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A STUDY ON SENSORIAL ANALYSIS AND THE ASSESSMENT OF THE NUTRITIVE VALUES OF BREAD ASSORTMENTS

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Abstract

Bread is a product that occupies an important place in the basic nutrition of consumers, obtained by the total or partial baking of a dough properly grown, made from flour, water and yeast, with or without added salt. In order to analyze the impact of various types of bread on consumers, 30 samples of sliced white bread produced by different producers - 6 samples from each assortment - were studied. The following analyzes were carried out: determination of sodium chloride content, determination of protein content, verification of the nutritional values present on the label and sensory analysis of the samples included in the research. The studies have taken place in a factory laboratory and in the laboratory of the Faculty of Veterinary Medicine in Bucharest. The sodium chloride content of the samples analyzed falls within the values indicated on the label and the protein content showed values within the declared production limits on the product labels. At the same time, a questionnaire was applied to 207 subjects aged between 21 and over 60 years. The purpose of this questionnaire was to obtain information from consumers about their preferences regarding bread consumption and the appreciation of the correspondence between what is written on the label and what is found in the bread. Analyzing the results, it is found that most people prefer to eat bread with both hot food and sandwiches, while others do not eat bread at all. Buyers put more emphasis on the freshness of the product, to the detriment of the ingredients used in manufacturing. As a result of the study conducted between 2017-2018, conclusions could be drawn on consumer's preferences regarding bread consumption and the price-quality balance of purchased products.

Key words: *bread, salt, freshness.*

INTRODUCTION

Bread is a product that occupies an important place in the basic nutrition of consumers, obtained by baking of dough properly grown, made from flour, water and yeast, with or without added salt (Hammes WP, Gänzle MG 1998 Sîrbu A., 2001; Sîrbu A., 2009; Mitrănescu E. et al., 2010).

Bread is a basic food that is consumed daily, and for this reason, the bakery industry occupies a significant place in the consumer goods market (Lascu D., 2008; Tăpăloagă D., 2012).

In the baking industry, in the production process, the following production phases take place: preparation of raw and auxiliary materials, dosing of raw and auxiliary materials, kneading of dough, fermentation, division, premodelling and initial rising, modelling, final rising, baking, cooling, packing and storing (Sîrbu A., 2009).

Because of the both the medium and the long term social effects of food and nutrition, nutritionists have set the criteria for a healthy diet and have proposed the "food pyramid", as a food guide, which highlights the main groups of foods and their weight in a balanced diet (Smith JP et al., 2004).

At the lower levels of the food pyramid are products derived from cereals. It is recommended that the cereal products, including bakery products, to be consumed daily and in moderate amounts (Willett et al., 1995; Banu C., 1998).

From nutritional point of view, bread mainly gives the nutritional value of the flour and other raw materials from which it is obtained (Bordei D., 2005; Ciesarova Z. et al., 2009; Marin M. et al., 2012).

MATERIALS AND METHODS

In order to analyze the impact of various types of bread on consumers, 30 samples of sliced

white bread produced by different producers, 6 samples from each assortment, were studied. The following analyzes were carried out: determination of sodium chloride content, determination of protein content, verification of the nutritional values present on the label and sensory analysis of the samples included in the research.
The studies took place in a factory laboratory and in the laboratory of the Faculty of Veterinary Medicine of Bucharest.

Sensory analysis
A questionnaire applied to 207 subjects was used to develop the research. The purpose of this questionnaire was to obtain information from consumers about their preferences regarding bread consumption and the appreciation of the consistency between what is written on the label and what is found in the bread. The study took place between 2017-2018.
Through the organoleptic method, the following were appreciated: the external appearance of the bread, the volume, the colour and structure of the crust, the elasticity and porosity of the crumb of the bread, the taste, the smell, the signs of alteration and the presence of the foreign bodies.
External appearance is determined by examining the entire bread. Symmetry is examined, noting the normal or incorrect shape and indicating the defects of the shape.
The sensory analysis was done by the score method (Table 1), the steps of appreciating the sensory quality of the white bread were determined by the total score obtained (Table 2) and based on this, the quality level of the product was determined (Mihaiu M. et al., 2013).

Sodium chloride analysis
The salt content dosing was performed according to SR 91:2007. The method is based on the extraction of chlorine ions in the aqueous extract and their determination by titration with silver nitrate in the presence of potassium chromate or ammonium chromate as an indicator (Mohr method).

