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RESEARCHES REGARDING THE IMPROVEMENT OF BREAD QUALITY USING FUNCTIONAL INGREDIENTS

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Abstract

The concept 'healthy foods' has appeared, as synonymous to 'functional foods'. A certain food can become functional by adding functional ingredients or by replacing some of its elements by some other functional ones. Therefore, white flour which is obtained by removing the natural elements of the wheat grain that are to be found in the shell and in the aleuronic coat can become functional by adding fibers. (soy fibers, barley fibers, rice husk etc.). The ingredients that provide for the functional nature of foods are called 'functional ingredients'. Baking industry is currently seeking to expand its products range, to create new products to appeal to sensitive needs, but also to constitute a way of maintaining and improving people's general health.
Keywords: *bread quality, functional ingredient, soy fibers, soy protein isolate, dough proprieties*

Introduction

Bread is a basis aliment that influences in a high way the equilibrated functioning of the body (Gisslen, 1993). Baking industry is trying to solve the problem of increasing products types and creation of new products that could satisfy consumer's needs, but in the meantime to be a way to maintain and improve the health state of the population (Modoran, 2003).

Due to their unique functional and nutritional properties, soy products have become important ingredients even in bakery products, the benefits being linked both to the improvement of the quality of

products and to the increasing of their nutritional value (Georgescu, 2004).

The most important functional characteristics of soy protein isolate are the capacity to form gels, the capacity to emulsion, the properties to retain water, the properties to bond and aeration properties (Costin, 1999).

Making these experiments we hoped to increase the number of bakery products, obtaining a bread rich in nutritive values and fiber compounds, due to the functional ingredient experimented, bread that could be included in the list of functional foods.

Experimental

The following materials were used to analyze the bread samples:

- grain flour type 650, freshly ground: humidity 13.8%, wet gluten 28.2%, deformation index 7mm; extensibility 25cm, water absorption capacity 59%.
- the same flour type 650, but matured for 25 days with improved parameters, as follows: 13.7% humidity, hydrated gluten 27.9%, deformation index 7mm, extensibility 21cm; water absorption capacity 60.8%.
- functional ingredient composed of: 85% proteic isolate made from genetically unaltered soy, powdered state, light coffee brown and 15% fiber from genetically unaltered soy, white, powdered state. The proportion of the components was established with regards to the content of protein and the water absorption capacity;
- Pakmaya yeast;
- Salt and water.

The flour was analyzed in conformity with ISO 90-88. Water absorption capacity has been determined using the dough ball method (Bordei, 1998). Humidity was determined on flour and on bread using the same method: mass loss by heating at 130 ± 2°C.

Bread qualities were analyzed in conformity with STAS 91-83. The following characteristics were determined: organoleptic (color, smell, taste), volume (Fornet apparatus) (min. 275 cm^3/100g), porosity (min.

72%) and elasticity (min. 85%) in conformity with STR 3232-89 – white bread.

The decay rate of the bread was determined organoleptically at 48 and 72 hours analyzing the breakage of the bread-crumb, knowing that when the bread decays the crumb is loosing elasticity and became brittle. Bread samples were packed in cold state using impermeable paper and stored in conformity with STAS 91-83.

The functional ingredient was added in proportion of 4% as well as for samples of freshly ground flour and samples of matured flour, the proportion established after numeral trials in the testing station with regards of the protein and fiber contribution.

Products obtained following the baking trials where compared with the baseline sample made only by type 650 maturing flour. The samples of bread 900g/pc where obtained by direct method of the dough.

For the blank sample (M) the following where use: 800 g flour, 24 g yeast, 12 g salt, 486 ml water.

For the other variant was used the following prescription:

P1 - 768 g fresh milled flour, 32 g functional ingredient, 24 g yeast, 12 g salt, 486+10 ml water;

P2 - 768 g matured flour, 32 g functional ingredient, 24 g yeast, 12 g salt, 486+26 ml water.

For each variant were made a double number of samples, so the issues that result represent the average of those.

Technological regime: kneading duration 5 min., fermentation time 60 min., initial dough temperature 34ºC, final 30ºC, re-kneading duration 30 sec., manually divide 1000g, manually dough moulding, dough pre-fermentation duration 5 min., manually moulding, final fermentation duration 50 min. to 32ºC, baking time 35 min. to 220ºC, cooling at room temperature.

Results and Discussions

The addition of functional ingredient, in both cases, had a favorable effect on dough characteristics, on manufacturing process and on brad quality parameters.

In table 1 the characteristics of dough as well as the quality parameters of baked products are shown.

Table 1. Characteristics of dough and quality parameters of baked products

Dough characteristics and bread quality index	M	P1	P2
Water absorption capacity, %	60.8	62.0	64.0
Dough's structure	normal	improved	improved
Dough's tolerance	normal	very brassy to kneading	high
Kneading duration, min.	according to prescription	low	low
Bread volume, $cm^3/100g$	262	321	310
Porosity, %	77.2	81.5	80.4
Elasticity, %	97	98	98
Humidity, %	40.2	42.5	44.0
Organoleptic properties: - aspect - crust - crumb - taste and aroma	 - round, raised - crispy, shiny, golden color - uniform distribution of pores, elastic, not wet by feel - agreeable	- round, well raised - crispy, shiny, yellow-golden color - fine pores with uniform distribution, soft, elastic, dry by feel, brighter color - agreeable with walnut aroma	

The decay rate of bread samples with functional ingredient was lower even after 72 hours; the bread was not maintained fresh. This could be explained by the higher property of soy protein isolate from the functional ingredient to retain water towards the dough without this ingredient.

It can be observed from the table 1 that the capacity of bread to absorb water is growing up until 3.2 % to P2 and the maximum volume was growing up to 22.5 % for P1.

Also, the bread humidity (in the core) is higher than reference sample for both samples, even that the aspect was „dry".

The improve structure of dough lead to a higher elasticity (with 1 %). The bread samples (P1 and P2) was softer than in the case of blank sample, the pores were finely and more equable. Also, the adding of ingredient contribute to light up the color and to improve the aroma (walnut aroma).

Conclusions

The functional ingredient experimented could be used with success in bread production both in the case of using maturated flour and in the case of using not maturated flour. The bread obtained using the functional ingredient is better raised, with fine pores, uniform distributed and it maintains its freshness a longer time. The higher quality of the bread is influenced by the characteristics of this functional ingredient that assures: an increased water absorption that leads to a longer time while the freshness of the bread is maintained, the improvement of the dough elasticity, improvement of the emulsion capacity, a bigger volume of bread, an improved texture of the bread-crumb and most of all a higher nutritional value.

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