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Техническое регулирование и метрология: современное состояние и перспективы развития

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CURRENT ISSUES IN THE DEVELOPMENT OF THE HACCP SYSTEM AT PROCESSING ENTERPRISES

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The need to introduce HACCP systems at food enterprises is carried out in order to meet modern market requirements to ensure the production of safe food products. With the entry into force of TR CU 021/2011 for the sale of food products not only on the external, but also on the domestic market, "the manufacturer must develop, implement and maintain procedures based on the principles of HACCP" [1].

According to statistics from the World Health Organization, about 3-4 million cases of various intestinal infections are registered every year, as well as severe poisoning, which is obviously caused by unsafe food, which includes fish products. In the CIS countries, where the share of adulterated food products is an order of magnitude higher than in other European countries, more than 570 thousand diseases with acute intestinal infections of various etiologies are registered annually, including those related to the use of fish products [2].

Fish can be considered one of the most popular food products. But at the same time, fish products are one of the most disadvantaged in the group of food products. According to expert analysts, already at the production stage, 5% of fish products do not meet hygienic requirements, and violations of temperature conditions of transportation, storage and sale are found in 10% of tested food products [3].

Products made from low-quality fish pose a particular danger to human health, and, therefore, the establishment of special hygienic rules is required, due to the potential microbiological and chemical hazards contained in it.

In order to ensure the release of safe food products to the market, it is necessary to take into account all important aspects of production technology and establish special control at all stages and operations of its production and consumption, high-quality labeling of products is of great importance [3].

To achieve such goals, the HACCP system should be implemented at the enterprise, which is a reliable tool for controlling factors that may threaten the safety of food production.

During the study of the assortment of enterprises in Kazakhstan and the analysis of information about fish products, the object of the study was selected products such as sausage boiled fish, as this is a new product that enterprises are planning to release. This is due to the fact that fish products always have a constant and high demand in the market, as it is a vital product, from the use of which the consumer cannot refuse due to the many useful properties that are contained in fish. Fish sausages began to appear on the market relatively recently and many more enterprises have not fully mastered the production technology of this product, therefore, such products will have increased demand. Also, in the production of these products, it is possible to vary the technological processes and the composition of raw materials, thereby remaining a unique manufacturer of this product on the market.

The purpose of this work is to develop elements of a quality control and safety system based on the principles of HACCP in the production of sausage boiled fish products.

To achieve this goal, you need to perform the following tasks:

- determine the scope of the HACCP system;
- Create a HACCP working group;
- collect the initial information for the development of the HACCP system (information about products, raw materials, packaging, production data);
- collect information about possible hazards and identify them in relation to the object of the study;
- compile a complete list of hazards in the production of products and develop preventive actions;
- identify critical control points;
- develop a system of monitoring and corrective actions;
- draw up a program of internal audits and develop documentation of the HACCP system.

The identification of critical control points for the technological process is carried out by analyzing each considered dangerous factor and considering sequentially all operations included in the flowchart of the technological process for the production of boiled sausage products from fish (Table.1)

Table 1 – KKT on the technological process of production of sausage boiled fish products

Number of the technological operation	Name of the technological operation	KKT Number	The considered dangerous factor
1	Acceptance of raw materials	KKT 1	KMAFAnM, BGKP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i> , scrapers, trematodes, cestodes, nematodes, toxic elements (lead, arsenic, cadmium, mercury), histamine, polychlorinated biphenyls, nitrosamines, radionuclides, pesticides, personal belongings and waste products, the presence of petroleum products
2	Storage of raw materials	KKT 2	KMAFAnM, BGKP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i>
3	Preparation of raw materials	KKT 3	KMAFAnM, BGKP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i> , personal belongings and remnants of vital activity
5	Cutting	KKT 4	KMAFAnM, BGCP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i> , personal belongings and remnants of vital activity
8	Sediment	KKT 5	KMAFAnM, BGCP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i>
9	Cooking	KKT 6	KMAFAnM, BGKP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i> , personal belongings and remnants of vital activity
10	Cooling	KKT 7	KMAFAnM, BGCP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i>
13	Storage of GP	KKT 8	KMAFAnM, BGCP, <i>S. aureus</i> , <i>Salmonella</i> , <i>L. monocytogenes</i> , <i>V. parahaemolyticus</i>
14	Transportation	KKT 9	<i>KMAFAnM, BGCP, S. aureus, Salmonella, L. monocytogenes, V. parahaemolyticus</i>

