FUNCTIONAL BAKERY PRODUCTS WITH THE ADDITION OF DIETARY FIBER

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Abstract: The concern of the population for the rational and healthy food has led to an increased consumption of products based on cereals, especially those with high content of fiber and products with low energy consumption. Research conducted in this study are aimed at broadening the assortment of bakery products with functional character on the local market and pursue the following objectives: development of producing bread recipe with functional properties and the technology of production, establishment of an optimum dose of fiber supply, study the influence of the addition of dietary fiber on the quality of finished products.

Keywords: bakery products, dietary fiber, wheat bran.

Introduction

Human nutrition is one of the fundamental pillars of its construction. Health and balance of each person, is in direct correlation with food. The habit of eating right brings, along with other items of correct behavior, healthy living.

Foods that are found on the market today are natural, semi–natural or even half synthetic. Of all these, is well known, the most wholesome are those of natural origin, which does not contain synthetic additives, which have not gone through industrial and refining processes that have not been overly processed from the culinary point of view. Of particular importance to human health, have those natural foods not processed in any way, usually of orogin plant [8].

Population concern for rational and healthy eating has led to increased consumption of grain–based products, particularly those with high fibre content and products with low energy. Great interest for the use of grain in the diet is due, on the one hand to the fact that they are restricted to a small volume significant quantities of nutrients and provides a large number of calories (about 50% of the calorific value of the daily ration), and on the other hand, the fact that the present economic benefits related to the vegetative period is short, the ease of transport and storing them [8]. As a result, more and more people today are turning toward a diet rich in functional foods.

A food can be called functional when it is shown that it has beneficial effect on one or more of the functions of the body, in addition to the usual nutritional effects, in the sense that the relevant effect over the health condition of the well being of the body and prevents the risk of illness [7].

Bakery industry, representing an area of the food industry, it is oriented toward widening assortment of products with prophylactic effect, increasing the nutritional value, and consumption of functional products.

Although the spectrum of selection of food fibres for bakery products is very wide, the most widely used material is wheat bran due to their availability on the market and low prices. In addition, near fiber, they constitute a strong source of vitamins, minerals and protein. Bran crisps contain 40–50 % dietary fiber composed of hemi cellulose, cellulose

and lignin. Using the proportions of 5–35 % of processed flour, approach towards, depending on the desired content of the bread and of the destination of the product [5], [7].

Materials and Methods

The bakers have used the following raw materials and auxiliaries: wheat flour of first quality, yeast, salt, dietary fibre (wheat bran), drinking water.

Organoleptic analysis and physico–chemical of raw materials, in particular of wheat flour and of wheat bran, intended for the production of bread with the addition of dietary fiber (wheat bran), were analyzed according to GOST 27558–87, 90–95, STAS pct. 3 [1], [2], [6].

There have been trials of experimental baking, depending on the amount of added bran (3, 5, 7, and 10 percent of the mass of wheat), with subsequent analysis of indices and on the basis of their physico–chemical. We also traced the influence of the degree of fineness of wheat bran on the indices of quality of finished products.

Results and Discussion

The results showed that the flour used for baking terms correspond to samples of the quality I flour. From the analysis of physico–chemical properties of the flour was obtained a corresponding standard humidity. In terms of the acidity of the flour used was obtained a rate of 3,8 degrees. Bran humidity used in preparing the bread has a moisture content of 14,4 %, according to the state standard, this value must be not more than 15,0%.

As a result technological process was carried out the following experimental samples with different percentage of dietary fibre of different sizes: PM: bread of wheat flour quality I; P1: sample with addition of 3 % of coarse bran; P2: sample with addition of 5 % of coarse bran, P3: sample 7 % with the addition of coarse bran; P4: sample with addition of 10 % of coarse bran; P1: sample with addition of 3 % of fine bran; P2: sample with addition of 5 % of fine bran; P3: sample 7 % with the addition of fine bran; P4: sample with addition of 10 % of the fine bran.

The dough was prepared by monophasic method. The quantity of yeast 3 %, 1,5 % salt and boiled wheat bran were given to the distress stage of the dough, which is 44,5 % humidity.

Quality of bread was appreciated in determinated time by the standards in force (not earlier than 12 hours and not later than 24 hours after baking) [3].

By undertaking the baking in laboratory conditions, with the addition of wheat bran, has appreciated the quality of bread after the organoleptic score 30 points.

