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DESCRIPTION OF PROTEINS AND POISONS CONTAINED IN FLOUR PRODUCED FROM WHEAT GRAIN PRODUCED IN OUR REPUBLIC

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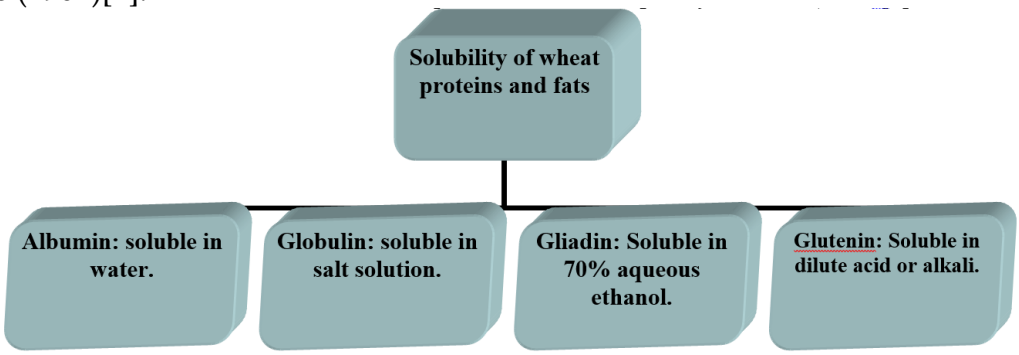
Abstract: This article describes the proteins and starches contained in flour produced from wheat grains grown in our republic. Nowadays, it is important to have information about the amount and structure of wheat flour proteins in the production and processing process. In our experiments, attention is focused on these factors, i.e. methods of determining proteins in flour and information about proteins in flour products available in our republic.

Keywords: Gliadin, glutenin, Kjeldahl procedure, CAN, albumin, globulin, wheat, macro and micro nutrients.

Introduction. 7.3 million tons of wheat are grown in our republic in 1 year. Cultivated wheat is being produced in existing large and small enterprises, and the composition of the developed flour products is considered to be a constantly consumed product due to its rich composition of macro and micro nutrients. A number of works have been carried out to study their composition and enrichment, especially experiments are being conducted to determine the structure of proteins in flour.

Wheat protein and the resulting flour protein are directly related to the size of the bread. Finney and Barmore (1948) showed a correlation between protein content and bread content[1].

Wheat proteins are traditionally classified according to their solubility properties. The first comprehensive fractionation scheme for wheat proteins was developed by Osborne (1907)[2].



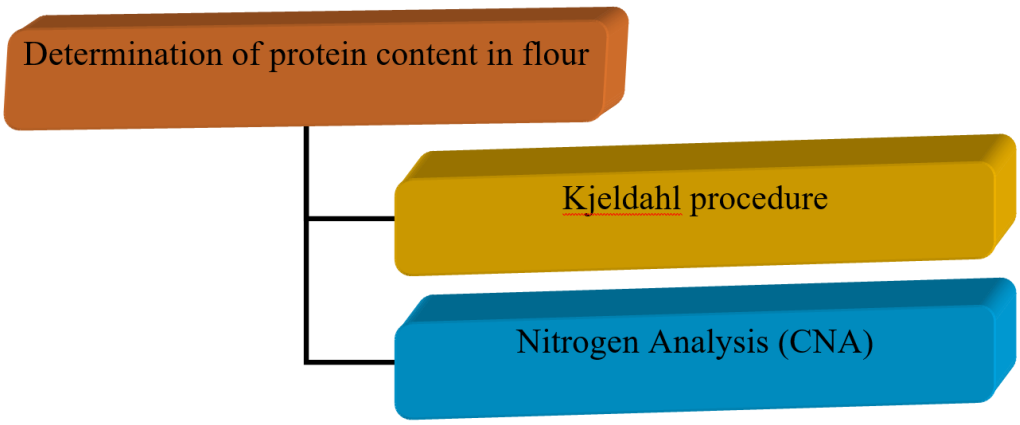
Gliadin and glutenin together account for approximately 80% of the total proteins in wheat and are present in approximately equal amounts (Tatham and Shewry, 1985;

Shewry et al., 2009; Békés, 2012; Békés and Wrigley, 2016). Gliadin and glutenin are the most important determinants of the functional properties of wheat flour [3].

