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MAIN TECHNOLOGICAL CHARACTERISTICS OF COW'S MILK IN ACCORDANCE WITH EU REQUIREMENTS

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The study is focused on considering the issues of harmonization of domestic standards in accordance with EU requirements, the importance of studies of the quality of cow's milk in relation to microbial contamination, and the informational capabilities of the indicator of the number of somatic cells in milk.

It is outlined that the production of milk in Ukraine has decreased over the last decade, nevertheless, an increase in the average annual milk yield per cow is being monitored, which indicates improvement in the genetic material.

The normative documents establishing requirements for the quality of milk and dairy products in accordance with European standards, in particular, for indicators of total bacterial insemination, number of somatic cells, freezing point, fat and protein percentage, were considered. The mentioned indicators in the leading countries for the production of dairy products and the peculiarities of determining its quality were analyzed, in particular, in relation to psychrotrophic microflora. In this sense, the temperature range of contamination of milk by bacteria of various types is given.

The main sources and the share of their impact on milk contamination, which spreads through the internal and external environment, are established in the study, as well as the means of their avoidance are indicated. The sanitary condition of milking equipment, the speed and quality of milk cooling after milking (in general, about 70%) have the greatest influence on the contamination of dairy products. Important influencing factors are proper care of the udder, the condition of the floor, the sanitary and hygienic condition of the location of the animals, feed, water, air in the premises, as well as the labour hygiene of the workers on the dairy farm. The important indicator of milk quality is the content of somatic cells, which is the main indicator of infection in the animal's body and makes it possible to identify cows with mastitis in time. Regular control of the content of somatic cells in milk is especially important during the subclinical course of mastitis. In this sense, it is promising to use express methods of mastitis diagnosis, to establish relationships between the synthesis of milk components and the physiological state of the cow, to determine the genetic determinant of the sensitivity of cows to mastitis pathogens, and therefore to prevent mastitis by targeted selection of animals.

Key words: *dairy cattle, milk production technology, milk productivity, milk quality, microbial contamination, quality standards.*

ОСНОВНІ ТЕХНОЛОГІЧНІ ХАРАКТЕРИСТИКИ МОЛОКА КОРІВ У ВІДПОВІДНОСТІ ДО ВИМОГ ЄС

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Поточне дослідження зосереджено на розкритті питань гармонізації вітчизняних стандартів відповідно до вимог ЄС, важливості досліджень якості молока корів щодо мікробного забруднення та інформаційних можливостей показника кількості соматичних клітин у молоці.

Зазначено, що виробництво молока в Україні останнім десятиріччям зменшилося, разом із тим, відстежується підвищення середнього показника річних надоїв на корову, що свідчить про поліпшення генетичного матеріалу.

Розглянуто нормативні документи, що встановлюють вимоги до якості молока та молочної продукції відповідно до європейських стандартів, зокрема – до показників загального бактеріального обсіменіння, кількості соматичних клітин, точки замерзання, вмісту жиру і білку. Проаналізовано зазначені показники у провідних країнах з виробництва молочної продукції та особливості визначення її якості, зокрема – стосовно психротрофної мікрофлори. У цьому сенсі наведено температурний діапазон забруднення молока бактеріям різних видів.

У дослідженні встановлені основні джерела і частка їх впливу на забруднення молока, яке поширюється через внутрішнє та зовнішнє середовище, а також зазначені засоби їх уникнення. Найбільший вплив на забруднення молочної продукції має санітарний стан доїльного обладнання, швидкість та якість охолодження молока після доїння (загалом близько 70 %). Важливі фактори впливу – належний догляд за вим'ям, стан підлоги, санітарно-гігієнічний стан місця розташування тварин, кормів, води, повітря у приміщенні, а також гігієна праці робітників на молочній фермі. Важливий показник якості молока - вміст соматичних клітин, що є основним індикатором інфікування організму тварин і дає змогу своєчасно виділяти корів, хворих на мастит. Регулярний контроль вмісту соматичних клітин у молоці особливо важливо за субклінічного перебігу маститу. У цьому сенсі перспективним є застосування експрес-методів діагностики маститу, встановлення взаємозв'язків між синтезом компонентів молока і фізіологічним станом корови, визначення генетичної детермінанти чутливості корів до збудників маститу, а отже – можливості профілактики маститів шляхом спрямованого відбору тварин.

