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Improvement of the technology for the production of semi-finished meat products

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Abstract. Chopped semi-finished meat products are portioned minced meat products based on raw meat, which are produced in a colossal assortment. The types of such semi-finished products, depending on the raw materials used, are divided into: naturally chopped semi-finished meat products made exclusively from meat raw materials; chopped semi-finished meat products, which, in addition to raw meat, include bread products, soybean additives, various cereals, vegetables. Almost all chopped semi-finished products are manufactured according to technical conditions that must meet the requirements of the main regulatory documents applicable to all food products established on the territory of the Russian Federation. Namely, manufacturers themselves develop a recipe for the production of semi-finished products, trying to reduce costs, using raw materials of poor quality or replacing meat raw materials with vegetable ones. This leads to a decrease in product quality. Therefore, it is necessary to pay special attention to the composition of semi-finished products and in their production strictly comply with the current regulatory documents.

1. Introduction

Some scientists note that recently the assortment of semi-finished meat products has increased significantly (by about 17-19%), in contrast to the assortment of sausages, which has increased at a slow pace over the past two years - approximately 2.8%. From the research of scientists and practitioners – the widest segment of the market for meat products is frozen semi-finished products [1,2].

With the increase in the capacity of the entire market for frozen semi-finished products, its structure is simultaneously changing, as many product categories develop disproportionately.

It is customary to refer to poultry meat products as products from poultry meat or mainly from it and meat products, the recipe of which includes poultry meat, even if in small quantities. For the production of such products, the meat of chickens, ducks, geese, turkeys, quails, beef, pork, horse meat, lamb and other food raw materials obtained during the processing of poultry and farm animals is used.

Poultry meat must meet the hygienic requirements of food raw materials and food products, determined by the Sanitary Rules and Regulations (Sanitary Rules and Regulations 2.3.2.560–96).



Hygienic standards are established in the maximum permissible content in the product of potentially hazardous to human health chemical compounds, including radioactive elements, and biological objects [2,3,4,5].

Of course, hygiene standards are not a sign of product quality in a broad sense. They only reflect its safety, that is, suitability for human consumption. The quality of meat is characterized by such criteria as consumer properties and assessment, nutritional and biological value, technological properties [6].

2. The results and discussion

At one of the Irkutsk enterprises, cutlets are produced according to the following recipe in accordance with, presented in table 1.

Table 1. Recipe for cutlets.

Raw materials, spices, materials	Cutlets from poultry	Cutlets with the addition of beef
Prepared raw materials, kg per 100 kg of products		
Chicken meat: white and red	40.1	30.1
Chicken skin	12.2	—
Beef	—	22.2
Texturat	5.8	5.8
Water on texturate	31.4	31.4
Dry onions	3.0	3.0
Dry garlic	1.1	1.1
Salt	1.2	1.2
Black pepper	0.1	0.1
Fresh system	0.1	0.1
Wheat rusks	5.0	5.0
Total	100.0	100.0

Description of the technological process for the production of cutlets: preparation of raw materials; minced meat preparation; formation of cutlets; freezing; packing and storage.

The shop for the production of semi-finished products receives chicken meat of its own production and the rest of the raw materials are purchased from other manufacturers. All incoming raw materials are carefully examined, checking the availability and correctness of filling out the documents [7,8].

Poultry carcasses or parts of them are thawed on stationary or mobile racks, which are made of corrosion-resistant material and are suitable for sanitation. Block poultry meat, individual carcasses or parts thereof are freed from packaging and placed on racks for defrosting [1,2,7].

Before loading frozen meat, the chambers create an optimal temperature and humidity regime. The device of chambers, heating systems, humidification and air circulation should provide and automatically maintain a certain mode of air parameters: temperature should be 5-15°C, relative humidity – 75-100%, movement speed – 0-0.2 m/s [1,6,8,9].

The duration of defrosting meat is set by the temperature, humidity, air velocity in the chamber and the temperature reached in the thickness of the product when defrosting or thawing the product. When the meat reaches a temperature of -5 ...-3°C, the process can last 4-6 hours. The temperature and humidity conditions in the chamber can be provided by one of the following methods: air conditioning; constant supply and circulation of warm air (20-30°C); heating system device; by supplying live steam to the chamber.

Thawed poultry carcasses (or parts thereof) are scorched with fluff, carefully examined, bruises, bruises, remains of plumage and internal organs are removed, cleaned and thoroughly washed.

When accepting for cutting and deboning, meat raw materials are inspected, the presence of veterinary documents accompanying the batch is checked. Carcasses are cleaned, namines are removed, the remains of plumage and internal organs, including lungs and kidneys, are washed in running water.

