LIGHT INDUSTRY AND FOOD INDUSTRY


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TRENDS FOR THE DEVELOPMENT OF THE TECHNOLOGIES FOR SEMI-FINISHED RESTRUCTURED MEAT PRODUCTS

Abstract. The authors analyze the main trends in the technology of restructured meat products. The main technical and technological methods of restructured meat production technologies are identified. An innovative idea for a new product – restructured semi-finished meat products, is formulated; the main indicators are defined and characterized. Criteria for the selection of food
ingredients and mixtures based on them, which are able to modify adhesive and cohesive properties of meat pieces for obtaining a new product - restructured meat products.

**Keywords:** meat semi-finished products, restructuring, innovative idea

As a result of improving the nutrition structure for the population in the food market of Ukraine, there is a pronounced trend of increasing demand for new products [1]. In addition, solving the issues of rational use of raw meat, creation of resource-saving technologies, development of mass consumption products and expansion of its range is an important national task.

Global trends in the food industry development demonstrate that meat products, including frozen ones, are presented in a wide range and are in stable demand in the food market of Ukraine. Expansion of the trade network and restaurant enterprises, due to the ease of use and reduction of labor intensity of technological processes, is an additional factor in the formation of demand for semi-finished meat products within the business processes "Business to Consumer" (B2C) and "Business to Business", in particular in the segment of HoReCa (as a necessity to improve functional efficiency) [2].

Scientific and practical interest in the problem of structure formation in food systems is rather high. The world is conducting research in this area, resulting in the development of the structured food market. One of the promising areas of meat production, which has certain advantages over traditional ones, is the creation of restructured products’ technologies, the advantage of which is the ability to reproduce the structure of whole raw materials, organoleptic properties of which are close to whole muscle meat products. The process of restructuring is the combination of separate pieces of meat of relatively small size (often depersonalized) into one monolithic, which when cut into slices will have a uniform shape and size [3].

The application of restructuring in the production of meat semi-finished products allows to regulate organoleptic and structural-mechanical properties of products, to involve in the production of low-grade raw materials with low functional and technological properties, to expand the range, increase the yield and profitability [4].
It is known that concentration and condition of muscle proteins, surface area and condition, pressure, duration of contact, ambient temperature, ratio of muscle, fat and connective tissue, moisture content, the presence of additives influence the value of adhesive-cohesive interaction.

According to the generally accepted classification of adhesive interactions, meat products are classified as elastic-viscous-plastic bodies, in which the amount of adhesion depends mainly on the area of contact between the objects and characteristics of the connections between them (chemical and electrical connections, capillary force, wedging pressure of a thin layer of liquid). The main component that ensures the adhesive-cohesive interaction of pieces of meat is muscle proteins [5].

The use of intensive methods of processing raw materials during salination (tendering, massaging, tumbling), causes partial destruction of cellular structures of muscle fibers, promotes the release of exudate on the surface of a piece of raw material. The intermolecular interaction of muscle proteins containing in the exudate, makes it possible to increase the amount of adhesion and ensure the "gluing" of small pieces of meat into a product possessing the texture of a monolithic product while increasing the contact surface of the pieces.

The process of restructure can be carried out due to excessive pressure of different levels, pressing pieces of meat regardless of their size into a compact mass in a limited amount and, thus, destroying natural structure of meat thus releasing exudate [6, 7].

In addition, it is possible to use other technological techniques aimed at obtaining a monolithic product (using vacuum, low temperatures, ultrasound, etc.).

It is possible to use food ingredients and additives modifying the properties of raw meat, in particular salts [8, 9], enzyme preparations [10, 11], binders (wheat flour, wheat gluten, methylcellulose, egg albumin, finely ground raw materials after heat treatment or protein fibers) [12, 13, 14].

However, the existing production technologies for restructured semi-finished products require additional specialized equipment; do not solve all the existing problems to the full. There is no comprehensive research concerning the creation of
scientifically substantiated resource-saving technologies for their production. Therefore, there is a necessity to create new scientifically sound technological solutions.

