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PROTEIN PREPARATIONS OF ANIMAL ORIGIN IN TECHNOLOGY OF MEAT SEMI-FINISHED PRODUCTS

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Summary. The combination of meat and animal protein provides great opportunities to create quality food. It has been established that partial replacement (up to 15-20%) of muscle protein with connective tissue protein does not impair the biological value of semi-finished products.

Key words: technology, animal proteins, functional properties, meat semi-finished products.

Recently, meat processing specialists significantly interested in the use animal proteins. This is due in particular to the fact that animal proteins in the production of meat products are a complete substitute for meat.

Attempts to maximize the involvement of connective tissue proteins in food production using traditional technologies have not yielded the desired results due to the different functional and low organoleptic properties of native connective tissue components in meat product formulations, including meat semi-finished products. One of the ways to obtain protein products from low-value raw materials is its

hydrolysis, which allows to obtain preparations of isolated collagen proteins of high purity, as well as to stimulate key functional and technological properties important for food industry, in particular, meat processing.

High functional properties of protein preparations based on collagen-containing raw materials due to changes in the native structure of collagen in the manufacture of these additives. Thus, thermal and mechanical effects on raw materials lead to the release and increase in the number of active hydrophilic and hydrophobic groups, such as - OH, - COOH, - NH2. As a result, there is an improvement in functional properties, namely the ability to absorb, bind and retain water and fat in its structure [1].

Animal proteins are a relatively new type of food supplement. They are used as protein enrichments, regulators of nutritional value, consistency stabilizers (improve the monolithicity and cutting of the finished product), emulsifiers (increase the bonds of the components - protein, fat and water). In addition, they increase the yield of finished products and increase the efficiency of meat production.

A distinctive feature of animal proteins is that the technology of their production includes only physical and thermal processes, which helps to increase the functionality of proteins without treatment with chemical reagents.

Animal proteins have a high ability to hydrate and emulsify fat with the formation of stable protein-fat emulsions. These proteins can be used as meat substitutes with a replacement level of up to 30% [2].

The great interest in animal proteins on the part of technologists is due to the unique properties of these products. The combination of meat and animal protein provides great opportunities to create quality food.

Whole animal proteins are much superior to plant proteins in biological value. It is proved that in comparison with vegetable animal proteins (except connective tissue) are better balanced in amino acid composition, more meet the needs of the human body in essential amino acids.

Animal proteins significantly improve the rheological properties of food products, and above all their consistency, while playing the role of stabilizers, gelling agents, improving the appearance of finished products.

The nutritional value of animal protein is significantly higher than vegetable. It is also known that the digestibility of animal proteins is 78-90%, while vegetable - only 54-75%. The daily requirement of the human body in animal protein is 50 g, and in vegetable proteins - 68 g per day. Whole animal proteins are much higher than vegetable proteins in biological value. It is proved that in comparison with the latter, they are better balanced in amino acid composition, to a greater extent meet the needs of the human body in essential amino acids.

Vegetable proteins are digested worse than animal proteins, but a combination of plant products can fill this gap. And, although animal proteins are more versatile in structure, combining them with basic plant substances such as wheat and soybeans can increase the biological value of the product. One animal or vegetable protein, as experiments have shown, has less biological value than their mixture in a rational ratio. In terms of value, functional animal proteins are about 2.5-3 times more expensive than soy isolates.

However, the moisture-retaining properties of the latter are approximately 3.5 times lower than similar properties of functional animal proteins. Therefore, in economic terms, animal protein concentrates are quite competitive with soy isolates.

Compared to vegetable proteins, animal protein preparations are more versatile and in structure, better combined with raw meat in the production of sausages and other products of the meat processing industry.

An important quality of animal proteins is their multi-purpose, ease of use, preservation of their qualities during long-term storage, the ability to provide through their use to increase the yield of finished products and high profitability.

Due to its chemical composition and functional qualities, animal proteins are an alternative to vegetable proteins and can be used in the production of meat products to fully replace meat, increase nutritional and biological value, improve organoleptic qualities, enhance meat taste and reduce the cost of meat. clear products.

