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CHANGES IN QUALITY INDICES OF WHEAT BREAD ENRICHED WITH BIOLOGICALLY ACTIVE PREPARATIONS

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Abstract
The research purpose was to assess the technological characteristics (volume, elasticity, porosity) of some types of fresh bread, enriched with biologically active preparations respectively biologically active wheat (BAW) and sweet whey (SW).
Biologically active wheat has a composition which justifies its use in bakery, being rich in dietary fiber and vitamins from complex B with the benefits to health.
Compounds accumulate during germination forming redox systems and have in their structure B. The group vitamins, the vitamins B1, B2, B5, B6 is 5-10 times higher than in mature grain. It also synthesize vitamin C, which completely lacks mature beans.
Sweet whey is a very good nutritional source because of the glutathione content with antioxidant role, minerals (Ca, K, P) with beneficial effects in preventing osteoporosis and immunoglobulins involved in growth and maintenance of immunity.
The white bread, control sample (CS), was obtained using a preset recipe and the supplementation consists in replacing flour with varying amounts of biologically active preparations (5%, 10%, 15%, 20%, 25%, 30%), respectively, the replace of water with various quantities of sweet whey (3%, 5%, 7%, 10%).
Sensory characteristics were evaluated according to regulations, using a scale score of 20 points, with penalty points for bread (simple and supplemented).
The panel group consisted of three persons, formed and trained according to Romanian Technical Standards (STR 3196-83).
Samples of bread enriched with 15% BAW, respectively 5% SW presented superior physical, sensory and technological characteristics comparative with the control sample and the other variants utilization in the experiments.

Keywords: bread, whey, biologically active wheat, sensory characteristics

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1. INTRODUCTION

Today, consumers are increasingly interested in bakery products with high biological value, excellent sensory qualities and shelf life increased.
Current technology promotes bakery breads made from whole wheat, as an important source of fiber, vitamins and minerals.
Studies have shown a good correlation between the intake of dietary fiber and beneficial physiological effects on the body .However, the amount of dietary fiber derived from bread is lower than recommended, white bread assortment of the most requested by consumers, (Lorentz, K., 2000). The most common sources of dietary fiber enrichment of white bread are inulin, polydextrose, and rice fibers (Wang, J., Rosell, CM, CB Barber, 2002).
The use of biological activated wheat in bread technology is a new method to obtain breads with high nutritional and physiological value, products that can be considered protective foods whose consumption contributes to maintaining optimal health status of consumers.
High content of biologically active compounds, the harmony between them and mutual potentiation reflects on cellular homeostasis, immunity and its resistance, (GM Costin, Rodica Segal, 1999). The germination of wheat realizes a significant growth of nutritional value by increasing the bioavailability of nutritional compounds, vitamins, bioelements and other biologically active substances due to

the partial hydrolysis of starch, proteins, hemicelluloses and even celluloses. Also, the activity of some anti-nutritional factors (enzyme inhibitors, haemaglutinins, antivitamins etc.) decreases or disappears during germination, allowing a complete valorization of biological compounds, (Hosney, R. C., 2010).

The compounds accumulated during germination form redox systems with B vitamins in their structure. Thus, the level of B1, B2, B5, B6 vitamins is 5-10 times higher than in mature grain. Also, the vitamin C, which is missing in mature seeds, is synthesized.

The increase of biological potential obtained by germination is due to phytase activation, which results in disposal of minerals (P, K, Mg, Ca, Mn, Zn).

At the same time with biodisponibilityof of ions bound in the form of phytate is released the inoyitol with powerful lipototropic action (Pomeranz, Y., 1988).

A variety of wheat bread enriched with ABM presented a higher vitamin (niacin increased 3.1 times, 2.7 times that vitamin E, vitamin B2, vitamin B1 8.7 times and 4.1 times) compared with bread unsupplemented the BAW. The content of vitamin C in samples of bread unidentified PM, increased to 42.8 mg / kg (Rakcejeva, T., 2006).

Information documentary presents research on the use of unfermented or fermented dairy ingredients to obtain bread, in terms of accumulation and stimulate formation of flavor substances.

Sweet or acid whey, a by-product of cheese industry, is preferable as ingredient or fermentation substrate due to the presence of important flavor precursors such as lactic acid, lactose and lipids (Pyler, E.J., 1988). Incorporation of acid whey obtained from cheese manufacture fermented milk processing (eg. Cheese Cottage) in bread dough lead to a complex aroma substances that enhance fermented taste and smell of the product (Shenkenberg, DR et al., 2011).

2. MATERIALS AND METHODS

Laboratory investigations were conducted bakery Technology Faculty of Environmental Engineering and Food Science, "Valahia'' University of Targoviste, Romania.

Getting BAW was conducted in the laboratory, using conditional winter wheat grain, the harvest of 2011, as illustrated in Figure 1 (Rakcejeva, T. et al, 2007).

