

Ways to improve product quality when using bee pollen

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Abstract. The article presents studies of the influence of pollen on the quality of a bakery product. It was found that when replacing sugar with pollen in an amount of not more than 20% in the recipe of bakery products, it has a positive effect on organoleptic indicators. The influence of pollen on the physico-chemical parameters of bakery products was also studied. As a result, it was found that the physical and chemical parameters of products with the addition of pollen do not deteriorate and correspond to the GOST indicators. The article presents data on the determination of the mass fraction of sugar and the amount of dietary fiber.

1 Introduction

At present, in the production and sale of confectionery and bakery products, the Russian market is a competitive environment for enterprises. Therefore, enterprises need to look for opportunities and ways to increase the competitiveness of products by improving quality indicators and increasing nutritional value [1-2].

At the same time, non-traditional raw materials and the ability to effectively introduce them into the technological process play an important role, giving certain qualities to products. As non-traditional raw materials, products from fruit and vegetable, vegetable, medicinal and technical raw materials, as well as bee processing products (pollen, perga, honey, etc.) can act, which allow reducing the amount of sugar, but at the same time increasing the nutritional value of products, have antioxidant activity, can improve the economic efficiency of production, the quality of finished products, expand the raw material base of production and the range of products [2;7-8].

It has been established that pollen contains various enzymes produced by bees. It is one of the most protein rich foods as it contains all the essential amino acids. The sources of literature noted the presence of 32 forms of free amino acids - proline, asparagine, aspartic acid, glutamic acid, phenylalanine, tryptophan, gamma-aminobutyric acid and serine. Pollen also contains carbohydrates, fatty acids, and phenolic compounds [3-6].

In many studies of foreign and domestic authors, a positive effect of pollen on human health has been noted. It has been established that pollen enhances the protective function of the body due to the content of antioxidants that have antimicrobial, antifungal or anti-inflammatory effects [9-10].

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Therefore, the purpose of this study is to improve the technology of fried bakery products - donuts, which will improve the quality of the finished product by enriching traditional product recipes. The paper provides a rationale for the effectiveness of the use of non-traditional raw materials, namely pollen in the production of fried donut bakery products.

2 Materials and methods

Research in accordance with the goal was carried out at the Department of Catering Technology and Processing of Vegetable Raw Materials of the Federal State Budgetary Educational Institution of Higher Education "Bashkir State Agrarian University".

The quality of finished products was determined by organoleptic and physico-chemical (humidity, acidity, porosity, etc.) indicators using the methods described in GOST 31751-2012. The following metrics were also identified:

- Porosity GOST 5669-96.
- Mass fraction of sugar GOST 5672-68
- Dietary fibers GOST 34844-2022

3. Results and Discussion

The effect of pollen-pollen on the organoleptic characteristics of donuts.

In order to determine the potential demand for the developed product, the method of tasting evaluation was used. In this regard, a tasting evaluation of finished products with different dosages of pollen was carried out among the employees of the University of Bashkir State Agrarian University.

To identify consumer preferences, samples were made with the addition of pollen in the amount of 5, 10, 15, 20, 25, 30, 35, 40% of the mass of sugar and a control sample without the addition of pollen. Based on the data obtained, a profilogram was built (figure 1).

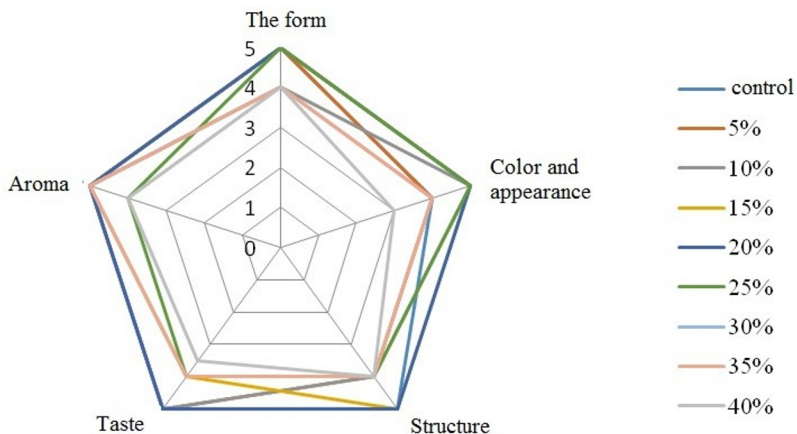


Fig. 1. The influence of pollen dosage on the organoleptic characteristics of donuts.

According to the data obtained, it was revealed that samples of donuts with the addition of pollen of no more than 20% by weight of sugar received the highest organoleptic assessment.

Influence of pollen-pollen on the physical and chemical parameters of donuts

To establish the effect of pollen on the physical and chemical properties of donuts, samples were made with dosages of 5; 10; 15; 20; 25; 30; 35; 40% by weight of sugar. As a control, samples made without the addition of pollen were used. The dough was made by a non-dough method, pollen was introduced in crushed form together with sugar in the form of a suspension.

When conducting the study, GOST 31751-2012 was used.

The influence of the pollen dosage on the acidity of donuts was determined. The results are presented in figure 2.

