MICROBIOLOGICAL STUDY OF OBJECTS ENVIRONMENTAL FOOD PRODUCTION

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Abstract. *In order to minimize or manage food safety risks, it is necessary to develop and implement food safety and quality standards, as well as quality assurance systems in the food industry for the production of safe food products. A thorough food safety risk assessment should be carried out to determine what kind of monitoring is needed for the process environment, what microorganism or indicator group is subject to monitoring, how to evaluate and adjust the results obtained.*

Key words: *microbe, epidemiology, salmonella, listeria, enterobacteria, staphylococcus, bacteria.*

МИКРОБИОЛОГИЧЕСКОЕ ИССЛЕДОВАНИЕ ОБЪЕКТОВ ОКРУЖАЮЩЕЙ СРЕДЫ ПРОИЗВОДСТВА ПИЩЕВЫХ ПРОДУКТОВ

Аннотация. *Для минимизации или управления рисками безопасности пищевых продуктов необходимо разрабатывать и внедрять стандарты безопасности и качества пищевых продуктов, а также системы обеспечения качества в пищевой промышленности для производства безопасных пищевых продуктов. Следует провести тщательную оценку риска безопасности пищевых продуктов, чтобы определить, какой вид мониторинга необходим для технологической среды, какой микроорганизм или группа индикаторов подлежит мониторингу, как оценивать и корректировать полученные результаты.*

Ключевые слова: *микроб, эпидемиология, сальмонелла, листерия, энтеробактерии, стафилококк, бактерии.*

There are a number of methods and tools that must be used to implement microbiological monitoring of the environment of food production [1-3]. Based on the analysis of literary sources and our study of environmental objects of food production, it was determined that the choice of the laboratory control method and the criteria for assessing the sanitary and epidemiological state of the environment of the process environment should be determined by the production control program and the type of enterprise assessment. Thus, the sanitary and epidemiological state of the environment of the process environment of food production must be assessed during state sanitary supervision, sanitary and epidemiological audit, during the development and implementation of production control programs, during the assessment of the effectiveness of production control programs.

When planning microbiological studies of samples from food production environments, it is necessary to determine the number of representative sampling control points in each epidemiological risk zone, select laboratory testing methods, and criteria for assessing the results obtained. It is important to ensure that samples can only be transported in cooler bags at a temperature of (5±3) °C. The time it takes to deliver samples to the laboratory should not exceed 6 hours from the time of collection, unless otherwise validated by an accredited laboratory in accordance with the established procedure, as ensuring a reliable result. It will be necessary to start the analysis as soon as possible. If there is a need to store washings in the laboratory, this can only be done at a temperature of (3±2) °C. It is important to conduct the sample analysis no later than 24 hours after receipt at the laboratory and no later than 36 hours after collection. The objects of laboratory control at a food enterprise are sampling control points from the process environment.

Control points in food production are: surfaces, equipment, refrigeration chambers; hard-to-reach areas for processing; threaded connections of vessels and tanks; rubber and silicone nozzles; hands of workers, gloves, sanitary clothing; surfaces and edges of inventory subject to mechanical loads: knife blades, edges of plastic and metal scoops, cutting boards, containers, etc.

Sampling is carried out from control points, both in direct contact with food products and not in direct contact with food products (e.g. storage areas). Control points are divided into zones according to the degree of epidemiological risk based on an assessment of the probability of cross-contamination of food products with indicator and pathogenic microorganisms during their production and an analysis of the results of monitoring the sanitary and epidemiological state of the process environment. Qualitative criteria of the sanitary and epidemiological state of the process environment are: detection of pathogenic microorganisms (Salmonella spp., Listeria monocytogenes, etc.) and detection of indicator microorganisms (Enterobacteria, coliform bacteria (coliform bacteria), Staphylococcus aureus, etc.).

Quantitative criteria of the sanitary and epidemiological state of the process environment are: concentrations of mesophilic aerobic and facultative anaerobic microorganisms; concentrations of Enterobacterial, coliform bacteria (coliform bacteria), Staphylococcus aureus, etc.

The main methods for studying the microbial contamination of process environment objects are classical microbiological methods that allow us to assess the qualitative and quantitative criteria of the sanitary and epidemiological state of the process environment. Along with classical microbiological methods, it is recommended to use alternative research methods using contact cups, dip slides, ready-made dry substrates, petrifilms, samplers, kits with indicator nutrient media, reagents, etc.).

To monitor the general level of hygiene in order to obtain information about the level of cleanliness in the test environment, including assessing the effectiveness of cleaning, washing and disinfection procedures, it is additionally recommended to use express methods, for example, systems for determining intracellular adenosine triphosphoric acid, determining nicotinamide-adenine-dinucleotide, etc.

To assess the sanitary and epidemiological state of the environment of the technological environment of food production, epidemiological investigation, phenotypic and genotypic characteristics, the presence of pathogenicity and virulence factors of microorganisms, markers of resistance to antimicrobial drugs, and to carry out intraspecific typing of isolated isolates, it is recommended to use rapid methods based on polymerase chain reaction, immunological (for example, enzyme-linked immunosorbent assay, flow cytometry), and mass spectrometric methods.

Thus, qualitative criteria for assessing the microbiological contamination of objects in the environment of the technological environment and criteria for the quantitative content of microorganisms in washings during the production of food products have been determined.

Qualitative criteria are recommended for use in unscheduled state sanitary supervision for epidemiological indications; in planned state sanitary supervision in the event of an unsatisfactory current sanitary-technical and sanitary-hygienic condition of the facility; when assessing the effectiveness of the food safety control system or its elements in the food chain, including good hygienic practices and food safety control programs. Quantitative criteria are recommended for use in implementing programs and assessing the effectiveness of the industrial safety control system at a food enterprise; when monitoring the effectiveness of cleaning, washing, disinfection and sterilization procedures and their ability to effectively remove food residues, various contaminants and transient groups of microorganisms.

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