

U.S. SOYBEAN MEAL PROVIDES MORE ENERGY FROM SUCROSE

- Energy is a critical and expensive component in diet formulation
- Sucrose is the predominant sugar in soybean meal and contributes to increased energy content in monogastric diets
- U.S. soybean meal has more sucrose and is more consistent when compared to soybean meal from other origins

Soybean meal is used in monogastric nutrition as a main source of protein and amino acids providing a balanced nutritional bundle in the diet. In addition to protein, soybean meal contains carbohydrates composed of simple sugars (monosaccharides), oligosaccharides, starch, and non-starch polysaccharides. This sugar content is particularly important as sucrose contributes to increased energy content. Because **energy is a critical and expensive component in diet formulation, sucrose is notable for its contribution to increasing energy levels which brings additional value to soybean meal used in the diet.** Unlike other sugars (i.e. lactose) and amino acids that are lost during thermal processing, sucrose is not which better preserves the energy in the soybean meal.

Dietary energy content is estimated using equations that consider soybean meal chemical composition¹ to predict the energy provided to the animal. As chemical composition of soybean meal varies by origin, it is essential to rely on updated equations to correctly estimate the energy content in the meal. **Recent energy predictive equations² account for soybean meal components individually when estimating energy values.** Including components such as monosaccharides, starch and oligosaccharides in the estimation can significantly change the energy estimates and better inform nutritionists when formulating diets. Although sucrose, a disaccharide, should not be considered in isolation when evaluating energy, if sucrose is not included in the equation the energy contribution in soybean meal will be underestimated.



¹ Among the included chemical components: fiber (crude fiber), neutral detergent fiber (NDF) or acid detergent fiber (ADF), protein, starch, ether extract, nitrogen-free extract, ash and sugars.

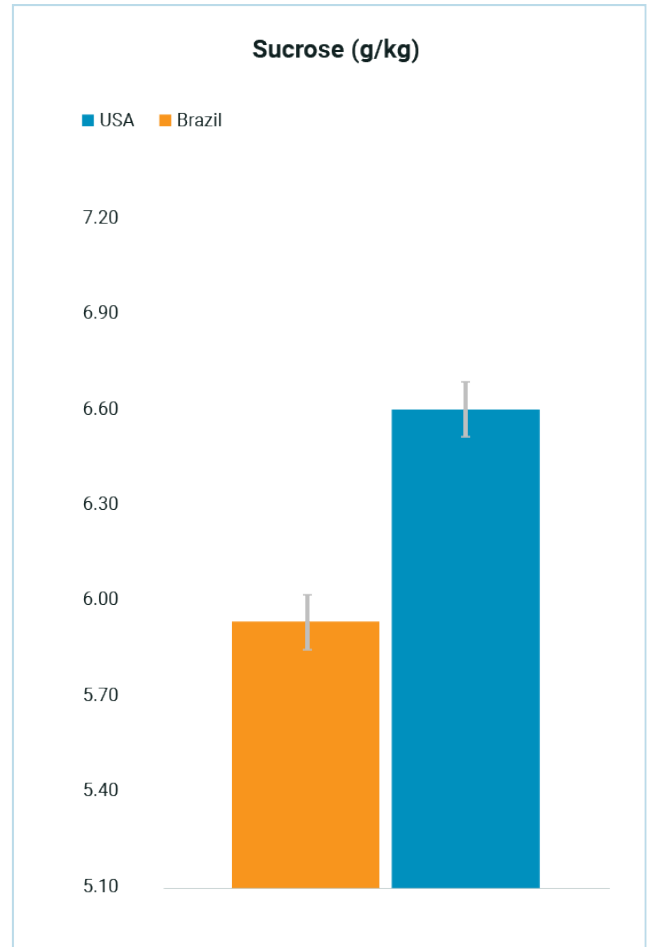
² CVB (Centraal Veevoeder Bureau). Feed Table, 2018. Chemical Composition and Nutritional Values of Feedstuffs. Veevoedertabel (Livestock Feed Table), Wageningen. The Netherlands.

Sucrose is a highly digestible carbohydrate ($\geq 78\%$), which increases the energy content in the diet and makes the feed more palatable to the animal³. Higher palatability can assure that animals, particularly piglets, meet the targeted daily amount of feed intake. It also reduces the stress in the animal that occurs when transitioning from liquid and highly digestible diets (milk) to dry complex ones. Therefore, sucrose is a desirable component of soybean meal. Differences in sucrose content among countries have been reported in research⁴, where latitude (day length) and average temperatures during growing season are the main factors of influence.

As a result, soybeans produced in cooler locations have a higher proportion of sucrose in the soybean.

When comparing U.S. soybean meal to other origins using data⁵ from January 2020-July 2021, differences in sucrose content (measured as 65% of total sugar content) are notable, where **on average the U.S. has an average 10.7% higher mean value of sucrose as compared to Brazil. Moreover, the sucrose content of U.S. soybean meal is less variable (measured by the lower standard deviation) than soybean meal from Brazil**, which is summarized in the table and illustrated in the chart by the grey error bars.

