Study of semi-finished chopped poultry meat safety indicators

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Abstract. Health is an important component of the preservation of the whole society. In practice, the results of mass surveys in different Russian regions ultimately show that there are currently a large number of various violations in the field of nutrition. Making various functional products in the 21st century is a growing trend. More and more various functional products are now appearing in the Russian Federation, and they are gaining popularity among consumers. The purpose of the research is to study various microbiological indicators of the safety of meat and vegetable chopped semi-finished product with a functional orientation. According to the research results, it can be concluded that the minced meat and vegetable semi-finished product fully meets the established quality safety requirements in accordance with the currently valid regulatory documentation.

1. Introduction
Health is an important component of the preservation of the whole society [1-5]. In practice, the results of mass surveys among the population in different Russian regions ultimately show that there are currently a large number of various violations in the field of nutrition. In particular, among them it is worth noting the excess in the use of animal fats, which leads to the fact that the number of people with obesity of various forms is growing; the diet of people is also low in polyunsaturated fatty acids. It is worth noting the meager content of animal proteins in the diet.

Nowadays, functional food products of people make up no more than 5% of existing food products. At the same time, first of all, beverages were able to gain confidence in the market - 48%, various bakery products - 27%, dairy products - 14%. As for the segment of meat products, today it is still very little developed, primarily due to the characteristics of the characteristics of its manufacture at enterprises [6-12].

The production of various functional products is a developing trend today. In developed countries, including the Russian Federation, more and more various functional products are now appearing, and all of them are gaining popularity. Nowadays more and more products are manufactured in the country, which are enriched with various useful vitamins, microelements and other substances that are extremely necessary for human health [13-20].

Among other rather dynamically developing industries in the meat industry is the manufacture of various semi-finished meat products [2, 21]. Currently, semi-finished meat products have earned...
consumer recognition, and every year they occupy a strong place in the diet of the population, the demand for semi-finished products has increased, which do not require a long time for cooking at home and at public catering establishments. Meat semi-finished products are meat products that are pre-prepared for subsequent culinary processing. The main raw material used in the production of semi-finished products in the Russian Federation is poultry meat, which has undoubted advantages [22-24]. To increase the range of semi-finished meat products and improve the food industry as a whole, minced meat and vegetable semi-finished products were developed. The main components of the semi-finished product are chicken meat and fresh potatoes with sprouted rye flakes. Also used were: onion, talkan, protein-fat emulsion and water, whey from milk, a set of spices to enhance the taste and salt.

Despite the need to improve the quality characteristics of the product, there is also the task of product control from the point of view of safety and assessment of the technology quality management system [25-31].

The purpose of the work is to study various microbiological indicators of the safety of meat and vegetable chopped semi-finished product with a functional orientation.

2. Material and methods
The object of the research was chopped semi-finished meat and vegetable product. This invention makes it possible to expand the range of semi-finished meat and vegetable minced products, to obtain a chemical-balanced product with high nutritional value, preventive and dietary orientation.

Ingredients of the product are: chicken meat, fresh potatoes, vegetable oil, rice flour, flakes hydrated from sprouted rye or sprouted wheat, concentrated milk whey, table salt, ground black pepper, fresh peeled onions, dried basil, dried dill, chicken eggs, talkan, coriander, water.

As for the technology of manufacturing minced meat and vegetable semi-finished products, it includes the following stages: preliminary preparation of raw materials is carried out, then the preparation of curing ingredients of the product, fillers and spices is carried out. Then a protein-fat emulsion is prepared, minced meat is produced. Then the products are shaped and crumbed, packed, cooled or frozen, stored, transported, sold. The technological scheme for the production of a semi-finished meat and vegetable minced product is shown in figure 1.

To resolve the issue of the presence or degree of probability of the presence of microbes harmful and dangerous to humans, microbiological studies were carried out. The studies were carried out in accordance with GOST 21237–75.

3. Results and discussion
The developed semi-finished product was investigated from the point of view of the safety of various indicators. Table 1 shows the results of prototypes of meat and vegetable chopped semi-finished product for microbiological indicators.

