Title The Physical Properties of Micronised Lentils as a Function of Tempering Moisture
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Abstract

Micronisation (infrared heat treatment) following tempering (conditioning) is an effective means of reducing cooking time in grain legumes such as lentils. However, the physical, physico-chemical and chemical changes that bring about this desirable change in the lentils have not been extensively investigated. The objective of this study was to investigate the physical changes occurring in lentils as a result of micronisation at different moisture contents. Lentils were tempered to a range of moisture contents (17–45%) and micronised under an electric microniser to return them to their initial moisture content (13%). Control samples were tempered to the same moisture contents but were air-dried (at 40 °C). Changes in the density and apparent elastic modulus (of a collection of grains) of the processed lentils were measured, as was the diffusion coefficient of moisture into them. Porosity of the micronised lentils increased with increasing tempering moisture, up to approximately 25%, arising from void creation induced by evaporation of moisture. However, porosity decreased at higher tempering moisture contents, presumably due to filling of voids by amylose from partially gelatinised starch granules. Changes in the porosity of air-dried lentils were slight. Apparent elastic modulus of the micronised lentils was essentially unaffected by tempering conditions. The rewetting coefficient of the micronised lentils was significantly greater than that of air-dried lentils, and the difference increased as tempering moisture content was increased. Diffusion coefficients of moisture within the lentils were strongly dependent on tempering moisture content, increasing as tempering moisture increased. The results indicate that rate of hydration of the lentils (a factor in cooking time reduction) depends on the physico-chemical changes brought about by heat and moisture during micronisation as well as on the increase in porosity.