Laminitis and other metabolic diseases. High sugar and starch intake can also increase blood glucose and insulin concentration, resulting in Insulin Resistance.

It's a tricky balance. Knowing the (estimated/general) starch and sugar content of your feed and forage will help you make the best feeding decisions for your horse.

CARBOHYDRATES AT A GLANCE

Carbohydrates- Essential nutrients which include sugars, fibers and starches found in grains and forages that are used as an energy source—either converted to energy or stored. Also known as saccarides and classified by the number of sugar molecules they contain: single, double or multiple.

Simple Sugar- A carbohydrate with one or two sugar molecules (monosaccharides and disaccharides). Includes glucose and fructose; found in different amounts in most plant-based feeds.

Fructan- A carbohydrate made of a short chain of fructose molecules that can't be effectively digested in the small intestine like other nutrients but are fermented by bacteria in the hindgut. They are part of the WSC component and over consumption can lead to laminitis. Found in cool-season grasses.

Starch- A carbohydrate composed of many linked glucose molecules found mainly in grains; mostly digested in the small intestine, where they are broken down and absorbed as glucose (simple sugar). Some starches are resistant to small intestine digestion and are fermented in the large intestine. A typical analysis does not differentiate between the two types. Low starch content generally means little glucose will be absorbed in the small intestine (low glycemic response). This is good for horses that can't handle large blood sugar changes (i.e., insulin-resistant horses). High starch generally means a high glycemic response.

NSC (nonstructural carbohydrates)- A measure of digestible carbohydrates, including simple sugars and fructans; WSC+Starch. Glucose-sensitive horses should be fed a low NSC diet.

WSC (water-soluble carbohydrates)- A measure of water-soluble sugars, including simple sugars and fructans; sometimes called "sugar" on analysis reports. High WSC may indicate high fructan levels in grasses or high simple sugars in non-grass forages and grains.

ESC (ethanol-soluble carbohydrates)- A measure of ethanol-soluble sugars, including mostly monosaccharides and disaccharides (simple sugars). These carbohydrates are a subset of WSC that are primarily digested in the small intestine and give a true glycemic (blood sugar) response. High ESC generally means a feed will generate a high glycemic response (unless there is a high level of fructans in this fraction). Might be helpful for hard-working horses that need lots of energy, but not so good for horses that are sensitive to large blood sugar changes (i.e., insulin resistant horses). However, low ESC does not necessarily mean the feed will have a low glycemic response, because starch could keep it high.

Sources: https://thehorse.com/119859/carbohydrates-101-for-horses/; https://thehorse.com/127958/changing-carbohydrate-evaluations-in-animal-diets/

VALUES FROM CARBOHYDRATE TESTING SHOULD BE USED AS AN ESTIMATE

Often, horse owners use carbohydrate values to do an exact A to B comparison. However, there is no industry standard for carbohydrate testing which can make evaluating the data difficult. Some companies test in-house while others use outside labs. Some companies use wet chemistry to test values, while others use NIR testing which requires calibrations to be sure that all labs have access to the same data for the equipment to provide consistent results, but not all machines are calibrated in the same way. Some companies list carbohydrate values on a dry matter basis; others list them on an as-fed basis. Some companies use the term "sugar," but don't designate if they mean WSC or ESC.

None of these methods is "the right way "or "the wrong way," but a quick comparison of just carbohydrate values is most likely not an apples-to-apples comparison. The key is to use carbohydrate values as a guide, not gospel. Triple Crown uses EquiAnalytical and other outside laboratories to complete our nutritional testing. We use both NIR and wet chemistry analytical methods, depending on the information we are obtaining regarding the sample.

WHAT PERCENT SUGAR AND STARCH IS MY HORSE'S DIET?

When feeding horses with metabolic concerns, many people are advised to feed 10% or less NSC. This does not mean that everything you feed your horse must be below 10% NSC. It means that you should keep the horse's overall diet (grain and hay) at an average of 10% NSC. Remember, forage is the largest component of your horse's diet. The 1-2 lb. of feed recommended for a metabolic horse will not make a big difference in the overall NSC value of a diet. For reference, a 1,000 lb. horse eating 20 lb. of hay per day with a total 10% NSC diet is eating approximately 908 grams of carbohydrates per day.

Use this handy tool to calculate your horse's carbohydrate intake and learn what changing forages or feed can do for your horse:

Download Carb calculator Excel sheet

AVERAGE CARBOHYDRATE CHART NOTES (see page 3 for actual chart)

All feeds have fixed ingredient formulas. Values reflect an estimated analysis of multiple feed samples from across the U.S. with the understanding that geographic differences can impact the results.

When choosing a horse feed, select feed/forage with Low Starch + ESC values for horses to prevent tying up disease (EPSM, PSSM, RER), prevention of developmental orthopedic disease (DOD), calmer behavior and reduced insulin resistance for equine metabolic syndrome (EMS) and Cushing's disease. Also, forages with high NSC values (fructans) are more likely to cause laminitis.

WSC is water soluble carbohydrates, ESC is ethanol soluble carbohydrates, NSC is nonstructural carbohydrates and NSC = Starch + WSC.

