OBTAINING OATMEAL BISCUITS AND THE MANUFACTURING PROCESS

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Abstract
Nowadays, consumers are more and more concerned about what both they and their family consume and, from those points of view, the market has started to develop and introduce products obtained from safe ingredients and with an impact on well-being. Because of this, the purpose of this paper is to obtain oatmeal biscuits. The ingredients used in this project were chosen to have a beneficial impact on the health of the consumer without affecting them. Three varieties of oatmeal biscuits were made, through several experimental variants: oatmeal and raisin biscuits, oatmeal and cranberry biscuits, oatmeal and walnut biscuits. In this way, the manufacturing recipes and the technological process of obtaining them were established. The development of the product was carried out at laboratory level by making experimental variants and at batch level. The established variants were subjected to laboratory analyzes: microbiological analyzes to highlight the microorganisms of alteration and to establish the shelf life, physico-chemical analyzes to determine the amount of macronutrients needed to determine the nutritional values of products and sensory analysis necessary to determine consumer acceptability and, finally, the packaging in which the products can be placed has been established. The obtained results of the analyzes were compared, thus drawing the necessary conclusions.

Keywords: pastry products, bakery, ingredients, analyses, benefits

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1. INTRODUCTION

These days, diet is a big challenge for people living in urban areas due to the accelerated pace of modern lifestyle. The lack of land where they can grow or cultivate food and the lack of time to prepare it from purchased raw materials have led to the development of the agri-food industry and to an increased number of people who have given up preparing their own food (Ghasemzadeh, 2012). Rapid processing methods have been used to improve the efficiency of food industrial production, as well as the use of refined ingredients and the use of additives which confer various properties and increase the preservation of the food products. As a result, diets have become deficient both in vitamins and minerals and in fibers (very important for gut's health).
Although people are looking for foods that are found and consumed quickly, while being tasty, there is a growing interest in improving and maintaining health by
introducing as many whole foods into the diet (Cukelj, et al., 2017). This can be seen by the appearance on the market of many healthy foods, a replica of the usual commercial ones, but improved (wholemeal biscuits, wholemeal cakes, etc.). Marketing reports show an increase in biscuit sales and even predict a continuous increase, especially in "healthy" biscuits (Čukelj, 2016).
Biscuits are included in bakery products being considered a versatile snack due to their extended shelf life, ease of use, and varied taste and texture, and can be adapted to any type of diet (Arepally, et al., 2020). They can include various ingredients with special nutritional properties, being an excellent way to improve the diet with fiber, vitamins and minerals (especially as they are enhanced with ingredients that are not frecvent in day to day life) (Čukelj, 2016).
A variant of healthy biscuits are oat biscuits, being appreciated both for their nutritional value and for the texture and organoleptic qualities that this cereal gives.
Oats are a very good source of quality carbohydrates and proteins with a balanced ratio of amino acids, high percentage of lipids,

especially unsaturated fatty acids, minerals, vitamins and phytochemicals (Alok, et al., 2015). Oats also have soluble fiber, known as beta-glucans, proved as lowering the blood cholesterol (Gunness, et al., 2017). We also find wheat flour that gives elasticity to the dough to obtain a low density, as well as a pleasant texture and aroma of the finished product (Vieira, E., R., 1996). In addition, eggs are used as a thickening and binding agent, having the main feature of complete protein (Vaclavik et al., 2008, Snigdha, et al., 2018). Butter gives tenderness to the product and increases its palatability and, depending on the assortment, we use ingredients with antioxidant properties, rich in vitamins and minerals, but which also offer an organoleptic addition, such as: raisins, cranberries, nuts that contain significant amounts of omega 3 essential fatty acids with anti-inflammatory properties (Chauhan, 2020) and flaxseeds that are rich in fiber, essential fatty acids and reduce total cholesterol (Vaclavik et al., 2008, Kristensen, et al., 2012).

