

MEASURING SORGHUM'S GLYCEMIC INDEX



Glycemic index (GI) values allow health professionals, menu planners and food formulators to compare blood glucose rise after consumption of foods containing carbohydrates and are important for a number of reasons.

BENEFITS OF GI VALUES

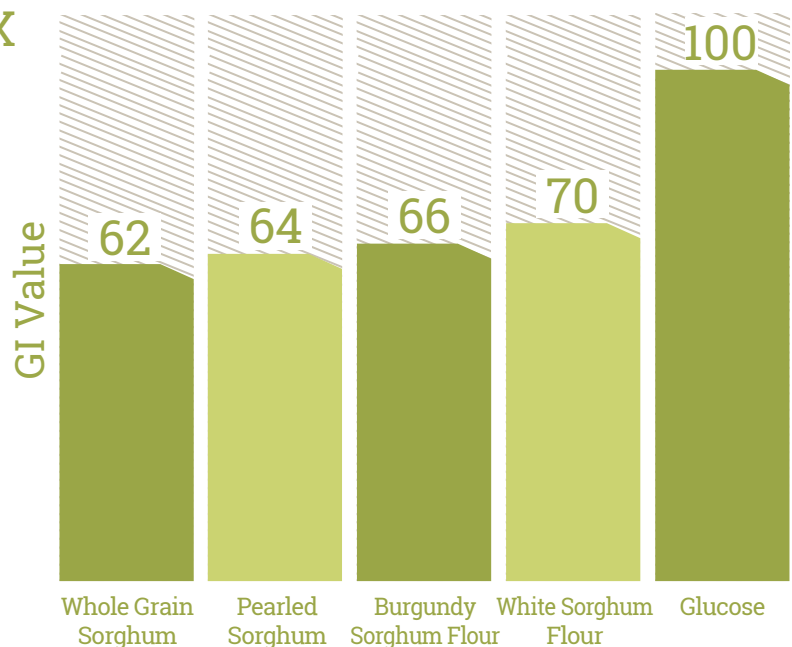
Generally, foods resulting in slower blood glucose rise and a longer sustained blood glucose level are more desirable than foods resulting in a rapid blood glucose rise and subsequent rapid glucose drop because insulin responds to elevated blood glucose to move glucose into cells¹. Additionally, upon reviewing studies that examined breakfast foods and cognition, researchers concluded GI might affect cognitive performance. Overall, GI values are useful in developing products and designing menus. Clinicians and dietitians also use GI values to help clients manage diabetes and weight.

FACTORS AFFECTING GI

- Bio-individual human characteristics
- Food processing, such as a highly processed flour, moderately processed wheat bulgur, or a minimally processed sorghum grain
- Nutrient formula on of food matrix, including fat, protein, carbohydrate and fiber
- Rate of food consumption
- Amount and nutrient composition of other foods and beverages eaten concurrently

SORGHUM'S GLYCEMIC INDEX

Sydney University's Glycemic Index Research Service maintains the world's largest database of GI values and was the perfect location to analyze sorghum. The analysis included whole grain sorghum, pearled sorghum, whole grain burgundy sorghum flour and whole grain white sorghum flour. The values for whole grain sorghum and pearled sorghum were 62 and 64, respectively. Burgundy sorghum flour and whole grain white sorghum flour values were 66 and 70, respectively. Both flour and grain values were significantly different ($p < 0.001$) from the glucose standard with a GI of 100, but were not significantly different from each other.



**The mean GI value for the two sorghum flour pancakes, two grain products and reference food*

CONDUCTING THE STUDY

Sorghum's GI study used published standardized protocol. Two groups of 10 healthy non-smoking volunteers, men and women, ages ranging from 19-55.9 years old, not under or overweight, no impaired glucose intolerance, allergies or illnesses, and consuming no medications, other than hormonal prescriptions participated in the study. GI values below 55 are ranked low, values between 56-69 are ranked medium and values 70 and over are ranked high, thus the whole grain white sorghum flour GI is ranked high (on the med-high cusp), and the burgundy whole grain sorghum flour, whole grain sorghum and pearled sorghum GI's were all ranked medium.

TESTING GI IN FLOUR IS A CHALLENGE

Testing GI in flour, an ingredient, rather than a consumable food with humans is a challenge since people do not consume flour per se. In this study, each of the sorghum flours were mixed with water to make a batter and subsequently pancakes were cooked for the test. No other typical pancake ingredients such as milk, fat or eggs were added, which would have lowered the GI. Furthermore, the total available carbohydrate (AC) amount of 50 grams used in this test is unlikely to be a serving. Since the AC affects blood glucose level, nutritionists calculate the glycemic load (GL) to accommodate for differing amounts of AC/serving. Multiplying the GI by the AC/serving and dividing by 100 yields the GL value. The GL thus takes into account the fact that people eat varying amounts of AC per serving of food.

Example of glycemic load calculation for a 40g flour serving with varying AC

GI = Glycemic Index

GL = Glycemic Load

AC = Available Carbohydrate

White whole grain sorghum flour (40g): $(28.6 \text{ AC} \times 70 \text{ GI})/100 = \text{GL of } 20$

Burgundy whole grain sorghum flour (40g): $(25.7 \text{ AC} \times 66 \text{ GI})/100 = \text{GL of } 17$

TESTING RESULTS

The current consensus is that GL values of 10 or less are ranked low, values of 11-19 ranked medium and GL values more than 20 ranked high. Thus in this study, white whole grain sorghum flour and pearled sorghum GL are ranked high (on the med-high cusp) and the burgundy whole grain sorghum flour and whole grain sorghum GL's are ranked medium. The burgundy whole grain sorghum contains slightly more fiber and protein, thus the expected lower GI and GL. However, the two whole grain sorghums flours were not statistically significantly different from each other, while both were statistically significantly lower than the glucose control ($p < 0.001$). Additionally, the two grains were not statistically different from each other, but they were significantly lower than the glucose control ($p < 0.001$). Knowing which foods will produce a lower blood glucose response is an important consideration for people with diabetes and those at risk of developing it. This knowledge can help individuals determine if sorghum is the smart choice for them and their family.

References

¹Edefon, et al Am J Clin Nutr 2014;100

²Sidney University's Glycemic Index Research Service. A Study to the Glycemic Index Value of Two Sorghum Products. 2015.

³Sidney University's Glycemic Index Research Service. A Study to the Glycemic Index Value of Two Sorghum Products. 2014.

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