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STUDY CONCERNING THE IMPROVEMENT OF GLUTENOUS BISCUITS CHARACTERISTICS USING FOOD ADDITIVES

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Abstract

This paper aimed to improve the properties of gluten biscuits using food additives. For the research, sodium metabisulphite and cysteine antioxidants, were used, and their influence on the properties of gluten biscuits was observed. Sodium metabisulphite had a good effect on biscuits taste and external appearance, and also for the mastication process, finally with a positive impact on biscuits sales. Cysteine has a moisture-reducing effect compared to sodium metabisulphite, an aspect very important for product's consistency.

***Key words*:** *glutenous, additives of food, biscuits.*

INTRODUCTION

Biscuits are minced products obtained by baking a loaf dough made from: flour, sugar, fats, eggs, honey, glucose, milk, flavors, chemical and biochemical lances, and the like. Cookies are obtained from a chemically or biochemically fermented dough and are considered to be products with low moisture content and very good organoleptic properties. Due to the large number of raw and auxiliary materials used, their different proportions and the technological processes used, the range of biscuits is very rich [1].

It is not possible to distinguish between materials that provide the nutrients of biscuits and what contributes to integrating their personality in the presentation and evaluation of the tasting, each of which contributes a certain amount of potential, thus providing some potential [1-3].

Wheat flour is the basic matter, which accounts for more than 50% of the biscuit composition. The main types of flour used to make biscuits are white. The manufacturing process and the quality requirements of biscuits require that the meals destined for this production meet certain physico-chemical and technological requirements.

The actual product of the biscuit manufacture begins with the dough preparation [4-7].

The purpose of preparing the dough is to produce a table with corresponding characteristics, the requirements of the assortment being uniformly found under differentiated conditions, depending on the group of biscuits for which it is intended, and consists in the operations by which the incorporation of all the components into the homogeneous mass. For this purpose, the preparation and dosing of the framing materials is required [9,11].

Biscuits are one of the most important groups of pasta products. By the composition and shaping of the dough, by filling, decorating with creams and glazes, as well as by the packing variants, a great variety of assortment is achieved.

MATERIALS AND METHODS

The quantity of the sample will be calculated so that for each taster you can get about 100g of the product.

Sample preparation is done in a separate room other than the tasting room.

Samples will be prepared identically (the same amount, in the same way of vessels, of the same size, of the same material, white) [8,13].

Sample coding:

It is done according to STR 3196-83

Performing the analysis:

After receiving the samples to be analyzed, the tasters complete the standard form with the personal data and enter the coding rules on the test vessels in the form. He then proceeds to the examination and evaluation of the organoleptic traits on the basis of the 5-point scale points (1-5).

• Exterior appearance (shape, surface and color)
• Appearance on the section
• Smell
• Taste
• Behavior with mastication

Examination of the external appearance is done on the whole product, checking whether the shape, the upper and the lower surface, as well as the color correspond to the analyzed product [7,10,13]. In order to evaluate stratification, porosity, and therefore sectional appearance, the product will be cut into smaller halves and fractions.

The smell is appreciated for the whole product and cut, by deep inspiration a few times. The taste and behavior of mastication is appreciated by taking small portions of the product into 2-3 slices (2-3 biscuits).

After tasting each sample, the residual taste of the oral cavity, with drinking water at room temperature, will be eliminated [9,13].

Sensory analysis will be carried out in perfect quiet and hygienic conditions, without hurry, with a relaxation pause of 2 minutes between samples. When the number of samples is large, groups of 4 products (of the same assortment) will be made, and after tasting a group, a 15-minute break will be made.

After examining each test, the results will be included in the analysis forms

Scoring ladder:

Scoring ladders used to assess each organoleptic trait of products are the 5 and 6 point ladders.