2. MATERIALS AND METHODS

The oatmeal biscuits are included in pastry products. Three experimental variants were performed. The first experimental variant is represented by oatmeal and raisin biscuits, using the following ingredients: oat flour, white wheat superior flour, eggs, butter with 80% fat, baking powder, white sugar, fine iodized sea salt, honey, water, raisins. The second variant is represented by oatmeal and cranberry biscuits, using the following ingredients: oat flour, white wheat superior flour, eggs, butter with 80% fat, baking powder, white sugar, fine iodized sea salt, honey, water, cranberries. The last variant is represented by oatmeal and walnut biscuits using the following ingredients: oat flour, white wheat superior flour, eggs, butter with 80% fat, baking powder, white sugar, fine iodized sea salt, honey, water, nuts, flaxseeds.

The three experimental variants were obtained at the level of the pilot experimentation station for processing cereals and flours within INCDBA-IBA Bucharest. The experiments keep the same base, being added differently certain ingredients to differentiate according to the assortment. Thus, the base is represented by oat flour, white wheat superior flour, eggs, butter with 80% fat, baking powder, white sugar, fine iodized sea salt, water, honey. Raisins were added to the variant of oatmeal and raisin biscuits, cranberries were added to the variant of oatmeal and cranberry biscuits and flaxseeds and walnuts were added to the variant of oatmeal and walnut biscuits.

From the point of view of the technological process, the products were obtained through the following stages: reception of raw materials, followed by their storage until use, sieving oat flour and white wheat superior flour, foaming white sugar with butter 80% fat and dissolving salt in drinking water. The leaven from oat flour, white wheat superior flour, white sugar, honey, butter, eggs, salt and water is formed, then the leaven is kneaded and is left to ferment. The next stage is represented by the kneading of the dough consisting of fermented leaven, baking powder and raisins for the first experimental version, cranberries for the second version and walnuts and flaxseeds for the third version. The dough thus formed is divided in order to facilitate the following operations. The divided pieces are left to rise. After fermentation, the modeling operation takes place, then the biscuits thus formed are subjected to the baking operation at a temperature between 180°C-190°C, for 15-25 minutes. Finally, the biscuits are cooled to the ambient temperature, packaged and delivered.

3. RESULTS AND DISCUSSION

Three experimental variants of oatmeal biscuits were obtained: oatmeal and raisin biscuits, oatmeal and cranberry biscuits, oatmeal and walnut biscuits.


Fig. 1 - Oatmeal and raisin biscuits


Fig. 2 - Oatmeal and cranberry biscuits


Fig. 3 - Oatmeal and walnut biscuits

The products were characterized from a technological point of view so that, for the variant of oatmeal and raisin biscuits, a specific consumption of Cs=1.16 kg/kg and a yield Ƞ=86.2% were obtained, for the variant of oatmeal and cranberry biscuits a specific consumption Cs=1.25 kg/kg and a yield Ƞ=80% were obtained and, for the variant of oatmeal and walnut biscuits, a specific consumption Cs=1.14 kg/kg and a yield Ƞ=87.7% were obtained.

The obtained products were subjected to laboratory analyzes to be characterized from a physico-chemical, microbiological and sensory point of view, thus the packaging is established.

From a physico-chemical point of view, the quantities of macronutrients needed to determine the energy and nutritional values of the products have been established (table 1).

From a microbiological point of view, the products were subjected to the initial analysis carried out after sampling, the analysis at 7 and 10 days from the date of manufacture, following the analysis of yeasts, molds and enterobacteriaceae according to the standards in force. According to this consideration, food products have less than 10 cfu/g.

From the point of view of a sensory analysis, the characterization of some attributes related to the products (color, shape, firmness in bite, intensity of taste, sweet taste, unctuousness, chewing aroma and taste remaining after swallowing) was followed, using a scale from 0 at 5, the tests being organized within the Sensory Analysis Laboratory of IBA Bucharest with a panel of 7 evaluators (female evaluators), with an average age of 30 years, the following results were being obtained (table 2).

The packaging in which the biscuits can be stored has been established: cardboard box with window, PET casserole and BOPP bag. (fig. 4, 5, 6).

