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STUDY CONCERNING THE INFLUENCE OF SALT ADDITION ON BREAD'S QUALITY

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Abstract

The study is referred to the implications of increasing the salt content in dough composition on dough's physical-chemical parameters also on bread's physical, chemical and sensorial properties, as finished product. The optimal results regarding dough development and bread quality as finished product was obtained adding 1.5 % salt reported to the quantity of flour added.
Keywords*: salt, bakery products.*

Introduction

In making the bakery products, excepting through the dietetics (non-chloride) is used the cooking salt (NaCl) in proportion by 1.2-1.7 % reported to flour. The salt is used for taste and for improving dough's physical properties and also bread as finished product. The dough without salt is soft and sticky and during dough fermentation the pieces of dough are expanding (Leonte, 1998, 2000 and 2003).

The salt is used like a solution 20-30 % concentration and it is introduced in the dough. Concerning the purity, the content of NaCl, the salt is presented in the following assortments:

- extra salt (99.2 % NaCl, 0.5 % humidity);
- superior quality salt (98 % NaCl, 0.8 % humidity);
- first quality salt (97.5 % NaCl);
- second quality salt (96.5 % NaCl).

The salt exercises multiple influences over microbian flora and dough's enzymes, over dough's moulding and fermentation process, over physical properties and bread quality (Bordei, 1980; Giurca, 1980, Moraru, 1983).

Experimental

For realizing experimental program were made six tests and a blank test. The blank test didn't contain salt, while in the others test, the salt content grew progressively (Table 1).

Table 1. Experimental program

Samples	1	2	3	4	5	6	7
Salt addition (% reported to flour.)	0	0.5	1.0	1.5	2.0	2.5	3.0

For every test were maintained constantly the following ingredients:

- flour type 000 – 500 g;
- compressed yeast - 1,5 % reported to flour;
- water - 275 cm^3.

The tests were realized using roundabout process of bread's processing that consists in two stages. To establish the optimal conditions for the technological bread are making process, regarding the salt addition variation process, it had been studied the following physical-chemical and quality parameters:

- for dough: humidity, [%] and temperature, [°C].
- for bread: acidity degree, elasticity [%], porosity [% vol.], bread's volumetric efficiency [cm^3/100g flour], ratio H/D, specific volume [cm^3/100g bread], and scores graphic for bread's quality evaluation (the maxim score being 32 points).

The analyses were made as is prescribed in SR 878/1996.

Results and Discussions

The results interpretation through graphic representation has been permitted to obtain certain information concerning the optimal salt addition. The experimental influence of salt addition on studied characteristics of dough and bread are graphically presented in figure 1 – for dough humidity, in figure 2 – for dough temperature, in figure 3 – for bread acidity, in figure 4 – for bread elasticity and porosity, in figure 5 – for specific volume, in figure 6 – for volumetric efficiency, in figure 7 – for H/D ratio, and in figure 8 for final score.

From figure 1 can be observed that dough humidity linearly increases with salt addition growing, being a good linear correlation (R = 0.98058) between DU (dough humidity) and S (salt added):

$$DU\ (\%) = 39.7 + 1.43 \cdot S \qquad (1)$$

In figure 2 can be observed that dough temperature decreases with salt addition growing. As for dough humidity, also there is a good linear correlation (R = -0.97985) between dough temperature (DT) and salt added (S):

$$DT\ (°C) = 32.3 - 1.36 \cdot S \qquad (2)$$

For the two dough characteristics it is possible to estimate them with relations 1 and 2 in the domain of 0 – 3% for salt added.

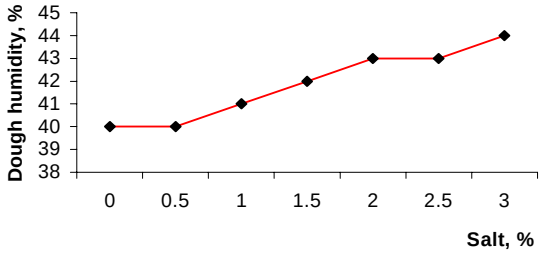

Fig.1. The influence of salt addition on dough humidity.

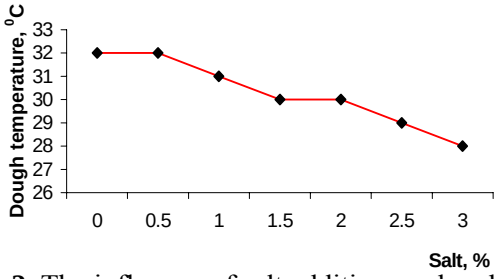

Fig. 2. The influence of salt addition on dough temperature

It can be observed from figure 3 that there is a very good linear correlation (R = -0.99328) of bread acidity (BA) with the salt addition because the salt exercises an inhibitory action over the yeast activity. Mathematically, this dependence can be described with the linear function 3:

$$BA = 2.66 - 0.18 \cdot S \qquad (3)$$

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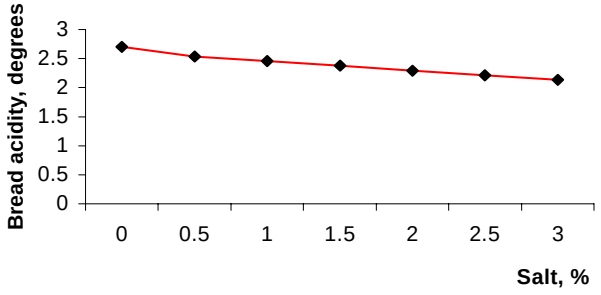

Fig. 3. The influence of salt addition on bread acidity

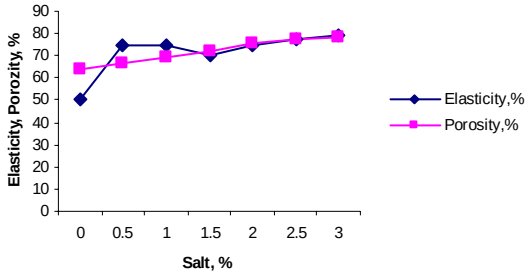

Fig. 4. Relationship between bread's elasticity, porosity and salt content.

