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STUDYING THE BORROWING STRUCTURE OF BAKERY PRODUCTS

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Abstract: *Bakery products after mixing by working elements of various configurations are estimated by physical and chemical indicators, one of the important consumer qualities of bread is its freshness and porosity.*

Among the most important organoleptic characteristics of porosity the uniformity of the arrangement of pores and their size were determined. After mixing, the yeast dough should increase in volume, acquire a capillary-porous structure, in which pores will form gaseous fermentation products. Studies have been carried out on the influence of costs of specific work during mixing on the formation of the number of pores in the cereal product.

Porosity characterizes the important qualitative property of bread. Low porosity is usually characterized by bread from poorly-battered yeast dough. By means of enhanced mechanical processing of the dough, the specific work required for the batch increases and the qualitative parameters of the porosity of the finished product increase accordingly. The porosity and structure of the porosity of finished products were investigated, preliminary kneading the yeast dough with the working elemets of different configurations.

Keywords: *Mixing, Yeast Dough, Porosity, Structure, Distribution.*

INTRODUCTION

The mixing of the yeast dough was carried out on a kneading machine of continuous action, used to knead the screw, finger and cam working elements. After kneading the yeast dough, had been vibrated for 30 minutes and baked in the oven for about 12 minutes. Porosity was investigated using ImageJ software.

The porosity of bread is an important indicator of its quality. After mixing, the yeast dough should increase in volume, acquire a capillary-porous structure, in which pores will form gaseous fermentation products. For the formation of a dough with an elastic structure, it is required that the gluten proteins are elastic and envelop the whole grain of starch with a thin film. If the protein is insufficient or the gluten is not elastic, the dough will have a low gas-retaining capacity, which in turn will reduce the formation of porosity.

EXPOSITION

Investigations have been carried out on the influence of the costs of specific work during mixing on the formation of the number of pores in the bread product (Fig. 1). Porosity characterizes the important qualitative property of bread. Low porosity is usually characterized by bread from poorly-battered yeast dough. Due to enhanced mechanical processing of the dough, the specific work required for the batch increases and the qualitative parameters of the porosity of the finished product increase accordingly.

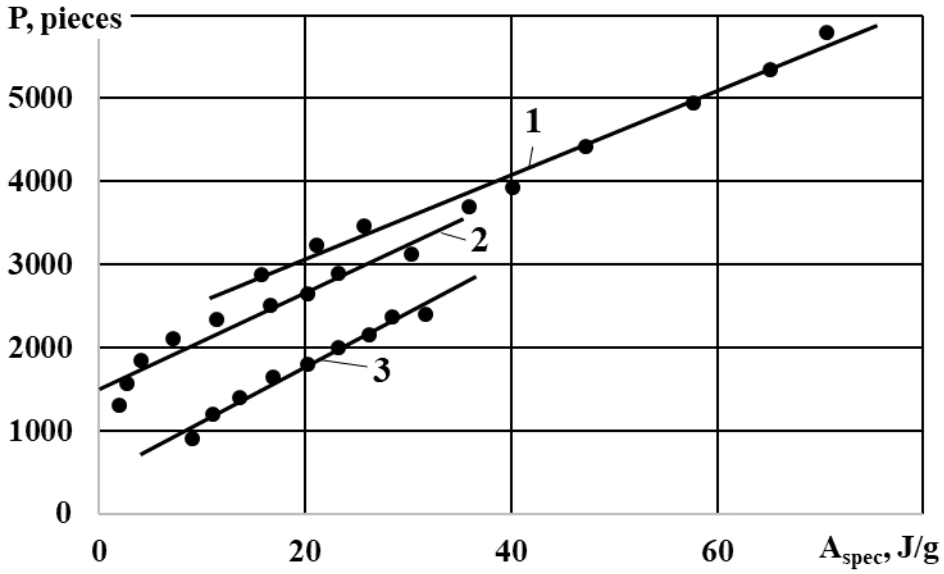

Fig.1. Investigation of quantitative indices of porosity of the finished product from the costs of specific work on mixing the yeast dough (1-Cam working element; 2-Screw working element; 3-Finger working element)

The processed experimental data shows that, with increasing costs of specific work on the batch, the number of pores in the finished product increases as well.