Ключові слова: *молочна худоба, технологія виробництва молока, молочна продуктивність, якість молока, мікробне забруднення, стандарти якості*

Introduction. Food safety is the basis of the health of any nation in the world. Ensuring the safety of food products at enterprises in developed countries is guaranteed by the HACCP (Hazard Analysis and Critical Control Point) threat analysis system. This system is designed to identify dangerous factors of food products and establish means of their control (Kapitula, 2020).

Since becoming independent, Ukraine has undergone significant economic and social transformations and has acquired the status of a European country with a rapidly

developing economy, although the COVID pandemic and war have significantly reduced the rate of economic growth. Against the background of socio-economic changes, the country's food system has undergone significant changes as the dynamics of investment in the food supply chain is growing, due to which the market for agricultural products is expanding. Nevertheless, the urbanization of the country and the migration of the rural population to the cities, as well as the desire of producers to make products cheaper, lead to an increase in unhealthy processed food (Bukalova, 2022).

Milk production in the world is growing, and the number of workers in the milk production sector is also increasing, which indicates the importance of this product in nutrition (OECD-FAO, 2018). India, the European Union, the USA, China and Brazil consume the largest amount of milk. The highest dynamics of milk production is currently in Asian countries. India alone accounts for 22% of world milk production (Kumar, 2014). In African countries with rapidly developing economies, an increase in milk production and consumption due to population growth and urbanization can be foreseen (Owusu-Kwarteng J., 2020; Blackmore, 2022). In addition, some African countries have set themselves the task of replacing imported milk, milk powder and dairy products with local products as much as possible, accordingly, the requirements for producers, most of which are small family farms, are increasing (Breurec, 2010). In general, the risks associated with the consumption of raw milk vary between developed countries. Thus, in economically developed countries, the dairy sector has an industrial level with the use of modern technologies for the production and processing of milk, and in developing countries, most milk is produced on small farms and milk is sold without proper cooling, processing and contamination control (Owusu-Kwarteng J., 2020).

Raw milk is among the main products that become a source of outbreaks of foodborne diseases, especially in low-income countries due to the tradition of raw milk consumption and the lack of necessary equipment for its processing (Algammal, 2020; Aliyo, 2022; Deddefo, 2023). In addition, numerous microorganisms with various drug resistance patterns have emerged in recent years, causing challenges in the treatment of diseases (Asfaw, 2023). Antibiotics, which are widely used by farmers in livestock farming and later end up in food products, cause even more harm to human health (Bastam, 2021). In addition to food safety, milk quality is a factor that carries significant weight in the marketing and industrial sectors. In most countries, laws set minimum requirements for milk components and standards that ensure added value if they are satisfactory. Therefore, producers need to implement strategies that ensure the best quality of milk in the production process and, thus, receive economic benefits. High standards of quality and safety of dairy raw materials, which are the norm for the world's leading producers, should be integrated into domestic production as soon as possible (Palii, 2020).

In recent years, people all over the world are increasingly concerned about the problem of healthy eating. This is related to the development of the industry of genetically modified and synthetic food products, the impact of which on human health has not yet been studied. Therefore, consumers pay more and more attention to the quality of products, in particular, the absence of harmful additives and the impact of food products on health and the environment. People are more willing to buy products from welfare farms where animals are kept in good conditions and with environmentally friendly production methods, particularly in countries with limited natural resources (Gao, 2020; Jiang, 2021). The most densely populated countries India and China are especially concerned with the problem of food resource sufficiency (Kumar, 2014; Jiang, 2021). The majority of the Chinese population is not interested in product quality, but health-conscious consumers are willing to pay 40% more for quality milk, especially families

with children, which shows concern for the future generation. Consumers are becoming more aware of food safety issues with rising incomes (Fernández, 2015).

Thus, the effects of milk and dairy products on human health are of relative concern and are the subject of many studies, both as food and as their components. That is why **the purpose of the study** was to establish the parameters of microbial contamination of milk in relation to modern quality standards.

