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**STUDY OF THE INFLUENCE OF MICROBIOLOGICAL, CHEMICAL AND PHYSICAL HAZARDOUS FACTORS IN THE TECHNOLOGICAL PROCESS OF DAIRY PRODUCTS PRODUCTION**

**ДОСЛІДЖЕННЯ ВПЛИВУ МІКРОБІОЛОГІЧНИХ, ХІМІЧНИХ І ФІЗИЧНИХ НЕБЕЗПЕЧНИХ ЧИННИКІВ ТЕХНОЛОГІЧНОГО ПРОЦЕСУ ВИРОБНИЦТВА МОЛОЧНИХ ПРОДУКТІВ**

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**Abstract.** When analyzing dangerous factors, the raw materials from which this product is made, ingredients, auxiliary materials that are part of this product, step-by-step production of the food chain, product storage, and transportation should also be considered. In order to ensure the effectiveness of the HACCP plan, it is necessary to carefully analyze the risk factors. Identification and analysis of dangerous factors in the technological process of pasteurized milk production were carried out at the milk processing enterprise. Careful monitoring at the stage of receiving dairy raw materials makes it possible to reduce the list of potential dangers at other stages of the food chain production. The second and third critical control points are established at the stages of primary and secondary pasteurization. The biological effect on milk after pasteurization is that there is an opportunity to destroy residual microflora depending on the coefficient of pasteurization level and primary bacterial contamination of milk raw materials.

**Key words:** dairy raw materials, pasteurization, identification, dangerous factors, technological process

The purpose of the analysis of dangerous factors is to prepare a list of all dangers that, in the event of non-compliance with the requirements and poor quality control, can lead to serious consequences.

The analysis of dangerous factors is always specific for each technological process, even when producing similar products, it will differ [1].



When analyzing dangerous factors, the raw materials from which this product is made, ingredients, auxiliary materials that are part of this product, step-by-step production of the food chain, product storage, and transportation should also be considered. In order to ensure the effectiveness of the HACCP plan, it is necessary to carefully analyze the risk factors.

Analysis of all hazards that arise during production consists of two stages. The first step is to identify the dangerous factor at this stage of the food chain. At this stage, the HACCP working group conducts an analysis of incoming raw materials, as well as a list of ingredients and materials, technological processes and equipment used during production, the finished product and its storage and distribution, as well as its intended use. Based on research data, the working group defines a list of possible biological, chemical, or physical hazardous factors that may exceed acceptable standards and be controlled at each stage of the technological process [3].

The hazard analysis procedure begins with the analysis of the input materials, using the product description and the list of ingredients and materials of the product. Such a procedure as a product description, in accordance with the requirements of the Codex Alimentarius, should consist of the following information: name; storage; chemical/physical characteristics (pH); type of processing (heat treatment, freezing, salting, smoking); packing methods; methods of storage; implementation/sales method; intended for use by the consumer; method of consumption (ready to use, requires defrosting, requires heat treatment).

Next to each ingredient and packaging material in the list, it is recommended to put the corresponding letters that indicate the possibility of the existence of biological, chemical or physical dangerous factors (B, X, F). Each dangerous factor indicated in this list is fully described. After determining all dangerous factors, the second stage of analysis is carried out - the process of hazard assessment. At the second stage of the analysis of dangerous factors, the HACCP group decides which of the list of dangerous factors are important and should be taken into account in the HACCP plan. During this stage, each potential dangerous factor is evaluated based on the probability of occurrence and possible harm to the consumer.

When evaluating each potential hazardous factor, it is necessary to take into account the types of food products, methods of their preparation, transportation and storage, as well as potential consumers in order to determine the possibility of these factors influencing the probability of occurrence and severity of the hazardous factor. The emergence of dangerous factors that do not exceed permissible norms and their occurrence is unlikely, do not need to be considered further [4].

Identification and analysis of dangerous factors in the technological process of pasteurized milk production were carried out at the milk processing enterprise. To do this, they first compiled a description of pasteurized milk and a list of ingredients and materials [2].

