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CURRENT TRENDS IN THE IMPLEMENTATION OF THE EUROPEAN MODEL OF ENSURING THE QUALITY OF LIVESTOCK PRODUCTS IN UKRAINE

Abstract. The most important task of the modern agrarian policy for the development of the meat products sub-complex is to maintain and increase the level of meat production, stimulate the expansion of its range and degree of processing, as well as to improve the quality. The country's transition to market relations necessitates further improvement of the economic mechanism of management in the meat products sub-complex, their reorientation to stimulate the production of competitive products, considering consumer demand.

The article aims to reveal modern approaches to guaranteeing the quality and safety of livestock products in the EU and substantiate the possibilities of their application in Ukraine.

This work reveals modern approaches to guarantee the quality and safety of animal products in the EU and justify their possible use in Ukraine. The key elements of the new food safety concept in the EU, rooted in the early 2000s are discovered. The specific legislation governing food safeties in the EU is shoved up. The features of the system of quality certification and livestock products produced with food are discovered. Directions for the formation of an effective system for ensuring the quality and safety of organic livestock products are proposed. The experience of product quality management in the meat sub-complex of the EU countries is revealed. The trends of the European system of compulsory labelling of animal welfare in the manufacture of certain types of livestock production and distribution systems of the voluntary certification program for the protection of animals are revealed. The problems in quality due to the intensification of livestock are noted. The trends and modern approaches to improving knowledge about the impact of a number of substances and ingredients contained in animal products, on human health are analysed.

Keywords: livestock products, quality, safety, falsification, certification programs, organic farming, quality assurance logo, intensification

Formulas: 0, fig.: 2, tabl.: 4, bibl.: 23

JEL Classification: Q16, Q18, Q57

Introduction. In recent decades, the problem of guaranteeing the quality of livestock products, and especially their safety, has become extremely acute in Ukraine. According to numerous studies, about 60% of dairy products in the country are counterfeit. If earlier butter and condensed milk were falsified, now these processes have also spread to cheese and whole milk products. After receiving quotas for the export of dairy products to the EU, it turned out that no brand of products meets European quality standards and can not be sold on the European market. Antibiotics were detected in almost 50% of products, and large quantities [SAFOSO, 2016].

There is an uncontrolled filling of the domestic market with low-quality products with the 'smell of milk and meat', the content of palm oil, stabilizers, enzymes, antibiotics, veterinary drugs, etc. [Pabat, Vinnichuk, 2013]. Residues of heavy metals, toxic substances, radionuclides in feed and, accordingly, livestock products cause hepatotoxic, mutagenic and carcinogenic effects, immunodeficiencies and allergies, nervous system disorders, cancer, acute and chronic toxicosis and more.

Literature review and the problem statement. The problem of guaranteeing the quality and safety of livestock products in their works paid considerable attention such scientists as D. Wagner, E. Webb, W. Wismans, J. Dyerberg, R. De Catherine, M. Di Nardi, J. Zhalilo , O. Kovaleva, I. Kravchenko, Y. Oglashenny, T. Ostashko, V. Pabat, G. Rupp, J. Ferreira, J. Higgs and others.

Scientists emphasize a possibility of the production intensification negative impact on the product quality [Czyżewski, Matuszczak, Miśkiewicz 2019; Dzwigol 2019; Dzwigol 2020; Dźwigoł, Shcherbak, Semikina, Vinichenko, Vasiuta 2019] also of animal origin and the sustainability of production systems [Rodríguez-Ortega, Bernués, Olaizola, Brown 2017 for exemple regarding production impacts on GHG emissions [Bais-Moleman,

Schulp, Verburg 2019; Gerssen-Gondelach, Lauwerijssen, Havlík, Herrero, Valin, Faaij, Wicke 2017]. Attempts have been made to analyse the impact of certain qualitative characteristics of meat and milk (cholesterol, various types of fatty acids, antibiotics) on human health and to predict the vectors of development of quality assurance and control systems in animal husbandry, including in the direction of expanding the possibilities of genetic modification [Hocquette, Richardson, Prache 2005; Nardone, Valfrè 1999], milk somatic cell count and risks to the consumers' health [Moradi, Omer, Razavi, Valipour, Guimarães 2021].

Modern research emphasizes the need to optimize the ratio of polyunsaturated fatty acids contained in red meat in favour of omega-3 (ω-3) using the latest genetic technologies [Delgado, Ansorena, Van Hecke, Astiasarán, De Smet, Estévez 2021; De Caterina 2011; Meisel 1997; Wyness 2016]. It is noted that restrictions on fat and cholesterol intake are becoming an important measure to prevent obesity and atherosclerotic risks [Enser, Richardson, Wood 2000; Cizzolini, Zanardi, Dorigoni 1999; Gullón, Astray, Gullón, Franco, Campagnol, MLorenzo 2021; Yuan, Zhang, Hua, Liu, Liu, Yuan, Li, Zhu, Zhang 2020]. According to research by J. Higgs [Higgs 2000], the level of cholesterol in human blood increases due to the fat content in beef and pork. The recent survey has shown that the interest in fish meat consumption is relatively low, whereas pork is more highly preferred [Samková, Hasoňová, Kadlec, Smetana, Kala 2019]. At the same time, meat containing ω-3 polyunsaturated fatty acids can lower cholesterol and, consequently, thrombotic tendencies [Solomando, Antequera, Perez-Palacios 2020]. Different breeds of animals have been found to have different subcutaneous and intramuscular fat levels [Lonergan, Topel, Marple 2019].