The main ingredients used to prepare bread were: flour, water, compressed yeast, salt, sugar, shortening (palm oil), biologically active wheat - BAW and sweet whey - SW (from Natura S.A. Company, Targoviste).

Assortment of bread (CS) was performed after a predetermined recipe as a technology for obtaining, in a single step, using the direct method: flour 100 g, yeast - 3%, salt - 1.6%, water 55%, sugar - 2% palm oil - 2%.

The enriched breads were obtained by replacing flour with varying amounts of BAW - 5, 10, 15, 20, 25, 30%, respectively, by replacing water with varying amounts of SW: 3; 5, 7, 10%

Physico-chemical evaluation of flour and bread varieties obtained

Physical signs - chemical flour (moisture content, wet gluten, gluten deformation index) and baking qualities of wheat flour (eg. Capacity of hydration) and physical quality indices (volume, porosity and elasticity core) of bread obtained were determined according to standard methods of analysis.

- Determination of moisture flours STAS 90-1988;
- Determination of wet gluten EN ISO 21415;
- Determination of hydration of flours SR 90-2007;
- Determination of deformation of gluten SR 90-2007;
- Determination of bread volume SR 91-2007;
- Determination of porosity bread SR 91-2007;
- Determination bread crumb elasticity SR 91-2007.

Sensory evaluation

Sensory analysis was conducted according to the regulations STR 3205-83 by a group of tasters consisting of 3 members, on a scale of 20 points with penalty points for loafs unsupplimented and supplemented bread.

Single or multiple features are evaluated. shape, appearance, volume, appearance shell core aspect, consistency and chewing behavior, smell, taste. Each distinct described characteristic is determined by the maximum score of 3 or 4 points, differentiated by the importance in assessing of the total sensory quality of product. Defects are determined and valued by 0.5 or 1.0 penalty points assigned to each quality defect that is to be subtracted from the maximum score given by each assessor.

Products analyzed based on the scoring scale are graded by quality as follows: Very Good - 19 to 20 p, Good - 16 to 18.9 p; Satisfactory 14 to 15.9; Unsatisfactory <14 p.

3. RESULTS AND DISCUSSION

The physico-chemical characteristics and moisturizing ability of flour

Flour type 480 attributes used in the experiment for obtaining some varieties of bread are shown in table 1.

Table 1. The main characteristics of flour type 480

Characteristics	Values obtained features
Humidity,%	13,58
Wet gluten content, %	26,1
Gluten deformation index, mm	2
Absorption flour,%	62,14

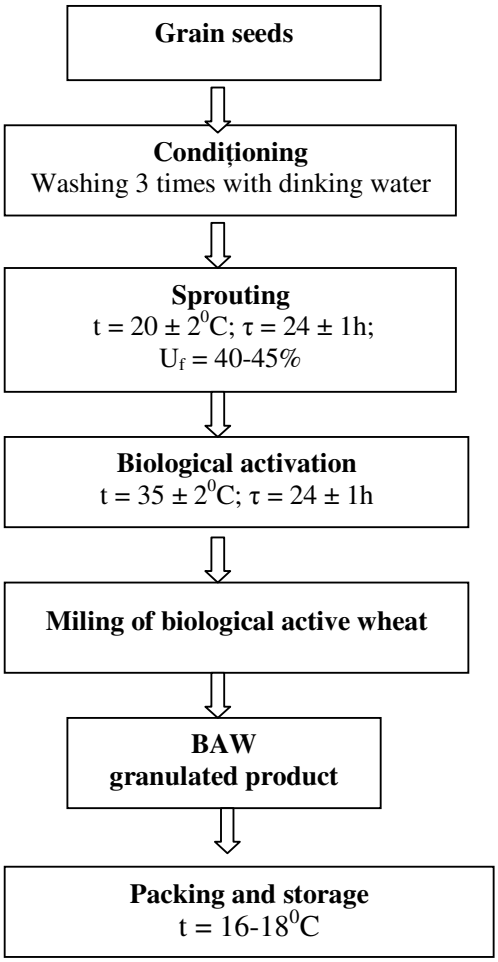

Fig.1 Technological scheme for obtaining biologically active wheat

Evaluation addition of BAW on physico-chemical indices enriched bread BAW / Whey is presented in Tables 2 and 3.

From the data presented it is observed that the sample with 15% BAW recorded the highest increase in volume of 9.76% to the CS.

Volume is an indicator for assessing the quality of bread, correlated with gas retention capacity in the dough. Doughs with reduced gas retention capacity is obtained both weak and damaged flours and meals of strong (Bordei Despina, 2005). This finding is verified in the experiments. Thus, the flour used in the experiment had a gluten deformation index of 2 mm lower than the standard (min. 29 mm), which resulted in a probe of a low specific volume.

