



## Physio-Chemical Changes in Fermented Sorghum Flour During Kissra Making

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### Abstract

**Introduction:** Kissra, is a traditional gluten-free flatbread prepared from a fermented sorghum flour batter. It is a staple food in Sudan. Studies on the modifications induced by fermentation processes on the main macromolecular components of sorghum flour (i.e., proteins and starch) are limited. Hence, establishing the relationships between the starch and protein molecular changes during fermentation their effects on batter rheological properties and baking performance of sorghum flour is required to identify the relevant criteria of product quality and shelf life for sorghum bakery products.

**Methodology:** Six sorghum varieties (Lekgeberwa from Botswana; Gadam from Zimbabwe; Macia from South Africa; and Tabat; WadAhmed and Wafer from Sudan) were milled into whole grain flour with and without mixed microflora fermentation treatment and their batter rheological and functional properties were determined. The samples of the fermented, unfermented batter were analyzed.

**Results and Discussion:** The pH of the fermented batter decreased significantly with fermentation time and there was a rise in titratable acidity (TA) over 40 hours ( $P < 0.05$ ). The viscosity of the fermented batter decreased with increasing the fermentation time, possibly due to increase in soluble molecules (reducing sugar and free amino nitrogen) from hydrolysis of dispersed biopolymers in water. However, there was an increase in pasting viscosity of the batter during fermentation compared to control. The highest peak viscosity was observed at 24 hours. This is due to possible breakdown of the flour protein matrix to release starch. The weakening of protein matrix was shown by increase of free amino nitrogen and microscopy. The increased availability of starch granules thus increased swelling capacity, hydration, gelatinization and pasting of the batter.

**Conclusion:** Lactic acid fermentation of sorghum flour appears to change its biomolecular structure, and this can be related to batter rheological properties.

### Biography: Sami Ali

Sami Ali was born in Sudan and currently he is a PhD student at the Department of Consumer and Food Sciences, Faculty of Natural and Agricultural Sciences at University of Pretoria, Republic of South Africa.

He is Researcher in Department of Environment, National Centre for Research in Khartoum-Sudan. He was graduated from Faculty of Agriculture He was graduated from Faculty of Agriculture, University of Khartoum majoring in Biochemistry and Food Science in 2005. He obtained MSc in Food Science and Technology in 2013 from University of Khartoum.