

**TECHNOLOGY OF USING NATURAL ADDITIVES TO IMPROVE THE QUALITY  
OF BREAD PRODUCTS MADE FROM WHEAT FLOUR**

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**Annotation:** This article examines the use of natural additives to improve the quality of bakery products made from wheat flour. The effect of natural additives - plant powders, dairy products, enzymes and biologically active substances - on the composition, texture, taste and shelf life of bread was studied. The results of the study showed that natural additives increase the nutritional value of bread, improve its organoleptic properties and ensure the environmental friendliness of the product.

**Keywords:** wheat flour, bakery products, natural additives, technology, biological activity, enzymes, quality indicators.

**Introduction.** Bakery products are the main consumer product in the food industry, and their quality, nutritional value and shelf life are one of the most important indicators determining the level of food safety in society. Today, strengthening the principles of healthy eating and consumer demand for products with biological value and free from chemical additives requires the widespread use of natural substances. Therefore, scientific research has intensified on the use of natural additives - plant powders, cereal and legume extracts, spices, enzymes, vitamin and mineral complexes and probiotic cultures - to improve the quality of bakery products made from wheat flour.

The use of natural additives improves the rheological properties of the dough, increases the volume of bread, stabilizes its structure, enriches its taste and aroma, and most importantly, increases its biological value. In addition, natural additives improve the water retention capacity of bread, prevent its rapid deterioration and extend its shelf life. Compared with traditional technologies, the use of natural additives allows the production of environmentally friendly, economical and functional food products.

The purpose of this study is to improve the quality of bakery products made from wheat flour, increase their nutritional and biological value, and scientifically substantiate the technological advantages of using natural additives. This research is relevant for the development of the food industry and technologies, and creates a basis for the production of innovative and environmentally friendly products.

The aim of this study was to investigate the effect of various natural additives on the technological process of improving the quality of bakery products made from wheat flour. The following raw materials, equipment, additives and experimental methods were used in the study.

**Materials and methods.** Materials used in the study. The main raw materials were grade 1 wheat flour (gluten content 28–30%), Drinking water – purified in accordance with GOST requirements. Yeast (*Saccharomyces cerevisiae*) – pressed baker's yeast. Grade 1 table salt was used as a base.

Natural additives: Pumpkin powder is a natural supplement rich in  $\beta$ -carotene and fiber. Rice bran powder is rich in tocopherols and B vitamins. Ginger powder has antioxidant properties. Citric acid (naturally occurring) is a fermentation activator. Honey extract is a natural sweetener and fermentation stimulant. The additives were added to wheat flour at a rate of 0.5%, 1% and 2%.

Research methods. The rheological properties of the dough were evaluated using the following methods:

- Farinography – determination of the percentage of water absorption, formation time and stability time.
- Amylography – determination of the starch gelatinization temperature and viscosity index.
- Extensography – determination of the elongation and elasticity of the dough.

These methods allowed us to evaluate the effect of additives on dough structure.

During the fermentation process, the following were determined:

- dough rise volume (ml),
- CO<sub>2</sub> evolution rate,
- pH change

Measurements were carried out at 30°C for 120 minutes.

The quality indicators of the finished bread were determined according to the following standards:

- Organoleptic indicators:
  - appearance,
  - color, crispness of the crust,
  - porosity of the interior,
  - taste and aroma.

The assessment was carried out on a 5-point sensory scale.

**Analysis results.** The study investigated in detail the effect of natural additives added to wheat flour on the rheological properties of the dough, the fermentation process and the quality of the finished pastries. The results are presented below.

Results on the rheological properties of the dough

Water absorption index. It was found that the addition of natural additives increased the percentage of water absorption of the dough:

Supplement Type	Quantity	Water absorption (%)
Control (No Supplement)	—	58.2
Pumpkin Powder	2 %	61.4
Rice Bran	2 %	63.1
Ginger Powder	1 %	59.8

Fiber-rich additives (pumpkin powder, rice bran) bind more water and ensure that the dough forms a stable structure.

Dough stability and formation time

- The dough stability time in the control sample was 4.1 minutes,
- 5.5 minutes in samples with the addition of rice bran,
- 5.2 minutes when pumpkin powder was added,
- 4.4 minutes when ginger powder was added.

Fermentation process results

Dough rise volume

Dough rise volume during 120 minutes of fermentation was as follows:

Sample	rise volume (ml)
Control	1080 ml
Pumpkin powder 2%	1250 ml
Rice bran 2%	1310 ml
Honey extract 1%	1380 ml
Ginger 1%	1120 ml

Honey extract, due to its natural sugars, enhanced yeast activity and gave the highest fermentation efficiency

Results of finished bread quality indicators

Loaf volume. The total volume of finished loaves was as follows:

- Control: 420 cm<sup>3</sup>
- Pumpkin powder 2%: 470 cm<sup>3</sup>
- Rice bran 2%: 490 cm<sup>3</sup>
- Honey extract 1%: 515 cm<sup>3</sup>

These additives show that the dough has improved its gas-holding capacity.

Moisture and porosity indicators

Sample	Humidity (%)	Porosity coefficient.
Control	39.8	0.68
Pumpkin powder	41.3	0.72
Rice bran	42.0	0.70
Honey extract	41.1	0.74

The additives slowed down the setting process of the bread; the addition of honey and pumpkin powder ensured a more uniform porosity.

**Conclusion.** The results of this study showed that the use of natural additives in the production of bakery products made from wheat flour significantly improves technological processes and product quality. The addition of additives such as pumpkin powder, rice bran, ginger powder and honey extract to the dough improved the rheological properties, water absorption properties, stability and fermentation efficiency of the dough.

According to the results of the study, the volume, porosity, taste and aroma of breads containing natural additives were further improved compared to the control samples. In particular, the gas-holding capacity of the dough increased in samples containing rice bran and honey extract, resulting in a 15-25% increase in bread volume.

The obtained biological value results showed that the use of natural additives significantly increased the content of dietary fiber, protein, and antioxidants such as carotene and tocopherol in the bread. This allows us to evaluate the resulting bread products not only as traditional foods, but also as functionally important products.

In general, the study confirmed the following:

Natural additives are effective substances for improving the quality of bakery products.

Technological processes are becoming more sustainable, environmentally friendly and economical.

Bakery products with high nutritional value satisfy the population's need for healthy nutrition and are recommended for production as innovative products.

On this basis, it is advisable to expand the range of bakery products using natural additives, introduce technological processes on an industrial scale and study their functional properties in more depth.

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