Monitoring in the HACCP system is carrying out a planned sequence of measurements of control parameters to verify that the critical control point is under constant control. For each critical control point, it is necessary to develop a monitoring system with the help of which, in a planned order of observations and measurements, violations of critical limits can be detected accurately and in a timely manner and appropriate preventive or corrective actions can be taken.

When developing a monitoring system, it is necessary to determine:

- control parameters corresponding to the signs of identification of the considered dangerous factors;
- observation procedures;
- frequency of control;
- responsible for monitoring;
- the form of registration of monitoring results (Table.2)

Table 2 – Monitoring of CCP in the process of production of sausage boiled fish products

№ KKT	Name of the operation	Controlled parameter	Monitoring procedure	Frequency	Responsible	Registration form
1	Acceptance raw materials	Organoleptic indicators of raw materials	Organoleptic control	Each batch	Master technologist	Journal of periodic control
		Appearance and integrity of packaging and labeling	Visual inspection			
		Accompanying documentation	Control of accompanying documentation			
2	Storage of raw materials	Temperature in the storage chamber	Temperature control in the storage chamber	At least 2 times per shift	Storekeeper	Temperature and moisture monitoring log
		Relative humidity	Control of relative humidity in the warehouse	At least 2 times per	Storekeeper	
3	Raw material preparation	Water temperature	Water temperature control	Every 30 minutes	Master technologist	Temperature and moisture control log
		Water change	Monitoring of water change	At least 4 times per shift	Coordinator	Journal of Technological Control
4	Cutting	Duration	Control of cutting time	Each batch	Master technologist	Journal of technological control
		Temperature	Control of minced meat temperature	Each batch	Master technologist	Temperature and moisture control log
		Sanitary and hygienic requirements for personnel	Personnel control	Every shift	Coordinator	Personnel control log
5	Precipitation	Duration	Control of	Each batch	Master	Journal of

	n		precipitation time		technologist	technological control
		Temperature	Room temperature control	Every 30 min	Master technologist	Temperature and moisture control log
6	Cooking	Temperature	Cooking temperature control	Every 30 min	Master technologist	Temperature and moisture control log
		Duration	Control of cooking time	Each batch	Master technologist	Journal of technological control
7	Cooling	Water temperature during showering	Water temperature control	Each batch	Master technologist	Temperature and moisture monitoring log
		Chamber temperature during cooling	Temperature control in the intensive cooling chamber			
8	Storage	Temperature in the storage chamber	Temperature control in the chamber	2 times a shift	Storekeeper	Temperature Control Log
		Storage duration	Control of the shelf life of the finished product			Journal of technological control
9	Transportation	Temperature in the container	Temperature control in the vehicle	Before each shipment	Forwarder	Temperature control log

Correction and corrective actions are necessary to influence the measured parameters, if they have exceeded the established critical limits. To develop correction and corrective actions, it is necessary to establish:

- procedures for correction and corrective actions;
- responsible for their conduct;
- forms for recording the implementation of correction and corrective actions.

