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DEVELOPMENT OF AN INTEGRATED FOOD QUALITY MANAGEMENT SYSTEM

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ABSTRACT
The high-speed growth in the global population has resulted in a deficit of foods, which has stimulated the development of technologies for planting agricultural products and fattening domestic animals. However, these processes are supplemented in many cases by worsening of the quality of foods and their pollution by foreign substances. To guarantee the proper quality and safety of foodstuffs for health, the International Organization for Standardization developed the standards ISO 9001:2015 and ISO 22000:2018. At the same time, businesses fabricating foods, especially meat-based ones, have to observe the norms of the international standard ISO 14001:2015. Finally, because treatments of raw materials and ingredients used in food products contain in many cases substances harmful for health, enterprises must introduce the norms of standard ISO 45001:2018. To simplify management processes, enterprises introduce so-called 'integrated management systems'. This study proposes one variant of such a system recommended for use in food-producing organizations including those that treat raw meat and produce products based on its use.

Keywords: quality management system; integrated management system; quality; safety; food; food safety; quality standard

INTRODUCTION
The world population is currently 7.7 billion people and continues to increase. The United Nations Population Division estimates that it will be about 9 billion in 2042 and may rise to 16 billion by 2100.

As a consequence of such fast growth, the problem of ensuring humankind has an adequate quantity of foodstuffs originated as early as the 1940s. This phenomenon prompted the beginning of the so-called 'green revolution' in agriculture, i.e. the dramatic change in technologies of planting and of fattening domestic animals **(Hazell, 2009)**. The principal steps in such evolution were the introduction of the practice of irrigation and the use of pesticides and chemical fertilizers which permitted a doubling of cereal productivity to 1985. However, solely increasing output is not sufficient to solve the problem of supplying foodstuffs because it is not the only task of the food industry. Enterprises must also produce products safe for the health of consumers. They must also observe the norms of the technologies of farming and reprocessing of crops, protection of the environment, and guaranteeing safe labour conditions for production personnel.

The current problem in the food industry is that intensification of farming practice has resulted in decreasing water availability, infringement of water intake schedules, and salification and desertification of considerable areas of fertile soils. The result of wide-ranging use of mineral fertilizers and chemical means of protecting plants (aromatic heterocyclic compounds of chlorine and phosphorus) is worsening human health and is the origin of problems of ecological character. Hence the World Health Organization (WHO) adopted a resolution that recognizes the problem of food safety as crucial in protecting human health because food pollutants of chemical and radiological character, bacteria, viruses, and vermin provoke the origin of more sicknesses **(WHO, 2014)**. It has been shown that consumption of poor-quality food and water results in the death of up to 2 million people worldwide each year **(Brijnath, Butler and McMichael, 2014)**.

To decrease the rate of accidental deaths, the WHO recommends the introduction of the following principles of alimentary hygiene: a) consumption of only safe water and raw materials in the fabrication of foods, b) protection of raw materials and ingredients against contact with insects, rodents and vermin, c) prevention of contamination of products by harmful substances and pathogens transferred by people, domestic animals, and vermin, d) placing raw products and finished ones in separate places to prevent their cross-contamination, e) cooking of foods at scheduled temperatures and for a time sufficient to annihilate harmful microorganisms, f) storage of finished foods at the scheduled temperature **(WHO, 2018)**.

Thus, the issue of food safety and quality control is an important area of research in Ukraine and across the world. A similar issue has been raised and studied in Russia **(Tsaregorodtseva et al., 2020)**. The authors argue for the use of the best practices of EU countries in Russia, to improve its own regulatory and legislative framework to empower the elimination of threats to the safety of food raw materials and food products. This will allow the reduction to an acceptable level of the risks of contaminating food products at all stages from production to sales, thereby guaranteeing the end-user safety of food products.

Scientific hypothesis

As a result of a systematic analysis of theoretical research, we will have formulated and implemented the principles of a systematic approach to the development of an integrated management system for product quality and safety of meat processing enterprises in Ukraine. This approach will provide an opportunity to develop a risk and critical control point (HACCP) plan for meat processing plants, following the example of the world's best practices. Based on a comprehensive approach to the systematization of international standards, an integrated system of product quality management and the safety of meat processing enterprises operating in conditions of minimal environmental damage will be developed. Thanks to the introduction of an integrated quality system, the overall level of food safety in Ukraine will be increased.

MATERIAL AND METHODOLOGY

Theoretical research methods were used in the work: a comprehensive study of the provisions of legislative, regulatory, and normative documents on the criteria for compliance of food industry enterprises with the norms of product quality and safety, the proper state of the environment, and safe working conditions for staff.

Theoretical methods of research

Methods of literary source and document analysis, induction and deduction, analysis and synthesis **(Hennink, Hutter and Bailey, 2020)** were used, which made it possible to determine the principles of a systematic approach to the development of an integrated management system for product quality and safety of meat processing enterprises in Ukraine.

International documents as a subject of analysis:

1) HACCP meat processing plant; good practices of hygiene (GHP), manufacture (GMP), and distribution (GDP).

