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Oksana Pashchenko*
PhD in Economic Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 13 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0002-0603-8072

Olena Zharikova
PhD in Economic Sciences, Associate Professor
National University of Life and Environmental Sciences of Ukraine
03041, 13 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0000-0002-1259-1712

Olena Lymar
Lecturer
Institution of Higher Education "Vinnytsia Humanitarian and Pedagogical College"
21019, 13 Nagirna Str., Vinnytsia, Ukraine
https://orcid.org/0009-0003-1731-0312

Dmytro Alexandrov
Postgraduate Student
National University of Life and Environmental Sciences of Ukraine
03041, 13 Heroiv Oborony Str., Kyiv, Ukraine
https://orcid.org/0009-0001-3820-1559

Milk production trends in Ukraine

Abstract. During 2015-2023, the dairy industry faced challenges that led to a decrease in the number of cows, a decline in production, a decline in its competitiveness, and an imbalance between supply and demand in the internal market. Considering the political and economic situation, it was necessary to solve the problems of dairy production, provide the country's population with high-quality dairy products, and increase their exports to global markets. The study was conducted using abstract and logical, statistical, and tabular methods to collect, process, and analyse information on milk production, cow numbers and their productivity, feed consumption, and the formation of market offers. The graphical method was employed to investigate the share of milk production, the distribution of self-sufficiency, the dynamics of livestock keeping, and the average annual milk yield. The study analysed milk production and examined the share of production in the structure of gross agricultural output in 2015-2023. The study analysed the balance of production and consumption, examined the distribution of Ukrainian regions by the level of milk self-sufficiency, formed a rating of regions by production per capita in 2021. The study analysed and grouped enterprises by livestock, developed a map of the number of cows in farms in 2023, and considered

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*Corresponding author

the average annual milk yield in 2015-2023. The study found that to improve the situation in milk production, it is necessary to comprehensively consider state support that will help increase production and create suitable economic and legal conditions for the gradual transformation of enterprises into family farms or dairy cooperatives. The article identified the main problems of milk production in Ukrainian farms, developed ways to address them, and highlighted the practical value of an integrated approach to measures that will improve the quality and competitiveness of dairy products in the domestic and foreign markets

Keywords: consumption; livestock; productivity; households; enterprise; self-sufficiency

INTRODUCTION

The dairy market plays a significant role in Ukraine's food industry, providing the human diet with animal products such as milk, cheese, yoghurt, kefir, sour cream, butter, sour milk, etc. By supplying the human body with essential nutritional and biologically active substances that are a source of animal protein, the dairy farming industry has become an integral part of the economic structure, which has made it possible to analyse and investigate its development trends, promote exports, provide jobs, and stimulate the development of agricultural cooperative complexes. The study of trends in the dairy industry, such as the introduction of innovative technologies, improvement of the quality of dairy products, and reduction of their environmental impact considerably affect the country's overall economic situation and its integration into the global market.

According to V. Antoshchenkova & Yu. Kravchenko (2022), consumers are increasingly seeking to include dairy products in their daily diet to improve their health with high-quality and healthy natural products. According to the FAO (Food and Agriculture Organisation of the United Station, n.d.), global milk production was estimated at 930 million tonnes in 2022, and in 2023 it grew by 1.4%. The slowdown in milk production growth was driven by a 39% increase in feed prices compared to 2022, higher prices for fertilisers, fuel, and electricity, adverse weather conditions that reduced yields, international climate protection initiatives, and a reduction in the carbon footprint of farms (Kukhaleishvili, 2023). As of 2023, Ukraine was ranked 32nd in the global milk production ranking with 7.36 million tonnes (Official website of the State Statistics of Ukraine, 2023). Ukraine has a favourable geographical location, rich natural resources and production potential, and opportunities for the development of dairy farming. However, in 2015-2023, the industry experienced negative trends in the reduction of livestock, a decrease in milk production, increased imports, rising prices and, accordingly, an increase in the cost of dairy production (Gladiy & Prosovich, 2022). L. Donets *et al*. (2024) believe that negative trends also include a decrease in the share of dairy exports, a low technological level of milk production at enterprises, and insufficiently established cooperation between households (the main milk producers) and dairy processing enterprises. Changes in consumer preferences, a decline in consumer solvency, the pandemic, climate and demographic changes, the introduction of martial law, and active hostilities were also factors. Consumer interest in plant-based animal milk substitutes grew in 2015-2023. It was necessary to constantly prove to consumers the benefits of milk consumption, provide reliable information about the dangers of alternative products, and fight unfair competition and falsified dairy products (Antoshchenkova & Kravchenko, 2022).

Considering that on 13 December 2023, the European Council decided to negotiate Ukraine's accession to the EU, and in 2024 Ukraine is working with the EU on the process of full integration of all its institutions into European standards, milk producers must modernise their production following European standards, such as Codex Alimentarius Commission (2024). Such as the EU Regulation developed under the auspices of FAO (Regulations of the European Parliament of the EU and of the Council No. 2019/1700 On a Common Framework for European Statistics on Persons and Households Based on Individual-Level Data Collected From

Samples, 2019), Order of the Ministry of Health of Ukraine dated No. 1145 "On Approval of the Requirements for Claims About the Nutritional Value of Food Products and Claims About the Health Benefits of Food Products", 2020), and the WHO Institute of Nutrition (Order of the Ministry of Health No. 1613 "On Approval of the Rules for Adding Vitamins, Minerals and Some Other Substances to Food Products", 2020). According to the Hazard Analysis and Critical Control Point (HACCP, 2023), DSTU ISO 22000:2019 (2019) and Food safety management systems (2020) standards, by modernising dairy production to EU standards, enterprises will be able to maintain the competitiveness of the Ukrainian dairy industry and open new markets. I. Tsvigun & F. Tsvigun (2023) noted that the main problems of dairy farming recovery are related to the growth of the number of animals, but it is also necessary to consider the economic indicators of milk production, prices and quality of dairy products, the volume of milk exports and imports, and the solvency of the country's population. According to L. Donets *et al*. (2024), it is important to stabilise and improve the situation on the milk market by using a combination of measures based on economic, legal, and government support.

