

CONTRIBUTION REGARDING THE INCREASE OF FIBRE CONTENT FROM FOOD PRODUCT WITH BRAN ADDING

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Abstract

This study was done in order to obtain bakery products with bran addition. It confirms the complex effect of bran on quantitative features of dough. By non-linear regression it was established technological parameters that can be used in the process in order to obtain the bakery products: the bran addition of 3-6%, fermentation temperature of 35°C and 35 minutes for fermentation duration.

Keywords: *bran, bakery products, dietetic products.*

Introduction

The industry of bakery products knows an intensive progress regarding the spreading of row material by superior capitalization of cereals byproduct. The assortment of bread with addition of fiber achiever by an addition of bran was accepted by dietetic property with utilization in alimentation and with a technical, economical and ecological influence.

The composition of bran, distinguish a content of 2% wheat flour, with positive effect found in ashes until 5.8% (Ciobanu, 2001). The chemical compositing established for bran is the following: cellulose; 5% saccharine, 4.7 row fat, until 10% mineral substances an B1, B2, PP, E vitamins (Leonte, 2000 and 2001).

Experimental

The experimental program was conceived with the utilization of programming model of experiences in the centered system by second degree, having four independent variables and 31 experiments.

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The independent parameters with technological influence in the fermenting process of dough are presented in table 1.

Raw material and the conditions of utilization are: wheat flour type 800, water 50 ml la 100 g mixture of bran and wheat flour, bakery yeast 5%, kneading duration, 10 minutes. The experimental program was done in order to limit the adding of fall bran in comparison with wheat flour until 12% quantitative ratio.

Table 1. Experimental conditions for dough fermenting

Independent variables	X _i	Codified values					
		-2	-1	0	-1	-2	Δ x
		Real values					
Bran, %	X ₁	0	3	6	9	12	3
NaCl type A, %	X ₂	0.75	1.50	2.25	3	3.75	0.75
Duration, minutes	X ₃	31	33	35	37	39	2
Temperature, °C	X ₄	30	35	40	45	50	5

Results and Discussions

The influence interpretation of the independent variables was accomplished by the particularization of the general regression equation:

$$y = b_0 + b_1X_1 + b_2X_2 + b_{12}X_1X_2 ++b_{11}X_1^2+b_{22}X_2^2$$

The dependent variables that express the progress of fermentation process are: dough acidity expressed as acidity degrees, dough development which is established by its deforming at the ending of the process, compared with the initial situation.

The regression equation particularized for the dependent variable at dough fermentation is presented in table 2.

The graphical representation of the regression equations depending on the correlation between dependent variables and independent variables was presented in figures 1, 2 and 3 for the dough acidity and in figures 4, 5 and 6 for the dough deformation.

The dough acidity has maximum values in conditions of minimum bran addition. In figure 2 it is observed an increasing of the dough acidity when the bran quantity decreases. The duration influence

concerning the fermentation process of dough is less important, in the situation when the bran quantity is maxim.

Table 2. Regression equations for dough fermentation process

Dependent variables, Y_i	Regression equation
Dough acidity	$Y_1 = 3.31 + 0.15x_1 - 0.165x_2 + 0.195x_3 + 0.24x_4 + 0.2925x_3x_4 - 0.1443x_1 - 0.1131x_2^2 - 0.225x_4^2$
Dough deformation	$Y_2 = 0.33 - 0.02x_2 + 0.03x_3 + 0.03x_4 - 0.01x_1x_3 - 0.006x_4 - 0.007x_2x_3 + 0.01x_2x_4 + 0.018x_3x_4 - 0.016x_1^2 - 0.02x_2^2 - 0.01x_3^2 - 0.02x_4^2$

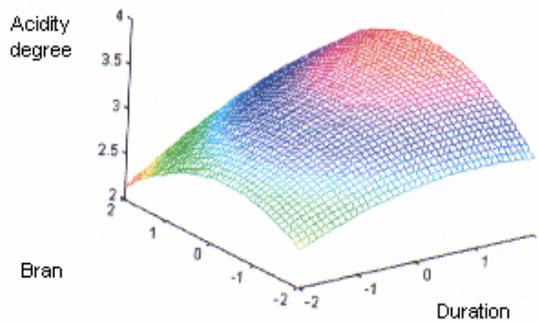


Fig. 1. The dough acidity variation with bran addition, depending on the bran content% and duration, minutes