2) **ISO 45001:2018 (2018)**, **ISO 9001:2015 (2015)**, **ISO 14001:2015 (2015)**, **ISO 22000:2018 (2018)**, **ISO 22004:2014 (2014),** and the national standards of different countries.

Normative documents on the problems of industrial sanitation and safety of work on production lines, as a subject of analysis:

Fire safety rules according to **GOST (1992)**; air quality standards of the working area according to **GOST (1989)**; vibration safety standards according to **DSTU GOST (2009a)**; norms of fire and explosion safety of static electricity according to **GOST (1993)**; safety standards for handling technological equipment according to **GOST (1991)**; norms of safe arrangement of workplaces according to **DSTU GOST (2009b)**; safety standards for technological processes according to **GOST (2014)**; norms of arrangement of supply and exhaust ventilation systems according to **DSTU (2010)**; norms of industrial noise according to the state sanitary norms of **LTO (1999a)**; vibration norms in the organization of production activities according to the state sanitary norms **LTO (1999b)**; microclimate parameters in production facilities according to the state sanitary norms of **LTO (1999c)**; parameters of heating, ventilation and conditioning according to sanitary norms and rules of **SNiP 2.04.05-91 *U (1997)**; the procedure for washing and disinfection of industrial and domestic premises according to the instructions **I 123-5/990-11-84 (1984)**; fire safety rules according to the norms of the document **NAPB (2004)**; lighting standards according to the requirements of the state building code **DBN (2006)**; norms of providing personnel with special clothes, special shoes and personal protective equipment according to the norms of the document **NPAOP (2008)**; the procedure for training and retraining of staff according to the requirements of the document **NPAOP (2005)**; rules of work on electrical installations according to the requirements of the document **NPAOP (1998)**.

Statistical analysis

The classic methods of Deming and Juran were used, which were developed during the whole period of formation of quality management and which have remained relevant today. Their essence is to study the development of methods of quality planning and statistical analysis **(Anderson et al., 1995)**.

RESULTS AND DISCUSSION

The first step in realizing a system of management for the safety of foodstuffs was the introduction by businesspeople of the principles of the HACCP system **(Hulebak and Schlosser, 2002; Lozova, 2019)** and GHP, GMP and GDP, as well as sanitary norms for maintaining equipment, buildings, and installations normalized by the international standard of food safety **ISO 22000:2018 (2018)**. This document normalizes the order of work by identifying risks and verifying the conformity of the index quality of production and its ingredients with their regulated norms (Table 1).

Table 1 Foodstuff quality control procedures.

Stage of work	Procedure	Result
Inspection	Control of conformity of procedures of work with the recommended norms	Working group reaches specified result
Control	Evaluation of results of work and/or comparing quality indices of samples in development with the basic norms	Quality control indices of new products reach their normalized values
Confirmation	Attestation of facilities by manufacture of new products	Production is safe and its quality conforms with the needs of specific groups of the population (children, adults with specified needs, etc.)