The most striking evidence of genetic modification of cattle is the breeding of breeds with the gene 'double muscles' [Teixeira, Oliveira, Chizzotti, Chalfun-Junior, Coelho, Gionbelli, Paiva, Carvalho, Ladeira 2017]. The fat content of carcasses with double muscles is very low compared to 'normal' carcasses (about 50% of adipose tissue and a third of intramuscular fat) [Webb, De Smet, Van Nevel 1998]. This type of meat is becoming very attractive to consumers who want to limit their daily consumption of meat fat. Recent molecular genetics results are also very promising for improving the quality of pork and poultry meat [Enser, Richardson, Wood 2000]. In addition, some studies have shown that an increase in the content of conjugated linoleic acid (CLA) in milk prevents a number of cancers and cardiovascular diseases in humans, stimulates the immune system, prevents the development of diabetes [Boland, MacGibbon, Hill 2001; Chen, Park 2019; Siurana, Calsamiglia 2016].

The authors rely on various components of the new concept of safety of animal products developed by scientists, according to which the concept of safety applies not only to the final product, but also extends to the entire production and marketing chain, in particular to agricultural raw materials [Costa, Vaz, Mendonça, Restle, Kroning, Ferreira, Farias 2020; Dai, Liu 2020; Despoudi 2020; German, Bonanno, Foster, Cotula 2020; Noordhuizen, Metz 2005; Xiang, Xu 2020]. As a basic example of the development of organizational and economic mechanism to improve the quality and safety of livestock products in Ukraine, the model adopted in the EU, which developed a number of basic documents covering all types of food and all processes related to their production and circulation.

Given the exacerbation of the problem of quality and safety of livestock products, there is a need to deepen research to substantiate and apply in Ukraine modern approaches to

ensuring its quality and safety, which are used in the EU and prove their effectiveness. In addition, the high demands of EU legislation and the demands of European consumers are becoming a significant barrier to the export of domestic livestock products - products with a significant share of value added.

The aim of the article is to reveal modern approaches to guaranteeing the quality and safety of livestock products in the EU and substantiate the possibilities of their application in Ukraine.

Research results. In recent decades, the problem of guaranteeing the quality of livestock products, and especially their safety, has become extremely acute in Ukraine [Miskiewicz 2017; Vatamanyuk-Zelinska, Melnychenko 2020]. According to numerous studies, in the country, there is an 'uncontrolled filling of the market with counterfeit products with the 'smell of milk and meat', palm oil, various stabilizers, enzymes, antibiotics, veterinary drugs, etc.' [Pabat, Vinnichuk 2013]. Residues of heavy metals, toxic substances, radionuclides in feed and, consequently, carcinogenic effects in livestock products, immunodeficiencies and allergies, nervous system disorders, cancer, acute and chronic toxicosis caused by direct and cumulative effects of toxicants.

Therefore, there is a need to use modern approaches to guarantee the quality and safety of livestock products used in the EU, as they have proven their effectiveness. In addition, the high demands of EU legislation and the demands of European consumers are becoming a significant barrier to export of domestic livestock products, products with a significant share of value added. That is, the main barriers to trade livestock products with the EU are not import tariffs, but technical barriers [Miśkiewicz 2019; Shkodina, Melnychenko, Babenko 2020]. The problem of improving the quality of livestock products has become more relevant in the context of the formation of a free trade zone between Ukraine and the EU.

In general, the mechanisms for eliminating technical barriers to trade between countries are based on mutual recognition of the results of conformity assessment, and the condition for such recognition is the technical harmonization of standards [Bochulia, Melnychenko 2019]. Such harmonization is achieved in the presence of a modern system of technical regulation in the country, which would comply with generally accepted international norms and rules of international organizations (including ISO). The main components of the technical regulation system are standardization, metrology, conformity assessment, accreditation of conformity assessment bodies and testing laboratories [Semenov, Kozhushko, Shurduk 2011].

The EU technical regulation system is considered to be one of the most successful mechanisms for removing technical barriers to mutual trade. The effectiveness of the European approach in the field of technical regulation confirms the existence of agreements on mutual recognition of the results of conformity assessment with the United States, Canada, Australia, Japan, Switzerland, Israel and other countries. The European model is based on the principles of the 'New approach' to technical harmonization and standardization (adopted by the Council of Europe on 07/05/1985) and the 'Global Approach' on conformity assessment (adopted by the Council of Europe on 21/12/1989). According to these principles, 'the basic requirements for the safety and quality of livestock products are contained in technical regulations, which are obligatory. Control over compliance with the requirements of technical regulations is carried out through market control, rather than one of production processes' [Technical regulation in the EU].

In the EU, there are three main types of legislation, governing economic relations in the field of quality assurance and safety of livestock products: regulations, directives and acts. The Regulation is a law of direct effect, the rules of which EU member states are obliged to comply with. From the moment of entry into force of the regulations, the norms of national law, which come into conflict with the provisions of the regulations, cease to apply (without official repeal). The directive, in contrast to the regulation, contains general concepts and objectives in the field of quality assurance and safety, and it is up to each state to decide how to apply them. The directive 'is binding on each state member to which it is addressed as to the expected outcome, but preserves for the national authorities the freedom to choose the forms and methods of action' [Musis 2005]. The third type of basic EU legislation is an Act. They are binding on those to whom they are addressed and apply to specific states or individuals or legal entities. As the analysis of documents in the field of food quality and safety shows, since 2000 the EU has been gradually moving away from the practice of applying directives (in favor of regulations).

Until early 2000s, regulations in the EU (directives, regulations) that defined the processes of guaranteeing the quality and safety of livestock products were vertically or product-oriented. They, like domestic legislation, contained a detailed description of quality standards and indicators for certain types of livestock products, but did not provide for feed control and analysis of hazardous factors. As a result, 'many problems with ensuring the safety of livestock products (cattle spongiform encephalopathy, the presence of growth stimulants in pork, dioxin in eggs and poultry, antibiotics in honey, etc.), which led to the despair of European consumers in its proper quality' [Nardone 2004].