Protein content analysis
Raw protein content is the total content of nitrogen compounds calculated by multiplying the nitrogen content by a conventional factor. The method is based on mineralization of the bread sample with sulfuric acid in the presence of a catalyst, according to the Kjeldahl method, alkalinisation of the mineralized, distillation and titration of released ammonia (SR 13013-3: 1994).

Table 1. Evaluation of the sensory quality of white bread by score method scale (Mihaiu M., 2013)

The sensory feature		
Form and volume of the product		
Score scale	**Description of the characteristics of the product examined**	**Content points**
0-4	Correct, symmetrical, aesthetic shape, proving the care with which the bread was made, non-flattened or with bulging bumps.	4
	The product has the established shape but is asymmetrical and the volume is increased enough.	2
	Bread has no established aspect, is anaesthetic, deformed, flattened.	0
The colour and appearance of the crust		
0-4	The product has a well-rounded crust, the surface of the crust is smooth, glossy without cracks; the crust of bread is crisp.	4
	The product has uneven baked crust, it is too brown or too pale, has rough surface, the crust is not crisp, but a little soft.	2
	The bread has a whitish crust, due to insufficient baking, especially in the sides, has the wrinkled surface or the dirty crust.	0
The degree of baking and the appearance of the crumb		
0-6	The bread is well baked, so that when biting into the bread crust, there is a clear, clean sound, characteristic of the baking product, has the elastic crumb and the crumb colour is uniform.	6
	The bread is baked enough, so that when biting into the crust there is a muffled sound, the crust is slightly soft, the bread core does not break.	3
	The bread presents half-baked remains dough, by the pressing of the core it becomes irreversibly deformed and it is easily crumbling when cut.	0

Table 2. Evaluation scale of results of sensory examination of white bread by score method (Mihaiu M., 2013)

Appreciation step	Total score	General description of the appreciation step
Very good product	24.1-30	Bread of exceptional quality, ideal.
Good product	18.1-24	Good quality bread.
Satisfactorily product	12.1-18	Bread with light defects, of proper quality.
Unsatisfactory product	6.1-12	Bread with pronounced defects, of poor quality.
Very unsatisfactory product	0.1-6	Altered bread, with great changes in the characteristics.

RESULTS AND DISCUSSIONS

Results obtained from the questionnaire interpretation

The subjects of this questionnaire were 207 persons. Question answers were statistically represented in graphical and tabular form.

Following the interpretation of the results, it was concluded that more responses were provided by people living in urban areas and the number of female respondents to the questionnaire was higher compared to the number of male respondents. Most responses were provided by people aged 21-30 years, respectively 117 subjects out of a total of 207.

Analysing the answer to the question "How often do you buy bread?", was noticed that 3.4% of people did not consume bread and a considerable percentage of 42% buy bread daily (Table 3, Figure 1).

Table 3. How often subjects buy bread?

Frequency	The number of people	Percentage value %
Every day	87	42.0
Once every two days	65	31.4
Once a week	48	23.2
Do not consume	7	3.4

Analysing the answer to the question, "How much bread do you eat per day?", it is noticed that more than half of the interviewed subjects, namely 62.32% consumed less than a half a loaf of bread per day, and the opposite was a percentage of 6.28% consuming more than one bread per day (Table 4, Figure 2).

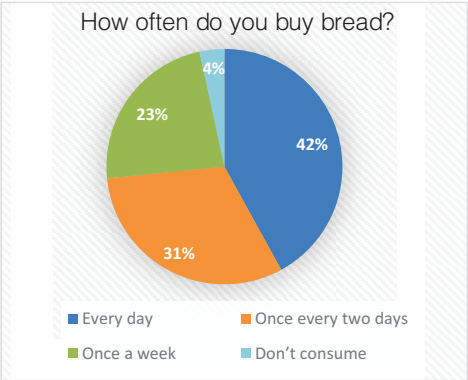

Figure 1 - Graphical representation of bread purchase frequency

Table 4. How much bread the subjects eat per day?