Table 1: Physico-chemical analysis of oatmeal biscuits

Attributes	Oatmeal and raisin biscuits	Oatmeal and cranberry biscuits	Oatmeal and walnut biscuits
Energetic value	1764 kJ / 420 kcal (/100g)	1791 kJ / 426 kcal (/100g)	**1940 kJ / 464 kcal (/100g)**
Protein	7,26 %	6,85 %	**9,59 %**
Total lipids	15,59 %	16,68 %	**23,57 %**
of which saturated fatty acids	9,3 %	10,00 %	**12,25 %**
Total carbohydrates	**62,57 %**	62,18 %	53,24 %
of which sugars	**32,7 %**	32,68 %	14,91 %
Salt	0,38 %	0,38 %	**0,40 %**

Table 2: Sensory analysis of oatmeal biscuits

Attributes / sample	543 Oatmeal and raisin biscuits	801 Oatmeal and cranberry biscuits	796 Oatmeal and walnut biscuits
Color	**3,29**	2,43	2,57
Shape	3,57	**3,86**	3,43
Firmness	**4,00**	3,86	3,57
The intensity of the taste	**4,29**	3,86	3,43
Sweet taste	**3,71**	2,71	3,00
Unctuousness	**2,14**	**2,14**	**2,14**
Flavor	**3,43**	2,86	3,14
Remaining taste	**3,29**	3,00	2,86

Fig.4 - Cardboard box with window

Fig.5 - PET casserole

Fig.6 - BOPP bag

4. CONCLUSION

The nutritional value of the biscuits was increased due to the added ingredients. The products have an allergenic impact due to the added ingredients such as oat flour, white flour, eggs, butter, nuts. From a technological point of view, oatmeal and cranberry biscuits have a Cs=1.25 kg/kg, higher than other products. Oatmeal and raisin biscuits have a Cs=1.16 kg/kg, and oatmeal and walnut biscuits have a Cs=1.14 kg/kg. The yield of the products has the following values, in descending order: for oatmeal and walnut biscuits Ƞ=87.7%, for oatmeal and raisin biscuits Ƞ=86.2%, and for oatmeal and cranberry biscuits, Ƞ = 80%.

From a microbiological point of view, for biscuit products, the permitted limits for yeasts and molds are 100-1000 cfu/g, and for enterobacteriaceae, the permitted limits are 10-100 cfu/g. From this point of view, the products fall within the permitted regulated limits.

From physico-chemical analysis, oatmeal and walnut biscuits have the highest energy value (1940 kJ/464 kcal), then oatmeal and cranberry biscuits (1791 kJ/426 kcal) and, finally, oatmeal and raisin biscuits (1764 kJ/420 kcal). The amount of
protein, in descending order, corresponds to oatmeal and walnut biscuits (9.59%), oatmeal and raisin biscuits (7.26%) and oatmeal and cranberry biscuits (6.85%).

The amount of lipids in descending order corresponds to oatmeal and walnut biscuits (23.57%), oatmeal and cranberry biscuits (16.68%) and oatmeal and raisin biscuits (15.59%). The amount of saturated fatty acids in descending order corresponds to oatmeal and walnut biscuits (12.25%), oatmeal and cranberry biscuits (10.00%) and oatmeal and raisin biscuits (9.3%). The amount of total carbohydrates in descending order corresponds to oatmeal and raisin biscuits (62.57%), oatmeal and cranberry biscuits (62.18%) and oatmeal and walnut biscuits (53.24%). The amount of sugars in descending order corresponds to oatmeal and raisin biscuits (32.7%), oatmeal and cranberry biscuits (32.68%) and oatmeal and walnut biscuits (14.91%). The amount of salt in descending

order corresponds to oatmeal and walnut biscuits (0.40%), oatmeal and cranberry biscuits (0.38%) and oatmeal and raisin biscuits (0.38%).

Following the analysis, it was found that the oatmeal and raisin biscuits have a darker color, had the most intense sweet and aromatic taste and had a more pronounced remaining taste. All products had the same unctuousness. In terms of shape, all products had a popular shape, the most popular being the shape of oatmeal and cranberry biscuits. In terms of firmness, all products were firm at the first bite, having above average firmness, even to hard. In terms of total acceptability, 4 reviewers mentioned oatmeal and walnut biscuits, 2 reviewers mentioned oatmeal and raisin biscuits and 1 reviewer mentioned oatmeal and cranberry biscuits.

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