During the kneading of the yeast dough by the cam and the fingers, linear dependence is observed, while for the screw working elements, the curve has a degree of dependence. For the costs of the specific work of 20 J/g among the represented working elements, the greatest number of pores (3241 pieces) is formed when kneading the yeast dough by cam operating elements.

The influence of the specific work during the cam shaking by the working elements on the formation of the number of pores in the finished product is determined by the mathematical formula:

$$П = 50{,}6A_{spec} + 2056, \text{ pieces} \quad (1)$$

A_{spec} – the costs of the specific work on mixing the yeast dough, J/g.

The highest number of pores is 2884-5786 units formed during the kneading of the yeast dough by the cam operating aelements, there is an intensified mechanical treatment of the dough, the performance of the specific work reaches 15-70 J /g, in the process of kneading the dough does not rupture and shrinks, thus a quality batch is produced, the dough becomes elastic, gluten films hold off carbon dioxide and a fine-grained uniformly distributed pore structure is formed throughout the volume of the finished product.

The influence of specific work during mixing by screw working elements on the formation of the number of pores in the finished product is determined by the mathematical formula:

$$П = 58A_{spec} + 1501, \text{ peices} \quad (2)$$

A_{spec} – the costs of the specific work on mixing the yeast dough, J/g.

Indicators of the specific work during the kneading of the yeast dough vary in the range from 2 to 30 J/g, according to these values, the number of pores reaches 1311-3126 pcs. The process of mixing in this case takes place in a short time, as a result, the gaseous phase is represented by bubbles of air, the captured dough during the mixing is unevenly distributed in the volume of the finished product, increases the pore size but reduces their amount.

The influence of specific work during the kneading by the digital working elements on the formation of the number of pores in the finished product is determined by the mathematical formula:

$$П = 65{,}2A_{spec} + 460, \text{ pieces} \quad (3)$$

A_{spec} – витрати питомої роботи на замішування дріжджового тіста, J/g.

Expenditures of specific work during kneading by the finger work elements reach 9-31 J/g, low amount of pores (902-2410 units) in this case is explained by the fact that the components are

not equable mixed, mixing by the finger's working elements leads to a constant breakdown of the gluten of the dough, which does not have time to recover as a result of gluten films are not able to fully retain carbon dioxide necessary to further form the fine-grained porosity of the product.

Bakery products after mixing by working elements of various configurations are estimated by physical and chemical indicators, one of the important consumer qualities of bread is its freshness and porosity. Among the most important organoleptic characteristics of porosity were determined the uniformity of the arrangement of pores and their size. The porosity and structure of the porosity of the finished products (Fig. 2) was investigated, after having previously subjected to different configurations by the working elements of the yeast dough.