Quantity	The number of people	Percentage value %
Less than half	129	62.32
A half	28	13.53
A bread	37	17.87
More than one bread	13	6.28

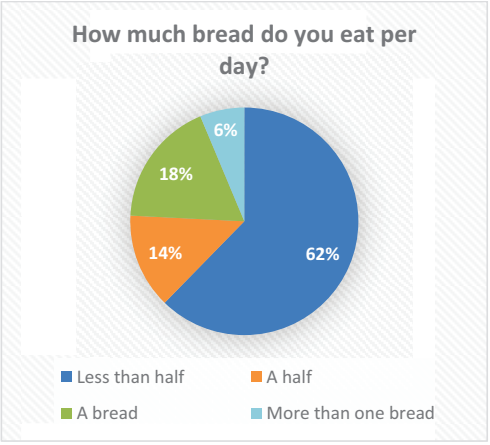

Figure 2 - Graphical representation of the amount of bread consumed daily

Analysing the answer to the question "At which meal do you eat bread?", it could be seen that most of the subjects consume bread at all meals (Table 5, Figure 3).

Table 5. At what meal the subjects eat bread?

Meals	The number of people	Percentage value %
At breakfast	57	27.53
At lunch	40	19.32
At dinner	9	4.35
At all meals	101	48.80

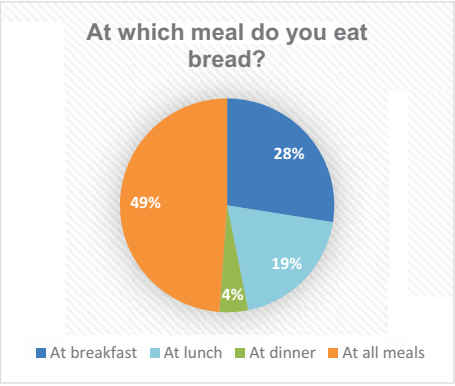

Figure 3 - Graphic representation of the meals to which the subjects eat bread

Within the question "How do you eat the bread?" could be given multiple answers and most people prefer to eat bread with both hot food and sandwiches. A smaller percentage of subjects said that they ate hard bread (Table 6, Figure 4).

Table 6. How do the subjects consume bread?

The way in which bread is consumed	The number of people	Percentage value %
With hot food	152	73.43
In the sandwich	147	71.01
Hard bread	18	8.70

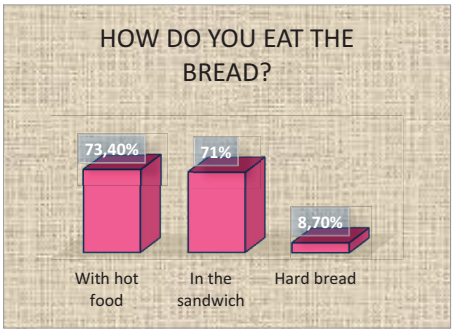

Figure 4 - Graphic representation of how the bread is consumed by the subjects

After analysing the answers to the question "Do you consider the bread as an important part of the meal from a nutritional point of view?", it appeared that approximately half of the interviewees consider the bread to be a significant part of the meal from a nutritional point of view (Table 7).

Table 7. Is bread considered nutritionally important?

Answer	The number of people	Percentage value %
Yes	101	48.80
No	106	51.20

To the question "What are the characteristics you follow when buying a bread?", the subjects offered multiple answers, and from the analysis of the results obtained, buyers put more emphasis on the freshness of the purchased product at the expense of the ingredients used (Table 8).

Table 8. Characteristics to be followed when buying bread

Characteristics	The number of people	Percentage value %
Freshness	151	72.95
Appearance (shape, volume, colour)	79	38.16
Taste and smell	85	41.06
Packaging	21	10.14
Ingredients used	95	45.89
Form of delivery (sliced / entire)	49	23.67

A very large percentage of buyers read the packaged bread label before purchasing it (Table 9).

Table 9. Is the label of packed bread read?

Answer	The number of people	Percentage value %
Yes	142	68.60
No	65	31.40

In the question "What information from the product label you are interested in?", the answers were multiple and the majority of buyers, namely 82.12%, were interested in the shelf life period (Table 10, Figure 5).

Table 10. Information sought on the label

Information	The number of people	Percentage value %
Shelf life	170	82.12
Nutritional values	110	53.14
Quantity	32	15.45

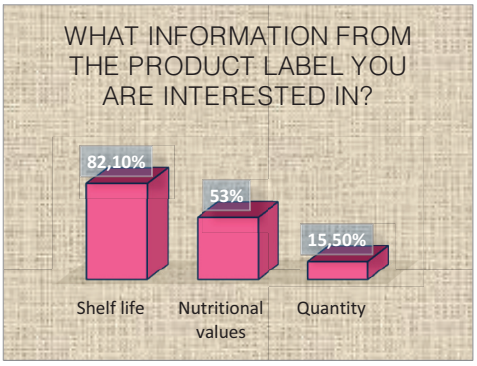

Figure 5 - Graphical representation of the information sought on the label by consumers

To the question: "Do you consider that the nutritional parameters on the label are sufficient to assess the quality of the bread?", 57% of consumers did not consider the nutritional parameters on the label to be sufficient (Table 11) and the question "Do you think that the nutritional values on the label really reflect the quality of the bread?", 72% of consumers believed that the information on the label did not show the true quality of the product (Table 12).