Wheat proteins are divided into monomeric and polymeric proteins depending on whether they have single or multi-chain polypeptides (MacRitchie & Lafiandra, 1997). Monomeric proteins include gliadins and albumins and globulins. Gliadins are generally divided into α-, β-, γ-, and ω-gliadins, with molecular weights (MW) ranging from 30 to 80 kDa. Glutenins are polymeric proteins composed of low molecular weight (LMW) and HMW glutenin subunits. SDS-PAGE of wheat gluten showed five bands corresponding to HMW-glutenins along with some bands corresponding to LMW-B-glutenins and gliadins (Kaur et al., 2010a). Incubation of wheat gluten in the presence of pepsin and KE has been reported to result in digestion of all glutenin and gliadin proteins and subunits less than 250 kDa (Kaur et al., 2010a)[4-10].

It is known from the available researched literature that wheat flour proteins are considered very important for the human body and life activities. Today, it is important to have information about the quantity and structure of wheat flour proteins produced in our republic in the process of production and processing. In our experiments, attention is focused on these factors, that is, the methods of determining the proteins in flour and the information about the proteins in the flour products available in our republic are given.

Methods. There are a number of methods for determining the amount of proteins in flour that have been developed in the grain processing industry. They include:



Nowadays, CNA is used more than the Kjeldahl method in advanced laboratories because CNA provides higher accuracy while being free from a number of corrosive chemicals required for Kjeldahl analysis. In addition, the CNA method is faster and more efficient in nitrogen recovery, resulting in proteins being detected consistently above Kjeldahl values.

The CNA method is carried out at high temperature in a fully automated protein analyzer. It assumes that protein is the main nitrogen-containing flour compound. Thus, the amount of nitrogen released during combustion at high temperature is converted into protein.

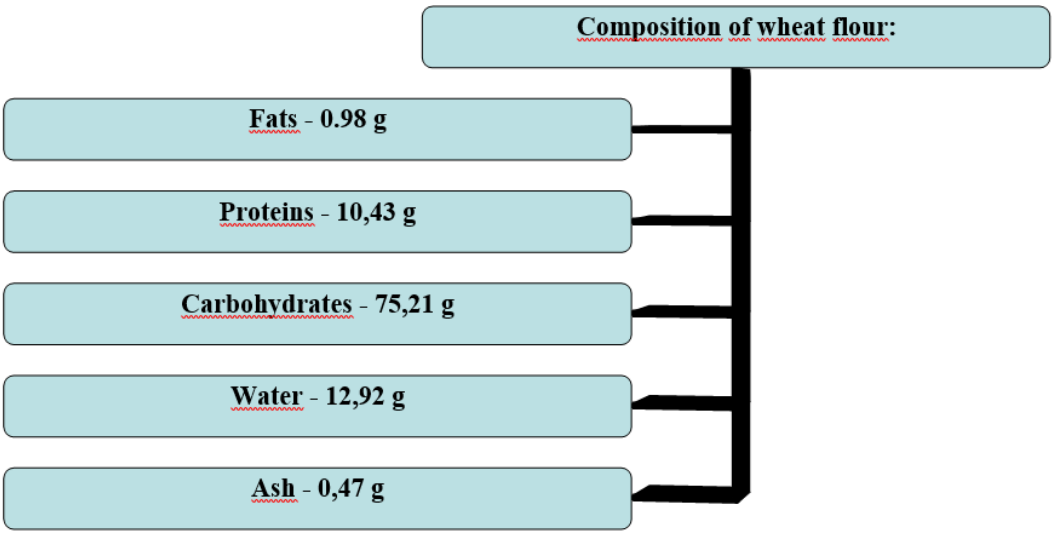
Protein content results are expressed as % of total sample weight after factoring for moisture. The latter may differ from one to another.

Weigh a sample of flour or ground wheat to 0.2 g and place it in the CNA protein analyzer.

The sample is automatically placed in a hot furnace that burns at 952°C (1,746°F).

The amount of protein in the sample is determined based on the amount of nitrogen gas released during combustion. This measurement is used to convert to protein content.

Results. Are high molecular biopolymer substances consisting of proteins and amino acids. In the protein molecule, the amino and carboxyl groups of amino acids are connected to each other by peptide bonds. Proteins of wheat and rye flour consist only of amino acid residues. The technological role of flour proteins in the production of moldy bread is considered high. The structure of protein molecules in flour and the physico-chemical properties of flour determine the properties of the dough and negatively affect the shape and quality of the bread.