Analyzing the results we can mention that the sample with the addition of 5 % of coarse wheat bran recorded the highest score awarded in the following organoleptic analysis. The product has a regular shape, symmetrical, and well–developed. Peeled nicely browned, uniform color, good taste, ripe, pronounced aroma, pleasant, characteristic fermented bread and ripe. Uniform core porosity, 75,59 %, acidity of the core bread of 2,9 degrees.

The results obtained on the physico–chemical evaluation of the finished products, are presented in table 1.

Table 1. Assessment of the quality of the finished product features

Features	PM: bread of wheat flour quality I	P1: sample with addition of 3 % of coarse bran	P2: sample with addition of 5 % of coarse bran	P3: sample 7 % with the addition of coarse bran	P4: sample with addition of 10 % of coarse bran	P1: sample with addition of 3 % of fine bran	P2: sample with addition of 5 % of fine bran	P3: sample 7 % with the addition of fine bran	P4: sample with addition of 10 % of the fine bran
Bread weight, g	440	435	440	440	435	440	435	435	435
Bread volume, cm^3	1650	1400	1460	1250	1228	1435	1443	1351	1264
Return bread, %	113,6	114,9	115,9	115,9	114,9	113,6	114,9	117,2	114,9
Volumetric efficiency of bread, cm^3	521,7	442,6	452,5	395,2	395,3	453,7	456,3	418,7	399,7

Addition of fiber to flour makes a number of changes in technological parameters, changes that directly affect the quality of the finished product. The main effect of the addition of bran in bread refers to lower their volume. The reducing of bread volume is due to reducing the percentage content of gluten in the dough and thus reduces the capacity to keep the dough fermentation gases.

Study has shown that the addition of up to 7 % of bran, volume decreases proportionally to the reduction in bread protein gluten content. If you go over this amount, as shown in the case of baking with 10 % of bran are even more pronounced in the rough, then with bran bread volume decreases at a rate greater than theoretical one.

This phenomenon is explained by mechanical damage of glutenice films by bran entered, thus bran placed in the dough with small fine grain size reduced volume of bread, in a lesser extent than those with larger fine grain size. Another assumption is that in the presence of bran, due to competition for water in the dough, glutenice proteins do not moisturize enough, so the glutenic network is formed in a smaller proportion

From the diagram we can see, as the most developed volume in both cases the sample P2 with the addition of 5 % bran, as it is observed that the percentage of bran is greater than the volume bread is less.

Volume variation is more pronounced in the samples with the addition of coarse bran that has a greater influence on the volume of bread compared to fine bran.

Efficiency in terms of output we see that the samples with th Efficiency in terms of output we see that the samples with the addition of coarse we have dietary fiber increases the yield of bread, where the last sample decreases. The same situation can be seen in the samples with the addition of dietary fiber fine. Increase in yield is due to the properties of the fibers to absorb and retain water in the product.

The dependence of the amount of the addition of dietary fiber in different

proportion and porosity of bread is shown in Figure 1 and 2.

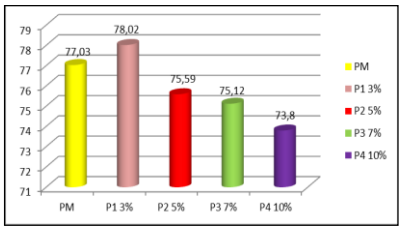

Fig. 1. Dependence of the amount of the addition of gross dietary fiber in different percentage and porosity, %

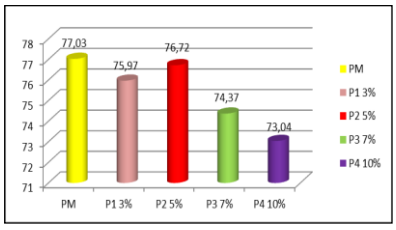

Fig. 2. Dependence of the amount of the addition of fine dietary fiber in different percentage and porosity of bread, %

In terms of porosity it is observed that the bread has a well–developed porosity, which is an important index, also a decrease of porosity as with volume, i.e. the amount of added higher bran with both takes place and a gradual decrease in porosity. The addition of 3 % of coarse bran in the P1 has demonstrated that it has a beneficial influence on the finished product, where he obtained a value greater 1 % than the blank.

Note that data following the lowest porosity has been obtained from the sample with 10 % of P4 bran, sample date has uneven porosity with gross walls, due to the addition of bran in higher percentage. We can observe the following diagrams that in both cases, the sample with coarse and fine bran with the addition of 10 % is a decreased porosity.

