



PROSPECTS AND MODERN TECHNOLOGIES FOR PRODUCING FLOUR FROM BARLEY GRAIN

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Abstract

This thesis highlights the scientific and practical significance of processing barley grain based on extrusion technology. Barley is of high nutritional value, containing protein, β -glucan, starch, vitamins, and dietary fiber. The extrusion process alters the physicochemical properties of the grain components, increasing the digestibility of the product and improving its nutritional value. Studies have shown that during the extrusion process, starch gelatination, partial denaturation of proteins, and inactivation of anti-nutrient substances are observed. Additionally, extrusion technology allows for extending the shelf life of food products, ensuring microbiological safety, and expanding the range of functional products. The production of early-ripening pasta, dietary products, and functional foods from barley-based extruded flour is a promising direction. This technology is significant for its resource efficiency, high efficiency, and economic advantages.

Keywords: barley, extrusion, cereals, functional food, starch, protein denaturation, food fibers, instant pasta.

Today, providing the population with high-quality and functional food products is one of the urgent tasks of the food industry. From this perspective, the effective use of biologically active substances in grain crops is of great importance. Barley is one of the valuable grain crops that has been widely used in human nutrition and livestock farming since ancient times. It has a high content of β -glucan, protein, minerals, vitamins, and dietary fibers, which is of vital physiological importance for human health. Its technological properties are of great importance in the production of food products from barley grain. The chemical composition and processing method of the grain directly



affect the quality of the finished product. In traditional grinding processes, biologically valuable components are lost due to the partial removal of the husk and the aleurone layer from the grain. Therefore, in modern technologies, special attention is paid to preserving the physiological value of grain.

Table 1.

Average chemical composition of barley grain

Indicators	Amount, %
Humidity	12,0
Protein	11,5
Starch	58,0
Fat	2,3
Food fibers	15,0
β-glucan	4,8
Ash	2,4

As seen from the table data, barley grain contains a high proportion of starch and food fibers. The presence of β-glucan characterizes barley as an important raw material in the production of functional food products.

Extrusion technology is considered one of the most effective methods for processing grain products. In this process, the raw material is processed under high temperature, pressure, and mechanical impact within a short period of time. As a result, complex physicochemical and biochemical changes occur in the product composition. The gelatinization of starch, partial denaturation of proteins, and inactivation of anti-nutrient substances increase the digestibility of the product. At the same time, during the extrusion process, harmful microorganisms are destroyed, ensuring the microbiological safety of the product.

Research indicates that during the extrusion process, the sugar content and dextrins in barley increase, improving the energy value of the product. As a result of extruder processing, the product has a high water-holding capacity and the structure of the finished product is improved. This is important for the production of instant pasta, breakfast products, dietary dishes, and functional food products.

Table 2

Influence of the extrusion process on the properties of barley products

Indicators	Pre-extrusion	After extrusion
Degeneration rate, %	68	87
Sugar content, %	2,1	14,5
Amount of dextrins, %	3,2	16,0
Humidity, %	13,0	8,0
Microflora content	Upper	Few
Shelf life	Short	Far

The results of the table show that the extrusion process significantly improves the technological and nutritional properties of the product. In particular, increasing the degree of digestion and ensuring microbiological safety are among the advantages of this technology.

Another significant advantage of extrusion technology is the continuity of the process and its economic efficiency. Simultaneous mixing, grinding, baking, and shaping processes on a single equipment reduce energy and labor costs. Furthermore, the use of small-sized and high-performance extruders creates favorable conditions for local enterprises.

The production of functional products based on barley grain extrusion is of great importance in strengthening human health, enriching the diet, and ensuring food security. Therefore, one of the promising areas is the improvement of technologies for the deep processing of barley grain and its implementation in the local industry.

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