As a reaction to a number of scandals concerning the low quality of food of animal origin, as well as to change in the attitude of consumers, a new concept of animal hygiene was justified in the EU. According to it, the concept of hygiene applies not only to the final product (meat, milk, eggs, honey), but also applies to the entire production chain, including primary feed production. As a result, the EU is now dominated by a horizontal approach to product quality and safety: a number of key documents have been developed covering all types of food and all processes related to their production and circulation.

The main piece of legislation governing food safety in the EU is Regulation (EC) №178/2002 'On the establishment of the basic principles and requirements of food law, the foundation of food safety agency and establishment of appropriate procedures related to food safety'. It is also called the basic food law of the EU. The regulation contains the following provisions:

- the food chain is considered as a whole on the principle of 'from the field to the table';
- a prerequisite for a successful policy to improve the quality of PAO is the traceability of feeds and components of these foods at all processes and links in the food chain. The principle of traceability means that in the event of a threat to the health of consumers, it becomes possible to withdraw from circulation relevant feeds and products;
- primary responsibility for the safety of PAO is borne by feed manufacturers, farmers and food industry enterprises;
- the consumer has the right to receive accurate and reliable information about the food product. He is responsible for the proper storage, preparation and use of PAO;

- an important component of the security policy of the PAO is risk analysis. This is the basis on which food safety policy is generally based;
- when approving decisions in the framework of risk management, as a rule, preventive methods are used [Butylo, Dobidovska 2012].

The European Food Safety Authority (EFSA) was established under this regulation. The scope of the agency covers a wide range of issues related to food safety, public health and food safety, animal and plant health and protection (feed sources). The Agency also assesses the possible impact of the feed and food chain on the biodiversity of the animal environment, the environmental risks of the use of genetically modified organisms. In general, EFSA is the main source of scientific advice for effective risk management decisions throughout the food chain by the European Commission, the European Parliament and EU Member States.

In addition, in 2004 the EU approved the so-called 'hygiene package', i.e. legislation on the safety of livestock products. Special requirements for the production, processing and circulation of livestock products set by a number of EU regulations. The main provisions and scope of these regulations illustrated in Table. 1.

Table 1 - EU regulations on safety of livestock products and their main characteristics

Regulations	Scope of implementation
№ 852/2004 'On general rules of food hygiene'	Established general rules of food hygiene for all stages of its production, processing and sale, such as: the need to ensure the safety of food of animal origin at all stages of the food chain, starting from the stage of production of raw materials; responsibility for food safety on the part of manufacturers; for food products of animal origin that cannot be safely stored at ambient temperature (especially for chilled and frozen products), the obligation to store at the same temperature at all stages of the food chain; general procedure for the application of procedures based on HACCP principles, together with the application of responsible sanitary and hygienic practices
№ 853/2004 'On special rules for the hygiene of food of animal origin'	Established for entrepreneurs (producers, slaughterhouses, food companies) special rules applicable to food products of animal origin, which often revealed microbiological and chemical risks. These rules supplement the rules laid down in Regulation (EC) No 852/2004. They shall apply to processed or unprocessed products of animal origin: 1) all products of animal origin must have either a marking or an identification sign; 2) owners of slaughterhouses should take animals to the slaughterhouse only if they have invited and received full information on food safety (including the composition of feed, water, veterinary medicinal products or other substances provided to animals during the appropriate period). dates of their provision and periods of detention); 3) strict requirements are established for the hygiene of premises, hygiene of slaughter of animals, hygiene of milking, collection and transportation of milk;

№ 853/2004 'On special rules for the hygiene of food of animal origin'	ed 100 thousand cells/ml, the number of somatic cells - 400 thousand/ml (corresponds to the domestic grade of extra)
№854 / 2004 'On departmental control of certain products of animal origin intended for human consumption'	Established special rules for the organization of official control over products of animal origin. The provisions of this Regulation apply in addition to Regulation 882/2004. The regulations contain separate articles: permission to carry out the activities of enterprises; general principles of official control over all products of animal origin falling within the scope of the regulation; fresh meat; live mollusks; fish products; raw milk and dairy products. This Regulation also contains procedures relating to imports
№882 / 2004 'On official control measures applied to ensure confirmation of compliance'	Establish general rules for the conduct of official control measures to confirm compliance with rules aimed, in particular, at preventing, eliminating or reducing risks to humans and animals to acceptable levels directly or through the environment; guaranteeing fair practice in trade in feed and food products and protection of consumer interests, including labeling of feed and food products and other forms of information for consumers
№2073 / 2005 'On microbiological criteria applicable to foodstuffs'	Established the microbiological criteria applicable to certain micro-organisms and the rules to be followed by food market participants when carrying out the general and specific hygiene measures referred to in Article 4 of Regulation (EC) No 852/2004. Competent authorities shall monitor compliance with the rules and criteria in accordance with Regulation (EC) 882/2004 by taking samples and analyzes to detect and measure the content of micro-organisms, their toxins or metabolites, and to examine foodstuffs suspected of presenting a danger.

Source: *compiled by author based on: [Butylo, Dobidovska 2012; Tavlui 2014].*

The characteristic of all these regulations are the following key components: first, the principle of risk analysis, hazards and critical control points (HACCP), which allows to ensure the production of safe high-quality livestock products by identifying, analyzing and controlling hazards; secondly, it is strictly regulated sanitary and hygienic conditions, which are necessary for effective control of dangerous factors and ensuring the suitability of PAO for human consumption, provided they used for intended purpose; thirdly, the professional competence of management and employees, which allows to successfully solve the problem of improving product quality and, consequently, its competitiveness.

