STUDY REGARDING THE POSSIBILITIES TO OBTAIN FUNCTIONAL FOOD FROM WHEAT FLOUR: BREAD WITH EXOGENOUS BUCKWHEAT ADDITION

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Abstract: *This paper presents the beneficial role of the addition of buckwheat in bakery products. It highlights aspects of buckwheat as food and drug use and possible use as a flour or buckwheat groats in bakery products. The research paper presented to obtain bread with added buckwheat flour The purpose of the bread samples were made several mixtures of wheat flour with different proportions of buckwheat flour (5%, 10%, 15%), after the flour samples were subjected to laboratory testing where absorption and wet gluten were seen in the difference in the behavior of the flour mixture. Also, it was made determination of technological properties through Alveograph curves, in order to make recommendation for different usages. In the laboratory control sample and the samples under study were made with the same formulation and the same treatment technology. Once made bread samples were also subjected samples of flour mixture, followed study tests the core porosity and elasticity and also to check the acidity during the technological process of hygienically. Bread made with buckwheat flour 5% is the bread with the best organoleptic properties and physico-chemical. Bread is a normal appearance, glossy shell, corresponding smell, taste sweet. The core is uniform with a very good elasticity, optimal porosity and acidity normal bread so obtained can be considered a very good bread.*

Keywords: *alveograph courves, technological properties, bakery products*

1. Introduction

In the production of bread can be used in addition to wheat flour and other raw materials that can help improve the nutritional value of finished products.
Buckwheat is a plant that is within the boundary between food and medicine. As food, particularly because energy intake is higher cereal classics. In terms of treatment, apart from energy intake particularly rich in routine is a good protector of vascular fragility [1].
Diets that contain buckwheat have led to a lower risk of developing cholesterol and blood pressure. China's population consumes large amounts of buckwheat (100 g / day).
When researchers tested blood lipids over 800 people in China, found that buckwheat flour has contributed significantly to lower cholesterol, lower density lipoproteins from cholesterol (related to cardiovascular disease)[2].
Buckwheat can help to cure diabetes. A single dose of buckwheat seeds can lower blood glucose levels by 12-19% after 90-120 minutes of administration time.
Component in buckwheat responsible for lowering blood glucose appears to be Chiro-inositol, a compound that has shown through several tests both in animals and humans, it has an important role in glucose metabolism and cell. [3]
Buckwheat also prevents gallstones, improves circulation, lowers blood

pressure and has a significant energy value.
Buckwheat contains no gluten. Because of this, is a very valuable food for people with gluten intolerance (celiac disease sufferers). Buckwheat prevent the formation of bladder stones. Eating foods high in insoluble fiber, as buckwheat, helps women to be protected by the formation of bladder stones, according to a study published in American Journal of Gastroenterology.
Buckwheat groats contain carbohydrates (68-72%), protein (10-13%), fat (2%). The composition of the protein falls lysine and methionine. [2]
Buckwheat is rich in vitamins B. It is indicated in liver disease, atherosclerosis, diabetes and other diseases that requires increasing the amount of lipotropic substances in the diet.
Their nutritional value depends on the variety and how to obtain them.
By removing the membrane decreases the content of vitamins, mineral salts, cellulose, and assimilation of carbohydrates and protein improves. Groats contain many carbohydrates (65-77%), including starch (55-74%), protein (7-13%) lower value, a small amount of fat (0.6 to 6%) [1].
These foods, particularly oat groats, buckwheat, millet, barley, serve as important source of vitamins B, PP, magnesium, phosphorus, potassium.
Oat groats, buckwheat, millet are rich in lipotropic substances. They are easily digestible meal groats, oat flour, flour made from cereal diet. Oat groats, buckwheat, barley, barley contain increased amounts of cellulose.
Buckwheat flour is used best when mixed with wheat or rye Buckwheat the generally recommended for pregnant women, people with overload syndromes, diabetic shoes, paddy rice mixed with wheat flour to replace the yeast dough [3].
Buckwheat contains also magnesium which helps relax blood vessels improving circulation and distribution of nutrients and resulting in decreased blood pressure perfect combination for a healthy cardiovascular system.
Nutrients in buckwheat help maintain blood sugar. In a test comparing the effect on blood sugar bran bread made from buckwheat and one made from wheat flour showed that buckwheat bran decreased blood glucose and insulin. [2]
This paper presents research to obtain their bakery products with added buckwheat flour.

