PROSPECTS OF THE USE OF COMPLEX MIXTURES WITH CRYOSTABILIZER PROPERTIES IN TECHNOLOGIES OF FROZEN MEAT PRODUCTS

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In connection with the accelerated rhythm of life in the food market, the demand for frozen food products is increasing. Part of the frozen products market is occupied by frozen meat products, in particular semi-finished products. Under the influence of low temperatures in the process of freezing meat raw materials, a number of physical, histological, colloid-chemical, biochemical changes occur, associated with the deterioration of its quality: loss of mass and color change, violation of the structure of muscle fibers, denaturation and aggregation of proteins, decrease in moisture retention capacity and solubility of myosin, slowing down of enzyme activity, lipid oxidation, reduction of vitamins, ability of some microorganisms to withstand low temperatures.

As a result, there is a need to use food additives with cryostabilizing properties that preserve the quality of meat semi-finished products at the stages of freezing, storage and thawing. To increase the efficiency of the technological process, it is advisable to use them in the form of complex mixtures.

The issue of the use of food additives with cryostabilizing properties is covered in the works of Khouryien H.A.M., Phillips G.O, Milani J. and others. Their research proves the positive effect of some substances on the course of physico-chemical processes in meat raw materials when low temperatures are used.

In the production of frozen meat products, substances of a carbohydrate nature, in particular polysaccharides, are mainly used. They are high-molecular substances, soluble and insoluble in water, widely distributed in nature and differ in origin, chemical composition, properties, fields of application. The use of polysaccharides leads to a decrease in the cost of production, but more significantly improves the quality of meat products and increases the efficiency of the technological process. Among many food additives, polysaccharides show a higher moisture-retaining capacity. Their properties as functional additives with cryostabilizing properties have not been fully revealed. A very important feature of polysaccharides is the ability to synergize as a result of interaction with various substances, including each other. In addition to polysaccharides,

phosphates, table salt, etc. can be used as additional substances in the composition of complex additives.

The mechanism of action of polysaccharides in frozen semi-finished meat technologies is based on the reduction of water mobility and the formation of ice crystals of smaller sizes and in larger quantities. This leads to a decrease in the degree of damage to meat fibers, a decrease in the amount of frozen water, and a decrease in losses during defrosting and heat treatment.

Comprehensive studies of the influence of the freezing and thawing process on the physicochemical properties of complex mixtures with cryostabilizing properties, which include polysaccharides (Table 1), and taking into account the limit values of the selection criteria (determined on the basis of analytical literature data) allow us to assert that the potential of using complex mixtures is sufficient for implementation during the production of frozen meat products.

Table 1

Comprehensive studies of the influence of the freezing and thawing process on the physicochemical properties of complex mixtures with cryostabilizing properties

Name of indicators	Mixture SK 001	Mixture SK 002	Selection criteria
Duration of swelling, $\tau \cdot 60^{-1}$, s	15…20	20…30	≤ 40
Viscosity, Pa·s before freezing (η_{start}) after freezing-thawing ($\eta_{freezing}$)	 0,047 0,058	 0,010 0,012	$\eta_{start} \leq \eta_{freezing}$
Viscosity reversibility of dispersions (k)	1,2	1,2	$1,0 \leq k \leq 1,5$
Mass fraction of frozen moisture, %	86,7	88,4	≤ 90
The average size of ice crystals, μm	175	190	≤ 200

Therefore, the use of complex mixtures with cryostabilizing properties will allow solving the problems of stabilizing the structure, consumer properties and preserving the nutritional value of frozen meat semi-finished products for long-term storage, and will also provide manufacturers with new opportunities to expand the assortment and increase the volume of production of products that are in high demand.