

Title: **Effects of a Sorghum Starch on Blood Glucose and Insulin Responses in People with Pre-diabetes**

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Status: Reporting on year 1 of 2

Introduction: Pre-diabetes is the state in which individuals have higher blood glucose level than normal but not high enough for a diagnosis of diabetes. About 35% of U.S. adults aged 20 years or older had pre-diabetes in 2005-2008 and about 11% of people with pre-diabetes developed type 2 diabetes each year. There is growing interest in researching functional carbohydrates to improve human health such as lower blood glucose, decreased insulin release, increased satiety, and weight control.

Objectives:

1. Characterized the functional starch contents of grain sorghum and prepare the sorghum muffin for a human feeding study
2. Assess the functionality of consuming grain sorghum muffins to ameliorating blood glucose and insulin levels in people with pre-diabetes

1st Year Results:

Total starch content and functional starch fraction (slowly digestible starch and resistant starch) in four different grain sorghum flours (Table 1). Total starch was measured using Megazyme Total Starch kit (Wicklow, Ireland). Rapidly-digestible starch (RDS), slowly-digestible starch (SDS), and resistant starch (RS) of four grain sorghum flours were analyzed using a modified Englyst method.

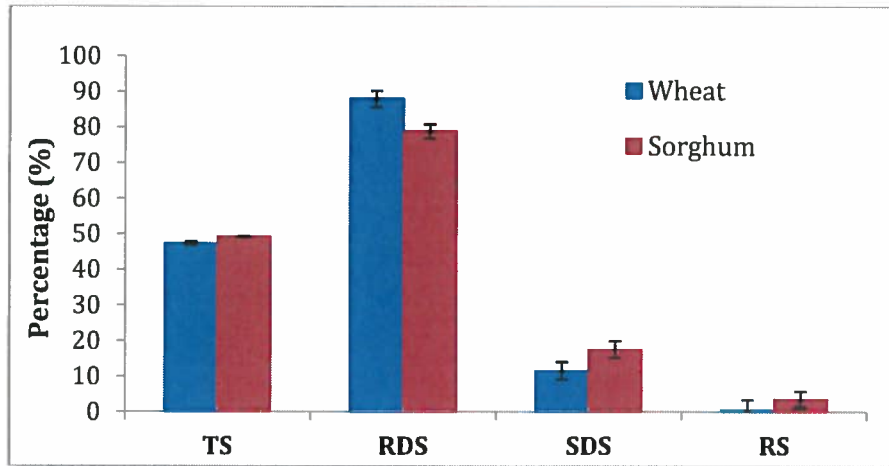
Table 1. Starch fractions (RDS, SDS, and RS) of four sorghum flours

	<i>Total Starch (TS, %)</i>	<i>Slowly digestible starch (SDS, %)</i>	<i>Resistant Starch (RS, %)</i>	<i>Rapidly digestible starch (RDS, %)</i>
Sorghum I	71.9±0.7	35.4±0.3	8.2±0.5	28.3±0.2
Sorghum II	82.3±1.6	42.7±0.1	9.8±0.3	29.8±0.3
Sorghum III	75.4±0.8	48.5±0.8	11.9±0.7	15.0±0.1
Sorghum IV	74.2±0.7	32.5±0.5	24.9±0.2	16.8±0.5

TS, SDS, RS, and RDS values represent mean ± SEM

Figure shows the total starch (TS) analysis and RDS (rapidly digestible starch), SDS (slowly digestible starch), and RS (resistant starch) fractions of grain sorghum muffins (treatment) and wheat muffins (control). The measurement of the different starch fractions in grain sorghum or wheat muffins was based on the method of Englyst *et al.* (1992). RDS is converted to glucose by enzyme in 20 min. SDS

is converted to glucose by enzyme between 20 and 120 min. RS is not hydrolyzed after 120 min and calculated by subtracting SDS and RDS from the total starch content as determined by an enzymatic method.



Values represent mean \pm SEM

The protocols involving human subjects were approved by the University of Arkansas Institutional Review Board (IRB Protocol #11-10-200). The humans study is ongoing right now to investigate the efficacy of a grain sorghum muffin on blood glucose and insulin responses.