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II GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES

TECHNOLOGY OF FREEZE-DRYING OF RAW MEAT

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Abstract: Expanding the assortment of agricultural products and providing the population with ecologically clean, natural and safe food products is one of the urgent issues today. Currently, many agricultural products, mainly finished and semi-finished products made from meat products, as well as problems of long-term storage of meat raw materials, or problems such as low structural quality indicators in production productsit is considered one of the priority issues. as a solution to these problems, there is a possibility to apply sublimation drying technology, which is now popular, as a solution. In short, the types of products produced, as well as long-term storage of meat raw materials through drying, are important as they can ensure high efficiency in termsof composition. Drying products makes it possible to provide the population with agricultural products throughout the year. In addition, the demand for dried ecologically clean products is very highly valued in the world market.

Keywords: Drying, freezing, vitamin, microbe, bacteria, sublimation, vacuum drying, trace elements, sorption, desorption, packaging.

Introduction. The nutritional value of meat products is determined by its chemical composition. The amount of proteins, fats, carbohydrates, extractive substances, macro-microelements, including protein amino acids and fatty acids in fat determines the value of the product. Thus, the nutritional value of meat depends on the biologically important components in its composition, the quality of the finished product during their processing, the effect of these components on enzymes in the digestive tract, digestive properties, and the body's physiological to a certain extentextentprovides consumption.

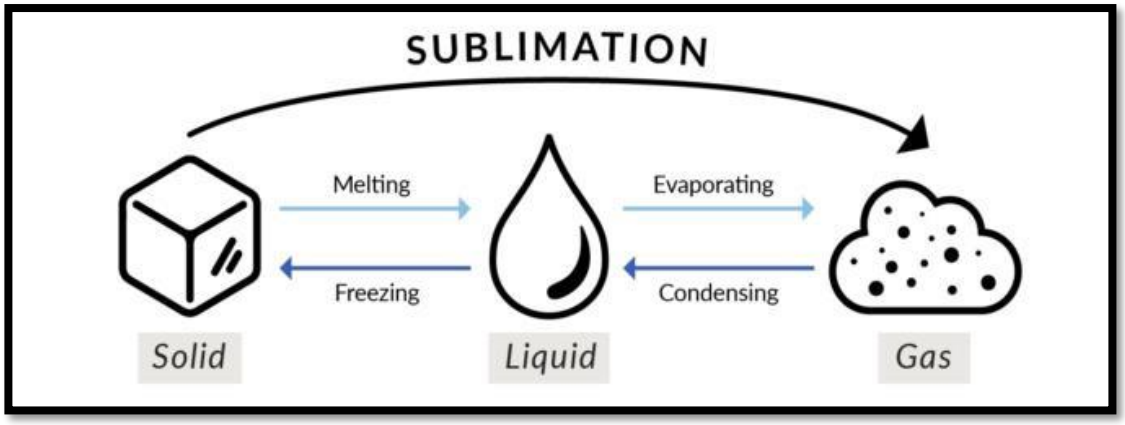

Figure 1. Freezing drying technological scheme.

Methodology. Sublimation drying is the only acceptable method for obtaining dry form of many thermolabile biological products, because in this case the quality of the product is maximum, it is easily regenerated when moistened, the smell, taste, color, nutritional value of the product being driedinitial properties such as biological value are preserved.Sublimation drying is a process of drying wet products under high vacuum in a frozen stateSublimation drying as a technological process includes several stages, which include the preparation of raw materials, its freezing, loading into the sublimation chamber, sublimation drying and packaging. As a result through this process is considered favorable for the production of high quality food and pharmaceutical products.

Freezed: Freezing is one of the first most important stages of sublimation drying, and includes the process of crystallization of meat and some fruit and vegetable products to -30^{0}C depending on the type of product using cold air mass before sublimation drying. Freezing is the crystallization of the solvent, which is water, in food products.

The main priorities in the product as a result of the freezing process:

1. Immobilizing ingredients in solution in the product and facilitating the formation of water vapor during depressurization in the freeze dryer chamber.
2. It allows high limitation of chemical, biochemical and microbiological changes occurring in the product.
3. The unique parallel arrangement of ice crystals in the frozen product limits high changes in the product, that is, shrinking processes in the fabric of the product are prevented. The finished product improves the porosity indicator.
4. As a result of the good porosity in the dried product, it makes it possible to facilitate the rehydration process in the finished product.

Primary drying – in the freezing stage, the product is completely frozen using individual quick freezing (IQF). Then the raw material to be dried is placed in vacuum cylinders. And the structure is hermetically sealed. During this stage of freeze-drying, vacuum pumps in the machine expel air from the chamber to reduce the atmospheric pressure below 0.06 atmospheres (ATM). A small amount of heat is used to vaporize solid ice particles without melting them in the first step. In more detail, in order to break down

a water molecule and bring it to a bond state, the internal pressure of the vapor must overcome the atmospheric pressure. And in this method, as a result of the pressure drop, it is possible to break down molecules even in the case of low internal pressure of water vapor, and therefore, unlike other methods, high temperature is not required. At the end of this stage, more than 90% of the water in the product is sublimated.

