DIETARY FIBRES ROLE IN MANUGACTURING BREAD WITH LOW CONTENT OF GLUCIDES

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Abstract *Nowadays the food producers meet the demands of the consumers that want food products with an important role in health preservation. Thus, the bread producers focused their attention towards the researches of the functional food. A functional role it is attributed especially to the soluble fibres, that help controlling the level of glucose and lipids in the blood. Therefore, the practical and theoretical researches were made in order to obtain bread with a low content of glucides, and comply with legal requirements. The aim of this paper is to prove that adding soluble fibers in bread products it is possible to obtain functional food with glucides low content, with good sensorial characteristics, fated consumers with different diseases. It was make a study on bread made with added insoluble (bran) and soluble fibres (inulin), in different amounts. Inulin was obtained from chicory and Helianthus tuberosus (topinambur). It was analyzed the percent of inulin retrieved in the final product relatively to the initial supplementation, the percent of protein and glucides. Sensorial tests were performed on the products containing inulin and compared to a free inulin control sample. It was calculated the energetically value and it was estimated the intake of the fibres in comparison with the recommended daily dose, without passing over the economical aspect. Based on results that were obtained, it is recommended the use of 3% inulin (irrespective of source) related to the flour content.*

Keywords*: insoluble fibres, soluble fibres, functional food, bran, inulin, chicory.*

1. Introduction

The tendency of the great corporation is to satisfy both, the consumer's demands, and also their desires to maintain health. Thus, the notion of functional foods had appeared, especially created for pretentious consumers, which want to maintain a healthy lifestyle. [1] Functional foods in bread making industry were appeared through adding soluble fibers supplementary, witch have prebiotic effects. [2,3] The common know soluble fiber is inulin, which has like obtaining sources chicory and *Helianthus tuberosus* (topinambur). Adding inulin in bread products we could observe a technological improves like: considerable volume increase, an equable porosity, easiness slices up, freshness maintaining during the shelf life without microbial modification. [4,5,6] Looking the nutritional aspect it was observed there is an improvement of proteins and soluble fibers (inulin) content and a decrease of glucides content without taste affected. Starting with these facts we want to present the bread products making on S.C. Baneasa S.A., which meet the demands of the consumers.

2. Materials and methods

Materials

In order to obtain some available experimental data we used like materials:

- Dietetic flour/total grinding, from Dobrogea cultivar, with alveograph characteristics: W 120, P/L 2,28, and pharinograph characteristics: Development 2'30", stability 5'30", Softening 90 UF;
- Black flour, from Dobrogea cultivar, with alveograph characteristics: W 128, P/L 1,9, and pharinograph characteristics: Development 2'30", stability 5'30", Softening 80 UF;

- Wheat bran
- Soluble fiber (inulin) from chicory (provided by Enzymes &Derivates S.A. Romania) and from *Helianthus tuberosus* (extract 12.5% provided by S.C. Hofigal Export Import S.A., Romania) in different percents;
- Vital gluten , provided by Enzymes &Derivates S.A. Romania
- Compacted fresh yeast (*Saccharomyces cerevisiae)*, provided by S.C. Rompak S.A. Pascani, Romania with 32.5% dry matter and 46.54% protein content (N x 6.25)
- Iodated salt
- Water

Samples preparation

The frame recipes which are used in order to obtain bread products with fibers added are shown in table1.

Table 1

Frame recipes for 100 kg final products

Ingredients	Bread with bran Witness (M)	Braed with bran and inulin			
		Chicory P1	Topinambur extract 12.5%		
			P2	P3	P4
Graham dietetic flour	5	-	-	-	-
Dietetic flour/total grinding	-	37	37	37	37
Black flour	40	-	-	-	-
Yeast	2	1.8	1.8	1.8	1.8
Vital gluten	0.7	13	13	13	13
Bran	7	13	13	13	13
Inulin	0	2	2	2.5	3
Iodated salt	1	1	1	1	1

Work method

For samples preparation we used the direct monophazic method, pan baking. Kneading time was 15 minutes in spiral mixer. The dough temperature was 26° C. The dough's were allowed to rise for 40-55 minutes at 34° C and, after degassing and moulding by hand, for 15 minutes at 34° C. The bread was subsequently baked for 30 minutes at 230° C.