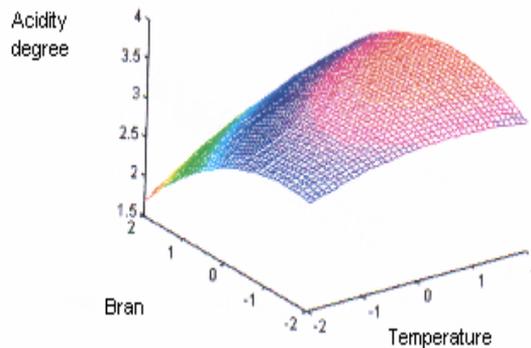


Fig. 2. The dough acidity variation with bran addition, depending, on the bran content % and temperature degree

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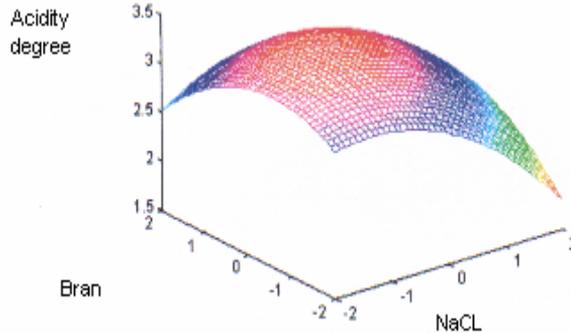


Fig. 3. The dough acidity variation with bran addition, depending, on the NaCl content % and duration, minutes

The maximum of fermentation process is obtained when the bran content is minim and does not exceed 6%. In this case the total dough acidity reaches the value of 3.2 acidity degrees.

Figure 3 shows that dough acidity with bran addition, increases when the sodium chloride quantity is below 2.5% and the duration of the process is 37-39 minutes.

Further on it reproduced the influence of bran adding on the dough deformation.

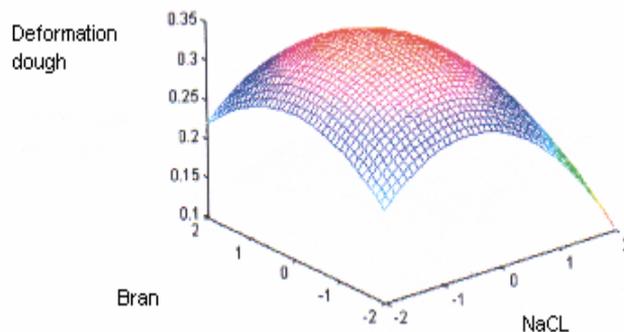


Fig. 4. The dough deformation variation with bran addition depending on the bran content % and NaCl content, %

For a normal dough increase, the bran quantity varies between 3 and 6%. The necessary and enough temperature are 30-35°C, and the fermentation time is 35 minutes.

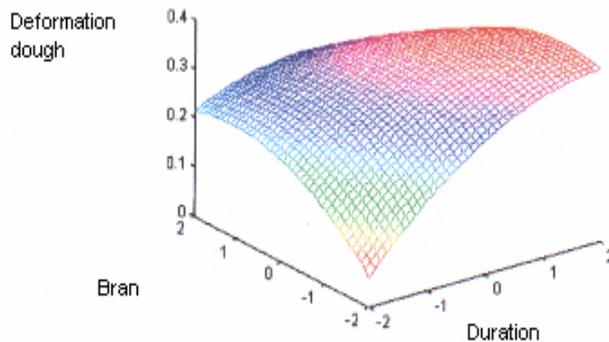


Fig. 5. The dough deformation variation with bran addition depending on the bran content % and duration, minutes

In figure 5 is observed that the dough deformation with bran addition is maxim when the bran content is minim. In this case, the duration of the process has a less meaningful significance.

The same things were observed in figure 6, namely the dough deformation is minim when the bran content is 12%.

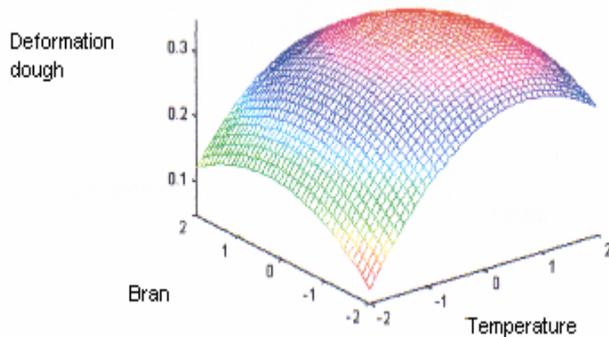


Fig. 6. The dough deformation variation with bran addition depending on the bran content % and temperature degree

Conclusions

This research has the goal to obtain the bakery produces rich in cellulose by bran addition. The research program establishes the following technological parameters that can be used in the process in order to obtain the bakery products: the bran addition, 3-6%, fermentation temperature, 35°C, fermentation duration, 35 minutes. A maximum addition of 6% bran can be considered a positive solution with effects in the nutrition and digestion system of food products.

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