2. Experimental

In order to obtain some available experimental data, wheat flour obtaining from FLAMURA 85 wheat variety grinding in Chopin Laboratory Mill was used like control sample.
The analytical flours' obtained quality (table 1) was determined in accordance with the international standard methods (ash content – ICC104/1, wet gluten – ICC105/2, protein content – ICC106/2, hydration capacity with Pharinograph - ICC115/1).
The moisture content of the wheat flour and bran were determined by oven drying at 1300C for 1 hour.

Table 1
Analytical parameters of Control flour

Moisture %	Ash %	Wet gluten %	Protein %	Hydration capacity %
13.42	0.68	31.1	13.3	62.6

Buckwheat flour was provided by local producers.
Like raw material I used also compacted fresh yeast (*Saccharomyces cerevisiae)*

from S.C. ROMPAK, Pascani, with 32.5% dry matter and 46.54% protein content (N x 6.25).
The recipe used for making breads is shown in table 2.

Table 2
Recipe for bread with buckwheat flour

Ingredients and technological regime	UM	Quantities
Raw materials and ingredients		
Wheat flour	grams	500
Buckwheat flour	grams	
Fresh yeast	grams	8
Salt	grams	7
Water	cm^3	270 to 300
Technological parameters		
Kneading time	min	10-15
Proffer time	min	20-25
Temperature of blanks	^0C	30-32
Baking time	min	30-35
Baking temperature	min	240-260

Dough was prepared using a straight dough method.

3. Results and Discussion

In order to evaluate the influence of buckwheat on the technological characteristics of flour it was made the following samples:

Witness sample - only control flour;
P1 control flour with 5 % buckwheat;
P2- control flour with 10 % buckwheat;
P3- control flour with 15 % buckwheat.

After establishing the flour mixtures, they were subjected to laboratory analysis: hydration capacity, wet gluten content and acidity were seen in the difference in the behavior of mixtures of flour (table 3).
The results of these tests led to the following conclusions:

- Samples increases with increasing acidity addition of buckwheat flour;