After baking, the samples were cooling 6-8 hours in controlled atmosphere (UV lamps). In order to be exam from sensorial point of view (after 24 hours), the samples were sliced for packed in plastic bags.

The bran and inulin samples were added to the baking formula during the mixing stage. Bread volume was determined after 24 hours of cooling by means of rape seeds.

The microbial charge was determinate after 24, 48 and 72 hours after cooling.

Methods of analyses

The analytical flour quality was determined according to the international standard methods. We use a Chopin Alveograph (AACC/No.54-30A, ICC121, and ISO 5530/4) to determine the relationship between elasticity of the dough and rising power in order to analyze the rheological characteristics of tested flours. Inulin determination was made means spectrophotometer method validate by S.C. Hofigal Export Import S.A.

NTG (Total Number of Germs) was determinate according to STAS ISO 4832:1992 and microbial charge 9yeasts and molds) according to SR ISO 7954:2001.

For sensorial analyze we used the scoring method validated by researchers from University "Stefan cel Mare" of Suceava, Food Engineering Faculty

3. Results and discussions

Physical – chemical analyses

The results are shown in table 2. In case of samples with inulin (P1, P2, P3, and P4), we could observe improve of volume against the witness (M1). Also we notice there aren't major humidity differences between samples and manufacture standards. The retrieve inulin percent report to 100 grams final product increase significant with increase of inulin percent added. The protein and insoluble fibers percent remain relatively constant report to 100 grams final product.

Table 2

Physical – chemical analyses

Sample	Humidity [%]	Volume [cm3/100g]	Proteins [g/100g prod]	Inulin [g/100g prod]	Lipids [g/100g prod]	Glucides [g/100g prod]
M	51.6	525	8.3	0.05	1.1	41.4
P1	50.1	556	12.5	2.1	1.8	27.6
P2	50	570	14.3	2.3	0.67	26.73
P3	50	570	16	2.7	0.72	24.58
P4	49.8	567	18.3	3.2	0.86	21.84

If we analyze the data recording in table 2, we could observe that once with the increase of inulin added percent decline the glucides percent in all samples. This aspect became very important from nutritional point of view, and we could recommend the obtaining bread in diet of diabetic persons.

Microbiological analyses

If we compare the obtaining results, shown in table 3, with legal admitted limited according to OMS 975, we concluded that our breads are safety for human consume.

Table 3

Microbiological analyses

Sample	Yeasts and moulds spores / g	OMS spores / g	Bacillus subtilis spores / g	OMS spores/ g
M	0	max 1000	absent	max 10
P1	0		absent	
P2	0		absent	
P3	0		absent	
P4	0		absent	

The dietetic fibres analyses and nutritional characteristics

Analyzing the data recording in table 4, we could observe that for each inulin added percent, the retrieve inulin percent rise with 0.2 – 0.5 grams. In case of adding soluble fibres, the energetic value decline through decline of glucides percent and increase of proteins and fibres content.

Table 4

Nutritional analyses

Nutritional information's/ 100 g final product	Bread with bran M	Breads with inulin			
		P1	P2	P3	P4
Energetically value, kcal	203	185	179	180	181
Proteins, g	8.3	12.5	14.3	16	18.3
Glucides, g	41.4	27.6	26.73	24.58	21.84
Lipids, g	1.1	1.8	0.67	0.72	0.86
Fibers, g	3.2	6	6	6	6
Inulin, g	0	2.1	2.3	2.7	3.2

Energetic values of samples (P1, P2, P3, and P4) with inulin added are with almost 11% lower against the witness (M1). For this reason we could recommend this kind of bread in diet of all persons which are interested in obesity control.

Sensorial analyze

We applied the scoring method, with a 5 points scale, 24 hour after baking. The selected peoples fills the analyze sheets, we pick out five fundamentally characteristics (table 5), which are graphic represented in figure 1. The recording data were statistical process means ANOVA method.

Table 5

Sensorial analyze

Nr crt	Sensorial characteristic	Medium score (11 peoples)				
		M	P1	P2	P3	P4
1.	Color of crumb	2.6	2.4	2.2	2.6	2.2
2.	Softness	4.8	4.4	4.2	4.4	4.2
3.	Equable of pores dimensions	1.2	1.6	1.6	1.2	2
4.	Fundamentally taste (sweet)	3	3.2	4.1	4	3.8
5.	Residual (little fibers through teeth)	4.3	4.2	4	3.9	3.8

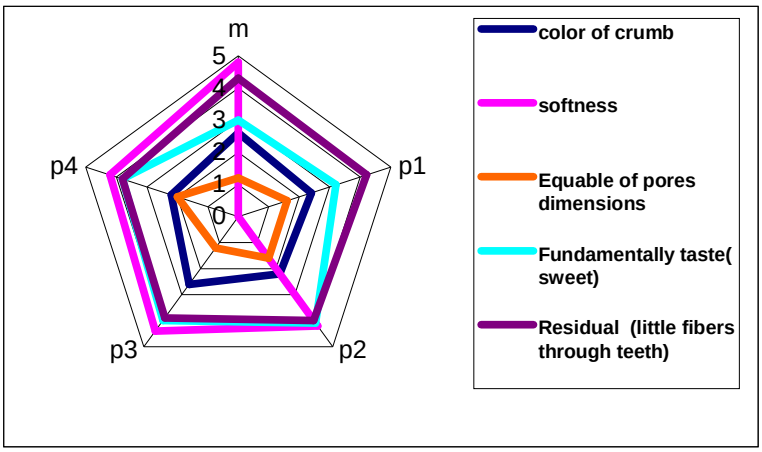

Figure 1:Sensorial analyze

The price analyze

The price analyze is shown in table 6. From economical considerate we recommend selecting the 3% percent of inulin added report to flour.

Table 6

The influence of inulin adding on expenses with raw materials, for1 kg final product

Ingredient	Price per unit [lei]	Consume per unit **M** [kg/kg	Val [lei]	Consume per unit **P1** [kg/kg	Val [lei]	Consume per unit **P2** [kg/kg	Val [lei]	Consume per unit **P3** [kg/kg	Val [lei]	Consume per unit **P4** [kg/kg	Val [lei]
Graham flour	9400	0.05	**470**	0	**0**	0	**0**	0	**0**	0	**0**
Total grinding flour	10500	0	**0**	0.37	**3885**	0.37	**3885**	0.37	**3885**	0.37	**3885**
Black flour	9400	0.4	**3760**	0	**0**	0	**0**	0	**0**	0	**0**
Yeast	23000	0.02	**460**	0.018	**414**	0.018	**414**	0.018	**414**	0.018	**414**
Gluten	52000	0.007	**364**	0.13	**6760**	0.13	**6760**	0.13	**6760**	0.13	**6760**
Bran	2300	0.07	**161**	0.13	**299**	0.13	**299**	0.13	**299**	0.13	**299**
Inulin from chicory	115500	0	**0**	0,02	**2310**	0	**0**	0	**0**	0	**0**
Inulin from topinambur	100000	0	**0**	0	**0**	0.020	**2000**	0.025	**2500**	0.03	**3000**
Salt	7000	0.01	**70**	0.01	**70**	0.01	**70**	0.01	**70**	0.01	**70**
Total			**5285**		**13738**		**13428**		**13928**		**14428**
Profit[%]			**26.8**		**10.63**		**11.15**		**10.31**		**9.49**

4. Conclusions

- The results obtaining in this study prove that inulin adding (like soluble fibre) do not affect the sensorial characteristics of bread products;
- From the point of view of physical – chemical properties we could observe an volume improve of bread;
- The microbiological parameters are under the legal limits admitted, which demonstrate that the final products are safety for human consume;
- In case of modified of soluble fibres adding percent, it was observe differences in retrieved amounts in final product, indifferent which was the inulin source;
- If we made a price analyze, we observe when we use native inulin, with *Helianthus tuberosus* (topinambur) like source the raw material expenses are small, and the profit is with almost 1% bigger that the products obtained with import inulin (2% addition). The profits begin to lower with increase of percent of inulin addition. At 2,5% addition of topinambur inulin we could obtain almost the same profit like in case of adding 2% inulin from chicory;
- Taking into consideration that inulin (dietetic fibre) have prebiotic role, the adding could be considerate like a viable alternative for obtain functional bread products.

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