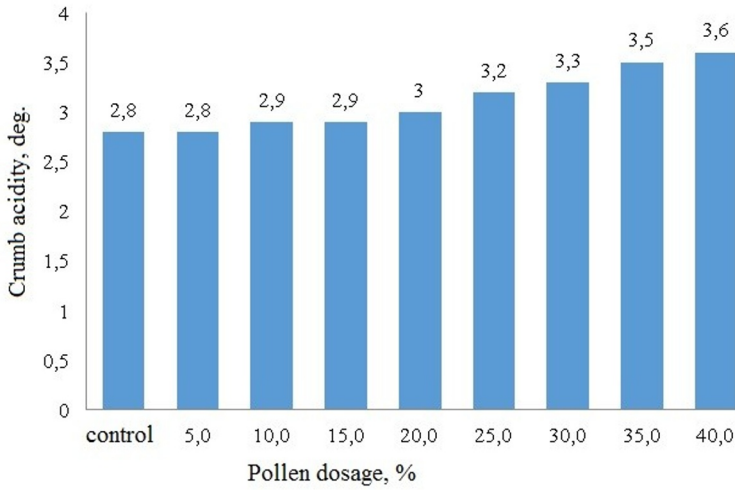


Fig. 2. The influence of pollen on the acidity of donuts.

The acidity of the crumb increased significantly with an increase in the dosage of pollen. The increase in acidity is probably due to the presence of organic acids in pollen. In this regard, we can conclude that the optimal dosage of pollen is 20%, since with a further increase in the dosage, the products deteriorate.

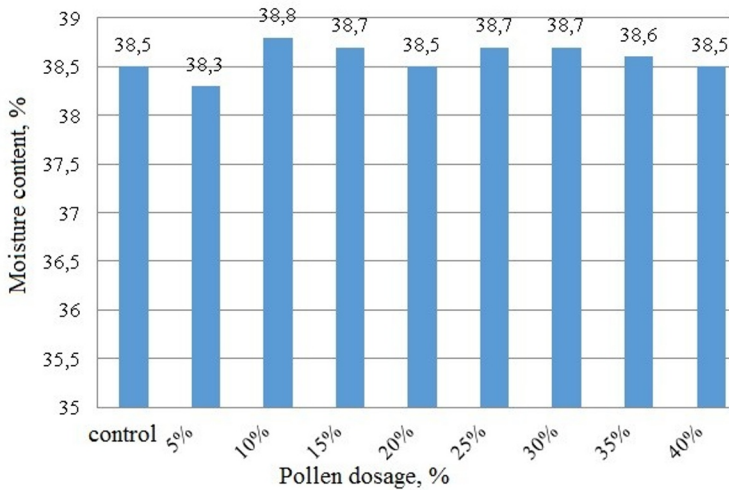


Fig. 3. Influence of pollen on the mass fraction of moisture.

As a result of determining the mass fraction of moisture, it was found that with an increase in the dosage of pollen, the humidity practically does not change, remaining within the range of 38.3 - 38.8%, which corresponds to the requirements of GOST.

Porosity was determined in donuts with different dosages of pollen according to GOST 5669-96, the results are shown in figure 4.

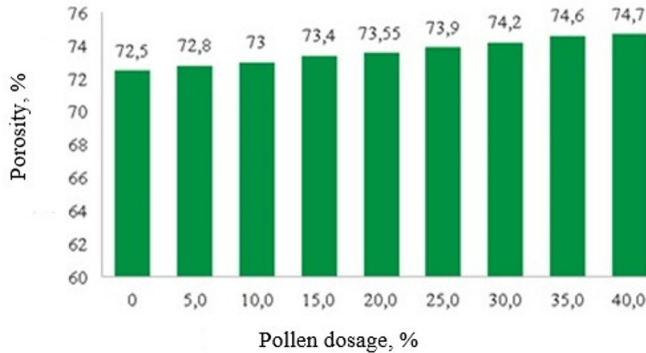


Fig. 4. Change in the porosity of donuts when pollen is added.

It has been established that with an increase in the dosage of pollen in the donut recipe, the porosity of the products increases. It is likely that the pollen is a nutrient medium for yeast; as a result, the rheological properties of the dough are improved and thereby the technological process of manufacturing the developed products is accelerated.

In experimental samples with different dosages of pollen and in the control sample, the mass fraction of sugar and the amount of dietary fiber were determined. The results are shown in table 1.

Table 1. Characteristics and composition of products with the addition of pollen

Index	Pollen dosage, %								
	0	5	10	15	20	25	30	35	40
Mass fraction of sugar, %	4.51	4.6	5.73	6.2	7.9	9.1	11.2	13.8	15.6
Alimentary fiber, %	20.1	20.7	21.9	22.2	22.7	22.9	23.1	23.3	23.6

It has been established that adding a dosage of pollen to donuts increases the mass fraction of sugar and the amount of dietary fiber. This is probably due to the fact that pollen contains a significant amount of carbohydrates and dietary fiber, which confirms the expediency of using pollen as a dietary supplement.

The obtained results indicate that the samples of donuts with the addition of pollen in the amount of 20% by weight of sugar had the best organoleptic, physicochemical and quality indicators.

4 Conclusion

According to the results of the research, the influence of pollen on the organoleptic and physico-chemical properties of donuts was established.

As a result of the tasting, it was revealed that samples of donuts with the addition of pollen of no more than 20% by weight of sugar received the highest organoleptic assessment.

It has been established that the addition of pollen to the recipe of donuts does not deteriorate the quality of the products. Also, as a result of determining the physico-chemical parameters, it was revealed that pollen-slightly affects the acidity and mass fraction of moisture of products and corresponds to the GOST indicators. With an increase in the dosage of pollen, an improvement in the porosity of products was revealed, which is due to the rich composition of pollen, which possibly acts as a nutrient medium for yeast.

It was found that when pollen is added to the donut recipe, the mass fraction of sugar increases (control sample - 4.51%, samples with the optimal dosage of pollen 20% - 7.9%) and the amount of dietary fiber (control sample -20.1 %, samples with the optimal dosage of pollen 20% - 22.7%). This is due to the fact that pollen contains carbohydrates and dietary fiber, which contribute to the enrichment of the developed product.

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