Fine bran samples from any of the samples with the addition did not exceed porosity blank, but a higher porosity of samples with the addition of the sample P2 with the addition of 5 % of fine bran. Porosity of samples with fine bran have lights walls and is more uniform in comparison with the samples with the addition of coarse bran, where it is observed that the porosity is not uniform and the walls are gross.

According to the results presented can observe an increase in humidity of samples with the addition of bran in relation to the blank. The maximum value was registered in the case of samples with added 7 % coarse bran. The smallest value of humidity was registered with the addition of 5 % fine bran in relation to the blank and other samples (Figure 3, 4).

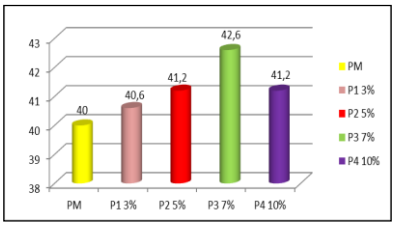

Fig. 3. Dependency between the amount of the addition of dietary fiber gross in different percentage and core moisture of bread, %

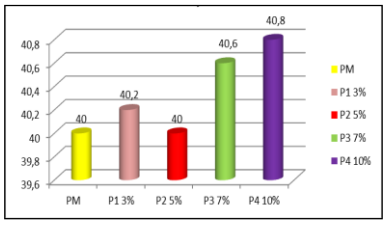

Fig. 4. Dependency between the amount of the addition of dietary fiber fine in different percentage and core moisture bread, %

The acidity index of flour characterize the quality of the finished product, in the case of the addition of bran, the acidity with increasing amount of bran and also bran composition and accumulation of lactic acid in the dough that occurs as a result of lactic fermentation leads to increased acidity of the finished product. In both cases were obtained from the samples with the addition of 10 % bran a increased value of acidity.

Also after the chart we can see that the acidity increases gradually with the addition of bran, this increase is apparent both in the rough bran, and to sample with fine bran (fig. 5, 6).

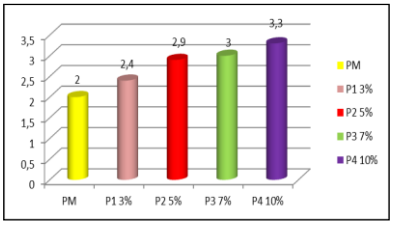

Fig. 5. Dependency between the amount of the addition of dietary gross fiber in different percentage and acidity bread (degree of acidity)

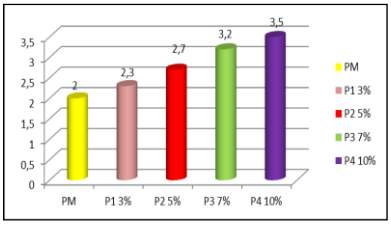

Fig. 6. Dependency between the amount of the addition of dietary fine fiber in different percentage and bread acidity (degree of acidity)

Losses in baking present losses expressed by the evaporation of water and volatile substances. Due to the increased moisture of the dough and wetting with steam the room, so we don't have large baking losses. This phenomenon is more due to the fact that the product was baked into shape, which just leads to reduction of losses.

Conclusions

The addition of bran proved to be a crucial influence on the quality of the bakery products obtained. As a result of the addition of bran in flour in different percentage, has noticed an improvement in flavour and taste, while volume decreased with the increase in the percentage of bran. Bread is due to downsizing, reducing the percentage content of gluten in the dough and thus reduces the capacity to keep the dough fermentation gases. Study has shown that the addition of up to 7 % of bran, volume decreases proportionally to the reduction in bread protein gluten content. Volume variation is more pronounced in the samples with the addition of coarse bran, which has a greater influence on the volume of bread compared to fine bran.

In the case of the porosity observed a decrease in the workload, i.e. the amount of added higher bran with both takes place and a gradual decrease in porosity. The samples with fine no evidence bran with the addition did not exceed porosity blank. The addition of 3 % of coarse bran in the P1 has demonstrated that it has a beneficial influence on the finished product, where he obtained a value greater 1 % than the blank. Porosity of bran samples have fine walls is more uniform in comparison with the samples with the addition of coarse bran, where it is observed that the porosity is not uniform and the walls are gross.

Acidity, humidity and return gradually increases with the addition of bran, this increase is apparent both in the rough bran, and to sample the fine bran. Increase in yield is due to the properties of the fibres to absorb and retain water in the product.

Therefore, in order to trace the beneficial effects of the addition of bran in wheat bakery products prepared by one method it is recommended to establish an optimal doses of 5–7 % of bran wheat flour and meal of wheat.

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