Research materials and methods. The systematic review of scientific sources was performed by searching for publications in the databases Scopus, Web of Sciences, Google Scholar, etc., published in Ukrainian and English in recent years in accordance with the inclusion criteria. The systematization of published data was carried out with the aim of accumulating modern scientific knowledge regarding the factors of influence of microbial contamination on the quality of dairy products in order to build further our own methodological basis for research in this direction in domestic conditions, taking into account international experience.

Research results. Indicators of milk production in Ukraine over the past 30 years are presented in Table 1. Unfortunately, the negative trend has been established in the volume of milk production, however, this is compensated by the increase in average annual milk yields for farms of all categories, both in large enterprises and in households. This indicates an increase in the quality of genetic material coming to Ukrainian farms and an improvement in the feeding system.

Table 1

Indicators of milk production in Ukraine (1990-2020)

Indicator	Years			
	1990	2000	2010	2020
Milk production in farms of all categories, thousand tons	24508.3	12657.9	11248.5	9263.6
including in enterprises	18634.1	3668.7	2216.6	2761.2
in farms				
in households, thousand tons	5874.2	8989.2	9031.9	6502.4
Average annual milk yield from 1 cow in farms of all categories, kg	2863	2359	4082	5129
including in enterprises	2941	1588	3975	6634
in households, thousand tons	2637	2960	4110	4666

In 2014, the Association Agreement between Ukraine and the EU was signed, within the framework of which Ukraine had to harmonize its legislation with the provisions of the EU, in particular, Regulation (EU) No. 853/2004, which establishes special hygienic rules for food products, including milk and dairy products. However, when signing the Agreement, the real situation in households in our country was not taken into account. In the countries of the European Union, unlike Ukraine, they do not keep one cow from which milk is given, family farms are more common, where they keep from 25 to 50 cows (Poland, Baltic countries), 50-100 cows (Scandinavian countries). Such livestock requires the mechanization of the processes of keeping and milking cows and, accordingly, the installation of equipment that makes it possible to obtain high-quality raw milk. In EU member states, for over twenty years, the average actual indicators of the number of microorganisms in raw milk are 20-50 thousand/ml, and the number of somatic cells does not exceed 200 thousand/ml. In Ukraine, at the time of the signing of the Agreement, the requirements for raw milk were regulated by the national

standard[vi]. According to this standard, raw milk was divided into three grades: high, first and second. Second-grade milk was mainly supplied to milk processing enterprises by households (80%), its total bacterial insemination was allowed at the level of 3000 thousand/cm3, and the number of somatic cells – 800 thousand/cm3. Obviously, according to European standards, such milk is considered too contaminated with bacteria and unsuitable for the production of dairy products for human consumption.

The need to approach European standards contributed to the introduction of new requirements for raw materials for the production of dairy products. Therefore, in 2015, a national standard was introduced to replace[vii], the only change in it was the introduction of the "Extra" grade, the quality of which meets the hygienic requirements of the EU regulation. This turned out to be not enough, because this standard allowed the production of low-quality milk, therefore, in 2018, a new national standard was put into effect[viii], in which the requirements for the raw milk production process and its quality were strengthened. In the new evaluation system, milk is divided into three grades: extra, high, first. The introduction of the new standard fully integrates the EU requirements with the national requirements and, furthermore, gives the opportunity for manufacturers to reach gradually the new quality standards. With the support of the Swiss State Secretariat for Economic Affairs (SECO), a new program "Development of trade with higher added value in the organic and dairy sectors of Ukraine" was implemented in Ukraine in 2019 (Kravchenko, 2019). One of the key tasks of the "milk component" of the program was to promote the provision of an effective system of public and private control over the production of safe milk. It was assumed that in cooperation with the Ministry of Agrarian Policy and the State Production and Consumer Service, within the framework of the Technical Assistance Program, further development and implementation of the national raw milk control program will be carried out in accordance with the approved requirements for the safety and quality of milk with a wide coverage of the target audience in order to raise awareness of the importance of safe milk production. According to the gradual transition to European standards from January 1, 2024, the minimum requirements for milk suitable for food processing should meet the following criteria: total bacterial contamination - ≤100 thousand/ml, number of somatic cells - ≤400 thousand/ml, freezing point - ≤-0.520ºC, also food milk should not contain inhibitors. It should be outlined that the requirements were planned to be increased gradually, but the gradual transition periods were postponed due to the introduction of martial law (Order No. 889, 2022). Nevertheless, in recent years, there has been an improvement in the quality of milk purchased from industrial farms, the share of milk of "extra" and "high" grades is increasing, which is explained by the creation of appropriate conditions on dairy farms for obtaining higher quality milk. Modern automated systems for managing the processes of feeding and housing cows make it possible to control the health of animals and, accordingly, the quality of milk. The task of Ukraine, which aspires to join the EU as soon as possible, is to introduce these standards. For this purpose, on March 12, 2019, Order No. 118 of the Ministry of Agrarian Policy and Food of Ukraine "On approval of requirements for the safety and quality of milk and dairy products" (Order No. 118, 2019) was issued. This Order was repeatedly amended (Order No. 2760, 2020; Order No. 595, 2022) regarding the improvement of milk quality requirements specifically in the conditions of Ukraine. The new requirements establish criteria, if exceeded, milk cannot be sold (Table 2).