The second drying – desorption stage further reduces the moisture in the product by applying more heat and pressure. After this is done, the freeze-dried product will only have about 1% to 4% moisture. Then the finished products are packed in different types of aseptic packaging depending on the packaging structure. And dried meat products are stored for 5-6 years or until the product is used.

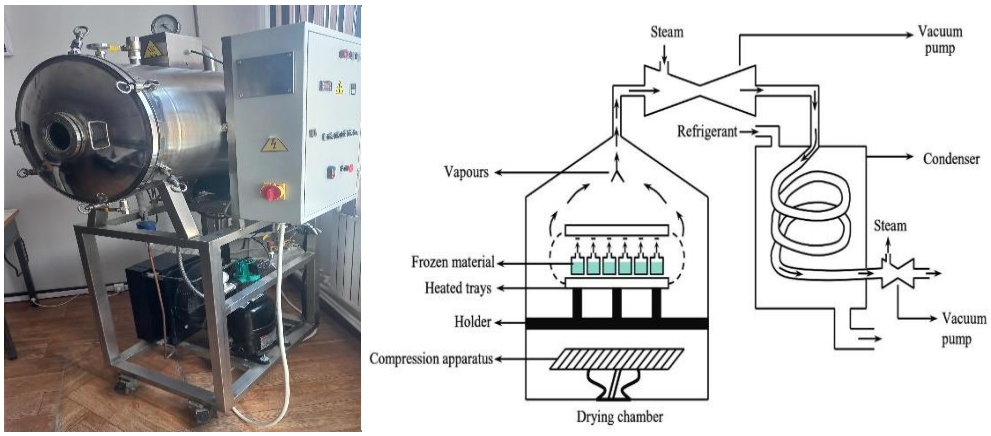

Figure 2. Operation scheme of the sublimation installation.

Results.

Characteristics of finished products.

1. Blocks the reproduction of pathogenic microorganisms. As a result of the process, up to 95% of water is dehydrated, and as a result, the life cycle of the movement of existing microorganisms in the intercellular channels is completed.

2the possibility of storing finished products without a cold chain. High-efficiency refrigerators are not required for long-term storage of the finished product. On average, it is between 5-8^{0}C.

3. Preservation of nutritional and emotional properties of products. Evaporation of only the sov molecule contained in the meat cell ensures absolute preservation of aromatic substances

4. Preservation of product shape and size.

5. Conveniences in storage, transportation and distribution of products for export. Transportation fully responds to expo conditions. the total weight of the product is reduced by 40-50% and can provide high resistance to physical deformations.

6. It allows rehydration to restore organoleptic properties and weight of food.

Discussion. Methods of freezing fish. The freezing of the herring is considered to save from violations of the quality of the coupling. The fish is whole, nimted and frozen

in a file case. From observations, it turns out that fish retain their taste, quality and satiety value for a long time if frozen at temperatures below -18°C. In general, the quality of frozen fishing depends on the state of the raw material, the intensity of the freezing process, the method, as well as the conditions of its storage.

Freezing fish. A fish with a body temperature not higher than -6°C is called Frozen. Fishing freezing is an effective method of providing residents with clean fish all year round. As a result of a sharp decrease in body temperature, the free water in the fish's body turns into ice. Consequently, the activity of enzymes in tissues decreases sharply. Oxidation, the cell of microorganisms decomposes, partial coagulation occurs in the cytoplasm, and its diffusion property decreases. Bulaming is all the exchange of a hyphal substance that occurs in the body of fish in various microorganisms and bacteria, the processes become extremely abrupt, in some cases completely stop.The quality and shelf life of frozen fish is determined primarily by its purity and freshness, the intensity and method of freezing, the quality and timely execution of the placement and the method of storage. High-quality frozen fish-prepared from immediate freezing at -25 35°C, subject to storage temperature requirements. Under the sharp influence of cold temperatures in fish, the water in its body turns into ice.

Figure 3. Drying process and finished products.

Dry freezing is performed in cooling chambers in cold rooms at -23°C, with a humidity of 90-95 percent. Small fish are frozen to a thickness of 13 cm in galvanized iron lists. Large fish are picked and frozen in a row without touching each other. If the fish are naturally holdamuzlated at temperatures below -15°C, the ulaming otters and jabra porpoises will solidify open. The petals of the Jabra turn into a light reddish color. All nutrients contained in fish are preserved. If the fish is not thoroughly washed, the mucus on its surface will turn white, and it will worsen the appearance of the fish. When the fish is artificially frozen in the sand, the mucus above the fish is washed away and lost, the intestinal mucosa of some species is also removed. The surface of the frozen fish in a dry artificial state is clean, natural in color, The Shape of the body is properly preserved, the fins and jabra caps are attached to the body. In this method, fish are usually frozen, either grained or scattered.

When storing frozen fish, the relative humidity of the air should be high, that is, 90-95%. Frozen fish in stores can be stored for up to 2 weeks at temperatures not higher than -5°C, 2-3 days at 0° to +3°C. In two hours of consumption, frozen fish is brought to commercial enterprises (if there is no refrigerator).

Conclusion. By freezing and drying meat products, the technology of obtaining functional natural ingredient additives, enzymatic additives and canned products is created, by long-term storage of dried (animal, poultry and fish) products, tourism, submarine and exportsthat products are obtained.

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