In the EU, the rules on microbiological criteria for livestock products (EU Regulation №2073/2005) complement and based on detailed animal health standards (EU Directive № 99/2002 'On Animal Health'). The relevant EU regulations №1829/2003 (products and feeds) and №1830/2003 (traceability and labeling) regulate the production and circulation of genetically modified food and feed.

EU directives and regulations approved in 2005-2006 contain a wide range of requirements related to feed hygiene (Regulation №183/2005 'On feed hygiene'), as well as labeling and comprehensive consumer information on product properties. In

particular, labels on PAO should contain a complete list of ingredients, as well as indicate presence of potential allergens. A list of ingredients and substances prohibited for use in the processing and processing of livestock products (Directive (EU) №26/2005). The maximum permitted level of residue of veterinary products and hormones in PAO has also been determined, rules for classifying products as organic and using regional names of food products have been introduced.

Thus, the EU has approved detailed norms and standards for products (prohibited substances), for the process (HACCP, traceability on the principle of 'step back, step forward'), for consumer information (labeling), as well as for procedures (official control).

Increased liability of all participants in the food chain for the quality and safety of livestock products has led to an intensification of their efforts to voluntarily assess compliance. In the EU, as of 2010, there were 441 systems for assessing the conformity of agricultural products and food. In order to harmonize these systems and limit their complex pressure to increase the costs of producers, who are often forced to evaluate their products under several schemes, Regulation (EC) № 1151/2012 'On conformity assessment schemes for agricultural products and food products' was adopted and entered into force in 2013. Although this regulation is broadly in line with existing quality assurance schemes, it amended the requirements of previous EU regulations № 509/2006 and 510/2006). They concern the introduction of a simplified certification regime for certain quality schemes (including a simplified procedure for the registration of protected designations of origin (PDOs) and geographical indications (PGI)); mandatory use of logos of origin for products made in EU countries; the need to enter the geographical names of third countries in the EU register on the basis of mutual agreements' [Onosova I. and Shevchuk 2013].

The use of schemes to ensure and confirm the quality of livestock products is based on legislation that contains requirements for its registration, circulation, certification and labeling (using logos of high quality confirmation) (Fig. 1). All applications for registration of logos confirming the high quality of products (PDO, PGI, TSG) are entered into the database of the European Commission.

In Ukraine, only certain parts of the national system of technical regulation are being formed, which ensure the implementation of a horizontal or process approach (instead of product-oriented) to improve the quality and safety of livestock products. Over the last 5 years, efforts have been intensified to bring the national technical regulation system closer to EU and WTO requirements.

According to the current Agenda of the EU-Ukraine Association, within the program to promote mutual trade by removing technical barriers in trading between Ukraine and the EU, the transition from mandatory certification to conformity assessment is carried out, gradual adoption of technical regulations New Approach 'EU, revision and replacement of old standards (State Standard (former edition), State Standard (current edition)) with ISO and European standards, the creation of a market control system [Technical regulation in the EU]. In particular, new (or in a new edition) laws of Ukraine 'On metrology and metrological activity' dated 05/06/2014 № 1314 were adopted; 'On standardization' on 05/06/2014 № 1315; 'On technical regulations and conformity assessment' dated 15/01/2015 № 124; 'On accreditation of conformity assessment authorities' (as amended on 11/02/2015); 'On consumer protection' (as amended on 01/01/2016); approved as the national basic standards of the ISO series 9000 and 14000. The strategy for the

development of the technical regulation system for the period up to 2020 was approved (by the order of the Cabinet of Ministers of 19/08/2015 № 844-p).

