The experience in implementing the food safety management system at a meat processing enterprise

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Abstract. The article analyzes the situation in the development and implementation of HACCP in the Russian food industry. The authors present the results of the analysis of various principles and ways to improve the efficiency of food production. Our own experience in implementing the food safety management system at Russian enterprises allows the authors to draw a conclusion about the key factors that are the reasons for the “disappointment” and lack of the expected effect of the company's development when implementing the management system.

1. Introduction

In accordance with the requirements of (Technical Regulations of Customs Union) TR CU 021/2011 “On Food Safety” within the period up to February 2015, all enterprises engaged in food production were required to develop, implement and maintain procedures based on the principles of HACCP [1].

The world scientific community is greatly concerned about the necessity to implement the food safety and quality management system. During validation and verification of the food safety management system in the meat industry and for the purpose of the correct implementation of the HACCP principles, it is important to rely on microbiological data. Significant scientific research has been conducted over the past twenty-five years. The researchers identified indicator microorganisms that should be used to promote the overall hygiene of the slaughtering procedure, evaluated the collected microbiological data and sampling methods. Scientists focused on the fact that microbiological results obtained at the end of the slaughter procedure do not provide sufficient information about the cause of the problem. Therefore, it is crucially important to analyze the risks and identify critical control points throughout the entire process. Step-by-step microbial assessment schemes were a useful tool for getting an idea of real microbiological results [2, 3].

The problem of Listeria monocytogenes contamination in poultry processing plants is described in numerous studies. Research results show that a high level of infectious diseases with listeriosis in animals is associated either with a general rejection of the food safety system as a whole, or when the food safety and quality management system is unsatisfactory [4, 5].

Salmonella spp.— another worst enemy that enters the human organism with food of animal origin, causing severe intoxication of the body. Studies of the impact of the HACCP system in slaughterhouses in Colombia, which is famous for its variety of meat dishes, have shown that the lack of disinfection of meat carcasses and non-compliance with temperature conditions when processing meat bran in a slaughterhouse, which in principle did not have a HACCP system, led to a significant increase in the
number of Salmonella spp. The impact assessment model estimated a 10-fold increase in the probability that the consumer will receive a contaminated portion [6, 7].

The results of numerous studies confirm that the introduction of the HACCP system in food processing plants can help reduce the impact of pathogenic microorganisms [2, 3, 4, 5, 6, 7].

As of 2020, a large number of Russian enterprises have already introduced procedures based on the principles of HACCP, but there are still some that do not know about this requirement and have not met the requirements of current legislation. The issue of developing and implementing food safety management procedures or systems is critical for such companies.

Control over the implementation of these requirements in terms of the development and implementation of HACCP in the food industry began in February 2015 by Rospotrebnadzor. In addition, the consumer has become increasingly interested in the presence of implemented HACCP principles.

Businesses that do not implement the system face fines from 20 to 1000 thousand rubles, and in extreme cases – suspension of activity for up to 90 days [8].

2. Results and discussion

It is important to note that many enterprises have implemented the Food Safety Management System (FSMS) based on the requirements of ISO 22000, and some enterprises, in order to develop their processes within the framework of the FSMS, strengthen the image and authority of responsible food manufacturers, have certified their FSMS according to 22000 FSMS certification scheme, which allows them to have not only the advantage of a certificate certifying that their FSMS meets the requirements of the international standard ISO 22000 and the ISO/TS 22002-1 technical specification, but also a number of other advantages highlighted by the international team of experts from SGS company and given in a more detailed format in the source [9].

Based on the experience in FSMS development and implementation according with the requirements of ISO 22000 standard in the food industry, the increase in production efficiency, which is closely related to the level of the enterprise's production system development, including the level of FSMS development, is carried out in two ways:

- classical (figure 1), in which periods of growth alternate with periods of stagnation;
- continuous improvement (figure 2), which involves the development of the system by solving problems using the “one-by-one” method and continuous development.

![Figure 1. Classical way of increasing production efficiency.](image-url)
In our opinion, the development and implementation of FSMS allows enterprises to improve their efficiency and develop along the path of continuous improvement (Figure 2), which is based on the implementation of the following fundamental requirements for the development of the standard:

- defining the context and stakeholders (Section 4.1; Section 4.2);
- the increased focus on leadership and leadership commitment. Section 5.1 of the standard includes new requirements for leadership demonstration and commitment;
- risk management (Section 6.1 of the standard);
- increased focus on goals as a driving factor for improvement. These changes can be found in Sections 6.2 and 9.1.
- expanding requirements related to communications. Section 7.4 contains the communication algorithm, including determining what, when, how, and whom to inform;
- application of the PDCA cycle. The standard explains that the PDCA cycle is applied in a dual way as separate cycles working together: the first covers the management system, and the second "covers" the HACCP principles [10].

The experience of FSMS implementation at various Russian food industry enterprises, mainly meat processing plants, allows us to draw a conclusion about three key factors that are the reasons for the "disappointment" and lack of the expected effect of the company's development when implementing the management system:

1. Lack of clear strategic goals in the company.
2. Lack of process approach in management.
3. Organization of work not according to the PDCA cycle.

Based on the requirements of ISO 22000:2018 Standard and its objectives (section 6.2) to ensure food safety, we conclude that the best tool in the formulation of objectives in the field of quality and food safety methodology is SMART where: S (Specific) – the specific end result; M (Measurable) a clear measurement objective; A (Achievable) – the availability of skills, knowledge, money, and other to achieve goals; R (Relevant) – the correlation of the target with the actual situation; T (Time) – the final date to achieve the goal [11].