Analyzing the block diagram of the technological process, identification of dangerous factors was carried out. After the list of potential dangerous factors was compiled, the second part of the analysis was carried out - the assessment of the probability of the occurrence of a dangerous factor. The probability of occurrence of a dangerous factor was assessed in points according to the criteria.



The probability of occurrence of a potential dangerous factor is assessed as high, medium, low and actually equal to zero. In terms of quality, the milk processing enterprises of our country have a system that includes various methods of quality management at all stages of production - from raw material research to consumer use - with the support of management and under the conditions of rational use of technical capabilities (Total Quality Management). The task of this system is the constant improvement of quality and safety through regular analysis of results and adjustment of enterprise activity [4].

**Table 1 - Criteria for assessing the probability of implementation of dangerous factors**

Probability of occurrence of a dangerous factor	Degree of probability	Rating scale
In case of occurrence or excess from 1 time per shift or more often	High	4 points
In case of occurrence or excess from several times a month to 1 time per shift	average	3 points
They occur several times a year to once a month	low	2 points
Low probability of the occurrence or increase of a dangerous factor (from 1 time per year or less often)	It is actually zero	1 point

For producers of dairy products, the determination of critical control points makes it possible to establish the reason for the deterioration of the quality of indicators as soon as possible and to take corrective actions in a timely manner.

A control point is considered critical if there is a high probability of a potential hazard occurring at a certain stage of the food chain production. It was established [5] that the stage of "Receiving dairy raw materials" is the first critical point for two types of hazards: chemical and biological. The chemical impact is that raw milk can be a natural source of toxic elements, radionuclides, pesticides, mycotoxins, heavy metal salts, antibiotics, hormonal drugs under conditions of milk harvesting in polluted regions, as well as under conditions of unauthorized use of inhibitory substances.

A biologically dangerous factor at this stage arises under the conditions of violation of sanitary and hygienic norms during milking and storage, lack of programs to prevent the ingress of foreign inclusions at primary production, violation of filtration regimes, untimely cleaning, washing and changing of filters, as well as transportation regimes. The development of microflora is possible due to non-compliance with the temperature of raw milk transportation. It is possible for microorganisms to enter from the contacting surfaces of the equipment in case of non-observance of sanitary treatment regimes, development of microorganisms in case of non-observance of temperature regimes of reservation. In case of non-compliance with the sanitary norms of keeping and treating animals. Because of this, raw milk can be a natural source of pathogenic microorganisms, including bacteria of the genus *Salmonella*, *Staphylococcus aureus*, *Listeria monocytogenes*.

**Conclusions.** Careful monitoring at the stage of receiving dairy raw materials makes it possible to reduce the list of potential dangers at other stages of the food chain production. The second and third critical control points are established at the



stages of primary and secondary pasteurization. The biological effect on milk after pasteurization is that there is an opportunity to destroy residual microflora depending on the coefficient of pasteurization level and primary bacterial contamination of milk raw materials.

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***Анотація.** Аналізуючи небезпечні фактори слід розглядати також сировину, з якої виготовляється даний продукт, інгредієнти, допоміжні матеріали, які входять до складу цього продукту, покрокове виробництво харчового ланцюга, зберігання продукції, а також транспортування. Для того, щоб забезпечити ефективність плану НАССР, потрібно ретельно проводити аналізування небезпечних чинників. На молокопереробному підприємстві провели ідентифікацію та аналізування небезпечних чинників технологічного процесу виробництва пастеризованого молока. Ретельний моніторинг на етапі приймання молочної сировини дає можливість знизити перелік потенційних небезпек на інших етапах виробництва харчового ланцюга. Друга і третя критичні точки контролю встановлені на етапах первинної і вторинної пастеризації. Біологічний вплив на молоко після пастеризації полягає в тому, що є можливість знищити залишкову мікрофлору залежно від коефіцієнта рівня пастеризації та первинного бактеріального забруднення молочної сировини.*

***Ключові слова:** молочна сировина, пастеризація, ідентифікацію, небезпечні чинники, технологічний процес*