Wheat flour grown in our country contains albumin and globulin, gliadin and glutenin proteins. Proteins containing wheat flour make up an average of 9-12% of the total weight of wheat mass and mainly have enzymatic and structural functions: enzymatic proteins accelerate chemical reactions in the dough, structural proteins, liquid gives hardness to biological components.

Proteins are divided into water- and salt-soluble proteins, albumin and globulin, which make up 18% of the total amount of wheat proteins, and water-insoluble gliadin and glutenin make up the remaining 78%. All types of wheat proteins do not have the same proportions. This type of wheat does not have less protein - as is believed - but the quality of the gluten is slightly better than that of wheat grown today. It is a type of gluten that absorbs less liquid with a different stiffness and a less resistant gluten mesh. This factor is unattractive to industries that prefer more structured grain products to obtain

bulky, alveolated bread products. Due to the chemical structure of proteins and the diversity of their bonds, food made from ancient grains is more digestible.

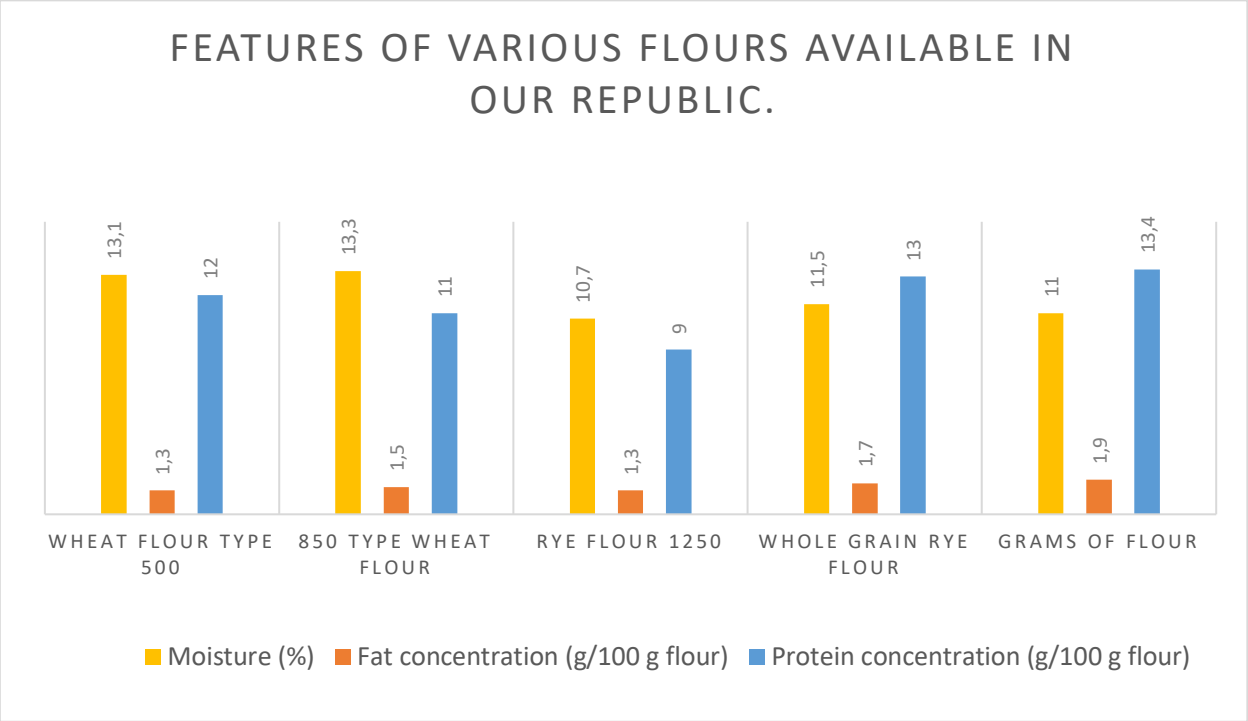


Figure 1. Moisture, fat concentration, protein concentration of various grain products in our republic.

Gliadins and glutenins are hydrophobic proteins. Gliadins are responsible for the dough's stretchability, while glutenins are responsible for its firmness. During the movement during mechanical processing, due to water, these proteins bind together and form a three-dimensional network called gluten. Gluten has a sticky, compact and elastic structure that absorbs water during dough processing and retains carbon dioxide during fermentation. Getting a well-developed gluten depends on the quality of the proteins in it and the correct processing.