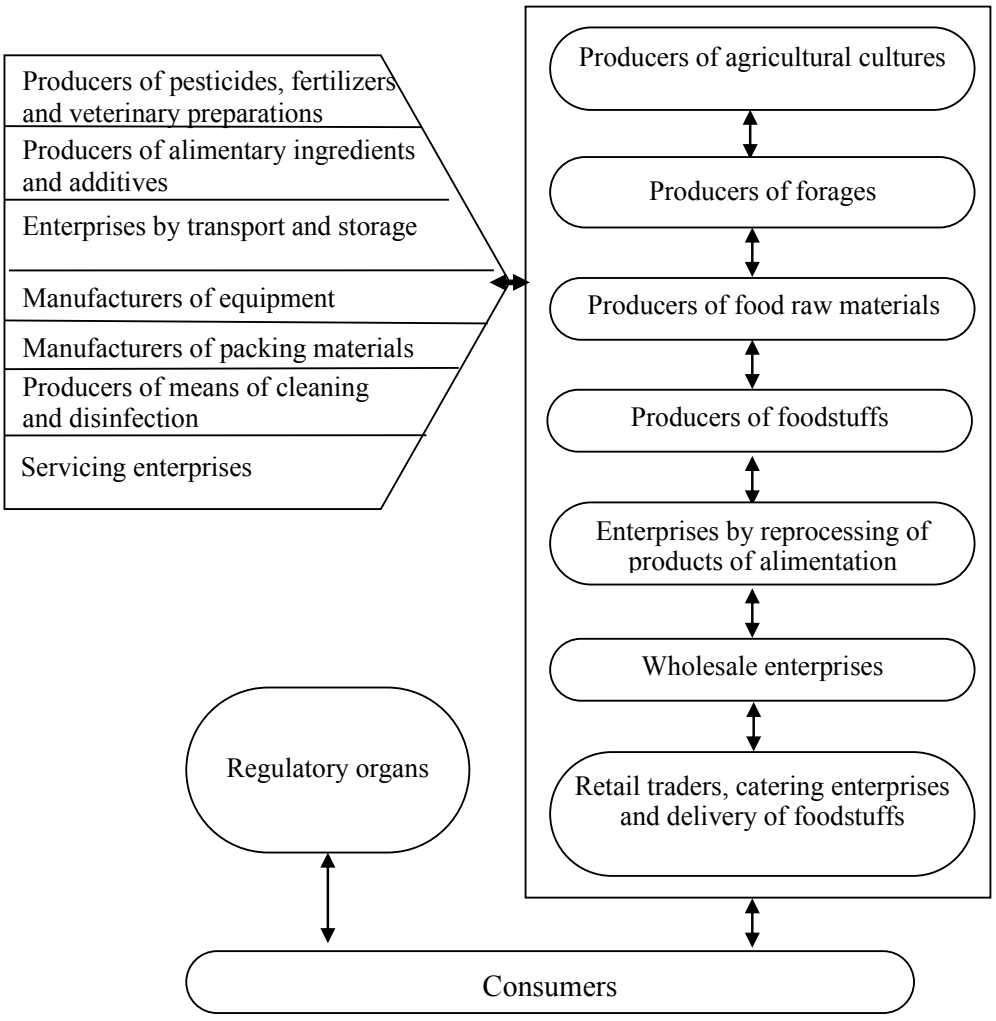

Figure 1 Order of information exchange for raw food.

The auxiliary standard **ISO 22004:2014 (2014)** identifies the objects of control as follows: a) ingredients of foodstuffs, alimentary additives, drinking water, etc., b) processes of treating water, c) state of equipment, condition of working surfaces, packing and other materials, d) compliance with the established requirements of qualification of testing and measuring laboratories and their work procedures, e) observance of norms of personal hygiene and industrial sanitation, f) procedures for storage, transport and distribution of produced foods.

To guarantee observance of the norms established by this document, European persons of the economy have developed several documents regulating the procedures of work for producing safe foods, e.g. the national standards **DS 3027 (2002)** (Denmark standard), **Netherlands specification (2002)**, **BRC (2019)** and **IFC (2019)**.

However, achieving the safety of a certain foodstuff only is not enough in modern conditions because the raw materials and ingredients used are potential sources of hazards, for example, pollution by bacteria, the existence of admixtures of pesticides and heavy metals, and so on. Therefore, the obligatory norm of standard **ISO 22000:2018 (2018)** is the continuous informing of all persons in the food chain (Figure 1).

The typical order of work in assuring the proper quality of manufacture normalizes the international standard **ISO 9001:2015 (2015)**. The ideas at the core of such a document may be classified into four groups: a) planning of quality: establishing the purposes and indices of quality, as well as norms of use of the management system, b) quality management: identification and observance of established norms of work, quality control and correction of non-proper actions, c) assuring quality: works convincing interested parties in the correspondence of objects of control to established norms, d) control and bettering of quality: carrying out work to increase the effectiveness of the enterprise's operation.

At the same time, the quantity of waste formed in the world annually has reached 1.3 billion tons and is estimated to increase to 2.2 billion tons in 2025 **(WHO, 2018)**, so optimizing the procedures of this activity will not solve the problem of assuring healthy conditions of life. Hence here becomes more insistent on the problem of utilization of harmful waste and emissions in the atmosphere, rivers, and seas, because wind, animals, and birds do not know state borders. So, there arose the crucial problem of minimizing the quantity of waste and eliminating sequences of negative human influence on the state of the environment, critical for guaranteeing the health of living and future generations.

We have identified the basic principles of a system of ecological management as a constituent part of a general system of management. They are successfully used in the training of quality management specialists **(Bal-Prylypko et al., 2017)**: a) principle of stable progress: satisfying the needs of humankind realized without the threat of limiting the capability of future generations to use natural resources, b) principle of raising the environmental purity of the enterprise: introduction of measures that assist in decreasing of the level of the negative influence of the person of the economy on the state of the surrounding nature (air, water, and soils) in conditions of the simultaneous raising of the economic and social effects of manufacture.

Karamanos (2001) and **Mitchell (2003)** believed that the components of an environmental management system are: a) consciousness that humankind is an inseparable part of nature and the state of its being depends completely on the state of the environment, b) consciousness of the possibility of health being conditional on the adequate state of natural systems only, c) consciousness of the scantiness of the natural and resource potential of the planet, d) the voluntary limitation of using natural resources up to a level that would not lead to irreversible changes in the state of nature, e) replacing existing goods manufacturing technologies with ecologically compatible ones, f) limitation (if possible) of the global population and the negative influence of its activities on the state of the environment at local, regional and global levels.

People's anxiety about the crucial worsening of global environmental conditions has also found its reflection in the norms of numerous documents and legal instruments devoted to problems of protecting the state of nature in Ukraine **(Law of Ukraine, 1991)**. The result is the development of international standard 14001:2015 'Environmental management systems – Requirements with guidance for use' **(ISO 14001:2015, 2015)**, which establishes the norms for the protection of surrounding nature.

The basic principles of action to reduce environmental damage from industrial waste can be presented in the form of a pyramid **(Kumar and Kumar, 2018)** (Figure 2).

