

500a A Novel Non-Invasive Method to Measure Visco-Elastic Properties of Cereal Grains during Processing

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The palatability of cereal grain foods is often increased with the addition of sugars during the cooking process. However, the role of sugars and the mechanisms in which they influence the physical and rheological properties of whole cereal grains after cooking and upon further processing is not well understood. Therefore, the effect of sugars on forms of starch reassociation (e.g. retrogradation) during processing (e.g. tempering) was investigated. Tempering was chosen because it is a common processing step used in the production of cereals from grain and it is associated with starch retrogradation. The cooking process consisted of cooking corn grits with an amount of water 1:1 by weight in a pressure cooker. Ten grams of sucrose were added per every 100 grams of cereal grain for the cooking process. Similarly, 10 grams of high fructose corn syrup (HFCS) were added for every 100 grams of grains. A control containing no sugar was also tested. The cooked cereal grains were dried to an approximate moisture content of 15%. The tempering process consisted of packing the dried grains into sealed containers and holding them for 30, 60, and 90 minute time intervals and rheological measurements performed accordingly. The rheological changes occurring during the tempering process for the cereal grains were monitored by using a broad band oscillatory squeezing flow method developed in our laboratory. The method is based on the measurement of the mechanical impedance of the sample. This mechanical impedance is closely related to the sample's visco-elastic properties. Both viscous damping and elastic stiffness values increased with increasing tempering times in all cases examined. Cereal grains cooked with sugars exhibited the greatest increases in hardness supporting the role of these ingredients in promoting retrogradation.