Table 11. Is it considered that the nutritional parameters on the label are sufficient to assess the quality of the bread?

Answer	The number of people	Percentage value %
Yes	89	43
No	118	57

Table 12. Is the nutritional value on the label actually reflecting the quality of the bread?

Answer	The number of people	Percentage value %
Yes	58	28
No	149	72

More than half from the interviewed people (62.80%), did not consider price a decisive factor in choosing bread (Table 13).

Table 13. Is the price a decisive factor in choosing the type of bread consumed?

Answer	The number of people	Percentage value %
Yes	77	37.20
No	130	62.80

A percentage of 51.70% of people interviewed believed that a higher price reflects a better quality of bread (Table 14).

Table 14. Do you think a higher price reflects a better quality of bread?

Answer	The number of people	Percentage value %
Yes	107	51.70
No	100	48.30

A sensorial analysis was performed by the score method, and the results were presented in Table 15.

Table 15. Results of sensory examination of sliced white bread

Sensory feature	Points sample 1	Points sample 2	Points sample 3	Points sample 4	Points sample 5
Form and volume	4	4	4	2	4
The colour and appearance of the crust	4	2	4	2	4
The degree of baking and the appearance of the bread core	3	3	3	3	3
core porosity and pore structure	6	4	6	6	4
Flavour	4	4	4	4	4
The taste	6	6	6	6	6
Total score	27	23	27	23	25

Samples 1 and 3 obtained the most points, respectively 27, and at the opposite pole were samples 2 and 4, which scored 23 points.

Results obtained after analysis of sodium chloride

Sodium chloride analysis was performed according to SR 91:2007, and the results are shown in Table 16.

Table 16. Sodium chloride values of the analysed samples

Sample number	Values	Mean value
Sample 1	1.15%	1.15%
	1.14%	
	1.16%	
Sample 2	1.13%	1.13%
	1.13%	
	1.15%	
Sample 3	1.26%	1.23%
	1.22%	
	1.23%	
Sample 4	1.18%	1.18%
	1.18%	
	1.20%	
Sample 5	1.25%	1.21%
	1.19%	
	1.21%	
Sample 6	1.20	1.19%
	1.18	
	1.19	

The highest value of sodium chloride was given by sample 3 (1.23%), followed by sample 5 (1.21%). The results obtained were consistent with the values written on the label.
The sodium chloride content of the samples used in the research was between 1.13% and 1.23%, results ranging from 1.10 to 1.30% on the label.

Results obtained from analysis of protein content

The results of the protein content analysis were shown in Table 17.

Table 17. Values of protein content

Sample number	Values	Mean value
Sample 1	12.80%	12.89%
	12.98%	
	12.90%	
Sample 2	12.63%	12.72%
	12.80%	
	12.75%	
Sample 3	12.74%	12.80%
	12.89%	
	12.77%	
Sample 4	12.85%	12.92%
	13,00%	
	12.92%	
Sample 5	12.26%	12.13%
	11.98%	
	12.15%	
Sample 6	12,84%	12.84%
	12,90%	
	12,78%	

The percentage of protein varied between 12.13% at sample 5 and 12.92% at sample 4. All samples corresponded to the values written on the label.

CONCLUSIONS

Following the organoleptic analysis, the samples were categorized as "very good product" and "good product", as there were no products in the "satisfactorily", "unsatisfactory" or "very unsatisfactory" categories.
The content of sodium chloride and the protein percentage of the analysed samples were within the values stated on the label and established by the technical specifications.
Most people preferred to eat bread with both hot food and sandwiches, while others did not eat bread at all. Buyers put more emphasis on the freshness of the product, to the detriment of the ingredients used in manufacturing.
After analysing all the results obtained, it was concluded that these bakery products fall within the quality standards imposed by the legislation and the results obtained were in accordance with the label values.

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