



Application and implementation of a number of methods of cold hydrothermal processing of grain products at flour milling enterprises.

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ABSTRACT

in this article, to improve the quality of grain during its processing and proper processing, the quality of the grain product is used, and for the process of moistening and steaming flour, the use of cold and hot air conditioning, which improves the quality of flour and saves time.

Keywords:

Grain, hot and cold conditioning, grain processing, humidity, temperature, pressure, hydrothermal treatment, vacuum pipe, moving screw, grain is poured into a pneumatic locomotive, Air conditioning system, compressor for producing compressed air, visual control of compressed air pressure, receiver for collecting and storing compressed air, pressure switch for automatic compressor control, hygrometer, air filter to clean incoming air,

Introduction. Flour products such as bread and pasta are made from wheat flour as a staple human food. After processing such as hulling and milling, the ripened wheat is converted into wheat flour. Wheat flour can be classified into different qualities based on fineness of grinding and nutrient content [1]. By mixing wheat flour and water in a certain proportion, various flour products such as dough, dough, etc., after operations such as steaming or frying, can be prepared into delicious dishes. With an increase in living standards, the idea of nutrition is gradually changing from nutritious, good food to healthy food [2]. People have increasingly high demands on the quality of flour products made from wheat flour. Although the taste and nutritional value of flour products made from wheat flour partly depend on the degree of processing (including artificial and mechanical), the most important thing depends on the quality of wheat flour as a raw material. Wheat flour of

different qualities has very different proportions of different nutrients, which affects the quality of the final product when preparing flour products [3]. The simplest and most understandable example: in everyday life, different types of wheat flour are chosen to prepare different types of flour products. To improve the quality of flour products, it is necessary to study wheat flour of various qualities [4]. The main stage of preparing grain for grinding is its hydrothermal treatment and cleaning [5]. Optimization of technological technologies, grain characteristics, and its processing by hydrothermal method. Grain conditioning is used in flour, grain and feed production technologies. Technological improvements are achieved by regulating processing parameters and grain properties (for example, temperature, pressure, humidity, duration of output technological operations). In a scientific journal of the twentieth century, the

term "grain conditioning" was replaced by the term "hydrothermal processing of grain" [6].

Materials and methods. As a result of the analysis of existing technologies and methods for controlling the refrigeration conditioning process, it can be concluded that in order to improve process control, it is necessary to improve the concept and structure of control of humidification and cleaning operations. and to develop the necessary controls for this [7]., can be divided into endosperm and seed coat. The main components of wheat are concentrated in the endosperm, which contains starch and protein [8]. When wheat is processed into wheat flour, its seed coat and germ are removed as much as possible and only the endosperm is ground, that is, wheat flour consists of the endosperm of wheat. Therefore, the main components of wheat flour are starch and protein, which are the main factors affecting the quality of wheat flour. The quality of wheat flour is usually determined by the amount of starch and protein.

Not only in our country, scientists conduct a lot of research in the field of economics of world grain products. As an example, we can cite the indicators of research on grain and grain products [9].

The product belongs to the flour and grain industry and can be used primarily in mills. After cleaning the wheat grain from impurities, it is subjected to hydrothermal treatment, which includes wetting the grain with water in a vacuum apparatus at a set vacuum with a residual pressure of 0.060-0.065 MPa, and then cleaning it in rigid vessels. In addition, grain is processed in wallpaper machines, entoleators, and air separators. Then the grain is moistened, briefly pulled out and sent to the grinding part of the mill. Due to the uniform moistening of the endosperm and improved washing of each grain husk, the yield of premium flour increases, while the overall yield of flour when grinding wheat grain of the grade increases, as well as the content of raw gluten in premium flour. increases, which helps improve its quality. Traditionally, mills use three methods of hydrothermal processing of

grain: cold, hot and high-speed conditioning [10].

Separately, it should be noted that in conditions of low ash content (high whiteness) of products crushed with grain husks, the biologically valuable aleurone layer is enriched with the largest amount of phenolic acids, anthocyanins (grain content 6.0÷13.0%), antioxidant properties, microelements, carotenoids, B vitamins, tocopherols [11,12] The product belongs to the flour and grain industry and can be used primarily in flour milling production. After cleaning wheat grain from impurities, hydrothermal treatment is necessary, including moistening the grain with water in a vacuum, creating a vacuum at a residual pressure of 0.060-0.065 MPa, and then conditioning it in storage silos. processed in casing mills, threshers, air separators. The grain is additionally moistened, conditioned for a short time and sent to the grinding department of the mill. Effects: further moistening of the endosperm, improved grinding of each grain shell, and a simultaneous increase in the overall flour yield when growing high-grade wheat. Increasing the protein content and the amount of raw gluten in premium flour increases the yield of premium flour and helps improve its quality. A well-known method of hydrothermal cleaning is vacuum cleaning of wheat grain in mills, including humidification. grains and creating a vacuum, softening, vacuum drying and heat treatment, repeated moisturizing and exfoliation. Wetting of grain is carried out during washing and. At the same time, drying and heat treatment are carried out in wetting machines.