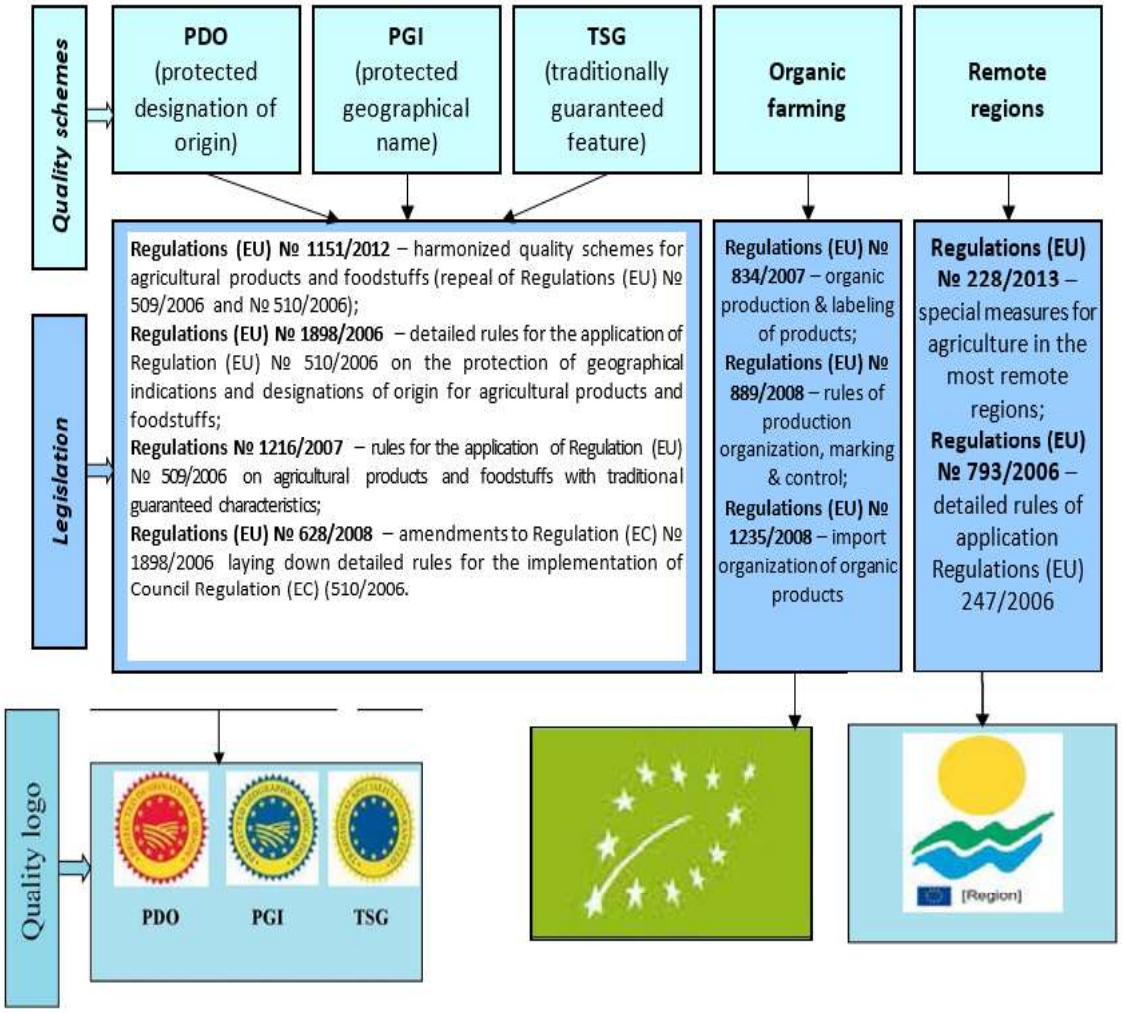

Figure 1 - Schemes of quality of livestock products and their food products
Source: *compiled by the author based on [Vysotska 2014; Katsarova 2013; Kyryliuk, Kyryliuk 2017]*

Thus, the main attention paid to the application of the European principles of the 'New Approach' and the 'Global Approach', which are implemented in Ukraine as technical regulations. In Ukraine, a technical regulation is a legislative act or normative legal act adopted by the Cabinet of Ministers of Ukraine (CMU), which may directly contain mandatory technical requirements or define them by reference to standards or by applying interrelated standards. During 2005-2017, more than 40 technical regulations were adopted.

The principles of the 'Global Approach' implemented in Ukraine by the technical regulation 'Conformity assessment modules and requirements for national conformity marking'. For the effective implementation of its provisions, the Cabinet of Ministers adopted the Resolution 'On approval of conformity assessment modules used for the development of conformity assessment procedures and rules for the use of conformity assessment modules' № 95 of 13/01/2016.

On 13/09/2018, the Cabinet of Ministers approved the draft Law of Ukraine 'On Amendments to Certain Legislative Acts of Ukraine in Connection with the Adoption of the Law of Ukraine' on Standardization' (dated 19/09/2017 № 7123), which brings all bylaws in line with the above Law of Ukraine 'On Standardization'. The provisions of this draft law establish the voluntary application of national standards (as required by European principles of standardization), respectively, eliminate the need for coordination of draft national standards, technical conditions (TC) of enterprises with government agencies, abolished industry standardization. The current product or industry-oriented approach to product quality assurance and the resulting control system based on testing only finished products were 'reactive, inefficient and did not meet existing international trends. They created major problems with monitoring compliance with quality requirements throughout the production and circulation chain' [Kyryliuk, Kyryliuk 2018].

These measures contributed to the harmonization of the main criteria of the domestic system of technical regulation with the European one and generally corresponded to the content of the agreement on the elimination or minimization of technical barriers to trade. At the same time, the European practice of implementing the principle of traceability of products at all stages of its production and circulation requires significant improvements in the system of guaranteeing product safety (especially livestock products). This necessitates the formation of an effective system of sanitary measures in the production and exchange of livestock products and feed, as provided by the Association Agreement 'Ukraine – EU' (Chapter 4 of Section IV), which entered into force on 01/09/2017. According to the agreement, to ensure the protection of human, animal and plant life and health, Ukraine must present and implement a comprehensive strategy to harmonize its legislation on sanitary and phytosanitary measures with EU legislation by priority sectors (according to Annex V to Chapter 4).

Act #228 adopted on 24/02/2016 'On Approval of the Implementation Strategy of Chapter IV (Sanitary and Phytosanitary Measures) of the Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their Member States, on the other side'. The strategy envisages the implementation in Ukraine in 2016 of measures to regulate the general principles and requirements of legislation on safety of livestock and feed products (by analogy with Regulation (EU) № 178/2002), requirements for the hygiene of livestock products (Regulation (EU) № 852/2004); in 2018 - requirements for traceability of food products of animal origin (Commission Implementing Regulation (EU) №931/2011).

However, the process of implementation of European and international standards of safety and quality of livestock products in the field of agricultural production is slow in Ukraine. Out of 297 standards of the Alimentarius Code in Ukraine, only 30 standards are harmonized and are being approved. Only 2 standards (7%) of the total number of State Standards that are in force in Ukraine in the field of animal husbandry and animal breeding (72 standards) as of 01/01/2017, were harmonized with international and European norms. This is one of the worst indicators in the agro-industrial complex (Table 2).