High functional qualities of animal proteins are manifested in their moisture retention capacity. An important advantage of animal proteins is their multi-purpose, easy to use, preservation of their properties during long-term storage and the ability to provide through their use to increase the yield of finished products [3].

One of the main sources of proteins of animal origin:

- animal collagen proteins isolated from pig skin, from pork trimming, from beef skin, from beef trimming.
- milk proteins (whey, caseinates isolated from whole milk);
- blood proteins;
- egg whites isolated from whole eggs, egg yolks and egg whites.

Therefore, the most important task in the technological process is the full use of these types of secondary raw materials with the maximum realization of its properties.

The use of proteins in the production of food emulsions is due to their functional properties, which include solubility in aqueous media of different composition, the ability to form and stabilize dispersed systems, gelling, moisture and fat-binding ability. The presence of hydrophilic and hydrophobic groups in protein molecules determines the possibility of the formation of interfacial adsorption layers

Pork skin is widely used in the production of meat products of various assortment groups. Interest in the use of pig skin is justified primarily by connective tissue proteins, the main of which is collagen, which differs from other connective tissue proteins by physicochemical activity and reactivity of functional groups, specific sequence of amino acids in polypeptide chains.

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Collagen is a connective tissue protein that, due to its physiological effect and role in human nutrition, is classified as dietary fiber.

Collagen has a high ability to swell, which is based on its functional and technological features and the main direction of its use in the meat industry.

Compared to plant-based structuring agents (carrageenans and gums), collagen proteins have two main advantages: first, they are identical in origin, structure, composition, and characteristics to meat connective tissue proteins; secondly, their functional properties are perfectly preserved and fully manifested in meat products in contrast to hydrocolloids of plant origin, the signs of which are affected by the concentration of salt, phosphates, ions of monovalent and divalent metals.

The use of collagen proteins improves the consistency and structural and mechanical characteristics of meat products, eliminates fatty edema in the manufacture of culinary products, achieve the desired homogeneity of the meat product, reduce losses during heat treatment and storage, and thus ensure high yield and good quality of finished products.

The properties of collagen industrial protein preparations depend on both the input raw material and its chemical composition, and on the methods of production.

Today, collagen proteins used in meat processing plants are mostly imported. Imported collagen supply volumes are estimated at 3.5 to 5.0 thousand tons per year. However, this figure is not very accurate, as it does not take into account the amount of animal protein in the form of complex food mixtures.

Currently, the Ukrainian market offers a wide range of animal proteins for the meat industry, many of which are collagen-containing proteins.

The difference between pork protein and beef is that for the production of the former pork skin is used whole. The peculiarity of the structure of cattle skin allows to use for the production of beef protein only the middle layer, which lacks ballast proteins, remnants of the hair follicle and more. Also, beef skin contains few sebaceous and sweat glands compared to pork. Thus, the content of functional collagen protein in the physical weight of the finished product is about 93-95% and 1-2% fat compared to 80% protein and 12-15% fat in pork [1].

The amino acid composition of the finished beef protein is identical to natural meat, with the exception of two amino acids - tryptophan and methionine. Interestingly, the

degree of hydrolysis of beef collagen protein allows the enzymes of the human body to break down and convert it into energy necessary for human life.

Another notable property of beef proteins is their non-thermal reversibility. That is, in contrast to milk and egg whites, blood plasmas, which when cooled form a dense structure and subsequent heating does not return to a liquid state, collagen protein hydrolyzate, so to speak, "glues" all the ingredients and with little heat gives juiciness and elasticity of semi-finished products. And the neutral pH level and odor allow it to be used in conjunction with various ingredients at different stages of production of semi-finished products [4].

Collagen is one of the most important components of by-products of processing of farm animals in industrial conditions. It is poorly exposed to digestive enzymes, and as one that lacks many of the most important amino acids in the structure, is classified as a protein of low biological value [5].

However, in recent years, the role of collagen in nutrition is gaining a special role. It was found that partial replacement (up to 15-20%) of muscle protein with connective tissue protein does not impair the biological value of the semi-finished product. Connective tissue proteins in combination with muscle stimulate the motor function of the intestine and stomach, juicing, well develop the beneficial intestinal microflora.

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