Calculation:

The formula is: $P_{mp} = P_{mnp} \times fp$

The terms according to STR 3196-83 are:

• individual score (I)
• Unmatched average score (P_{mnp})
• participation factor-importance ($f_{pi} = f_i$)
• transform factor (f_t)
• weighting factor ($f_p = f_2$)
• weighted average factor (P_{mp})

To complete the study, we completed three work samples.

Sample 1 - Dough gluten biscuits: Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar.

Sample 2 - Dissolving gluten biscuits with sodium metabisulfite: Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar, Sodium metabisulfite (4g per 100kg flour)

Sample 3 - Dissertation of gluten biscuits with cysteine: Flour, Water, Ammonium bicarbonate, Sodium bicarbonate, Salt, Plantol, Liquid glucose, Glucose-fructose syrup, Sugar, Cysteine (12g per 100 kg flour**)**

Fig.1. Samples of gluten biscuits subjected to sensory analysis (orig.)

The following steps were taken to make biscuits:

-Mixing the ingredients (water temperature = 40°C)
-Kneading at the blender at 1 minute speed and 2.5 minutes at high speed
-Allow the dough to rest
-Laminate and roll the dough
-Gluten-shaped biscuits
-Baking the biscuits
-The gluten biscuits are allowed to cool.

Fig.2. Mixer for biscuits (orig.)

Sample 1 - Dough gluten biscuits:
Weight of training - 93gr/ 0pcs
Crude product dimensions: Length = 51-52 mm, Width = 48.5-49 mm, Thickness = 3.5 mm
Finished product dimensions: Length = 53-54 mm, Width= 48-49 mm, Thickness = 5.5-6 mm
Sample 2- Dissolving gluten biscuits with sodium metabisulfite:
Weight of training - 92gr/10 pcs
Crude product dimensions: Length = 54.5-55 mm, Width = 49-49.5 mm, Thickness = 3.5-4 mm
Finished product dimensions: Length = 55.5-56 mm, Width= 49-49.5 mm, Thickness = 5.5-5.8 mm
Sample 3-Dissertation of gluten biscuits with cysteine:
Weight of training - 92gr/10 pcs
Crude product dimensions: Length = 53-53.5 mm, Width = 49-49.5 mm, Thickness = 3.5 mm
Finished product dimensions: Length = 54.5-55 mm, Width = 49.4-49.7 mm, Thickness = 5-5.5 mm.
The calculation of the factors is presented in Table 1.
The sum of the factors of participation - importance is equal to 1. The preliminary assessment is done according to STR 3196-83
If the individual score of 0, 1 or more of the tasters is given, the analysis is repeated for the particular grading [12,13].

Fig.3. Determination of the dimensions of gluten biscuits (orig.)

Tab1e 1. Calculation of the factors

The organoleptic traits examined	Participation factors Importance FPI	Factor of transformation $f_t = f_i$	Factor de weighting Fp
Exterior appearance	0.25	4	1.0
Appearance in section	0.10	4	0.4
Smell	0.10	4	0.4
Taste and aroma	0.40	4	1.6
Behavior in mastication	0.15	4	0.6

Calculation of the total score: Calculation mode:
The group leader calculates the weighted average score for each skill by multiplying the unweighted average score by the weighting factor, which is expressed in a decimal without rounding. Then the weighted average values obtained for the five qualifying categories are summed up, the sum obtained represents the total score of the respective product [13].
Research methods used to determine the physico-chemical properties of gluten biscuits; Thermobalance method
It is based on the loss of sample mass by evaporation of water by heating at 130-150° C under intense air circulation for 30 minutes.
Thermal humidity meter/digital thermobalance programmable:
Automatic portable and laboratory automatic digital device very easy to use; is the world's most performing line of thermo-volumetric

line adapted with a new infrared red radiation system IDR (infrared DARK Radiator) and the BOOST electronic system for very fast determinations.