*Estimated values determined by Equi-Analytical, Ithaca, NY. Equi-Analytical makes no claims with regard to the accuracy of the data. Link: http://equi-analytical.com/common-feed-profiles/

**The following coefficients of variation (cv) can be associated with the carbohydrate analyses. These should reasonably account for both sampling and analytical variation, though as you know, poor sampling can lead to much larger variation. The coefficients of variation (cv) for starch is 10%, WSC is 15% and ESC is 15%. For example, a feed with a WSC value of 10% should be expected to range from 8.5 – 11.5% and a WSC value of 20% to range from 17 – 23%. In addition, there are variables on ingredients between suppliers that could be as much as an additional 5% to 10% per ingredient.

TRIPLE CROWN PRODUCT AVERAGE CARBOHYDRATE VALUES

TRIPLE CROWN HORSE FEED	% WSC* AVERAGE / RANGE	% ESC* AVERAGE / RANGE	% STARCH* AVERAGE / RANGE	% STARCH + ESC*AVERAGE / RANGE	% NSC*=g/lb. WSC+STARCH=NSC / RANGE
Perform Gold	7.7 / 7.0-9.7	5.6 / 4.4-6.4	9.7 / 9.4-13.2	15.3 / 12.3-16.2	17.4%=78.99g / 15.5-18.5
Senior Gold	7.8 / 6.5-8.5	5.4 / 4.7-6.8	3.6 / 3.5-5.7	9.0 / 8.2-15.0	11.4%=51.75g / 10.0-15.3
Balancer Gold	8.5 / 7.7-8.7	6.4 / 6.2-7.1	7.8 / 7.0-8.0	14.2 / 13.2-15.1	16.3%=74.00g / 14.7-16.7
Senior	8.3 / 7.0-9.0	5.3 / 4.7-6.7	6.4 / 4.5-7.5	11.7 / 9.2-14.2	14.7%=66.73g / 11.5-16.5
Complete	12.0 / 11.0-14.5	8.8 / 8.5-10.5	11.5 / 11.7-13.8	20.3 / 15.4-22.0	23.5%=106.69g / 21.9-27.0
Growth	12.2 / 10.2-13.2	10.5 / 9.5-12.5	12.4 / 11.8-13.8	22.9 / 15.4-24.0	24.6%=111.68g / 19.7-25.1
Balancer	8.0 / 7.6-9.8	7.2 / 6.8-8.8	3.1 / 2.2-4.1	10.3 / 9.0-13.0	11.1%=50.39g / 9.8-14.4
Lite	4.8 / 3.6-5.6	4.2 / 2.5-4.5	5.3 / 6.4-8.6	9.5 / 5.5-13.1	10.1%=45.85g / 8.0-14.5
Low Starch	5.1 / 5.0-7.1	3.1 / 1.3-4.7	9.9 / 8.7-10.7	13.0 / 10.0-15.4	15.0%=68.10g / 12.2-16.4
Naturals Pelleted	7.3 / 5.7-7.7	7.0 / 4.7-7.7	14.8 / 14.0-17.0	21.8 / 19.0-24.2	22.1%=100.33g / 19.7-24.7
Safe Starch® Fortified Forage	8.1 / 8.0-9.8	4.5 / 3.8-6.1	1.8 / 0.2-2.2	6.3 / 4.0-8.3	9.9%=44.94g / 7.2-10.0
StressFree™ Fortified Forage	8.6 / 6.3-8.9	6.6 / 5.4-6.7	1.1 / 0.8-1.3	7.7 / 5.2-8.0	9.7%=44.03g / 8.1-10.2
Alfalfa Forage Blend	8.7 / 7.3-9.9	8.0 / 6.4-9.8	4.7 / 3.1-6.1	12.7 / 9.5-15.5	13.4%=60.83g / 10.7-15.8
Premium Grass Forage	8.7 / 8.4-10.4	6.1 / 3.8-6.4	2.1 / 0.2-2.6	8.2 / 4.0-9.0	10.8%=49.03g / 7.2-11.3
Naturals Timothy Balance® Cubes	8.0 / 6.0-8.0	6.7 / 5.7-6.7	2.0 / 1.5-2.0	8.7 / 7.2-9.7	10.0%=45.40g / 7.5-10.0
Naturals Alfalfa Cubes	8.0 / 4.8-8.5	6.3 / 4.7-6.7	3.0 / 1.3-3.3	9.3 / 8.0-11.0	11.0%=49.94g / 8.1-12.8
Naturals Alfalfa-Timothy Cubes	8.2 / 5.5-8.7	6.5 / 4.4-6.7	3.8 / 2.4-4.6	10.3 / 6.8-11.3	12.0%=54.48g / 7.3-13.3
Naturals Golden Ground Flax	4.0 / 3.8-4.6	3.8 / 2.4-4.5	3.9 / 0.10-4.6	7.7 / 3.4-8.8	7.9%=35.86g / 3.6-8.9
Naturals Rice Bran	7.9 / 7.2-8.3	6.3 / 6.2-7.5	21.2 / 20.8-24.8	27.5 / 22.1-29.7	29.1%=132.11g / 24.1-29.5

*see page 2 for chart notes