It is determined that during the development of new products, it is necessary to consider the following requirements:

− satisfaction of the needs of broad layers of population with the account of their psycho-geographical, behavioral and other characteristics;

− creation of a wide range of meat products with high nutritional and biological value;

− ensuring the stability of quality and safety indicators during the regulatory period of storage;

− high consumer properties of products, their naturalness and safety;

− use of low-grade raw materials with low functional and technological properties;

− use of traditional technological equipment that will ensure stability of the technological process;

− introduction of organizational and technological principles of production according to the assigned tasks.

The conducted analytical investigations became a precondition for determining the innovative idea of a new product – semi-finished restructured frozen meat products, the characteristics of which are presented in individual indicators in Table. 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Concept of the product</td>
<td>Technological process of production is resource saving, and allows involving in production low-grade raw materials with low functional and technological properties. Semi-finished products differ in high stability during storage (not less than 30 days), constant indicators of quality and safety of finished goods are provided, have reasonable price for consumers.</td>
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Table continuation 1

<table>
<thead>
<tr>
<th>Organoleptic qualities</th>
<th>Semi-finished products are characterized by a preset geometric shape and size, color - red of varying intensity, taste and smell - typical of good quality meat, in the finished form - juicy</th>
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<tr>
<td>Assortment</td>
<td>It is formed by giving semi-finished products certain shapes and sizes, use of spices, condiments, breading</td>
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<td>Users segment</td>
<td>B2B (HoReCa, food outlets in educational institutions, industrial enterprises, concentrated contingents, including the military), B2C (broad sections of the population through wholesale and retail business)</td>
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<td>Competitive preferences</td>
<td>New consumer properties, increase of the competitiveness of finished products and profitability of meat industry enterprises, deepening of intersectoral cooperation “meat industry – restaurants”, reducing the duration of cooking, and complexity of the technological process (especially relevant in the HoReCa segment with a reduced technological cycle)</td>
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The received meat product through the restructuring process will increase the profitability of meat products and expand their range by manufacturing products identical to whole muscle pieces of meat and meat products.

According to the analytical review of information sources and innovative design, it is predicted that the manufacture of new products can be achieved through the combined use of complex additives and low temperatures, which will form the required impermeability, affect the adhesion properties of muscle proteins. If the behavior of these influences in the meat systems is predicted, the restructuring process can be controlled, and the newly formed system will be adjusted according to their influence on the formation of functional and technological properties and the composition of individual elements.

According to the analysis of the transformations that occur in meat systems during the restructuring, it is determined that food ingredients and mixtures primarily meet technological requirements based on them, which modify adhesive-cohesive properties of lump meat to create an integrated product, which can be cut into slices followed by heat treatment. Therefore, the criteria for their selection were developed, namely:

- influence on muscle tissue proteins (partial destruction of cellular structures of muscle fibers, the presence of exudate or "gluing" layers on the surface of the piece of raw material);
− ease of use - insignificant duration of the preparatory stage, low content regulations during their use due to the implementation of functional and technological properties and synergistic effect, the possibility of homogeneous distribution in the system using traditional equipment, neutral odor, taste and color;
− economic indicators - low production cost, reduction of the technological cycle and reduction of labor intensity of the technological process.

Based on the above, scientific and technological tasks that need to be solved, are formulated:
− study of the course of physical, physicochemical, thermo-physical processes during the process of restructuring;
− substantiation of the composition and technological parameters of getting mixtures that affect the adhesion and cohesion processes of raw meat;
− determination of regularities concerning the change of functional-technological, structural-mechanical, thermo-physical, microstructural characteristics, state of moisture of meat systems with use of the developed mixes and during freezing or thawing;
− substantiation of the parameters of the technological process of obtaining the final (target) product - semi-finished restructured frozen meat;
− formation of the new product key technical and technological characteristics;
− qualitative and quantitative assessment of innovations implemented in a new product technology.

References:


