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PROCEEDINGS

DEVELOPMENT OF BAKERY PRODUCTION TECHNOLOGY FUNCTIONALITY LONG TERM IMPLEMENTATION

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ABSTRACT

Bakery products play an important role in the diet of people in Ukraine and occupy a special place in their diet. The priority is the possibility of realization of freshly baked bread at any time of the day and closer to the consumer - in shops, cafes and restaurants, hotels, recreation centers, and various points of fast food from frozen convenience foods. Large plants can supply semi-finished products in small batches, which would be baked in places of ultimate realization. There was a need to improve the technology of production of bakery products for long-term storage and to improve the quality of finished products from frozen part-baked dough. On the basis of theoretical and experimental studies, we developed the technology of production of frozen semi-finished bakery products for functional purpose. Quality parameters of finished products were improved through the use of potato starch and modified Paselli BC (E1414), replaced by chemical enhancers and formula ingredients of natural origin. It was also studied the possibility of using non-traditional types of flours in frozen part-baked products. This resulted in a product with increased nutritional and biological value with good sensory and physico-chemical quality.

Key words: bakery products, long-term implementation, frozen foods, quality

INTRODUCTION

Bakery products have a special place in the human diet. In recent years, consumers prefer fresh baked goods from bakeries and cafes, as reduced bakery products on traditional technologies. A promising technology is "part-baking", which allow large enterprises to produce frozen ready meal and deliver them to the place of sale. This technology can be considered energy-efficient, due to partial baking. The advantage of baked goods made by the technology of "part-baking" is a long-term storage.

The priority development opportunity is the realization of freshly baked bread with functional properties at any time of the day and closer to the consumer - from partially baked and frozen bakery.

In the production of bakery technology "part-baking", multiple warehouses use synthetic additives that prevent the production of functional bakery products from frozen partially baked commodities (Solonytska, 2009., Kulp and Lorenz, 2005).

Selection and combination of ingredients such as different types of flour, pectin, modified starch, processed rose, grape syrup, etc. makes it possible to improve the quality of finished products, baked from frozen partially baked and half-finished dough and provide functional properties through the use of ingredients of natural origin with high content of micro, trace elements, vitamins, fiber and other additives that provide functional properties to bakery products.

These measures provide product with increased nutritional and biological value with high sensory and physico-chemical quality.

In today's requirements for food, there is an urgent need to improve the technology for the production of bakery products by "part-baking" technologies and improve the quality of finished products as well as frozen partially baked commodities. On the basis of theoretical

and experimental studies, we are developing the technology of functional bakery products based on frozen partially-baked dough (Solonytska, 2015., Lebedenko, 2014).

MATERIAL AND METHODS

It was decided to use maltose syrup to improve the rheological properties of dough with high content of yeast. It was also investigated the effect of different ingredients on the quality of frozen part-baked bread.

Table 1. Recipe products 300 g flour

Crude	With buckwheat flour	With maize flour	With wheat chaff	W crude, %
wheat flour the highest grade	285	275	290	14,5
buckwheat flour	15	–	–	14,5
maize flour	–	25	–	14,5
wheat chaff	–	–	10	14,5
white salt	4,5	4,5	4,5	3,0
yeast baking pressed	9,0	9,0	9,0	75,0
syrup	15,0	15,0	15,0	22,0

The aim of the investigation was to define ratios and influence of different kinds of ingredients on the quality of ready-made bakery of a long term of realization (Kulp and Lorenz, 2005). The laboratory baking of bread was carried out in a leavened-doughless way. The kneading of dough was conducted on a Brabender's farinograph during ten minutes, then the dough was bulk-fermented for 60 minutes after which it was degassed, rounded, scaled, put into moulds and sent to final fermentation in the thermostat TS-80 during 40 minutes. The dough was baked in the laboratory oven RZHLP at the temperature 220-230 °C during 70% of the total time of baking. The products were cooled under the laboratory condition and then were deep-frozen at -18 °C. The period of freezing lasted about 120 minutes. In such conditions the products were kept during 3 days. The stage of defrost was conducted in the thermostat TS-80 at the temperature of 29-32 °C. The products were finally baked for the rest of 30 % of the total time of baking. For control we took the products made according to the traditional technology.

RESULTS AND DISCUSSION

This study determined the effect of maltose syrup on staling process and quality of the finished product made from frozen partially-baked dough. The results were compared to conventionally baked product. The use of syrup in baking production contributes to the quality of bakery products, accelerates the preparation of the dough, provides the necessary rheological properties of dough, preserves the freshness of the finished bread.

With increasing dosage of syrup, a dense protein-carbohydrate structure was created by uniform enveloping gluten with starch granules resulting in a more uniform crumb structure, well-developed porosity with thin walls of the pores, increased specific volume and increased freshness and resistance to staling. Syrup is an effective mean of stabilizing the baking properties of flour, regulating the fermentation process, forming of certain properties of semi-finished products, improving the quality of bread, including slowing down the staling process and reducing the friability of the crumb of bread products made by partial baking technology (Drobot, 2002).

Results showed that adding syrup in an amount of 5 % flour basis improves the sensory properties products and avoids premature staling, due to the presence of dextrin, which

have a high viscosity. Within 24 hours, stored bakery products developed elastic crust and crumb.

The part-baked bread did not significantly differ in sensory and physico-chemical properties as compared to the bread made according to conventional technology. The product freshness was extended by slowing the aging of starch.

In the first phase of the study, the effect of buckwheat flour on the structural, mechanical and physicochemical properties of finished products was determined.

Table 2. Physico-chemical indicators bread with buckwheat flour

Indicator	Control	Baked at 70 % and frozen
Weight, g	400,34	405,5
Specific volume, sm ³ /100g	2250	2200
Wetness, %	41,0	36,4
Acidity, grad	1,8	1,9
Porosity, %	55	58
Penetration, device units		
ΔH_{ov}	83	112
ΔH_{pl}	66	101
ΔH_{el}	17	11
Relative elasticity, %	79,5	90,1
Relative resilience, %	20,5	9,8

In the second phase, it was determined the effect of maize flour on the physico-chemical indicators of product.

Table 3. Physico-chemical indicators bread with maize flour

Indicator	Control	Baked at 70 % and frozen
Weight, g	417,8	438,4
Specific volume, sm ³ /100g	2250	2000
Wetness, %	41,7	34,6
Acidity, grad	1,6	2,0
Porosity, %	56	64
Penetration, device units		
ΔH_{ov}	115	79
ΔH_{pl}	100	65
ΔH_{el}	15	14
Relative elasticity, %	86,9	82,2
Relative resilience, %	13,0	17,7

Table 4. Physico-chemical indicators bread with wheat chaff

Indicator	Control	Baked at 70 % and frozen
Weight, g	409,9	407,4
Specific volume, sm ³ /100g	2300	2280
Wetness, %	36,3	40,2
Acidity, grad	1,0	0,8
Porosity, %	56	73
Penetration, device units		
ΔH_{ov}	55	101
ΔH_{pl}	36	76
ΔH_{el}	19	25
Relative elasticity, %	65,4	75,2
Relative resilience, %	34,5	24,7

Analysis of the quality of finished products showed that the addition of increased amounts of yeast can significantly increase the porosity of products. Adding maltose syrup to the recipe

allowed the extension of shelf life by improving the hydrophilic properties of the crumb and increasing the content of water-soluble substances.