Finally, the staff of food-producing enterprises is live people who are in continual contact with materials, semi-finished products, and finished foodstuffs that contain compounds and substances potentially harmful for their health. At the same time, all work in manufacturing, packing, storage, transporting and distribution involve contact of products with people, which may lead to product contamination and risks to the future health of consumers if hygiene norms are not observed by the personnel of the enterprise. Therefore, a crucial requirement is the observance of the norms of GHP and the creation of healthy and safe working conditions for personnel engaged in manufacture. The norms for organizing such work are found in the international standard **ISO 45001:2018 (2018)**.

Therefore, an enterprise engaged in work with foods must observe at all times the norms of some documents of regulative character, and control of their observance has to be done by specialized departments in its structure. However, the control functions of different kinds of work double in many cases so, to optimize the organizational structure, top management of enterprises has introduced integrated systems of management that comprise all the norms of documents of an administrative character.

We reckon that at a minimum they have to include the norms of four basic international standards, namely **ISO 9001:2015 (2015)**, **ISO 14001:2015 (2015)**, **ISO 22000:2018 (2018),** and **ISO 45001:2018 (2018)**. The layout of the organization of work in the development of such a system is represented in Figure 3 **(Nikolaenko, 2019)**.

Table 2a Succession of work and characteristics of basic norms of standards **ISO 9001:2015**, **ISO 14001:2015**, **ISO 22000:2018** and **ISO 45001: 2018**, used in the development of integrated management system (block 1).

ISO 9001:2015		ISO 14001:2015		ISO 22000:2017		ISO 45001:2018	
Art.	**Part**	**Art.**	**Part**	**Art.**	**Part**	**Art.**	**Part**
0	Scope	0	Scope	0	Introduction	0	Introduction
0.1	General	0.1	General	0.1	General	0.1	Background
0.2	Quality management principles	0.2	Purposes of system of ecological management			0.2	Aim of an OH&S management system
				0.2	FSMS principles		
		0.3	Success factors	—	—	0.3	Success factors
0.3	Process approach	0.4	Plan-Do-Check-Act model	0.3	Process approach	0.4	Plan-Do-Check-Act cycle
						0.5	Content of this document
0.4	Relationship with other management system standards	—	—	0.4	Relationship with other management system standards		
1	Scope	1	Scope	1	Scope	1	Scope
2	Normative references	2	Normative references	2	Normative references	2	Normative references
3	Terms and definitions	3	Terms and definitions	3	Terms and definitions	3	Terms and definitions
4	Context of the organization	4	Context of the organization	4	Context of the organization	4	Context of the organization
4.1	Understanding the organization and its context	4.1	Understanding the organization and its context	4.1	Understanding the organization and its context	4.1	Understanding the organization and its context
4.2	Understanding the needs and expectations of interested parties	4.2	Understanding the needs and expectations of interested parties	4.2	Understanding the needs and expectations of interested parties	4.2	Understanding the needs and expectations of workers and other interested parties
4.3	Determining the scope of the quality management system	4.3	Determining the scope of the EMS	4.3	Determining the scope of the food management system	4.3	Determining the scope of the OH&S management system
4.4	Quality management system and its processes	4.4	Environmental management system	4.4	Food safety management system	4/4	OH&S management system
5	Leadership	5	Leadership	5	Leadership	5	Leadership and worker participation
5.1	Leadership and commitment	5.1	Leadership and commitment	5.1	Leadership and commitment	5.1	Leadership and commitment
5.2	Policy	5.2	Environmental policy	5.2	Policy	5.2	OH&S policy
5.3	Organizational roles, responsibilities and authorities	5.3	Organizational roles, responsibilities and authorities	5.3	Organizational roles, responsibilities and authorities	5.3	Organizational roles, responsibilities and authorities
	—		—		—	5.4	Consultation and participation of workers
6	Planning	6	Planning	6	Planning	6	Planning
6.1	Actions to address risks and opportunities	6.1	Actions to address risks and opportunities	6.1	Actions to address risks and opportunities	6.1	Actions to address risks and opportunities
6.2	Quality objectives and planning to achieve them	6.2	Environmental objectives and plans to achieve them	6.2	Objectives of the food managements system and plans to achieve them	6.2	OH&S objectives and planning to achieve them
6.3	Planning of changes	6.3	Planning of changes	6.3	Planning of changes		—
7	Support	7	Support	7	Support	7	Support
7.1	Resources	7.1	Resources	7.1	Resources	7.1	Resources
7.2	Competence	7.2	Competence	7.2	Competence	7.2	Competence
7.3	Awareness	7.3	Awareness	7.3	Awareness	7.3	Awareness

Table 2b Succession of work and characteristics of basic norms of standards **ISO 9001:2015**, **ISO 14001:2015**, **ISO 22000:2018** and **ISO 45001:2018**, used in the development of integrated management system (block 2).

