

Nutritional and Functional Properties of Infrared and Microwave Heat Moisture-Treated Sorghum Meals

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Abstract

Starch is the main component of sorghum meals. The digestibility of a carbohydrate-rich product can be estimated by the glycaemic index (GI) using in vitro starch digestibility assay. Despite the statements in literature that, “sorghum foods are slowly digested starch and good for people with diabetes and obesity”, other researchers have proven sorghum foods to have a high and intermediate GI. Heat-moisture treatment (HMT) is one of the environmentally friendly physical modification methods that can be used to improve the physicochemical properties of starch without destroying its granular structure.

The nutritional and functional properties of infrared and microwave HMT sorghum meal were studied. Three types of sorghum meal (white and red non-tannin, red tannin) were treated by HMT at 25 % moisture by microwave (MW) and infrared energy (IR) (250 W) for 15 minutes.

All the microwave and Infrared HMT sorghum meal had significantly ($P < 0.05$) lower pasting peak viscosity as compared to the untreated samples. There was a reduction in the in vitro starch digestibility of the HMT samples with the red tannin sorghum type with the lowest estimated glycaemic index (eGI). HMT of starch changes the crystalline nature of the starch granule, which leads to the conversion of a fraction of amorphous lamella to a crystalline form. Tannins in tannin-type sorghum can also form complexes with starch and amylase enzymes through hydrogen bonds or hydrophobic interaction to reduce starch digestibility. This increases the amount of slowly digestible starch and resistant starch and further reduces the eGI.

The results of this study suggest that HMT by MW and IR energy changes the functional and nutritional properties of sorghum meals and has the potential to be used in the development of lower GI sorghum foods.