Proteins have a number of properties that are particularly important for bread making. The amount of protein in wheat flour grown in our republic ranges from 9.5 to 24%, depending on the type of grain and the conditions of its cultivation. They are distinguished by many physical and chemical properties, the most important in proteins are the ability to swell, dissolve, hydrolyze and denaturate.

The more proteins in the flour and the stronger their ability to rise, the more raw gluten we get, and it is important to have gluten, which determines the strength of flour in our republic. A significant part of flour proteins does not dissolve in water, but swells well in it. Proteins rise especially well at a temperature of about 30-35 ° C, and at the same time absorb water 2-3 times more than their weight. As the starch fulfills its function

during the preparation of bread, it rises as much as possible, and then the formation of the bread is finished.

Discussion. The value of gluten depends on the quality of gluten proteins. This feature is very important in dough processing. Dough processing time, soaking time, yeast time and volume of the finished product are important in determining the strength of the flour.

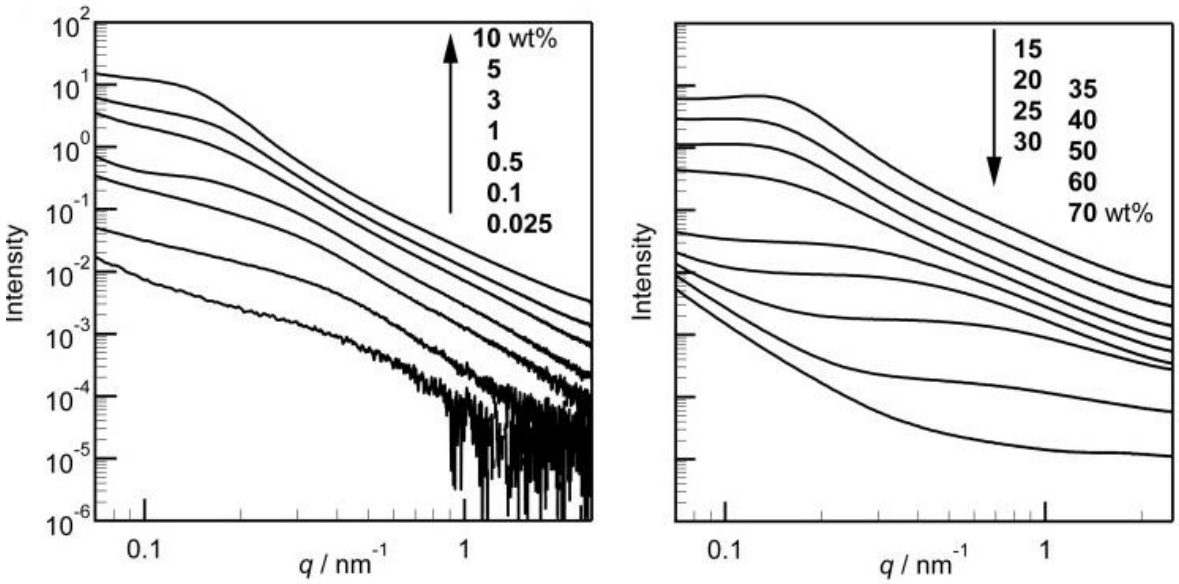


Figure 1. SAXS profiles of gliadins in distilled water. a) Solution components at low concentrations; b) gellike solid samples at high concentrations.

A flour with a higher gluten content produces a firmer gluten with a higher capacity to hold fermentation gases, which requires a longer leavening time. In addition, strong flour may require a large amount of water, resulting in products with highly developed alveolation. Weak flour, on the other hand, does not have the ability to absorb water, and several problems can be seen in a sticky dough if the dough is kneaded for several minutes, it is difficult to form, and there is little chance of retaining the carbon dioxide formed occurs by yeast, as a result, undeveloped and low-quality products are produced.

Conclusion. Currently, flour factories or combines in Uzbekistan are state mills, each of them has the capacity to produce 250-500 tons of flour per day. Year by year, as a result of the development of science and technology, the production capacity is increasing, it is important to determine the proteins, which are one of the most important components of flour products, and to know what processes are involved in the composition of flour. Wheat grain proteins grown in our republic are divided into water- and salt-soluble proteins, albumin and globulin, which make up 18% of the total amount of wheat proteins, and water-insoluble gliadin and glutenin make up the remaining 78%. They are determined by two methods, namely the Kjeldahl procedure method and the CNA method. Nowadays, the CNA method is more widely used because CNA provides high accuracy while being free from a number of corrosive chemicals required for Kjeldahl analysis. is determined using

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