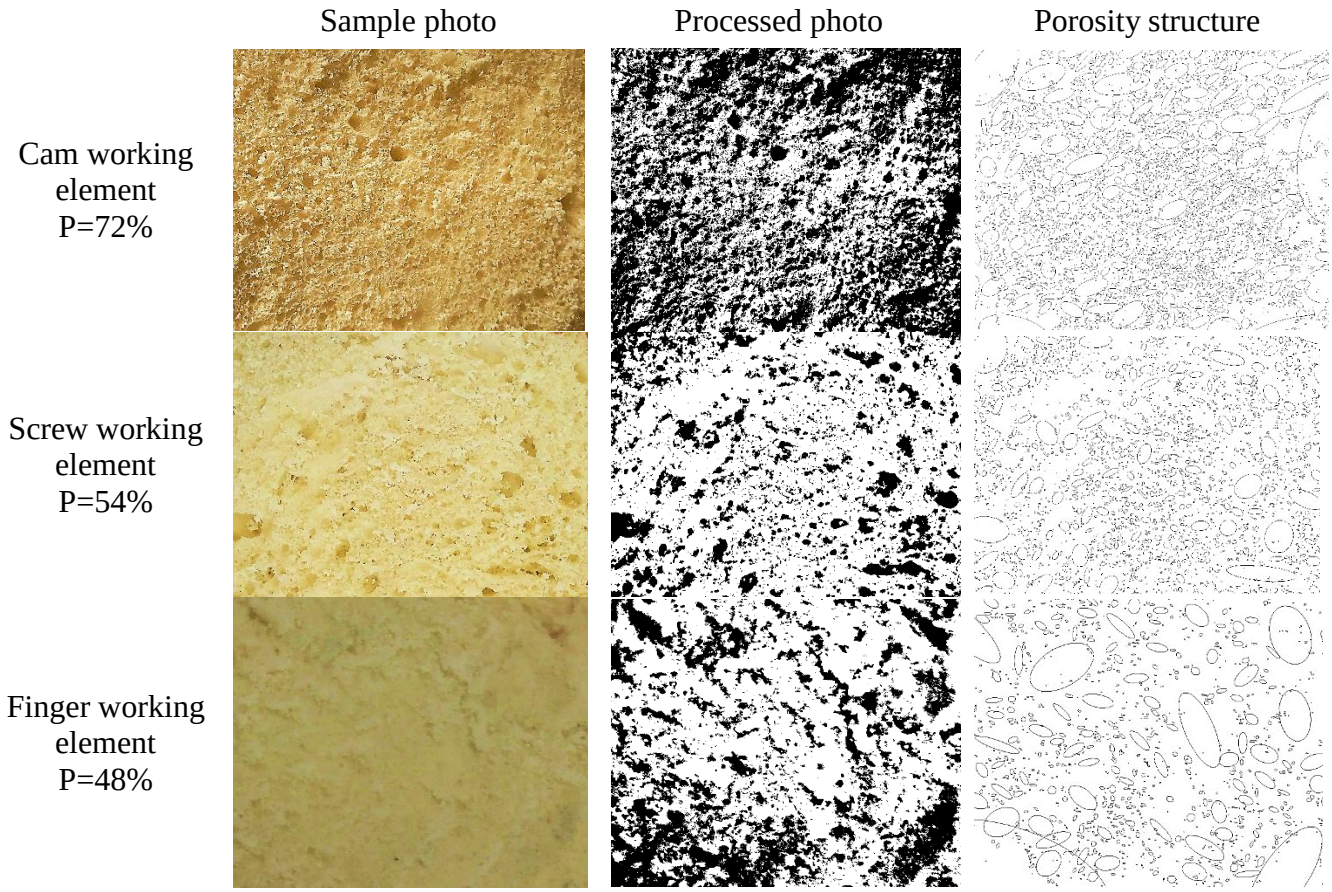

Fig.2. Structure of porosity of finished products after mixing by working elements of various configurations

The uniform fine-grained porosity of the finished product, P = 72%, is observed after mixing the yeast dough by the cam working elements, their mechanical effect improves the function of the microflora of the dough and maintains the elasticity of the surface, thereby increasing porosity and as a result, an increase in the volume of dough preform after baking and baking. The porosity of the finished product, after mixing with screw working elements, reaches 54%, reduced porosity indices are explained by the fact that some components of the dough at the first stage merged and in the future due to the rapid transport power of screw working elements did not have time to qualitatively pass the stage of actual kneading and plasticization. The mixing by the finger work elements resulted in damage to the gluten-free dough frame, resulting in a merger of small pores and the formation in some places of the volume of a large, unevenly distributed throughout the volume of the product, porosity of the bread P = 48%, and as a result of a decrease in the ' a large output of bread.

CONCLUSION

It has been established that with increasing energy consumption, the best dough mix takes place and more pores are formed. The influence of working elements of different configurations on qualitative indices of the finished product is investigated. It was found that the best porosity indices are observed when kneading the yeast dough by cam operating oelements. Indicators of porosity reach 72%. After mixing the yeast dough with the cam working elements a uniformly distributed fine-grained porosity is formed.

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