Benefits:

• Easy to use features
• very precise determination
•Meets the highest international quality standards.
•Thanks to the smart heating system (CHS) and the Boost system (which is also adjustable), results are achieved in a very short time and with high precision.
•Adapted to an "Auto-Stop" system that allows settings by percentage (%) or time (sec)
• The statistical functions can be set.
• Saves 20 sets of reports/results.
• Anti-Theft System

With the printer, the results can be printed according to GLP and HACCP, within a time range of 0.1 to 7 minutes.

Weighing system by model:

• Weighing range: 120 g, for XM120.
• Minimum weighing test: 0.2 g,
• Precision weighing: 0.001mg,
• Reading accuracy: 0.001 g,
• Measuring accuracy: 1mg,

Drying Process:

• Reproducibility: 1g/0.2%, 10g/0.02%,
• Reading precision: 0. 01%.
• Reproducibility: 1g/0.2%, 10g 0.02%,

Temperature range:

• Temperature range: 30°C and 250°C,
• Temperature ranges are in 1°C increments,
• temperature range: 2 points at 100ºC and 160°C,
• Intervals: Boost (very fast) +1 for XM60 + 3 model for XM120

Calibration modes:

• Balance (balance part): with a calibration weight,
• Temperature: calibrate in 2 steps (100°C and 160°C) with temperature sensor.

features

• RS 232 serial interface with PC and printer connection,
• Has built-in memory for 5 complete programs,
• LCD Touch Screen/Touch Control (XM120)

Certificates and Associated Documents:

• Quality Certificate ISO 9001: 2000,
• Certificate of conformity
• CE marking
• Warranty Warranty 24 months
• Operating manual

The sensory analysis was done on the 3 samples of biscuits and was performed by 5 tasters who gave notes for: appearance, appearance in the section, smell, taste, mastication behavior.

Fig.4. Samples of gluten biscuits subjected to sensory analysis (orig.)

RESULTS AND DISCUSSIONS

The results of the tasters were centralized in the individual tables for each sample, then each sample was compared to each other.

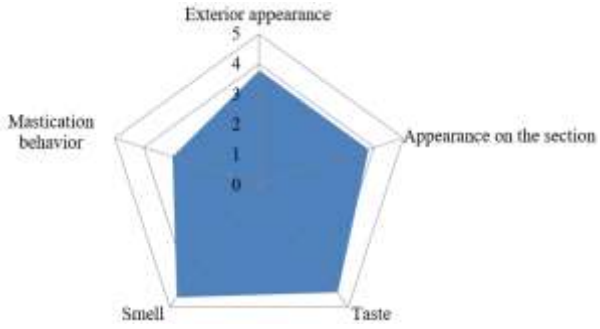

Fig.5. Results of Sensory Analysis for Sample 1

The sample that obtained the best results in sensory analysis is sample 2, gluten biscuits with sodium metabisulphite addition. Sample 2 obtained an average score of more than 2 points from the control sample, and sample 3,

the cysteine, obtained 1.8 points more than the control sample.

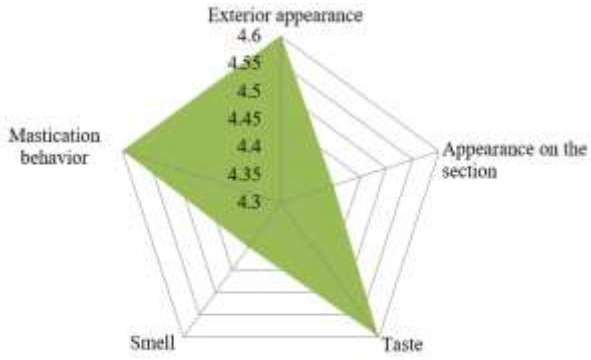

Fig.6. Results of Sensory Analysis for Sample 2

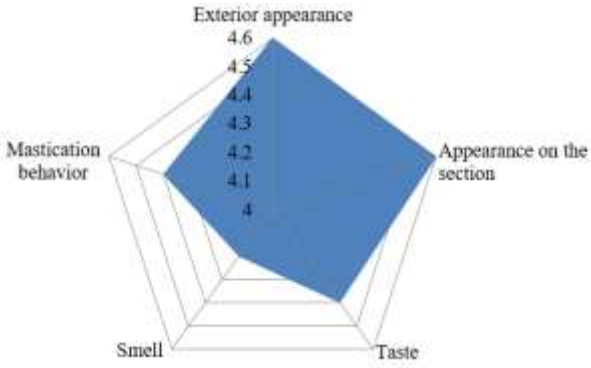

Fig.7. Results of Sensory Analysis for Sample 3

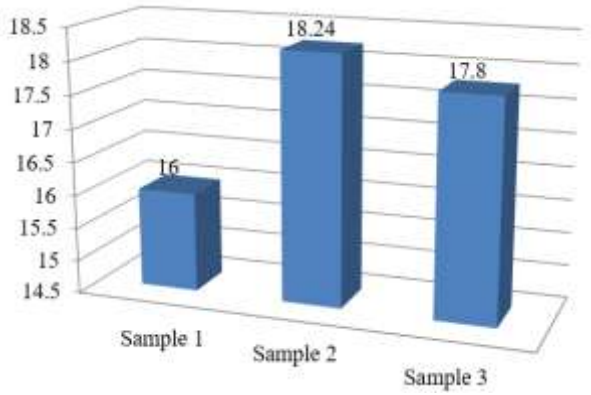

Fig. 8. Results of Sensory Analysis for all the samples

From this, we can conclude that any one of them improves the sensory properties of gluten biscuits.

From the figures above, it is noted that although the difference between the two loops is not very high, however, the sodium metabisulphite sample proved to be better than that with cysteine.

Effect of food additives on product humidity

To study the effect of food additives on product humidity, the moisture content of the dough before baking and the moisture content of the finished product was determined to observe the evolution of moisture.

Fig.9. Analytical balance used for weighing samples (orig.)

Fig.10. Determination of the moisture content of the biscuit dough (orig.)

From Fig.12, it can be seen that from the control sample, the dough obtained from the sloping samples has lower humidity. After baking, it can be seen that although sample 3 (cysteine sample) humidity dropped by more than one percentage point from the control sample, sample 2 (sodium metabisulphite sample) had higher moisture compared to the control sample.

Fig. 11. Determination of humidity of gluten biscuits (orig.)

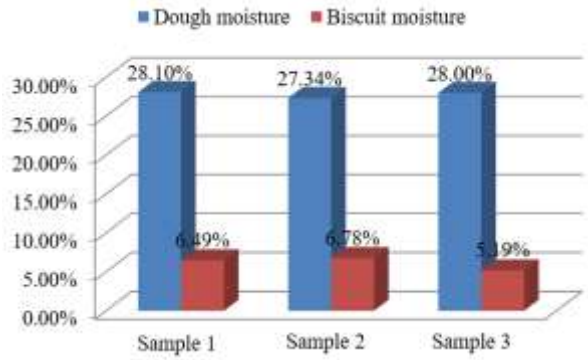

Fig.12. Moisture of analyzed samples

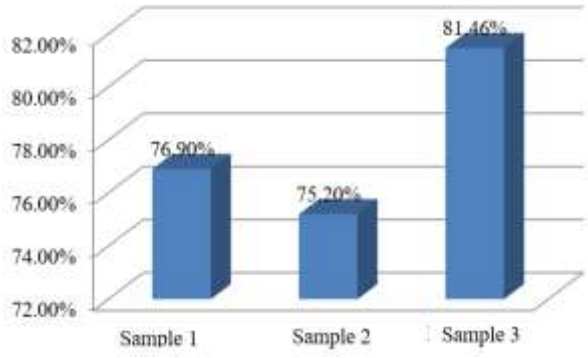

Fig. 13. The ratio of dough moisture to moisture content of gluten biscuits

From Fig.13 it can be seen that in sample 3 (the cysteine sample) has the highest ratio between the moisture content of gluten biscuits and dough. From here we can deduce that cysteine reduces the moisture content of the finite product. It can also be seen from the figure that the addition of added metabisulphite increases the moisture from the control sample.