It can be observed from figure 4 that the salt addition has a positive influence about bread's crumb elasticity and also, the porosity presents a uniform growing in parallel with raising the salt addition. There is a very good linear correlation (R = -0.98612) for porosity (P) and salt added, described with equation 4:

$$P\ (\%) = 64.4 + 4.93 \cdot S \qquad (4)$$

In literature there are some reports about some linear relationship between elasticity modulus and bread density (Scanlon, 2001) that is a measure of bread's porosity. For our data from figure 4 there is a marginal linear correlation of elasticity with porosity (R = -0.72).

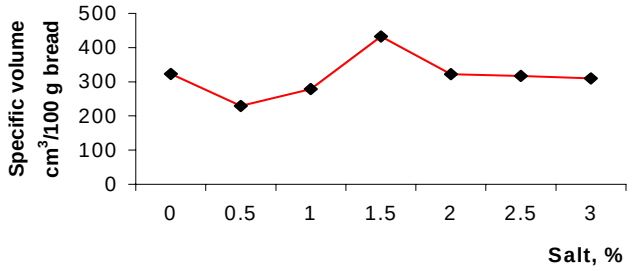

Fig. 5. The influence of salt addition on bread's specific volume.

In figure 5 it can be observed that bread's specific volume has maximum value when the salt addition is 1.5 %. On the range of salt addition: 0–1 % is observed a reduction of specific volume around 0.5 % and also a growing to 1%. On the range of salt addition 1.5 – 3 %, the bread's specific volume begins to decrease progressively

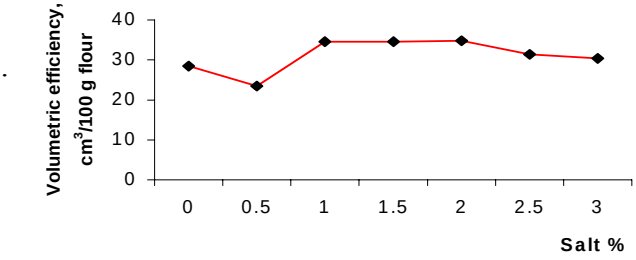

Fig. 6. The influence of salt addition on volumetric efficiency in bread.

In figure 6 can be observed that the volumetric efficiency in bread has been reduced when salt addition is 0.5 %. Between 1 – 1.5 % range, it can be observed a volumetric efficiency growing and after that, it has been decreased moderate until limit by 3 % salt.

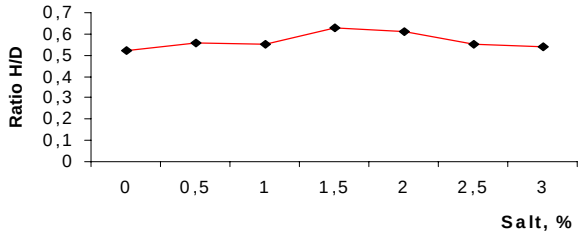

Fig. 7. The influence of salt addition on ratio H/D.

From figure 7, respectively figure 8, can be observed that maximum value of ratio H/D, respectively of final score was obtained when the addition salt was 1.5 %. The sample with 1.5% salt added brings together all optimal qualities and properties.

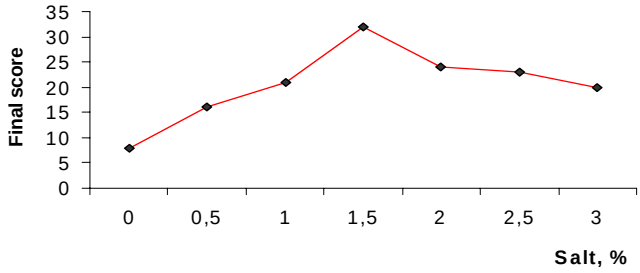

Fig. 8. The influence of salt addition about bread's qualitative final score.

The final score assembling all bread's quality characteristics, being taken in consideration the following parameters: product's form and volume, crust's colour and aspect, crumb's state and aspect, crumb's porosity and pores structure, crumb's flavour (smell), taste and acidity.

Conclusions

From the experimental dates, which were obtained it can draw that the salt influences favourable dough's physical properties. The dough with salt addition is more elastic, more resistant and with a better stability. Also, the salt influences positively the bread quality in the following way, the bread made from dough with 0 – 0.5 % salt addition is expanded and has a pale crust. Using of large salt quantity by 2.5 – 3 %, determines obtaining of product with saline taste, reduced volume, dens crumb, intensity bread coloured as a result of braking of the yeast's fermentative activity. Growing the salt addition from 1 to 1.5 determines the easily growing of bread's volume, and the salt addition over 1.5 % reported to flour determines obtaining bread which volume remains relatively constant.

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