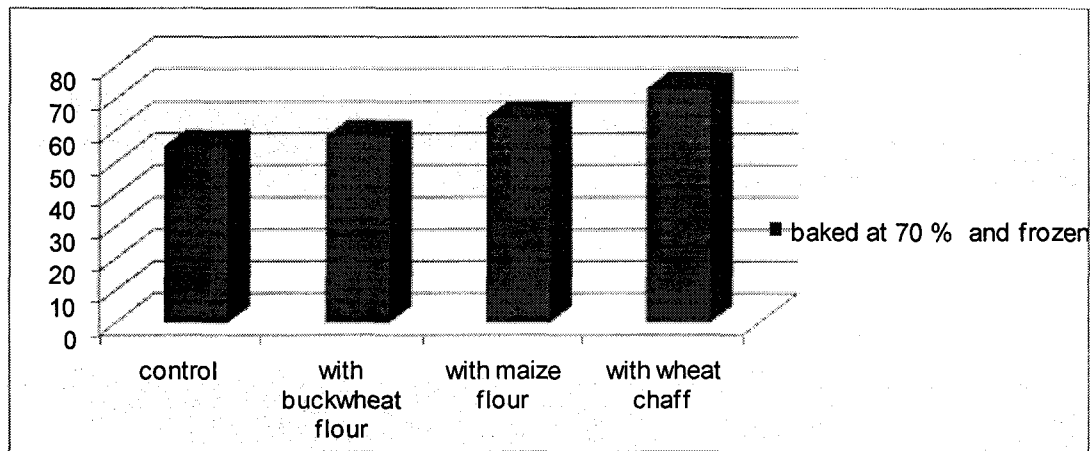


Figure 1. Graph of the porosity of the finished products from selected additives

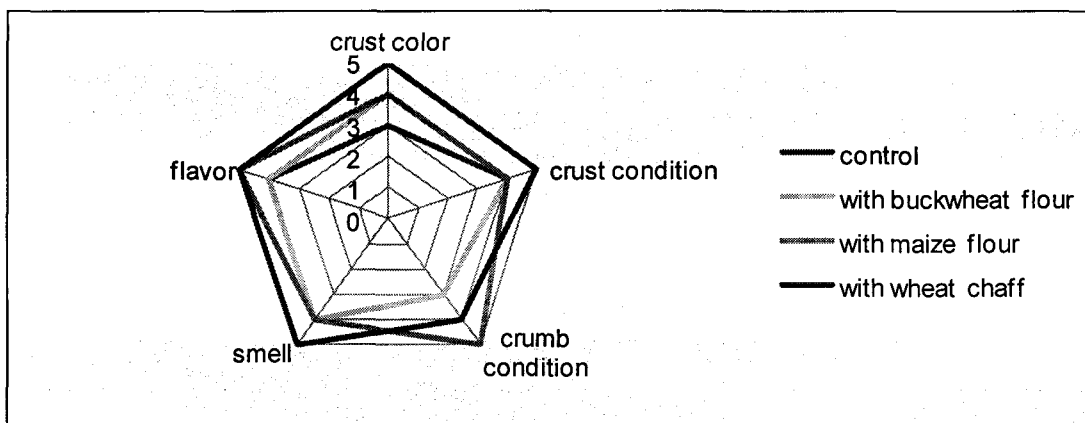


Figure 2. Profilohrama organoleptic quality of finished products

CONCLUSION

Based on research, it can be concluded that it is advisable to use buckwheat, corn flour and wheat flour in the production of frozen part-baked bread. Corn flour contains more lipids, sugars, hemicellulose, it is rich in macro and micronutrients (calcium, magnesium, phosphorus, iron and nickel), vitamins E, B1, B2, B6, PP. Buckwheat flour contains zinc, magnesium, calcium, iron, vitamin B, E group and antioxidant rutin [6]. It is well known that wheat flour is a source of dietary fiber that is an essential food component. Adding flour and cereal bran enhanced the nutritional value of products. Corn flour contains more lipids, sugars, and hemicellulose. It is rich in macro- and micronutrients (calcium, magnesium, phosphorus, iron and nickel), vitamins E, B1, B2, B6, PP. In the class of carotenoids cornmeal identified carotene, kryptoksantan, zeaksantan. Buckwheat flour contains zinc, magnesium, potassium and iron, vitamins B and E, antioxidants and rutin. It is known that wheat bran is the source of dietary fiber that is essential components of food. Due to the presence of wheat bran, corn meal and buckwheat flour in recipes, bakery products can be considered as functional ones

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