ANALYSIS OF LOCAL WHEAT GRAIN PROCESSING TECHNOLOGY

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Abstract

Development of recipes and technology for the preparation of new varieties of bread and bakery products using durum wheat gluten, improving the rheological properties of dough due to the protein content of wheat gluten, increases the quality, nutritional and biological value of bread and bakery products. Various bread and bakery technologies were developed based on wheat gluten, and the physicochemical and organoleptic characteristics of the finished product, as well as the content of ash and dry matter were studied. Based on the research, samples were taken from the planned products and technological schemes were formed.

Keywords: BMP-01, A1-BZK-9, R3-BMO- 6, R3-BAB, Eritma, Xamir, Resteptura, Modernizastiya, fizik-kimyoviy, g'ovaklik, Bug'doy, Kislota, kleykovina, aerastiya, ventilyastiya.

A grain represents a dispersed phase. Vertical transfer of grain from one machine to another in elevators, flourmills, goats and dry fodder plants is based on its fluidity. The fluidity property depends on the shape of the grain, humidity and the amount of foreign impurities in it. The rounder the shape of the grain, the greater the fluidity. The higher the humidity, the lower the flow. A large amount of foreign impurities also reduces fluidity. Usually, the fluidity of the grain mass is evaluated by external and internal friction coefficients, and determined by measuring friction and natural slope angles. The angle of friction is the angle at which the grain mass begins to slide along some surface. The angle of natural slope is the angle between the base diameter and the constituent of the cone formed by the grain mass falling on the horizontal plane.

Self-sorting of grain mass. When moving grain mass from one place to another, its self-sorting state is observed, i.e. uneven distribution of grain mass components along separate sections of the resulting heap. This leads to the appearance of unpleasant phenomena (self-heating, sticking, etc.) in the grain mass. The state of self-sorting is a consequence of the different density of the solid parts included in the grain mass. Self-sorting occurs when filling a container with grain mass or when grain is removed from it through a self-flowing pipe, when a conveyor transports it, when it is loaded into wagons and cars. When the mass of grain is shaken on the conveyor belt, parts with low density (light mixtures, seeds in flower husks, loose grains, etc.) are pushed to the

top layer and surface of the pile because of impulses during loading onto cars or wagons.

In the course of our research, we studied the quality indicators of localized winter wheat grains of the Babur and Chillaki varieties grown in the Fergana region. According to it, the following table shows the quality indicators of these wheat varieties.

Quality indicators of Babur and Chillaki wheat varieties

№	Indicators	Unit of measure	Wheat varieties	
			Babur	Chillaki
1	Moisture	%	10.3	11.4
2	Volumetric weight	g/l	781	788
3	Shaffoflik Transparency	%	75	72
4	Level of laughter	%	1.94	1.98
5	1000 grain mass	g	44	41
6	Amount of wet gluten	%	30	32
7	Quality group		1	1
8	Mixtures			
9	A pollutant	%	2.1	1.8
10	Cereal	%	4.2	3.8

It can be seen from the table that both wheats have an average moisture content of 10.3% and 11.4%. Samples have high indicators of volumetric weight and mass of 1000 grains. The transparency values of both varieties are around 75%, and this indicator meets the requirements for making flour. The amount and quality of wet gluten meets established standards, which ensures the production of high-quality gluten flour at the level of demand. It is known that the physical properties of the grain include its fluidity, self-sorting, hollowness, heat capacity, thermal conductivity, temperature conductivity and heat-moisture conductivity, and its physico-chemical properties geometric characteristics, size and smoothness, nature and relative volume, mass of 1000 grains, transparency.

In our study, we isolated the small grain fraction from Babur and Chillaki wheat varieties in accordance with existing regulatory requirements.

Indicators of Babur and Chillaki wheat varieties divided into fractions

Grain varieties	Initial state		After sieving			
	Initial grain mass (g)%	Fine grain fraction (g)%	Large mixtures (g)%	Large grain fraction (g)%	Fine grain fraction (g)%	Fine mixtures (g)%
Babur	100	13	2.3	75.5	7	2.2
Chillaki	100	15	2.5	72.4	8	2.1

It can be seen from the table that the extracted small grain fraction is 7% for Babur variety and 8% for Chillaki wheat grain. These indicators are 54% and 53%, respectively, compared to the fractions of small grains in the initial grain (13% in the Babur variety and 15% in the Chillaki variety). Based on the principle of extracting the fine grain fraction, it can be said that this process was carried out effectively.

Technological properties of wheat grains divided into fractions

The yield and quality of the finished product objectively determines the technological properties of the grain. These indicators change significantly under the influence of various factors, that is, the size of the grain, its completeness, the relative amount of kernel, moisture and similar factors. Let's consider the main factors. The main factors affecting the yield and quality of grain are its size and flattening. Smaller grains have less endosperm and higher ash content. As a result, the potential of the grain decreases. For example: when researching grain of Babur grade, when 12.5% small grain fraction was separated using 2a - 22x20 alvir from a certain measurement, which allows to obtain only 2nd grade flour, 35.8% with ash content of 0.75% was obtained from this grain. It is possible to separate 1st grade flour and 26.0% 2nd grade flour with an ash content of 1.19%. The yield of the product obtained from separate systems of the initial grain is 0.79%. The conducted studies show that if grain preparation and milling processes are carried out separately according to size fractions, the yield of high-grade flour can be increased by 9-10%.

Improvement of baking properties of flour in flourmills

One of the main directions of development in the field of flour weighing is the processing of grain to obtain new products, including the technology of obtaining flour and composite mixtures and its application. A big role in the expansion of the assortment is focused on the use of ingredients. They make it possible to use grain with high quality, nutritional value, dietary and preventive treatment. It is known that in grain processing, there is a need to adjust the quality of flour in order to meet the needs of bakeries and other enterprises for high and stable quality flour. In foreign mills, for this purpose, wheat flour is added to improve the quality of bread, for example, an enzyme preparation containing 2-amylase.