Table 2 - Standards for agricultural products and their level of harmonization with international and European ones

Industry, products	Number of current and old State Standards for poultry meat	Harmonized	The level of harmonization on average, %
Livestock and animal breeding	72	2	2,8
Agricultural buildings and livestock farms	17	4	23,5
Animal feed	218	39	17,9
Apiculture	22	0	0,0
Hunting	4	0	0,0

Source: *[Kovalchuk S., 2016; Ministry of Agrarian Policy and Food of Ukraine].*

Although, in Ukraine, since 01/01/2019, 90% old edition standards were abolished and readopted to new edition Ukraininan Standards EN, the livestock industry was practically not affected by such changes. First, a number of Standards for poultry meat remain in force until 01/01/2022, and secondly, most of the Standards in the field of animal husbandry remain not harmonized with international and European standards. This applies to State Standard 4426:2005 'Beef in cuts. Technical conditions', State Standard 7158:2010 'Meat. Pork in carcasses and half-carcasses', State Standard 4508:2005 'Compound feeds-concentrates for pigs. Technical conditions', State Standard 4673:2006 'Cattle for slaughter. Technical conditions' and other standards.

This situation is objectively determined. Consequently, after the introduction of European and international standards, it is difficult to ensure compliance with the main producer of livestock products - households. Therefore, for Ukraine, in our opinion, 2 real options available:

1) quickly (instantly) introduce European and international standards, in particular ISO standards (in particular ISO 22002-3), the Codex Alimentarius Commission, which will lead to a de facto prohibition on the sale of the vast majority of livestock products obtained on the basis of households. As a result, we may get a supply shock and a sharp rise in prices;

2) gradually introduce international standards simultaneously with the change in the structure of product supply in favor of agricultural enterprises, farms, cooperatives, on the basis of which, it is possible to ensure compliance with international quality standards.

Today, in Ukraine, it is expedient to implement the second option - the introduction of international and European standards of quality for livestock products. At the present stage, the emphasis is on the quality of food of animal origin. The basis for the implementation of measures to regulate the general principles and requirements of legislation on safety of livestock and feed products was the Law of Ukraine 'On Basic Principles and Requirements for Safety and Quality of Food Products' (as amended by Law № 1602 of 22.07.2014) [On the basic principles and requirements for food safety and quality: Law of Ukraine, 2014].

Although even earlier the Act of the Ministry of Agrarian Policy 'On approval of the Requirements for the development, implementation and application of permanent

procedures based on the principles of HACCP' dated 01/10/2012 № 590 [On approval of the Requirements for the development, implementation and application of permanent procedures based on the principles of the Food Safety Management System (HACCP), 2012] was adopted.

The Law of Ukraine 'On Basic Principles and Requirements for Food Safety and Quality' conceptually defines the procedure for guaranteeing in Ukraine the safety and certain indicators of the quality of livestock products produced or in circulation. This procedure is in line with European principles of guaranteeing safety and quality. It provides for mandatory accreditation in accordance with the standard DSTU ISO / IEC 17025:2006 'General requirements for the competence of testing and calibration laboratories' of all laboratories that perform product testing, as well as the creation of a network of reference laboratories.

Mandatory hygienic requirements have been approved 'for facilities for the production or circulation of livestock products, for premises where foodstuffs of animal origin are processed or reprocessed, for vehicles, equipment and inventory, hygienic requirements for water supply, food waste management, hygiene requirements for personnel working in the area of handling livestock products, hygienic requirements for food products of animal origin, including their packaging, including primary packaging, heat treatment, etc.' [On the basic principles and requirements for food safety and quality: Law of Ukraine, 2014].

One of the key ones was the regulation of the introduction of the European principle of traceability and risk analysis in the entire chain of production and circulation of livestock products, as well as the use of hazard analysis and control at critical points (HACCP) by the entities of this chain. The final and transitional provisions of the Law of Ukraine 'On Basic Principles and Requirements for Food Safety and Quality' [On the basic principles and requirements for food safety and quality: Law of Ukraine, 2014] for facilities operating with food products containing unprocessed ingredients of animal origin (except for small facilities) provided on September 20, 2017 to put into effect and apply procedures based on the principles of HACCP. For small businesses that sell products to end users (staff of up to 10 people, area - up to 400 sq.m), as well as facilities that do not sell products and have staff up to 5 people, the deadline is September 20, 2019.

According to the Ministry of Agrarian Policy, as of 01/01/2018, the HACCP system was implemented by 426 domestic enterprises that ensure the production and circulation of food products that contain unprocessed ingredients of animal origin. Another 143 enterprises carry out its development and implementation [State Service of Ukraine for Food Safety and Consumer Protection (official website)].

Compared to the same period in 2017, the number of enterprises that have implemented the HACCP system increased up to 25%, and the number of enterprises that are still developing and implementing, decreased by 5% (Fig. 2). The leaders in the number of enterprises that have implemented or are still developing the HACCP system were Dnipropetrovsk, Volyn, Vinnytsia and Kharkiv regions, in which 60, 49, 48 and 45 such enterprises operated, respectively.