If possible, corrective actions should be drawn up in advance, but it is permissible to deve

Table 3 – Corrections and corrective actions

KKT	The name of the operation	Controlled parameter	Corrective action and correction methods	Responsible	Registration form
1	Acceptance of raw materials	Organoleptic characteristics of raw materials Package appearance Availability and correctness of labeling Availability and	Return of raw materials to the supplier Change of supplier Informing management about nonconformities	Master Technologist	Acceptance Control Log Return certificate The act of termination of the contract

		completeness of the package of accompanying documentation			Official memo
2	Storage of raw materials	Storage room temperature and relative humidity	Temperature and humidity control Informing the technologist about violations of storage modes	Storekeeper	Temperature Control Log Official memo
3	Preparation of raw materials	Water temperature Frequency of water change Sanitary and hygienic requirements for personnel	Temperature regulation Informing management about violations Sending staff to the hospital	Master Technologist Coordinator	Temperature control log Journal of Technological Control Personnel control log Official memo
4	Cutting	Temperature Duration	Temperature control Recycling\disposal Recycling\disposal Informing the coordinator about the violation of the duration	Master Technologist	Temperature control log Journal of technological control Official memo
5	Precipitation	Temperature Duration	Temperature control Recycling\disposal Informing the coordinator about the violation of the duration	Master Technologist	Temperature control log Journal of technological control Official memo
6	Cooking	Temperature Duration	Temperature control Recycling\disposal Informing the coordinator about the violation of the duration	Master Technologist	Temperature control log Journal of technological control Official memo
7	Cooling	Water temperature during showering Chamber temperature during cooling	Temperature and humidity control Informing the technologist about violations	Master Technologist	Temperature control log Official memo

8		Temperature in the storage room Storage duration	Temperature regulation Informing the technologist about violations of storage regimes Processing\disposal Informing the technologist about violations of storage duration	Storekeeper	Temperature control log Official memo
9	Keeping	Temperature in the storage room for transportation	Temperature adjustment/disposal Informing the technologist about the violation of the temperature regime of the transportation of the finished product Change of the freight forwarder carrying out the transportation of finished products Camera operation monitoring storage for GP transportation	Freight Forwarder	Journal of technological control over the condition of the vehicle Official memo

Based on and as a result of the work done, a systematic list of HACCP system documentation was compiled:

1. Objectives and structure of the enterprise;
2. Documents of the enterprise on preventive actions;
3. Product Information;
4. Production information;
5. Documents establishing dangerous factors and risks for these factors;
6. Documents for the selection and justification of the CCT necessary to prevent the considered dangerous factors;
7. Documents defining critical limits for control points, monitoring systems and corrective actions;
8. Internal audit procedures;
9. Registration accounting documentation.

References

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HACCP SECURITY SYSTEM AT CONFECTIONERY PRODUCTION ENTERPRISES

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The Hazard Analysis and Critical Control Points (HACCP) safety system is a food safety management system that is used worldwide to prevent risks associated with food products. It is mandatory for all enterprises producing food products, including confectionery. In this article, we will look at what the HACCP security system is, how it works at confectionery production enterprises and why it is important for ensuring food safety.

HACCP at a confectionery enterprise implies a food safety management system (FSMS), which builds the work of the enterprise within the framework of international standards, but HACCP is not comprehensive, does not take into account a large number of biological, chemical, physical threats in the production of confectionery products, unlike FSMS based on ISO 22000:2018, FSSC 22000 standards, BRC or IFS [1]

Such a quality management model is used at all stages of confectionery production, starting from the receipt of raw materials and ending with the packaging of finished products. At the same time, critical control points are determined at each stage of production, where it is necessary to control and manage risks. [2]

As for the production of confectionery products, due to the fact that the process takes place at a high temperature, the sterilization of products is carried out very efficiently, as a result of which the possibility of the development of harmful microorganisms in them is minimized. Therefore, we can say that in most cases, in the production of confectionery products, the sources of potential danger are foreign elements, as well as contamination with foreign chemicals.

For example, all raw materials used for the production of chocolate pastes must have hygiene certificates, certificates of conformity and quality certificates, comply with the requirements of regulatory documentation, sanitary norms and rules [3].

For the production of chocolate pastes, a list of potentially dangerous factors has been compiled: physical, microbiological and chemical, which is given in Tables 1-5, based on all available information, including NTD.