[vi] DSTU 3662-97 "Whole cow milk. Procurement requirements"
[vii] DSTU 3662:2015 "Raw cow milk. Technical conditions"
[viii] DSTU 3662:2018 "Raw cow milk. Technical conditions"

Table 2

Raw milk quality indicators according to requirements

Criteria	Requirements according to DSTU 3662-1997			Requirements according to DSTU 3662-2015				Requirements according to DSTU 3662-2018			EU requirements (Regulation No. 853-2004)
	grade			grade				grade			
	high	I	II	extra	high	I	II	extra	high	I	
Total bacterial insemination at 30°C, thousand CFU/cm³	≤300	≤500	≤3000	≤100	≤300	≤500	≤3000	≤100	≤300	≤500	≤100
Number of somatic cells, thousand/cm³	≤400	≤600	≤800	≤400	≤400	≤600	≤800	≤400	≤400	≤500	≤400
Freezing point, °C	not controlled			not controlled				-0.520			-0.515
Density at 20°C, kg/m³	1027.0			1027.0				1028.0	1027.0		-
Acidity, °T	16-17	≤19	≤20	16-17	16-17	≤19	≤20	16-17	16-18	16-19	-
Fat percentage (basis), %	3.4			3.4				3.4			3.8-4.0
Protein percentage (basis), %	3.0			3.0				3.0			3.2-3.4
Mass fraction of dry substances	≥11.8	≥11.5	≥10.6	≥12.2	≥11.8	≥11.5	≥10.6	≥12.0	≥11.8	≥11.5	-
Degree of purity	I	I	II	I	I	I	II	I			-
Content of inhibitors	-	-	-	-	-	-	-	not allowed			not allowed

As we can see, the main criteria of milk quality, which are paid attention to in the EU, are the total bacterial insemination, the number of somatic cells, freezing point, fat and protein percentage. These criteria are important not only for raw milk, but also for the production of butter, cheese, and fermented milk products. It is worth noting that in the developed countries of the world, the requirements for the quality of milk are even stricter. Thus, the total bacterial contamination of milk should not exceed ≤10,000/ml in the USA, ≤20,000/ml in Great Britain and Norway, and Germany ≤20,000/ml. Moreover, in European countries such as Finland, the content of cold-resistant bacteria (psychrotrophs) is measured (not higher than ≤20 thousand/ml), which are the most hardy and harmful. Psychrotrophs and listeria are able to multiply even when milk is stored in refrigeration units (Tomar, 2018). It should be outlined that raw whole milk has the lowest content of psychrotrophic microflora in summer, and in spring and autumn their content increases threefold. Thus, the content of psychrotrophic microorganisms up to 5.0x10<^>3CFU/cm3 in fresh milk can be considered a hygienic standard of quality and safety, which characterizes the suitability of milk for cooling and storage. The content of psychrotrophic microorganisms in cooled milk before processing up to 7.5x10<^>4 CFU/cm<^>3 is an indicator of its technological quality, indicating a moderate level of lipolysis, at which milk is suitable for processing into all types of dairy products (Kukhtyn , 2015).

The temperature range for the reproduction of bacteria of various species is shown in Figure 1.