CONCLUSIONS

The purpose of this paper is to study the effect of food additives on the sensory and physico-chemical properties of gluten biscuits.

As a result of our analysis of the samples of gluten biscuits, we can draw more conclusions. The sample that obtained the highest sensory analysis results was the addition of sodium metabisulphite, and it also achieved the highest result in taste, mastication and external appearance, which are the most important characteristics of biscuits. Another important aspect is the taste of the product, which is important for 75% of the people who participated in the study.

As a result of the physico-chemical analyzes, there was a clear difference in the different types of chopsticks on biscuits. In terms of product humidity, it has been observed that cysteine has a moisture-reducing effect, and sodium metabisulphite has seen an increase in moisture in biscuits. This is important because the moisture content of biscuits greatly impacts the product's consistency.

Ultimately, the most important aspects of the product are its taste and appearance, as these two characteristics influence the sale of the finished product.

REFERENCES

[1]Banu, C., 1992, Progrese tehnice, tehnologice şi ştiinţifice în industria alimentară Technical, technological and scientific progresses in food industry), Technical Publishing House, Bucharest.

[2]Banu, C., 2000, Aditivi şi Ingrediente pentru Industria alimentară (Aditives and ingredients for food industry), Technical Publishing House, Bucharest.

[3] Banu, C., 2009, Tratat de industrie alimentară (Treatees of Food Industry). în D. Bordei, & A. Stoica, Vol.2, Chap.11, I ndustria panificaţiei, pastelor făinoase şi a biscuiţilor (Industry of bakery, pastas and biscuits), p. 721, ASAB Publishing House, Bucharest.

[4] Bordei, D., 2004, Tehnlogia modernă a panificaţiei (Modern technology of bakery), AGIR Publishing House, Bucharest.

[5]Bordei, D., Todorescu, F., Toma, M., 2000, Ştiinţa şi tehnologia panificaţiei (Science and Technology of Bakery), AGIR Publishing House, Bucharest.

[6]Burluc, R. M., 2003, Tehnologia produselor făinoase (Technology of flour products). Editura Didactică şi Pedagogică Bucureşti (Didactic and Pedagogical Publishing House, Bucharest).
[7]Leonte, M., 2000, Biochimia şi tehnologia panificaţiei (Bakery Biochemistry and Technology), Crigarux Publishing House, Piatra Neamţ.
[8]Leonte, M., 2001, Tehnologii şi utilaje în industria morăritului–Pregătirea cerealelor pentru măciniş (Technologies and equipment for milling industry, Millenium Publishing House, Piatra Neamţ.
[9]Leonte, M., 2003, Tehnologii, utilaje, reţete şi controlul calităţii în industria de panificaţie, patiserie, cafetărie, biscuiţi şi paste făinoase, (Technologies, equipment, recipes and quality control in bakery, pastry, confectionery, biscuits and pasta), Millenium Publishing House, Piatra Neamţ.
[10]Moldovan, G., Niculescu, N., Râmniceanu, M., 1987, Utilajul şi tehnologia panificaţiei şi produselor făinoase (Equipment and technology of bakery and pasta products), Didactic and Pedagogical Publishing House Bucharest.
[11]Moldoveanu, G., 1981, Utilajul şi tehnologia panificaţiei şi produselor făinoase (Equipment and technology of bakery and pastry products), Didactic and Pedagogical Publishing House Bucharest.
[12] Moldoveanu, G., 1994, Arta brutăritului românesc (The art of the Romanian baker), The Technical Publishing House of Bucharest.
[13] Zaharia, T., 1983, Cartea lucrătorului din industria produselor făinoase (The Worker's Book of the Pasta), Technical Publishing House of Bucharest.