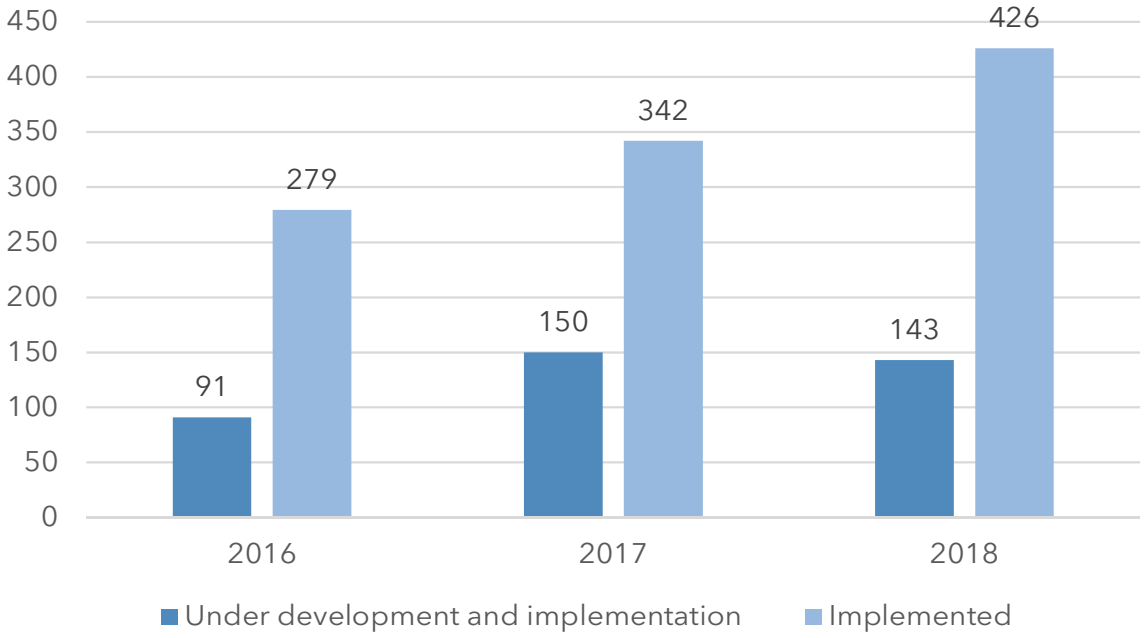

Figure 2 - Schemes of quality of livestock products and their food products
Source: *Ministry of Agrarian Policy*

In addition, the following tendencies are typical for domestic enterprises of food and processing industry: 1) the quality management system in accordance with the requirements of State Standard of Ukraine (SSU) ISO 9001 has been implemented by 449 enterprises, 46 are currently engaged in its development and implementation; 2) the food safety management system in accordance with the requirements of SSU ISO 22000 has been implemented by 686 enterprises, 129 are under development and implementation [Ministry of Agrarian Policy and Food of Ukraine: official website].

However, the ISO 22000:2005 standard stipulates that the application of HACCP principles should be preceded by the implementation and maintenance of prerequisite programs (PRP) for the safety of livestock products in agricultural enterprises. These programs provide effective control and management of hazards in feed production, feeding, watering and grazing, identification, health monitoring, use of veterinary drugs, milking, etc. The need to implement measures to manage hazardous factors in the production, transportation, storage and other handling of livestock products is also provided by Article 40 of the Law of Ukraine 'On Basic Principles and Requirements for Food Safety and Quality', the provisions of which entered into force in September 2016 [On the basic principles and requirements for food safety and quality: Law of Ukraine]. At the same time, the mechanism of development and implementation of these prerequisite programs is regulated by the standard ISO 22002-3:2011 'Programs-prerequisites for food safety. Part 3. Agriculture', which has not yet been approved in Ukraine as a national one. Accordingly, the mechanism of implementation and application of these prerequisites in the practice of domestic agribusiness has not yet been approved. Thus, in the system of technical regulation of quality assurance and safety of livestock

products there was a collision: agricultural producers need to take measures within the second stage of ensuring the safety of livestock products (implementation of HACCP principles), having no idea what mechanisms to implement measures of the first stage (development and implementation of programs - prerequisites in animal husbandry).

In Ukraine, there is a need to approve more than a dozen technical regulations that would determine the mandatory requirements for the processes of production, storage, transportation, circulation of major livestock products: milk, meat (beef, pork, lamb, goat, poultry, etc.), table eggs, and feed. Currently, for only a few of them the projects have been developed, including draft technical regulations 'Raw milk production and quality and safety management', 'Confirmation of safety and quality requirements for fish feed' and others.

In developed countries, standardization is developing mainly due to the active participation of large agro-industrial associations, cooperatives, associations, large exporters, TNCs, etc. However, in Ukraine the financing of standardization works is carried out mainly at the expense of the state budget. The amount of such funding should be quite significant. For example, the total cost of adapting to EU standards in the Polish meat industry alone was around € 2 billion [State Service of Ukraine for Food Safety and Consumer Protection]. In the absence of funds in the required amounts in Ukraine, government agencies are unable to address all issues of standardization, resulting in non-compliance of national regulations with modern requirements. Public bodies, movements and consumer associations have almost no authority and ability to influence the processes of quality assurance and control.

Currently, the safety and quality of most livestock products is controlled by outdated standards and requirements. Most of them do not contain detailed requirements for the content of certain antibiotics, hormones, modern veterinary drugs, residues of chemicals (including dioxin), insecticides, as in the EU. For example, in a number of EU countries (Germany, Belgium, the Netherlands, France, Spain) in 2017, an 'egg scandal' broke out due to the fact that eggs and chicken were found in the remains of chemical fipronil - an insecticide used to treat mites and cockroaches. In Ukraine, the current standards do not provide for the control of livestock products for the content of this drug.

According to some indicators of milk safety, the requirements of the current domestic DSTU are significantly inferior to the requirements of the EU and the US (Table 3).