ISO 9001:2015		ISO 14001:2015		ISO 22000:2017		ISO 45001:2018	
Art.	**Part**	**Art.**	**Part**	**Art.**	**Part**	**Art.**	**Part**
7.4	Communication	7.4	Communication	7.4	Communication	7.4	Communication
7.5	Documented information	7.5	Documented information	7.5	Documented information	7.5	Documented information
8	Operation	8	Operation	8	Operation	8	Operation
8.1	Operational planning and control	8.1	Operational planning and control	8.1	Operational planning and control	8.1	Operational planning and control
8.2	Requirements for products and services	—	—	—	—		
8.3	Design and development of products and services	—	—	8.2	Prerequisite programs		
8.4	Control of externally provided processes, products and services	—	—	8.3	Traceability system		
8.5	Production and services provisions	—	—				
8.6	Release of products and services	—	—				
8.7	Control of nonconforming outputs						
	_—	8.2	Emergence preparedness and response	8.4	Emergence preparedness and response	8.4	Emergence preparedness and response
	—		—	8.5	Hazard control		
	—		—	8.6	Updating the information specifying the PRPs and the hazard control plan		—
	—		—	8.7	Control of monitoring and measuring		—
	—		—	8.8	Verification related to PRPs and the hazard control plan		—
	—		—	8.9	Control of product and process nonconformities		—
9	Performance evaluation	9	Performance evaluation	9	Performance evaluation	9	Performance evaluation
9.1	Monitoring, measurement, analysis and evaluation	9.1	Monitoring, measurement, analysis and evaluation	9.1	Monitoring, measurement, analysis and evaluation	9.1	Monitoring, measurement, analysis and performance evaluation
9.2	Internal audit	9.2	Internal audit	9.2	Internal audit	9.2	Internal audit
9.3	Management review	9.3	Management review	9.3	Management review	9.3	Management review
10	Improvement	10	Improvement	10	Improvement	10	Improvement
10.1	General	10.1	General	—	—	10.1	General
10.2	Nonconformity and corrective action	10.2	Non-conformity and corrective action	10.1	Non-conformity and corrective action	10.2	Incident, conformity and corrective action
10.3	Continual improvement	10.3	Continual improvement	10.2	Continual improvement	10.3	Continual improvement
—	—	—		10.3	Update of the foods safety management system		—

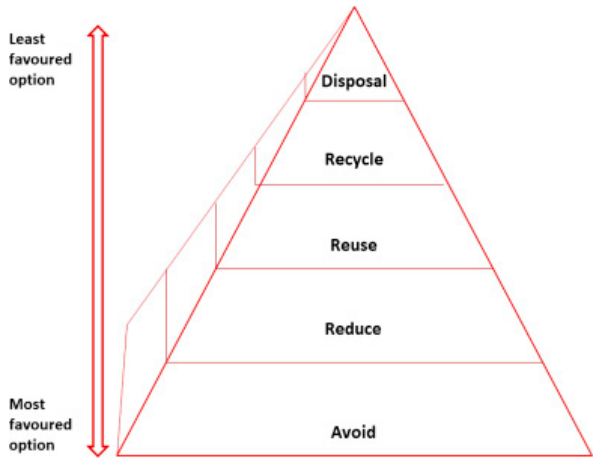

Figure 2 Waste management practice.

This system is also used in the educational process of our university.

The universality of methodology and most of the norms of ISO 9001 were used as a basis for developing system permits to simplify the task of integrating the activities of meat processing enterprises into one management system by the addition of the above standards.

The system offered by us successfully works in the advanced enterprises of Ukraine. We plan to patent it in the future. The succession of works in the development of integrated management systems is shown in Table 2a and Table 2b (blocks 1 and 2) **(Nikolaenko, 2019)**.

The posting shown in Table 2a and Table 2b may be recommended as a typical one in the development of complex integrated quality management systems in meat processing enterprises. The distinctive feature of its chapters is that those have to be taken in the order given in the table.

In Ukraine, the basic document in this area of meat production is the Law of Ukraine 'On Basic Principles and Requirements for Food Safety and Quality' **(Law of Ukraine, 1998)**. However, the norms for production organization established by it have a fragmentary character and cannot be recommended as a basis on which the corresponding products can be designed and put into operation **(Kyryliuk and Kyryliuk, 2017)**. In our opinion, the main reasons are the failure to take into account the provisions of good practices – production, hygiene, distribution, laboratory activities, etc. We eliminate all this in the proposed integrated system (Table 2a and Table 2b). In the proposed variant, the production of meat products is organized in such a way that the probability of occurrence of undesirable situations and a negative impact on the environment is minimized. Today, food legislation in Ukraine is also evolving. The new **Law of Ukraine (2018)** has come into force.

The development was based on the provisions of the Codex Alimentarius Commission, the HACCP principles, and the document **SQF (1995)**. Of greatest practical interest in Ukraine for producers of meat and meat products is Module 11: Food Safety Fundamentals – Good Manufacturing Practices for Processing of Food Products – GFSI El, Ell, Elll, ElV, and L **(SQF, 2017)**. This is especially important for products of animal origin and their processing with a short shelf life and sale.

There is continuous improvement of food production technologies **(Medina et al., 2019)** and the introduction of new product recipes, including those using non-traditional raw materials **(Tavdidishvili et al., 2020)**. All this also requires a comprehensive approach to risk management in the field of meat production.

Microstructural studies of ready-to-cook chopped meat products allow identification of their components, the establishment of the different properties of various tissue and cellular structures, and control of the manufactured articles **(Paska et al., 2019)**. Minced beef as the object of research was modified, with 5%, 10%, or 15% of the meat part replaced with lupin flour and 0.5% with elecampane root powder added as an aromatic raw material. It has been shown that histological studies, with the PAS reaction used, help determine the meat and plant content in the ready-to-cook meat developed, and that hematoxylin and eosin can help determine the functional ingredient content. With this in mind, we conclude that the traceability of meat products is important at all stages, which will ensure an integrated quality system.