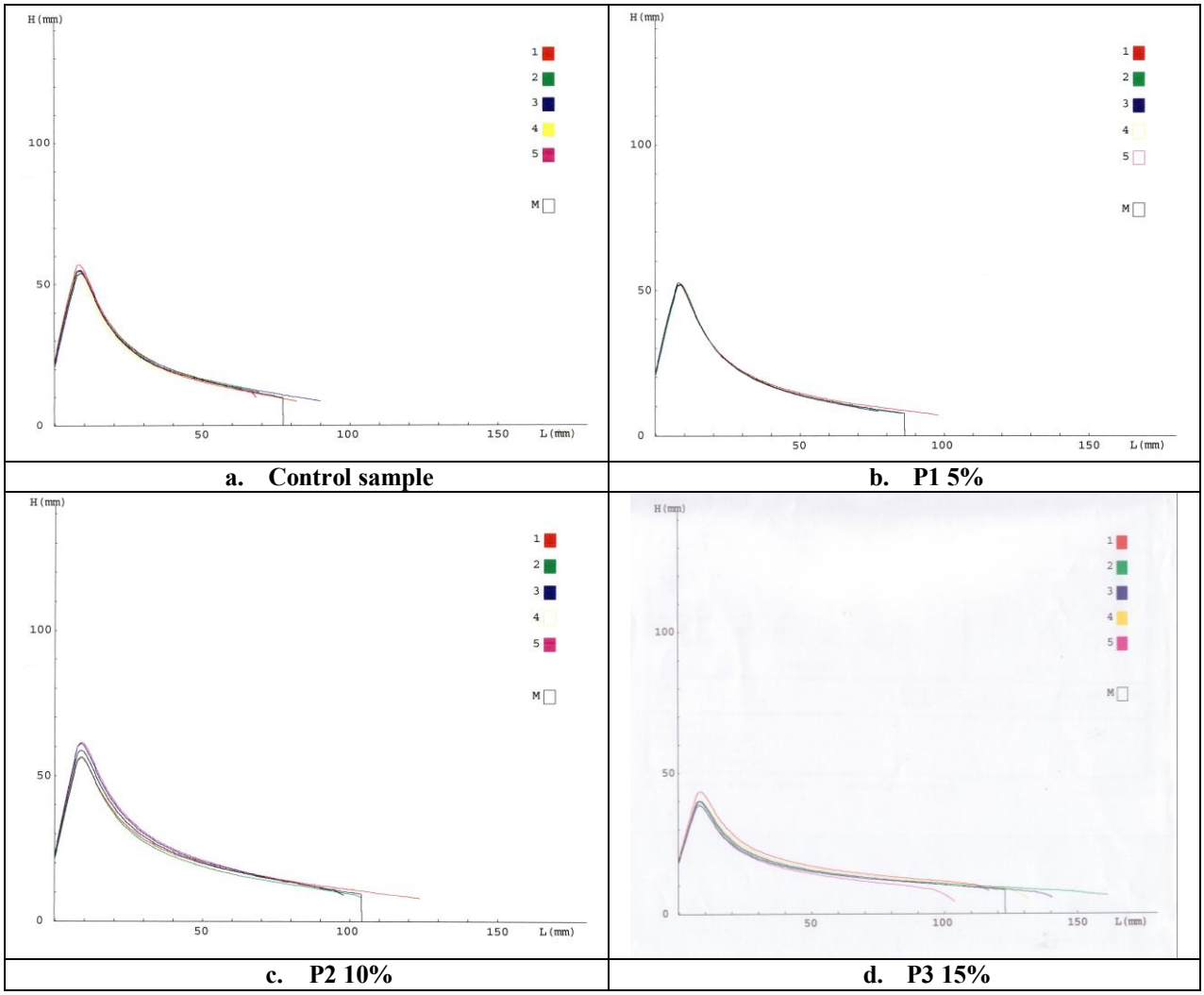
After baking, the samples were cooling 6-8 hours in controlled atmosphere (UV lamps). In order to be scoring (after 24 hours), and to be examined from microbiological point of view (after 72 hours), the samples were sliced for packed in plastic bags Microbiological quality of bread with buckwheat, over 3 days at room temperature was evaluated according with SR EN ISO 4832/2006 quality standard.
Also, it was made determination of technological properties through Alveograph curves, in order to make recommendation for different usages. A Chopin Alveoconsistograph was used for determination of resistance of deformation (tenacity) P, dough extensibility, L, the value of P/L, and the mixing energy W according with the international standard SR ISO 5530 – 4.The experiments are made in the research laboratory of "Ştefan cel Mare" University of Suceava, Faculty of Food Engineering.

- When content is high and buckwheat flour hydration capacity is greater;
- Wet gluten content decreases depending on the proportion of buckwheat flour in the sample, the lowest value with a sample with the highest amount of added buckwheat flour (15%).