Manual deboning of carcasses is a very labor-intensive operation that requires physical labor. In addition, it is almost impossible to separate all the pulp from the bones by hand. With mechanical deboning of the dorsal-blade part of poultry carcasses and wings, on auger-type presses, the meat yield is on average 60–65%, while during manual processing, no more than 20–25% of meat pieces are separated from this part [1,6,10].

It should be borne in mind that with manual and mechanical deboning of poultry carcasses, raw materials that are significantly different in terms of consumer and nutritional value are obtained. With manual deboning, fillets, large and small pieces of meat are obtained; with mechanical – skin, fat, meat.

The most optimal is the combined deboning of carcasses, where the chest and thigh parts of the carcasses are manually separated, mechanically – the dorsal-scapular part, wings and neck. With the use of special mechanisms – a cone for cutting poultry carcasses and a device for deboning legs – labor productivity per worker, including personnel at the operations of packaging semi-finished products and loading and unloading operations, reaches 200 kg of the finished product per shift.

Chopped semi-finished products can be produced from small-sized raw materials and mechanically deboned meat: cutlets, meatballs, schnitzels, meatballs, crazy, kebabs, the main difference of which is the form.

Next, when adding spices, black pepper is ground. If it has not been crushed, then it is sieved through a sieve to remove various impurities or passed through a magnet to remove metallic impurities. Further, dried garlic is added to the minced meat without preliminary soaking in water, at the rate of 0.5 kg of dried instead of 1 kg of fresh garlic. The amount of water added to the minced meat is increased by the difference between fresh and dried garlic.

Lump chicken meat and skin obtained by hand deboning are crumbled on a top through a grid with holes 2-3 mm in diameter. Meat raw materials, water, salt, watered protein, eggs, pepper, the rest of the ingredients according to the recipe are sequentially put into the mixer for minced meat of cyclic action L5-FMB and thoroughly stirred for 4-5 minutes until a bound homogeneous mass is formed. To lower the temperature of the minced meat while stirring, crushed food ice is placed in the mixer in an amount of 20% of the norm of water added to the mixer.

The prepared minced meat should be immediately sent to the formation of semi-finished products. Its temperature should not exceed 12°C. Then it is formed into cutlets in the form of rounded flattened cakes with a thickness of 2–2.5 cm on machines of the IPKS-123 type. The formed cutlets are placed on trays-inserts, evenly sprinkled with a thin layer of bread crumbs, and the surface is breaded.

Ready cutlets, which are sold in a frozen state, are frozen at a temperature not higher than -18°C to a temperature in the thickness of the product not higher than -8°C in refrigerators, quick-freezing cabinets or other equipment that provides the required temperature regime.

After that, the meatballs in the frozen state are packed in 900 g each in a polypropylene tray covered with a film, made of materials approved by the Ministry of Health of the Russian Federation for contact with food. Semi-finished products are packed in a semiautomatic device. Chilled cutlets are stored at temperatures from 0°C to 4°C and relative air humidity from 75% to 80%, frozen ones - at temperatures from -2°C to -4°C, frozen – at temperatures no higher than -12°C and relative humidity from 85% to 95%, deep frozen - at a temperature not exceeding minus -18 ° C and relative humidity from 85% to 95 percent.

The entire technological process for the production of cutlets takes place according to the diagram below in accordance with Specifications (figure 1). In the technological process, no significant violations, as well as temperature-time regimes, were revealed.

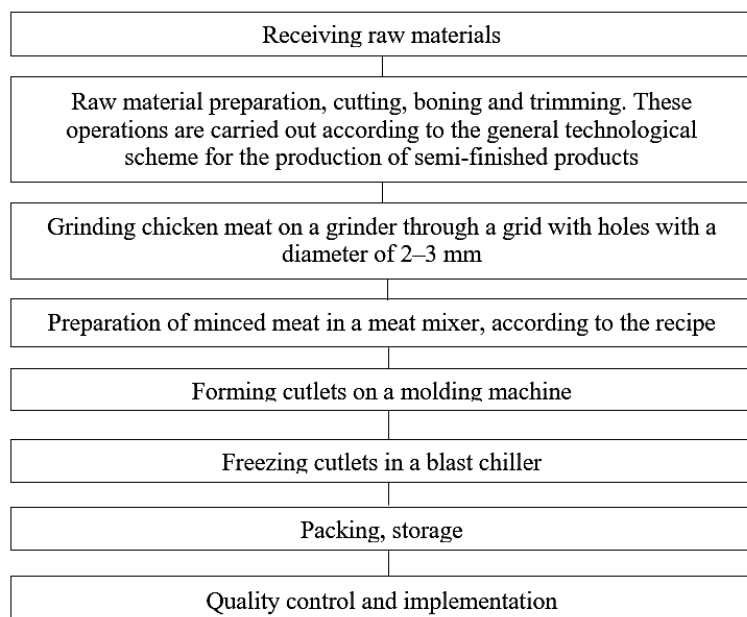


Figure 1. Technological scheme for the production of cutlets.