Regardless of the size and scope of the enterprise, when developing an integrated management system (IMS) in accordance to the requirements of two or more standards it should be developed a single comprehensive documentation, policy, documented information (procedures, forms of records), processes and management assessment that would create a universal management system for individual objects (quality, food safety, ecology, occupation health and safety, etc.) guided by the general approach of ISO standards to management systems.

Guided by Table 2a and Table 2b, we developed an algorithm for the implementation of IMS, taking into account the requirements of the four standards for management systems in the meat processing plant, presented in Figure 3.

To develop and implement the IMS, a team of specialists from each field (business process management, food safety, ecology, and labour protection) should be established, and a person will be appointed to manage and coordinate the team's activities and be responsible for the development and operation of the overall management system. That is, the IMS managing group should consist of 4 – 5 people. Usually, selected individuals must have appropriate qualifications in their field, understand the processes and manage them, and have sufficient knowledge of the requirements of individual standards. The IMS team leader must have the competence, knowledge, and ability to apply general approaches and requirements to management systems according to selected standards and rules and conditions of integration of management systems, as well as have leadership qualities for overall management and coordination of the IMS group. In the future, it is the IMS group and its head who are responsible for implementing the algorithm for implementing IMS in production.

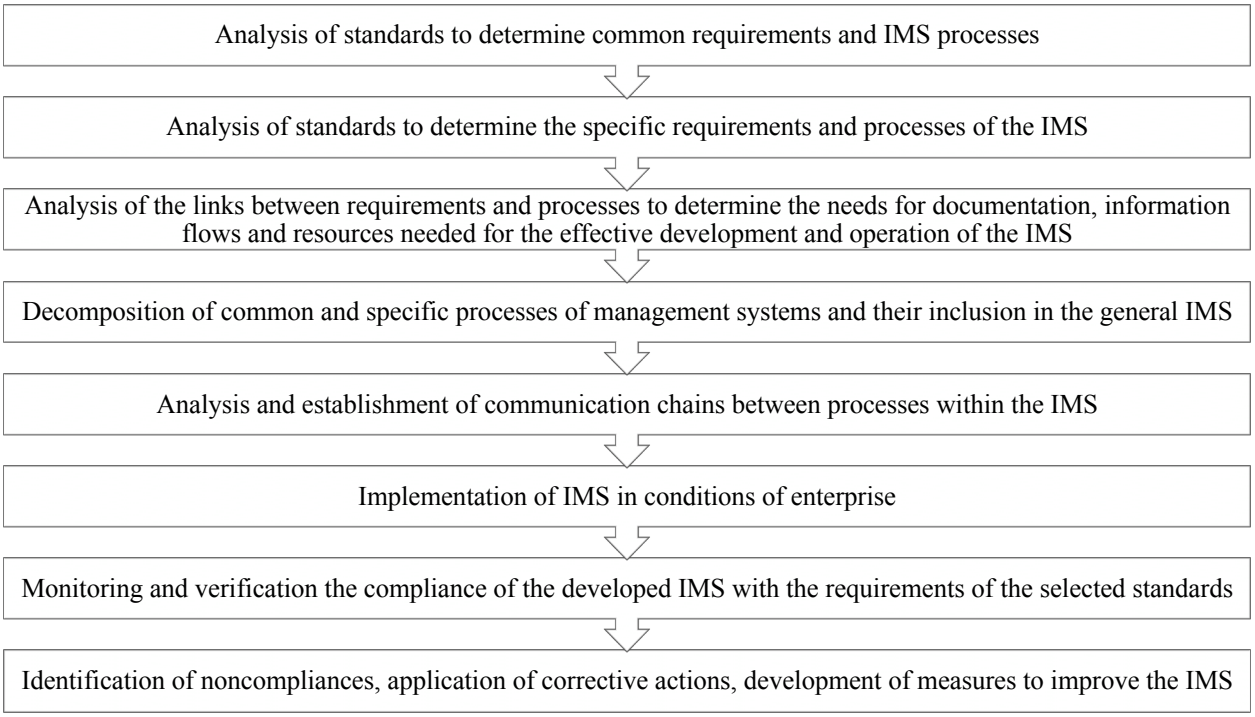

Figure 3 Algorithm of the introduction of IMS in the conditions of the meat-processing enterprises.