Table 3
The technological properties of flour mixing samples

Characteristic	Flour mixing samples			
	Control	P1 (5%)	P2 (10%)	P1 (15%)
Acidity, acidity grades/100 g	1.3	1.4	1,5	1,68
Wet Gluten, [%]	28	25	23	20
Hydratation Capacity, [%]	62.6	63.11	63.79	64.25

For trace possible correlations between the physical-chemical characteristics and the technological behavior of the obtained flours, we studied the rheological parameters of the four samples (figure 1). With Alveoconsistograph it were measuredthe following rheological parameters: P - tenacity (maximum pressure required for the deformation of the sample), L (or G) - extensibility (length of the curve), W - baking strength (surface area of the curve) and P/L -configuration ratio of the curve. The results are measured or calculated from the five curves (for each sample) obtained to the Alveolink. However, if one of the curves is far away from the 4 others, in particular following premature rupture of the bubble, it will not be taken into account when expressing the results.



a. Control sample **b. P1 5%**

c. P2 10% **d. P3 15%**

Figure 1 Alveograph curves for flour mixture samples

Research showed that between physic-chemical parameters of flour and dough alveographic parameters a number of significant correlations are established, suggesting that achieving a predictive model of alveographic characteristics based on physics-chemical properties of flour is possible.

Control sample and P1 (5%) samples have very good rheological properties: a W (kneading energy) between 123-241, which results in obtaining high quality flour, with very good tenacity and extensibility and could be used to manufacture a quality bread.

P2 (10%) has good rheological properties (with a W like118-136) which leads to obtaining good bakery products.

P3 (15%) has weaker rheological properties and could be used only for simple biscuits or cakes and cake tops (fluid dough's).

It was adopted three options for obtaining work in the laboratory of bread: 5%, 10%, 15% of buckwheat flour added in relation to wheat flour used in the formulation.

The finished product was analyzed in terms of sensory and physico-chemical (table 4).

The results of these tests are shown in the table above where it is observed that the acidity is low enough that the core porosity ranges between 25 and 35%.

Humidity and elasticity and core differs depending on the proportion of buckwheat flour under trial.

Sample P1, bread made with buckwheat flour 5% is the bread with the best organoleptic properties and physico-chemical.

Bread is a normal appearance, glosy shell, corresponding smell, taste sweet. The core is uniform with a very good elasticity, optimal porosity and acidity normal bread so obtained can be considered a very good bread.

Table 4
The physico-chemical analysis of the packed bread samples

Characteristic	Bread samples			
	Control	P1 (5%)	P2 (10%)	P1 (15%)
Height/ Dimension ratio	0.62	0.64	0.64	0.67
Volume, $cm^3/100g$	300	295	320	310
Porosity, [%]	35	35	30	25
Elasticity, [%]	78	83.33	63.66	55.55
Acidity, acidity grades/100 g	0,6	0.9	1.4	1.6
Humidity, [%]	69.46	70.73	78.78	69.02

4. Conclusion

Bread wheat flour with different proportions of buckwheat, was a new attempt to highlight the difference between wheat bread and buckwheat bread.

It had produced several samples with different proportions of wheat-buckwheat flour, comparing these samples with a blank (a sample made from wheat flour obtaining from FLAMURA 85 wheat variety grinding in Chopin Laboratory Mill).

It were made the following samples: Witness sample - only control flour; P1 control flour with 5 % buckwheat; P2-control flour with 10 % buckwheat; P3-control flour with 15 % buckwheat.

After establishing the flour mixtures, they were subjected to laboratory analysis: hydration capacity, wet gluten content and acidity were seen in the difference in the behavior of mixtures of flour.

The results of these show that the buckwheat adition led to increase the acidity and flour hydration capacity.

Wet gluten content decreases depending on the proportion of buckwheat flour in the sample, the lowest value with a sample with the highest amount of added buckwheat flour (15%).

Once made bread samples were also subjected samples of flour mixture,

followed study tests the core porosity and elasticity and also to check the acidity during the technological process of hygienically.
The results of these show that the bread made with buckwheat flour 5% is the bread with the best organoleptic properties and physico-chemical. Bread is a normal appearance, glossy shell, corresponding smell, taste sweet.
The core is uniform with a very good elasticity, optimal porosity and acidity normal bread so obtained can be considered a very good bread.

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