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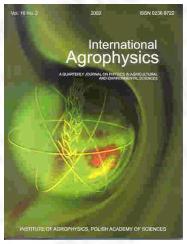

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Impact of microstructure in modelling physical properties of cereal extrudates

(get PDF)

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abstract A research was carried out into the extrusion process of corn semolina and oat bran mixtures with single- and twin-screw extrusion-cooking. The effect of an extruder used, of the concentration of oat bran, of the moisture content of raw material, and of the barrel temperature profile on the course of the process and physical properties of the extrudates was investigated. Attention was paid to relationships between radial expansion, specific density and microstructure of the product. The research indicated that at the oat bran concentration of up to 20%, the extrudate demonstrates cellular structure, low density and excep- tionally high expansion. With oat bran concentration reaching 20-30%, the cellular structure of the extrudate disappears, however it is still compact. Higher proportions of oat bran (over 30%) definitely exclude the cellular structure of the extrudate which takes the form of crumble. Subsequent increase in oat bran concentration, over 60%, leads to a product of more loose structure with semolina-like microstructure. Wide ranges of raw material moisture content and process temperature enabled obtaining a compact product with the oat bran concentration over 30%. Thus, the product's quality is determined by its microstructure which in this case depends on concentrations of lipids and dietary fibre. A com- parative analysis of yellow lupine var. Topaz also indicated that, despite a high content of protein, microstructure of the product is determined by the concentration of lipids. Such a remarkable impact of lipids is observed regardless of their extensive binding in the extrusion process, the samples examined demonstrated even 60% of bound lipids.

keywords microstructure, physical properties, extrudate, cereals, extrusion-cooking