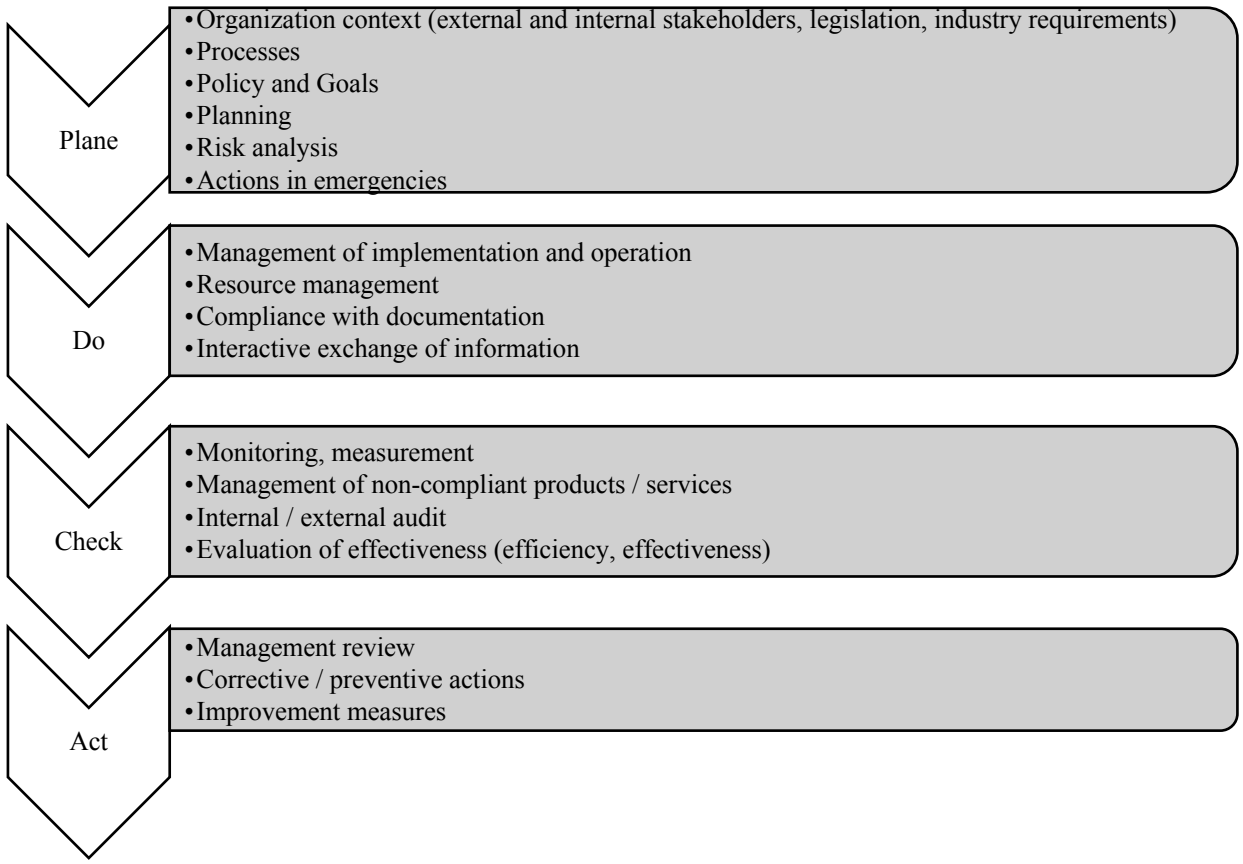

Figure 4 General requirements for IMS, taking into account the cycle Plan-Do-Check-Act.

Applying **PAC 99 Integrated Management (2016)** we have identified common elements of the IMS, taking into account the structure and requirements of the standards **ISO 9001:2015 (2015)**, **ISO 14001:2015 (2015)**, **ISO 22000:2018 (2018)**, **ISO 45001:2018 (2018)**, and the cycle Plan-Do-Check-Act (Figure 4).

Among the common requirements is the requirement to establish the context of the organization, i. e. to identify internal and external stakeholders in the activities of the organization, which either affect the organization or are affected by its activities. Where necessary, the limits of the application of the IMS are agreed with the stakeholders, unless otherwise specified in the contractual obligations or the legislation of the country.

The IMS should not only include external standards and specifications but should also be guided by industry or internal instructions and documentation, provided they are available and acceptable.

Next, the scope of the IMS should be defined, which includes standards, structural units of the enterprise, production sites, products/services, etc.

After defining the scope of the IMS, the management, core, and support processes required for the development, implementation, and operation of the IMS should be identified and the necessary processes should be available in the organization. When determining the processes involved in the IMS, it should be borne in mind that all processes necessary for the proper functioning of the system should be involved, including accounting, marketing, personnel management, etc., because without the inclusion of these processes it is impossible to produce/sell products, services.

In addition to determining the necessary processes, it is necessary to establish their sequence, interaction, and relationship, to establish the criteria and methods necessary to ensure the effectiveness of processes within the IMS.

For each process, it is necessary to develop maps of processes, the main purpose of which is to illustrate the technology of the process and reflect the movement of flows from inputs to outputs between departments and structural units of the enterprise. Exits from one process should be entirely inputs to other processes, and the reflection of inputs and outputs of all involved processes in the enterprise should reflect the relationship and responsibility for the compliance of the final product and activities to the requirements of stakeholders. Process maps should reflect the process with the degree of detail that is necessary to obtain reliable, reproducible, and acceptable process results. The process map is visualized in any form, but there are a number of mandatory elements that should be displayed, among them: name of the process; process operations; resources necessary for the proper course of the process (material, technical, human, information, etc.); competence and qualification of staff; special conditions or parameters of the process; documentation containing requirements for the process product; methods of process monitoring; reporting documentation on the implementation of the process; methods of checking the effectiveness of the process.