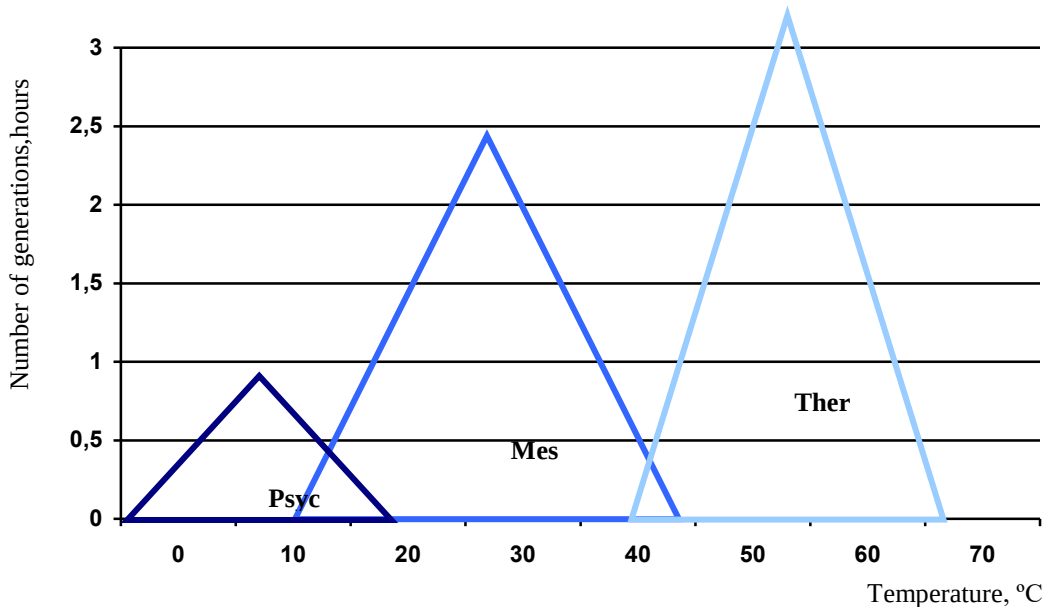

Fig. 1. **Temperature range of bacterial contamination by bacteria species**

It is known that milk is considered sterile in the lumen of the alveoli of a healthy cow, in such milk there are only lactic acid bacteria at the level of 10-50 cells/ml, in the ducts and udder cistern their number is much higher – 10 thousand/ml, in the teats it is even higher – 10 million/ml. It is precisely because of such a number of bacteria in the teats that it is important to milk the first streams of milk in a separate container, which allows reducing the total bacteria content to 10,000/ml. In addition to contamination of the outer surface of the udder and teats, some potentially pathogenic microorganisms (*Staphylococcus, Streptococcus, Bacillus, Micrococcus, Corynebacterium*) can colonize the mammary glands without symptoms. In addition, the analysis of the first streams of

milk makes it possible to detect cows suffering from mastitis and other diseases in time. If the animal has a systemic infection, bacteria can enter the milk through the circulatory system. After milking, the number of bacteria in the milk doubles every 20 minutes. Immediate cooling of milk after milking to 4ºC prevents the growth of microorganisms.

Bacteria contained in milk are divided into useful, harmful and pathogenic. Pathogenic bacteria (*Mycobacterium bovis, Brucella abortus, Coxiella burnettii, Staphylococcus agalactiae, Staphylococcus aureus, Aeromonas, Escherichia coli, Salmonella, Campylobacter jejuni*) can cause serious diseases due to the consumption of raw milk, including tuberculosis, brucellosis, staphylococcal toxicosis, etc. (Kukhtyn, 2017). As it was mentioned above, the most important thing is to avoid endospore-forming bacteria (*Bacillus, Paenibacillus, Staphylococcus aureus, Sporosarcina spp., Listeria monocytogenes*, etc.) that can survive even short-term high-temperature pasteurization (Huck, 2008). These microorganisms are able to form thermostable enterotoxins (Kukhtyn, 2021). The potential for psychrotrophic bacteria to enter the milk production and processing system is an urgent problem that requires a comprehensive solution when obtaining high-quality milk.

The main sources of bacterial contamination, the share of their influence, causes and ways of avoidance are listed in Table 3.