The main disadvantage of this method of hydrothermal treatment of spiked grain is the impossibility of its use on wheat grain, primarily due to the large depth of the vacuum created, which can lead to waterlogging of the wheat grain.

Research results and their discussion Deterioration of the grinding properties of flour and, accordingly, the overall yield of flour, including the yield of premium flour, and secondly, the use of grain drying can lead to a deterioration in the technological properties of

flour. grains of wheat. Undesirable redistribution of moisture in the grain and excessive strengthening of gluten, in turn, leads to a deterioration in the quality of flour, including high-grade flour; thirdly, due to high energy costs, the energy costs of obtaining a large vacuum depth when moistening grain are taken into account. The disadvantages of the described method of hydrothermal treatment are a decrease in the yield of high-quality flour due to the uneven moistening of each of the wheat grains that make up the grain mass when the grain is moistened in humidifiers; the impossibility of increasing the raw gluten content in premium flour by moistening the wheat grain in washing machines or atmospheric pressure humidifiers, which does not improve the quality of flour. In addition, the use of this method requires a large consumption of water, as well as mandatory wastewater treatment when soaking grain in washing machines.

The purpose of the article is to increase the total yield of flour when grinding wheat grain and to increase the amount of raw gluten in premium flour, which improves the quality of flour.

The problem is that in the method of hydrothermal processing of wheat grain, which includes soaking the grain with water, subsequent softening and additional moistening of the grain immediately before grinding, as well as short-term softening, according to research, grain moisture is 0.060. A residual value of - 0.065 MPa is made when installing a pressure vacuum.

An increase in the amount of raw gluten in premium flour occurs due to the penetration into it of the peripheral parts of the starchy endosperm, containing a larger amount of proteins that form gluten; At the same time, the ash content of premium flour does not increase and the whiteness does not decrease. Before grinding, it stabilizes the technological properties of grain, which leads to an increase in flour yield. In addition, this kind of moistening in a vacuum partially destroys the bonds between the membranes and the endosperm, which is also the reason. As a result of grinding

grain prepared in this way, the overall productivity of flour increases and productivity increases. The productivity of flour and its biological value increases due to the inclusion of peripheral parts in the grinding product. Starchy endosperm and its quality. In addition, enzymatic hydrolysis of cereal husks makes it possible to reduce the amount of heavy metals in grinding products due to the desorption of metal ions associated with non-starch polysaccharides during the dissolution of husk structures [13].

The method of hydrothermal treatment of wheat grain is carried out as follows. After cleaning the wheat from dust and weeds, the wheat grain is inspected, including the grain water, when installing a vacuum with a residual pressure of 0.060-0.065 MPa. moistens it with water, leaves it in the freezer for a certain time, and then processes it. It is also processed in grain cleaners, entolators and air separators. Then the grain is moistened, briefly softened and sent to the grinding part of the mill.

After hydrothermal treatment, the surface of the wheat grain is cleaned by passing it through a cleaner. Then the grain is processed in an entolator, after which the grain is cleaned with air in an aspirator or air-sieve separator. After air cleaning, the wheat grain is additionally moistened by 0.3-0.5% in a soaking machine and soaked in a hopper for 20-30 minutes. The next largest grain dispenser by weight is sent to the grinding part of the mill.

Thus, the use of the recommended method of hydrothermal treatment of wheat grain makes it possible to increase the yield of high-quality flour, while simultaneously increasing the overall yield and composition of wheat grain when grinding wheat grain.

Conclusion: Raw gluten in high-quality flour, which helps improve flour quality, leads to better utilization of the potential of each grain due to more uniform hydration of the endosperm and improved hull.

The proposed concept of cold conditioning process control makes it possible to create a control system that operates under conditions of uncertainty in the initial

properties of the processed raw materials and ensures the minimum duration of the process of transferring the product from a variety of possible initial states to a certain final one. state.

A grain moisture measurement sensor during processing has been developed, which has the advantages of periodic correction of the current calibration characteristics, continuous operation under vibration conditions, discrete continuous grain moisture measurement mode, ease of maintenance and ease of inspection.

The developed transducers make it possible to quickly and reliably control the dynamics of moisture redistribution by grain size.

With the help of digital measuring instruments and secondary converters, a universal decentralized control system for cold air conditioning before grain grinding is proposed, which provides control, storage and remote data transmission, reduces the error of direct measurement and increases the accuracy of indirect control of process parameters.

An algorithm for optimizing the operation of the cold conditioning unit has been developed and software implemented, with the help of which the optimal modes of processing crushed grain batches are determined depending on seasonality, initial technological characteristics and the volume of crushed batches, as well as both the geometric dimensions and the number of silos.

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