In Russia, the use of improvers to increase feed value and ensure the production of flour that meets standard requirements is at an early stage. Differences in soil-climatic agro technical and other conditions of grain development lead to considerable fluctuations in its quality, and this fact was confirmed when researching the harvest of recent years. Due to the different quality of grain batches, the problem of stabilizing the quality of weighing batches arises. In addition, the quality of wheat grain has been decreasing in recent years.

Wheat of high commodity quality is not available; most of the commodities are grains of low (3-5) class. According to the data of the State Agriculture Ministry, 65% of the 2018 wheat harvest in Russia belonged to 3-4 classes, and 30-74% of the rest of the region was fourth class. The remaining 35% of commercial wheat grain is included in non-food grains. Russian flour mills process 80% of low- or unsatisfactory-quality gluten grains with high or low activity per year. These include crusty, bruised, cold-beaten, high-temperature-dried grains.

One of the ways to improve the baking properties of flour is to use special processing technologies that allow separating the defective diseased grains or anatomic parts that worsen the baking properties. The use of baking quality improvers is one of the convenient ways to control the quality of flour and bread. This situation allows control and forecasting with sufficient accuracy. Unfortunately, this thing is used in practice only in baking enterprises. Currently, the importance is given to the use of complex improvers.

They affect different substances of flour at the same time. The improver should be of a powdery type with a certain size, not larger than the size of flour particles, well sprinkled for accurate dosing and well mixed with flour. Its moisture and hygroscopicity is low, its color is light, it does not change the color of the flour, and its shelf life should not be less than that of wheat flour. Although the enhancer is relatively cheap, its use should be economically feasible. One of the important moments of choosing an improver is to take into account its properties and characteristics, checking its compatibility with the quality of concrete flour. Because of the annual analysis of the harvest, it was found that the main reason for the deterioration of the marketability of wheat grain is the low amount of gluten.

Even in the 3rd grade wheat grain, the amount of gluten is at a lower level and does not exceed 23%. Flour produced from third class wheat does not always meet the requirements of GOST 26574-85. Dry wheat gluten is added to the low gluten content to improve its baking properties. It meets the requirements of flour production. Dry wheat gluten exhibits a finely dispersed, light-colored powder, has low moisture content, flows well, and allows correcting the common defects of low-quality flour without worsening the organoleptic indicators of flour. Dry gluten is a natural substance and its amount is not limited when used as an additive. Dry wheat gluten is

added to flours that are already low in protein in flourmills in France, the USA and other countries.

In European countries, dry wheat gluten is added to it without power, and the expensive wheat-improver saves money. In Russia, dry gluten is mostly added to bakery improvers. This makes it possible to increase the water absorption capacity of the dough, to improve its physical properties, to increase the quality indicators of the bread, including the structural and mechanical properties of the raisin, the yield and shelf life of the bread products.

Multidisciplinary studies have been conducted by researchers, in which a number of problems related to dry gluten have been solved. In particular, technological properties of various dry gluten samples are analyzed, evaluation of the quality of flour enriched with wheat gluten, as well as studies of the properties of dough and baked bread were carried out.

To evaluate the quality of dry wheat gluten, an express and objective method was developed in the laboratory of the department of food technology of the institute. It is enriched with dry wheat gluten, the change in the quantity and quality of gluten is checked, as well as the dose of dry gluten is observed. In our work, we experimentally added dry wheat gluten to flour obtained from 4th class ―Babur and Chillaki wheat grains. We found that it increased by -2%. Adding 2-4% of dry wheat gluten is enough to bring the quality of flour obtained from class 4 grain to the level of TSH requirements or to the level of GOST 26574 standard. The volume of the high-grade bread increased by 90 cm3, and that of the 1st grade increased by 116-118 cm3.

The increase in the shape of bread obtained from it of the first grade reached 0.34 to 0.37-0.38. When dry wheat gluten was added, the physical properties of the dough made from weak flour increased to the level of strong dough. Adding more than 4% of dry wheat gluten does not improve the baking properties of the flour much. Therefore, it is recommended to add 3-4% dry wheat gluten to baking flour. Because of adding dry wheat gluten in a dose of 3-4%, it is ensured that the quality of gluten changes from III-unsatisfactory weak group to II-weakly satisfactory group.

Flour due to the addition of dry wheat gluten change of baking properties

T\r	**Event name**	**The result achieved**
1	in each added percentage of dry wheat gluten	Flour gluten increased by 1.6-2%
2	Add dry wheat gluten in the amount of 2-4%	The quality of the flour obtained from the 4th grade grain met the requirements of GOST 26574

3	Add dry wheat gluten in the amount of 2-4%	The volume of high grade flour bread is 90 cm^3, the volume of 1 grade flour bread has increased to 116-118 cm^3
4	Maximum addition of dry wheat gluten	the dose is not more than 4%
5	Addition of dry wheat gluten in the amount of 3-4%	Flour ensures the transition of gluten quality from III-unsatisfied weak group to II-satisfied weak group.

Based on the results of the research, the following general conclusions were reached. Scientific studies have shown that dry wheat gluten can be used to raise low-grade wheat flour. An increase for protein in bread and dough products with dry wheat gluten has a positive effect on its quality indicators. The addition of wheat gluten has a positive effect on the ripening characteristics of the dough. The addition of wheat gluten has been found to increase the porosity of bread. It was found that high-quality bread and dough products can be obtained from low-strength wheat flour by adding dry wheat gluten.

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