The practice of introducing food safety management systems on individual meat processing plants suggests that when setting goals there observed the lack of measurable parameters, the lack of monitoring of the tasks performed to achieve the goal, as well as the lack of informing the staff about the goals set for a certain period, which significantly affects the failure to achieve the goals or the achievement of a result that does not fully correspond to the goal set.
The ISO 22000:2018 Standard states that “understanding and implementing management of interrelated processes as a system contributes to the effectiveness and efficiency of the organization in achieving the expected results. The process approach involves the systematic identification and management of processes and their interaction in such a way as to achieve the intended results in accordance with the food safety policy and the organization's development strategy.” Thus, the management of processes and the system as a whole can be achieved by using the PDCA cycle (figure 3), which, in turn, is a tool for organizing continuous scientifically substantiated improvements (innovations), no matter in which area, paying special attention to risk-oriented thinking, aimed at exploiting opportunities and preventing undesirable results [12, 13, 14].

![Figure 3. The PDCA Cycle.](image-url)

The role of top management in ensuring the implementation and effective functioning of food safety management system in the organization is of great importance.

In accordance with the requirements of paragraph 5.1 of the ISO 22000:2018 Standard [13], it is the duty of the top management to demonstrate leadership and commitment to the FSMS. To do this, the boss must not only inform employees about the need for FSMS in their organization and encourage them to make a personal contribution to improving the effectiveness of FSMS, but also provide all necessary resources.

The practical experience in FSMS implementation indicates the following problems concerning the demonstration of leadership of the top management in relation to FSMS:
- frequently occurring incompliance of food safety procedures and objectives with the organization's development strategy;
- low level of integration of the requirements of FSMS to the business processes of the organization;
- insufficient supply of resources that are necessary for the FSMS implementation;
- frequently occurring incompliance of the FSMS with the legislative and other obligatory requirements and the consumers' demands concerning food safety;
- the planned results are not always achieved by the food safety management system;
- lack of motivation of employees to make a personal contribution to improving the effectiveness of the food safety management system;
- lack of management support for continuous improvement;
- lack or weak support for employees' efforts to take on leadership roles in the performance of their respective leadership responsibilities [12].

The experience of the FSMS implementation in Russian enterprises, including meat processing (canned meat, sausages, meat delicacies), vegetable processing, fish processing, and confectionery production shows that the greatest difficulties in the FSMS implementation based on the ISO 22000 Standard or, just, procedures based on the HACCP principles required by TR CU 021/2011, arise for individual entrepreneurs and small enterprises with up to 100 employees. Such enterprises do not perceive the implementation of the FSMS as an opportunity for improvement and continuous development, but perceive this system as a barrier to carrying out the daily activities, which is partly true, since the development of documentation only within the FSMS implementation framework requires a significant degree of involvement in the process and, often, the lack of opportunities to combine this activity with the main work. Small businesses often do not have a separate specialist responsible for developing documentation, implementing its requirements in the process, and implementing a culture of continuous improvement. The problem is not due to the fact that the boss does not want to, but because it is financially difficult for a small enterprise to maintain a full-time specialist, finance activities related to the implementation of the requirements of the standard and to continuously improve something, even if these improvements do not always require significant costs. In addition, not all small businesses supply products to federal retail chains, which obliges them to implement the requirements of international standards.

The situation with the FSMS implementation is significantly better at medium and large enterprises. According to our observations, such businesses often have a separate staff unit, who is in charge of the documentation within QMS or FSMS, the organisation of the working group's activity on ensuring food production safety and also solving operational problems associated with the FSMS maintenance, implementation and development. Most often, such enterprises have already formed both a corporate culture and a culture of quality, which, in our opinion, is an integral part of the corporate culture.

If we consider the degree of the FSMS implementation in small enterprises of the food industry, in our opinion, the HACCP or FSMS systems are implemented in the canning industry (processing of vegetables and meat) and the confectionery industry to a greater extent, but in bakeries operating in small localities, with, in fact, no competition, to a lesser extent – which is odd enough.

If we consider the main problems that hinder the implementation of legal requirements within the HACCP or FSMS framework, the authors would highlight the following:
- lack of motivation for entrepreneurs in the form of the state support measures for those who implement and develop food safety management systems in their enterprises;
- lack of sufficient resources to implement and sustain food safety management systems (financial, human (trained, skillful specialists));
- misunderstanding of the Standard requirements, lack of understanding of these requirements' implementation tools, misunderstanding of the mechanism of outstanding results from the FSMS implementation as competitive advantages;
- lack of strong managers who can integrate the concept of “quality” into the main idea and purpose of the enterprise.

3. Conclusion
Thus, the introduction of FSMS in the food industry is an absolute necessity not only from the point of view of meeting the requirements of current legislation, but also from the point of view of ensuring the development and improvement of business efficiency.

However, the experience of the FSMS implementation in a number of Russian companies indicates a range of systemic, repetitive errors associated with the total or partial incompliance with the standards,
in this case, ISO 22000:2018 (GOST R ISO 22000-2019) [12], which require elimination, first and foremost, and, in our opinion, a fundamental change of the top management's approach to the organization of the company's effectively functioning FSMS to ensure integration of the food safety management system's objectives with the strategic goals of the company by means of applying the PDCA process approach and cycle when developing and implementing processes in the organization, maximizing employee engagement in ensuring process and organizational improvement, and maintaining the continuity of such improvements.

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