Microbial contamination of milk directly depends on temperature. Fresh milk has a temperature of about 35°C and has bactericidal properties due to the content of natural antitoxins, immune bodies, bacteriolysins, etc. But the storage of milk at a high temperature contributes to the rapid and intensive growth of the number of bacteria, especially during long-term transportation. Rodney J. Feliciano et al. (2020) note that under heat stress, the susceptibility of cows to microbial contamination increases, and, accordingly, the bacterial contamination of milk increases. Therefore, in order to preserve the quality of raw milk, it is necessary to provide low temperature before the processing stage. Cleanliness of milking equipment, cleaning and disinfection of udders, teats, and milking cups contribute to the reduction of milk contamination by bacteria and a longer period of its storage before primary processing (Vargova, 2023).

Toxic compounds produced during dairy fermentation are very dangerous for human health, such as mycotoxins produced by mycelial fungi (Aspergillus, Fusarium, Penicillium) and biogenic amines (products of bacterial metabolic activity) (Fernández, 2015). Mycotoxins enter milk through feed contaminated in the field or during harvesting. The most dangerous mycotoxin is aflatoxin which is a powerful carcinogen, a polyketide produced by the fungi *Aspergillus flavus* and *Aspergillus parasiticus*, which enter milk through damaged grain (aflatoxin B1), is transformed in the liver of lactating cows (aflatoxin M1) and is excreted through the mammary gland.

Biogenic amines are low-molecular nitrogenous organic bases with biological activity, synthesized mainly by decarboxylation of the corresponding amino acids. The most important and widespread biogenic amines found in dairy products are histamine, tyramine, and putrescine, which are formed by decarboxylation of histidine, tyrosine, and ornithine, respectively.

Table 3

Ways of bacterial contamination of milk

Source of contamination, share of impact on contamination	Cause of contamination	Means of avoidance
Sanitary condition of milking equipment (35.0%)	Insufficiently cleaned milking machines, milk cans, milk pipes, tanks, etc., sedimentation of milk residues in structures with difficult access	Washing and cleaning of equipment used in the production and processing of milk
Cooling speed and quality (35.0%)	Long-term storage of milk in an uncooled state, insufficient cooling	Availability of high-quality serviceable equipment, cooling as soon as possible
Udder (10.0%)	Improper care of the udder (contaminated teats, commensals of the udder ducts sticking to the epithelium)	Regular veterinary examination and maintenance of cows. Mastitis control. Washing of udders and teats with clean water before and after milking, treatment of udders with disinfectants after milking.
Soil, bedding, feed, air (10.0%)	Violation of hygiene systems and technologies of maintenance and feeding	Compliance with hygienic standards on the farm. Examination of feed for the presence of bacterial contamination.
Water (5.0%)	Farm water contaminated with pathogenic and saprophytic bacteria	Installation of water purification and disinfection systems on the farm, regular analysis of water quality
Human factor (5.0%)	Non-observance of labor hygiene by workers in close contact with milk, contact with milk by carriers of microbes	Compliance with occupational hygiene, regular medical examination of workers. Elimination of the human factor (roboticization of processes)

The specific issue in the dairy industry in connection with microbiological contamination of milk is an increase in the level of somatic cells in milk, associated with a violation of the physiological state of the udder of cows. On dairy farms in developed countries (the USA, Canada, the EU), the content of somatic cells in milk is considered an important indicator and is used to control mastitis, manage the quality and safety of milk, and adjust the conditions of its production, while in Ukraine this indicator is used mainly to establish the raw milk grade. The indicator of the number of somatic cells in milk is related to bacterial contamination of milk and is the main indicator of the presence of infection in the cow's body, if it exceeds 100 thousand/ml. If this indicator exceeds 200,000/ml, it indicates the activation of the immune system as a reaction to the infection. Most often, an increase in the content of somatic cells in milk indicates sub-

clinical mastitis, which is asymptomatic but associated with a decrease in milk yield, after which clinical mastitis occurs with serious consequences for the cow's health and production losses. Coliform bacteria, enterococci, streptococci (*Streptococcus agalactiae*, *Streptococcus dysgalactiae*, *Streptococc usuberis*), staphylococci (*Staphylococcus aureus*) and *Klebsiella spp* cause mastitis. Therefore, regular control of the number of somatic cells in milk makes it possible to detect animals at the beginning of the disease in time, establish the causative agent of the disease, treat them more effectively and avoid the spread of the disease in the herd. Somatic cells in milk are represented mainly by lymphocytes, macrophages and polymorphonuclear neutrophils, it is advisable to differentiate them by species for more accurate control of the condition of the udder and prevention of mastitis. The indicators of milk that are indicators of mastitis are presented in Table 4.

