

EFFECT OF THE ADDITION OF BRAN MIXTURES ON DOUGH RHEOLOGY, CORRELATION BETWEEN DIFFERENT RHEOLOGICAL EQUIPMENT AND BREAD PROPERTIES

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Abstract

Cereal bran is mostly rich in dietary fiber, the use of which prevents cardiovascular diseases, diabetes, rectal cancer and obesity, on the other hand it plays an important role in the rheological characteristics of the dough and properties of bread. The aim of this research was the impact of bran mixtures on rheological properties of dough by using Brabender and Mixolab Chopin equipment, and the possible correlation between these two types of equipment and the qualitative properties of produced bread.

Therefore, in our study we used the local wheat cultivar Orovcanka to obtain flour and bran. In order to increase the level of fiber in the bread, we added mixtures of wheat bran (Orovçanka) and rye in different proportions up to 20%. In the production of bread, we also used 4% yeast, 1.8% salt, vitamin C 200 mg/kg, 0.2% SSL (sodium stearoyl lactylate), and water. The dough was prepared in Mondial Forni-Italy mixer and it was baked in an oven of the same brand at a temperature of 230 °C for about 18 - 20 minutes. The determination of the physico-chemical properties was carried out in accordance with the Regulation (Official Gazette of SFRY no. 74/88). Rheological properties of the dough were performed with Brabender equipment (farinography, extensography and amylography) in accordance with ISO standards (ISO 5530-1:2013, ISO 5530-2:2012, and ISO 7973:1992). Rheological analyzes with Chopin Mixolab were performed based on the 2005 manual. While bread qualities such as bread volume, specific volume of bread and bread yield were determined based on the ICC 131:1980 method. Gained data were processed by SPSS 16 software.

Results from dough rheological analysis with Brabender equipment showed that increasing the addition of bran mixtures, one increases the water absorption which in turn delays/improves the development, stability and the degree of softness of the dough, whereas it decreases the extensibility, energy and viscosity of the dough. The maximal resistance and R/T ratio also increases. Results from the rheological analysis of the dough with Mixolab equipment showed an increase in the level of water absorption, dough consistency during mixing, protein weakening, as well as a decrease of the dough stability, starch gelatinization, amylase activity, and starch retrogradation. Correlation analysis showed a large positive signification of the results between certain parameters of the Brabender and Mixolab equipment with a significant correlation of $p < 0.01$ and $p < 0.05$. The weight and yield of bread had increased, but the specific volume and volume of bread had decreased by increasing amount of bran mixtures.

The use of bran mixtures up to 15%, as well as the use of Mixolab Chopin in rheological analyses, which had a good correlation with Brabender equipment are recommended.

Key words: Bran mixtures, Rheological properties, Mixolab Chopin, Correlation, Bread properties.