As a rule, the graphic and text form of process maps is most often used, which combines a block diagram of the process and a text description of it.

In the future, guided by the requirements of the selected standards for IMS and process maps, the structure of IMS documentation is created. If you define the general documentation that should be within the IMS, it is: IMS policy; objectives taking into account the scope of management of IMS standards; general organizational rules of the enterprise taking into account the requirements of the legislation, stakeholders and the accepted corporate culture; rules of daily routine and remuneration; IMS Guide, which describes the guidelines, processes, and documentation structure of the management system; procedures and documented information as required by relevant standards, specifications used and included in the IMS; documentation required for proper planning, operation, and monitoring of the effectiveness of IMS processes.

The company's policy should include all standards of management systems involved in the IMS, as well as clearly reflect the scope of the system. Objectives should be measurable, achievable, relevant, and include all aspects of management: quality, food safety, environmental and occupational health, and safety. In addition, the goals in different aspects of the IMS should not contradict each other and be clearly understood.

The main document of the IMS, which describes the established management system, is the IMS Guide.

The indicative structure of the IMS Guide is presented below:

1 Integrated management system
- 1.1 Terms
- 1.2 Scope
- 1.3 The organizational structure of IMS
- 1.4 Description of process interaction

2 Regulatory references

3 Terms and definitions

4 Requirements for documented information
- 4.1 General regulations
- 4.2 IMS Guide
- 4.3 Document management
- Records management

5.1 The context of the organization
- 5.1 Defining the context of the organization
- 5.2 Identifying the needs of stakeholders

6 Leadership
- 6.1 Leadership and commitment and leadership responsibilities
- 6.2 Consumer orientation
- 6.3 IMS policy formation
- 6.4 Responsibility and authority

7 Planning
- 7.1 Quality management system
  - 7.1.1 Risks and opportunities
  - 7.1.2 Management measures
- 7.2 Environmental management system
  - 7.2.1 Environmental aspects
  - 7.2.2 Management measures
- 7.3 Food safety management system
  - 7.3.1 Programs are prerequisites
  - 7.3.2 Dangerous factors
  - 7.3.3 Prerequisite programs
  - 7.3.4 Critical control points
  - 7.3.5 Management measures

7.4 Occupational safety and health management system
7.4.1 Hazard identification and risk assessment
7.4.2 Management measures
8 Provision
8.1 Provision of resources
8.2 Human resources, competence and awareness
8.3 Infrastructure
8.4 Functional process environment
8.5 Resources for monitoring and measurement
8.5.1 General regulations
8.5.2 Traceability of measurements
8.6 Knowledge management
8.7 Interactive information exchange
9 Production activity
9.1 Production process planning
9.2 Requirements for products and services
9.3 Definition, analysis and changes in requirements for products and services
9.4 Design and development of new products and services
9.5 Management of processes, products and services supplied by external suppliers
9.5.1 Type and degree of control
9.5.2 Informing suppliers
9.6 Production
9.6.1 Production control
9.6.2 Identification and traceability
9.6.3 Property owned by consumers or external suppliers
9.6.4 Storage
9.7 Supply of products and services
9.8 Change management in production
9.9 Management of inappropriate products and services
9.10 Planning and management of IMS work
9.11 Readiness for emergency stock
10 Evaluation of performance
10.1 General regulations
10.2 Satisfying the needs of consumers
10.3 Analysis and evaluation
10.4 Investigation of events / complaints
10.5 Internal audits
10.6 Management analysis
11 Improvements
11.1 General regulations
11.2 Corrections and corrective actions

After the implementation of the IMS, process monitoring procedures should be provided to obtain objective evidence of the effectiveness of the management system taking into account the established and defined requirements, as well as validation and verification of processes, documentation and overall IMS to assess the effectiveness of the IMS and policy compliance standards and stakeholders.

As a rule, conformity assessment is based on the results of internal and external audits. The overall evaluation of the IMS and the development of measures to improve the management system is based on the results of management analysis. After the analysis, the management updates the policy, goals, resource planning, and the next cycle of the IMS.

CONCLUSION

The principles of a systematic approach to the development of an integrated management system for quality and product safety of meat processing enterprises in Ukraine were formulated and put into practice. This made it possible to develop a plan for risk control and critical control for meat processing plants in Ukraine, taking into account best practices across the world. An integrated system for managing product quality and safety for meat processing enterprises operating in conditions of minimal environmental damage has been developed.

In conclusion, it should be noted that the introduction of IMS in food enterprises in general and meat processing, in particular, will provide a number of advantages:

1 prevent conflicts between management systems that are already in place or planned to be implemented;

2 reduce the level of duplication of documentation, powers, responsibilities and the general level of bureaucratization of the company's management;

3 due to the coherence of the IMS processes, the efficiency and effectiveness of the company's activities are increased and the general coherence of the actions of all structural subdivisions, both production, and non-production, are achieved;

4 a company that implements IMS receives a number of benefits that are aimed at optimizing the external and internal environment (context), and therefore focus on customer and stakeholder satisfaction while meeting the requirements of international standards and best international practices.

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