Table 4

Milk indicators of healthy and mastitis-affected cows

Type of somatic cells	A healthy cow	A mastitis-affected cow
Number of somatic cells, thousands/ml	<100	>200
Type of somatic cells, %:		
macrophages	66-88	<10
polymorphonuclear neutrophils	1-11	>90

Therefore, the number of somatic cells in the milk of cows and their differentiation by species are additional criteria for forecasting and monitoring the mastitis disease. The promising direction in solving the problem of increasing the content of somatic cells in milk is the determination of relationships between the synthesis of milk components in the udder and the physiological state of the cow, as well as the development of express methods for diagnosing mastitis. The study of this issue will also make it possible to determine the genetic determinant of sensitivity of cows to mastitis pathogens and, in the future, to carry out targeted selection.

Discussion. Among the permanent risks, the main ones during the reception, initial processing, storage and transportation of milk are, of course, microbiological. In the production of food raw materials and food products in general and the production of raw milk, in particular, a reliable means of managing dangerous factors is the HACCP system, in which risk management is carried out at critical control points (www.fda.gov). European standards set the most important safety indicators for milk - microbial contamination that can harm the human body. According to the European requirements for cow's milk, microbiological safety is a complex indicator that reflects the total number of microorganisms, the presence of pathogenic and opportunistic microorganisms. Ukraine, as a country aspiring to join the EU, is making a lot of efforts to meet European requirements in terms of milk quality. The main principles of milk quality regulation are contained in the Regulation of the European Parliament and the EU Council No. 178/2002/EC, which establishes the general principles and requirements of legal norms in the field of food products.

National standards of Ukraine DSTU are the basis of technical regulation regarding the quality of dairy products, methods of their control, etc. and they are developed by harmonizing the relevant international standards EN, ISO and other regulatory documents. Considerable work has been done to harmonize legislation on milk quality in accordance with EU standards. In particular, the requirements for the main indicators of

milk quality – bacterial contamination and the content of somatic cells – have been increased. According to the gradual transition to European standards from January 1, 2024, the minimum requirements for milk suitable for food processing should meet the following criteria: total bacterial contamination is ≤100 thousand/ml, number of somatic cells is ≤400 thousand/ml, freezing point is ≤-0.520ºC, food milk should not also contain inhibitors.

Conclusions. Analysis of milk production in Ukraine over the past 30 years showed a negative trend in terms of milk production volumes, however, this is compensated by the increase in average annual milk yields for farms of all categories, both in large enterprises and in households. This indicates an increase in the quality of genetic material coming to Ukrainian farms and an improvement in the feeding system.

The need to approach European standards contributed to the introduction of new requirements for raw materials for the production of dairy products. For this purpose, a number of documents have been developed and implemented over the last decade that regulate the gradual transition to the requirements of the European Union regarding the quality of milk, the main criteria of which are general bacterial insemination, the number of somatic cells, freezing point, fat and protein percentage.

Determination of the content of cold-resistant bacteria (psychrotrophs) in milk, which are the most hardy and harmful, requires special attention, this factor is determined separately in European countries with a developed dairy industry.

The main ways of bacterial contamination of milk are indicated: the sanitary condition of the milking equipment (35.0%), the speed and quality of cooling (35.0%), the cleanliness and physiological condition of the udder (10.0%), the influence of the technology of housing and feeding (10.0 %), water quality (5.0%), the human factor (5.0%), the causes of contamination and means of their avoidance are formulated.

The specific issue in the dairy industry in connection with microbiological contamination of milk is an increase in the level of somatic cells in milk, associated with a violation of the physiological state of the udder of cows. The number of somatic cells in the milk of cows and their differentiation by species are additional criteria for predicting and monitoring mastitis.

The promising direction in solving the problem of increasing the content of somatic cells in milk is the determination of relationships between the synthesis of milk components in the udder and the physiological state of the cow, as well as the development of express methods for diagnosing mastitis. The study of this issue will also make it possible to determine the genetic determinant of sensitivity of cows to mastitis pathogens and, in the future, to carry out targeted selection.

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