Table 1. Safety requirements for semi-finished meat products in terms of microbiological indicators and results of studies of prototypes.

| Indicators                              | TR TS 034         | TR TS 021         | Results             |
|-----------------------------------------|-------------------|-------------------|---------------------|
| BGKP (coliforms) in 0.1 g                | not allowed       | not detected      |
| Sulfite-reducing clostridia in 0.01 g    | not allowed       | not detected      |
| S. aureus in 1 g                        | not allowed       | not detected      |
| E. coli in 1 g                          | not allowed       | not detected      |
| Pathogenic, including salmonella in 25 g | not allowed       | not detected      |
| KMAFAnM, CFU / cm³ (g), no more         | 1x10⁶             | 1x10⁶             | 2.3 x10³            |
| L.monocytogenes in 25 g                  | not allowed       | not detected      |
As can be seen from the table, the studied samples of meat and vegetable chopped semi-finished product fully meet the requirements.

Figure 1. Production flow chart.
Toxic substances that can appear when growing plants and animals in contaminated areas, in violation of the technology of processing or storing food, are called food contaminants. The research to detect toxic elements, antibiotics, radionuclides and pesticides was carried out. The results are shown in tables 2–4.

Table 2. Safety requirements for the content of toxic elements in meat semi-finished products and results of studies of prototypes.

| Indicators, mg / kg, no more | TR TS 034 | TR TS 021 | Results          |
|-----------------------------|-----------|-----------|------------------|
| Lead                        | 0.5       | 0.5       | less than 0.001  |
| Arsenic                     | 0.1       | 0.1       | less than 0.001  |
| Cadmium                     | 0.05      | 0.05      | less than 0.0001 |
| Mercury                     | 0.03      | 0.03      | less than 0.0001 |

Table 3. Safety requirements for the content of antibiotics in semi-finished meat products and results of studies of prototypes.

| Indicators, mg / kg, no more | TR TS 034     | TR TS 021     | Results        |
|------------------------------|---------------|---------------|----------------|
| Levomycetin                  | not allowed   |               | not detected   |
| Tetracycline group           | not allowed   |               | not detected   |
| Grisin                       | not allowed   |               | not detected   |
| Bacitracin                   | not allowed   |               | not detected   |

Table 4. Safety requirements for the content of pesticides and radionuclides in meat semi-finished products and the results of studies of prototypes.

| Indicators, Pesticides       | TR TS 034 | TR TS 021 | Results |
|------------------------------|-----------|-----------|---------|
| HCH (α, β, γ - isomers), no more, mg / kg | 0.1       | 0.1       | not detected |
| DDT and its metabolites, no more, mg / kg | 0.1       | 0.1       | not detected |
| Radionuclides                |           |           |         |
| Cesium-137, no more, Bq / kg | 200       | 200       | 24      |
| Strontium-90, no more, Bq / kg | –         | –         | 8       |

As can be seen from the results of tables 2–4, the developed semi-finished product meets all safety requirements for the content of toxic elements, antibiotics, radionuclides and pesticides.

4. Conclusion
The investigated minced meat and vegetable semi-finished product fully meets the established safety and quality requirements in accordance with the currently valid regulatory documentation. It fully meets the expectations of consumers for this product. Various microbiological studies of this semi-finished product have been carried out. As a result, the following were not found: BGKP (coliforms) in 0.1 g; sulfite-reducing clostridia in 0.01 g; S. aureus in 1 g; E. coli in 1 g; pathogenic, including salmonella in 25 g; L. monocytogenes in 25 g. The number of mesophilic aerobic and facultatively anaerobic microorganisms, CFU / g, no more than 2.3x10³. The content of the investigated toxic elements is less than 0.001 mg / kg. Antibiotics and pesticides: chloramphenicol; tetracycline group; grisin; bacitracin; hexachlorocyclohexane; DDT and its metabolites were not detected. The content of radionuclides: Cesium-137 - 24 bq / kg; strontium-90 - 8 bq / kg.

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