Porosity is an important quality index of the product. This feature depends largely on the degree of assimilation of bread. The porosity is higher and lower flour extraction, the degree of gastrointestinal absorption is higher. (Fox, P. Mulvihill, D, 1982).

Blank breads CS presented the pores very small and undeveloped, the possible cause is relatively strong gluten flour that high resistance to the gases of fermentation. Assortment of bread enriched with 15% BAW recorded the highest value of porosity, increased compared to the control sample is 4.91%.

Firmness elasticity index assesses core. Impervious core may be a core gummy and sticky, although it normal humidity.

Table 2 summarizes the values obtained for the index of elasticity of the core assortment of bread with added BAW, CS. Data indicate elevated elasticity for varieties of bread made with 15% BAW supplementation leading to increased elasticity of 2.96% compared to the control sample. which shows that BAW has high potential impact on finished product quality.

Table 3 shows the influence of the addition of whey on the same physical and chemical indices evaluated for BAW enriched bread varieties, compared with the control sample.

From the data presented it is observed that the sample with 5% whey recorded the highest increase of volume, 5.86% higher than the CS.

Porosity varieties obtained additional blank whey was superior, the best option occurring in 5% addition of whey increased value compared with the control sample was 4.25%.

Elasticity samples varied in the same trend of increase in relation to the control sample, the best solution is formulated with 5% whey range, registering an increase of 2.6%.

Table 2 Evaluation of BAW addition on physico-chemical indices of bread

Product / Param.	CS	95% F + 5% BAW	90% F + 10% BAW	85% F + 15% BAW	%80 F + 20,% BAW	75% F + 25% BAW	70% F + 30% BAW
Mass (g)	562,11	557,82	557,46	549,6	552,85	549,97	547,98
Volume (cm^3)	2192,22	2176,94	2260,94	2375,42	2299,97	2213,42	2193,45
Specific vol. (cm^3 / 100g)	390,00	390,26	405,58	432,21	418,20	403,48	400,28
Porosity (%)	75,82	78,47	78,66	79,74	78,24	78,04	78,02
Elasticity (%)	94,49	96,76	96,1	97,38	96,93	96,52	95,38

Table 3. Evaluation of SW addition on physico-chemical indices of bread

Product / Param.	CS	52% water + 3% whey	50% water + 5% whey	48% water +7% whey	45% water + 10% whey
Mass (g)	515,52	523,01	546,11	535,34	509,39
Volume (cm^3)	1843,91	1897,89	2069,26	1988,46	1800,38
Specific volume (cm^3 / 100g prod)	357,68	362,88	378,91	371,44	353,44
Porosity (%)	71,75	70,81	74,94	71,94	71,46
Elasticity (%)	91,16	87,39	94,42	942,17	86,25

Table 4. Sensory evaluation of bread supplemented with BAW - 15%/SW – 5%

Product	Features evaluated						
	Shape, appearance, volume	Shell aspect	Bread heart aspect	Consistency in chewing behavior	Smell	Taste	The total average
Control sample (CS)	3,5	2,5	3	3	3	4	19
Bread enriched with15% BAW	4	3	3	3	3	4	20
Bread enriched with 5% whey	4	3	3	3	3	4	20

Evaluation of sensory characteristics

Sensory analysis was conducted according to the regulations of STR 3205-83 by a group of tasters consisting of 3 members, on a scale of 20 points, with penalty points for loaf.
Sensory evaluation results, the average scores of characteristics of the bread optimal variants according to the method described previously are shown in table 4.
Single or multiple characteristics are evaluated: loaf shape, appearance, volume, crust aspect, crumb aspect, consistency and chewing behavior, smell, taste. Each distinct described characteristic is determined by the maximum score of 3 or 4 points, differentiated by the importance in assessing of the total sensory quality of product. Defects are determined and valued by 0.5 or 1.0 penalty points assigned to each quality defect that is subtracted from the maximum score given by each assessor.
The analyzed products, based on the scoring scale, are graded by quality as follows: Very Good - 19 to 20 p, Good - 16 to 18.9 p, Satisfactory 14 to 15.9 p, Unsatisfactory <14 p.

4. CONCLUSIONS

Following tests performed and the baking of the bread obtained qualitative assessment can formulate the following conclusions:
The use of biologically active preparations such as sprouted wheat (BAW) and sweet whey (SW) obtained as a byproduct from cheese had positive influence on all quality characteristics (volume, porosity and elasticity). In all cases

studied, the addition of 15% BAW and 5% whey led to the best results.

Investigating sensory characteristics of bread varieties allows us to say that the addition of biologically active preparations has no decisive influence on total sensory quality of bread. Future experiments will continue to track the influence of combined addition of biologically active preparations, respectively and dietary fiber in order to increase potential health benefits of bread enriched consumer.

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