Sanitary and hygienic requirements. Washing and preventive disinfection of technological equipment, containers, inventory and premises is carried out in accordance with the instructions for washing and preventive disinfection at meat and poultry processing enterprises.

In order to check the detection of the causes of probable microbial contamination of the resulting products and control the sanitary state of inventory and equipment in the workshop for the production of semi-finished products, analyzes of washings from inventory for the presence of microbes, as well as from containers, technological equipment, special clothes and hands of workers, guided by the "Instruction on the procedure for microbiological control in the meat-processing industry", approved in the prescribed manner [1,2,3].

All equipment is subject to mandatory sanitization. At the end of the use of mechanical equipment, it is disassembled, thoroughly treated with hot water (at least 65°C) with an effective detergent, then rinsed with hot water (about 50°C) and dried. Then it is wiped with a dry cloth, the mechanical parts of the machines are treated with oil, the body is wiped with a damp and then dry cloth.

The marking of the test sample of cutlets meets the requirements of the state standard 51074-2003 «Food products. Information for the consumer. General requirements» for all indicators. The quantitative identification of the test sample is presented in table 2.

Table 2. Quantitative identification of the investigated samples of cutlets.

Sample	Net weight, g		Negative tolerance, %	Actual deviation from net weight, %
	nominal	actual		
Poultry cutlets	700.0	701.0±10.0	5.0	0.5
Beef cutlets	700.0	701.0±10.0	5.0	0.5

With quantitative identification, it was found that the samples of frozen cutlets comply with Specifications. Requirements for the number of prepackaged goods in packages of any kind during their production, packaging, sale and import according to the «Limit of permissible negative deviations» indicator, since it does not exceed 5 percent.

Organoleptic indicators were determined in samples of cutlets «from poultry meat» and «with the addition of beef» frozen, the results of which are shown in table 3.

Table 3. Organoleptic characteristics of cutlets.

Appearance	Cutlets should have a surface without cracks, torn and broken edges, for breaded cutlets - the surface is evenly breaded. The shape of the cakes is round-flattened. The color of the cutlets should be characteristic of the color of the raw materials used: meat, offal and other recipe components.	Cutlets have a surface without cracks, torn and broken edges, for breaded ones - the surface is evenly breaded. Cutlets have a rounded shape in the form of a flat cake. The color is characteristic of the color of the raw materials used: meat, offal and other recipe components.	Cutlets have a surface without cracks, torn and broken edges, for breaded cutlets - the surface is evenly breaded. Cutlets have a round-flattened shape in the form of a flat cake. The color of the cutlets is characteristic of the color of the raw materials used: meat, offal and other recipe components.
Consistency	The consistency of the cutlets must be firm. After frying, the consistency of the minced meat cutlets should be firm, dense, juicy, without crumbs.	The consistency of the cutlets is firm. After frying, the minced meat consistency is elastic, dense, juicy, without crumbs.	The consistency is firm. After frying, the consistency of minced meat cutlets is elastic, dense, juicy, without crumbs.
Taste and smell	Hot fried cutlets should have the pleasant taste and smell of the fried product. Moderately salted minced meat, with the aroma of spices and garlic (if used), without foreign taste and smell.	Hot fried cutlets have a pleasant taste and smell characteristic of raw materials, minced meat is moderately salty, without any foreign taste and smell.	Hot fried cutlets have a pleasant taste and smell characteristic of raw materials, minced meat is moderately salty, without any foreign taste and smell.

During the organoleptic quality assessment, it was found that the frozen cutlet samples meet the requirements of the Specifications «Meat semi-finished products». General technical conditions "for all indicators.

In general, an assessment of the quality of cutlets produced in the workshop for the production of semi-finished meat products showed that, according to all indicators, these semi-finished products meet the requirements of regulatory and technical documentation.

3. Conclusion

Thus, more and more people around the world prefer poultry products, as this product has a lower calorie level. In addition, poultry products contain less fat and cholesterol, which is perfect for people who care about a healthy and balanced diet. Chopped semi-finished products received their organoleptic and economic characteristics due to the individual recipe, since they have high taste characteristics, but at the same time, they also have a high selling price.

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