Table 3 - Comparative analysis of milk quality standards in the USA, EU, Russia and Ukraine

The number of somatic cells (thousand/ml)	Bacterial clogging (thousand cells/ml)	USA	EU	Rus	Ukraine	
					SSU 3662-97	SSU 3662:2015
< 100	< 3					
< 100	< 5	cl. A				
< 100	< 30		Ex			
< 150	< 5	cl. B				
100-200	30-50		Good			

< 200	< 10	cl. C				
200-350	30-50	Unsui-table	Sat			
< 300	< 100			Top grade		
< 400	< 100		Bad		Extra	Extra
301-500	101-500		Unsui-table	I grade		
< 400	< 300				Top grade	Top grade
350-500	300-500					
> 500	> 500					
501-1000	501-4000			II grade		
< 600	< 500				I grade	I grade
< 800	< 3000				II grade	Unsuitable

Source: *data from the Ministry of Agrarian Policy, own research*

According to European requirements in Ukraine, the only milk considered satisfactory that meets the extra grade. Simple tightening of standards, formal tightening the requirements for milk quality will not solve the problem, because its main production provided by the private sector, where from, the milk of the second grade comes. Processing companies, due to the lack of raw materials, in many cases, take milk with a bacterial inoculation of more than 3 million cells per milliliter for processing, i.e. the milk that does not meet even the second grade.

There are differences in European and domestic standards of animal welfare as a prerequisite for high quality products. Requirements for animal welfare, missing in national standards, are described in table 4.

Table 4 - European requirements for animal welfare missing in domestic standards

№	Animal species or process	Official document and content of requirements
1	All species	Council Act 98/58 / EC52. It is necessary to ensure 5 types of wellfare for farm animals: freedom from thirst, hunger or improper feeding; freedom from physical and physiological discomfort; freedom from pain, injury and disease; freedom from fear and chronic stress; freedom of expression of natural (inherent in a particular species of animal) behavior.
2	Laying hens	Council Act 1999/74 / EC. For free-range systems, there are requirements for feed chutes, drinking water supply, seat space, floor construction, litter area (at least 250 cm2 per hen) and number of nests per hen (at least one nest for every seven hens). Planting density should not exceed 9 laying hens / m2 of usable area.
3	Calves	Council Act 2008/119 / EC. Calves should be tethered for only 1 hour during feeding. Calves over 8 weeks of age are not allowed to be kept in individual pens (except for farms with less than 6 calves). Calves kept in groups must have a minimum space depending on weight (up to 150 kg - not less than 1.5 m2; from 150 to 220 kg - not less than 1.7 m2; above 220 kg not less than 1.8 m2). Requirements for minimum unit size (for individual maintenance up to 8 weeks), minimum daily amount of fibrous food for calves older than 2 weeks, average hemoglobin content in the blood (> 4.5 mmol/l), access to sufficient fresh water , feeding frequency.

4	Pigs	Council Act 2001/88 / EC. Sows and piglets should be kept in groups from 4 weeks after fertilization and up to 1 week before expected farrowing, and should have access to manipulation materials / toys for pigs. Directive 2001/93 / EC. Requirements for housing conditions (minimum floor area per animal, floor surface type), noise level (constant noise level up to 85 dB), light intensity (not less than 40 lux, not less than 8 hours per day), feeding (not less than one once a day), weaning age (at least 28 days), prevention of aggressive behavior, rules prohibiting infliction of bodily harm to pigs.
5	Slaughter	Council Regulation (EC) (1099/2009. Animals could be slaughtered only after stunning. The method of stunning should directly cause loss of consciousness or, if not, should prevent fear, pain, stress and unnecessary suffering. This condition should last until the animal dies due to bleeding. The animal must be bled quickly and prevented from regaining consciousness before death. You need to incise the carotid artery and jugular vein or, as recommended by EFSA, both carotid arteries.

Source: *compiled by the author based on [Handbook for small and medium-sized…, 2011]*

If animals imported outside the EU, they have to be documented by a certificate attesting to keeping them on adequate terms. Failure to comply with the abovementioned requirements makes it impossible to export live animals to the EU, as well as their side products. In addition, the EU is subject to certification of soils on which feed is grown, feed itself, as well as equipment, personnel. Accordingly, there is effective control throughout the chain from production to consumption. In some EU countries (particularly the United Kingdom), an enterprise does not participate in government procurement unless it is certified [Marenych, Aranchiy, Maryukha 2009].

Thus, the problem of guaranteeing the quality of livestock products is a complex problem, and along with solving these issues in the field of technical regulation, it should be based on certification of production, and only then - on product quality control. There is a need to intensify work in Ukraine on the formation of a similar to the European integrated quality certification system PDO / PGI / TSG for livestock products [Kovaleva]. The result of its creation will be the protection of economic interests and increase the marketing potential of domestic producers, especially small and medium.

Given the short deadlines for the formation of a close to the European national system for ensuring the quality of livestock products, the significant amount of work that needed to be done, the lack of adequate funding and qualified professionals, this system must be further improved.

Conclusions. The example of the EU shows that guaranteeing the quality and safety of livestock products, ensuring consumer satisfaction with information on the level of such quality is a basic public good, which testifies to the effectiveness and efficiency of the state's performance of its functions. European scientists have thoroughly studied various factors of safety and quality of livestock products (genetics, nutrition, quality management methods, environmental protection, animal health, etc.) and the possibility of their interaction. Currently, the 'classical' analysis of the qualitative characteristics of these products is rapidly expanding due to the development of genetic technologies. Research using genes and data markers is promising, the identification and display of which will contribute to the achievement of certain breeding goals.

However, in Ukraine, instead of looking for ways to improve the quality of milk, meat, eggs, etc., increase their content of useful fatty acids and other elements, there is a widespread trend to increase the consumption of fats of industrial origin, which contain excessive amounts of trans isomers. Thus, the prospects for further scientific research are to develop specific legislative and organizational and economic mechanisms to ensure the quality and safety of livestock products in Ukraine, which would take into account the latest approaches revealed in the study within the European experience.

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