Sucrose	Brazil	USA	% Diff. (USA/BRA)
Mean (g/kg)	5.951	6.665	10.7%
Std (g/kg)	0.228	0.154	-47.6%

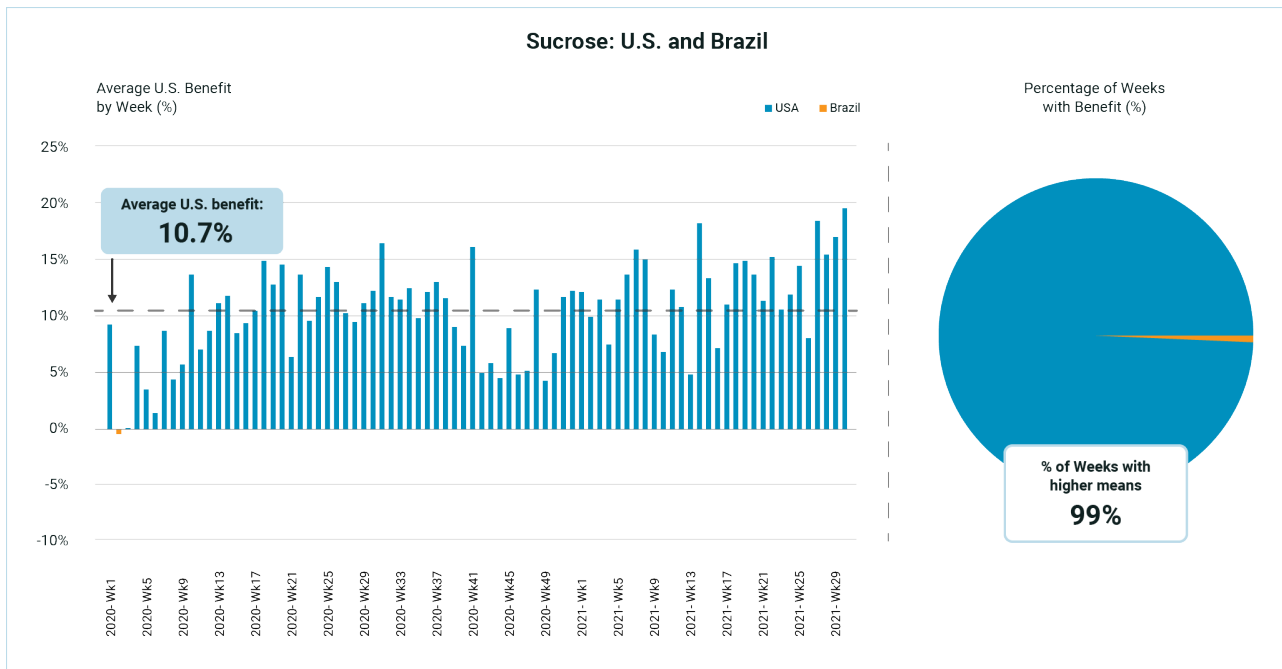


³ C.N. Coon, K.L. Leske, O. Akavanichan, T.K. Cheng, Effect of Oligosaccharide-Free Soybean Meal on True Metabolizable Energy and Fiber Digestion in Adult Roosters, Poultry Science, Volume 69, Issue 5, 1990, Pages 787-793, 0032-5791.

⁴ Wolf, R., Cavins, J., Kleiman, R., Black, L., 1982. Effect of temperature on soybean seed constituent oil, protein, moisture, fatty acids, amino acids and sugars. J. Am. Oil Chem. Soc. 59, 230-232. and Kumar, V., Rani, A., Goyal, L., Dixit, A.K., Manjaya, J.G., Dev, J., Swamy, M., 2010. Sucrose and raffinose family oligosaccharide (RFOs) in soybean seeds as influenced by genotype and growing location. J. Agric. Food Chem. 58, 5081-5085

⁵ Data obtained from Evonik and summarized based on international trading specifications and includes observations with crude protein values between 46.0-49.0% and fiber values between 3.5-3.9%.

Considering the soybean meal data on a weekly basis, **U.S. soybean meal has consistently higher sucrose levels compared to Brazilian soybean meal** as the base. **This advantage has been sustained for 99% of the analyzed period** as illustrated in the following chart.



From the chart above, **U.S. soybean meal has more sucrose when compared to soybean meal from Brazil week over week this translates into additional energy, which contributes to reduced diet costs.** In addition, **U.S. soybean meal is more consistent over time compared to soybean meal from Brazil.** This consistency improves formulation efficiency for nutritionists as it requires less adjustments to the diet and provides a more uniform nutritional bundle to animals.

THE HIGHER SUCROSE LEVELS IN U.S. SOYBEAN MEAL, COUPLED WITH LOWER VARIABILITY OVER TIME, CONTRIBUTE TO A MORE SUSTAINABLE AND EFFICIENT PRODUCTION SYSTEM AND INCREASE THE INTRINSIC VALUE OF SOYBEAN MEAL.

To learn more about how U.S. Soy can enable your business, please contact your U.S. Soybean Export Council (USSEC) region or country representative; or submit your contact details via <https://ussec.org/contact/>.

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