M. Gladiy & O. Prosovich (2022) found that an increase in state support and funding for the dairy industry can become a driving force for development, concluding that only with close contact, interaction, and consideration of the interests of all actors – producers, processors, and the state, development of a strategy, implementation of an effective mechanism for its implementation, it is possible to ensure sustainable growth of the dairy industry in the long term. The purpose of this study was to analyse trends in milk production and to find out the reasons for the negative trends in dairy farming. The objective of this study was to propose measures and determine the prospects for production in Ukrainian farms, considering the real conditions and practices of developed countries, to provide the internal market with the necessary volume, quality, and growth of its exports.

MATERIALS AND METHODS

The information and analytical framework of the study was based on statistical materials of the State Statistics Service of Ukraine (Official website of the State Statistics of Ukraine, n.d.) and FAO for 2015-2023, as well as the results of research by international organisations. The main sce of information is the section "Livestock Production, Number of Livestock and Feed Supply" and the statistical yearbook "Balances and Consumption of Basic Foodstuffs by the Population of Ukraine" on the website of the State Statistics Service of Ukraine (Official website of the State Statistics of Ukraine, 2023), which contains information on milk production, cow productivity, feed use, consumption of basic foodstuffs and balance of dairy products. The theoretical basis of this study was taken from the studies of Ukrainian and foreign researchers who have investigated the problems and challenges of the dairy industry. The recommendations of the WHO Institute of Nutrition of Ukraine (Order of the Ministry of Health No. 1613 "On Approval of the Rules for Adding Vitamins, Minerals and Some Other Substances to Food Products", 2020) were used to study the consumption of dairy products.

The National Programme for the Development of Dairy Farming and Processing Enterprises of Ukraine until 2030 was a strategic legal document at the national level. The general scientific methods of research included the method of analysis, based on which the research algorithm was built; the method of comparison, which helped to compare the principal indicators of the dairy industry development; abstract and logical method for generalising trends in the development of the dairy industry, forming prospects for its development, and drawing conclusions. Several special methods were employed in the study, namely: the method of economic analysis and ranking to identify the key factors that affect the efficiency of milk production; the econometric method of testing data in the Excel software package to confirm the existence of quantitative relationships between identifying trends in the development of dairy cattle breeding indicators; tabular and graphical methods to improve the analytical perception of data statistics and draw correct conclusions about milk production, cow numbers and productivity, feed consumption, milk supply, distribution of self-sufficiency, dynamics of cow keeping on farms, and average annual milk yield.

The principal standards in the Codex Alimentarius Commission study were "Standard for fermented milk products" (CXS 243-2003, 2003), "Standard for the naming of milk fats" (CXS 211-1999, 1999), "Standard for milk fat spreads" (CXS 253-206, 2006), "General Standard for Cheese" (CXS 283-1978, 1978), Order of the Ministry of Health "On Approval of the Requirements for Claims About the Nutritional Value of Food Products and Claims About the Health Benefits of Food Products" (Order of the Ministry of Health No. 1145 "On Approval of the Requirements for Claims About the Nutritional Value of Food Products and Claims About the Health Benefits of Food Products", 2020), "Food Safety Management Systems" (DSTU ISO 22000-2019, 2019). "Requirements for organisations in the food production chain" (Food safety management systems, 2020), and the Law of Ukraine "On Basic Principles and Requirements for the Safety and Quality of Food Products" (Law of Ukraine No. 3221-IX "On Basic Principles and Requirements for the Safety and Quality of Food Products", 2023).

The share of milk production in total agricultural production was calculated using Equation 1:

$$V = \frac{QxP}{GP}, \quad (1)$$

where P is the share of milk production in total agricultural production, %; Q is the production quantity, tonnes; P is the price, UAH; GP is gross agricultural production, UAH.

Factual consumption of dairy products was calculated based on Equation 2:

$$FCd = Q + I - E - CL, \quad (2)$$

where FCd is the factual consumption of dairy products, kg; Q is the production quantity, tonnes; I is the imports, tonnes; E is the exports, tonnes; CL is the feed costs and consumer losses.

The level of self-sufficiency was calculated using Equation 3:

$$SL = \frac{FICm + FC + L}{Q}, \quad (3)$$

where SL is the self-sufficiency level, kg; $FICm$ is the fund for internal milk consumption, kg; FC is the feed costs, tonnes; L is losses, tonnes; Q is milk production volume.

The concentration of livestock per farm was calculated using Equation 4:

$$C = \frac{Ni}{\sum Vi, i<1<n}, \quad (4)$$

where Ni is the number of livestock of the i-group, heads; i is the group by number of cows, number; n is the number of groups.

The calculation of the number of cows and their number by farms was based on the average number of cows in the farms of the regions of Ukraine. The degree of influence of the factor characteristics on the result was analysed using Microsoft Excel software. The sample was formed based on data from 24 regions of Ukraine. The data does not include the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol, and part of the temporarily occupied territories of Donetsk and Luhansk regions.

RESULTS AND DISCUSSION

The dairy industry is one of the leading sectors in Ukraine's food industry. In 2023, the share of milk production in total agricultural production (in gross output prices of 2021) was 29.9%, and in the structure of gross livestock production – 5.6% (Fig. 1).

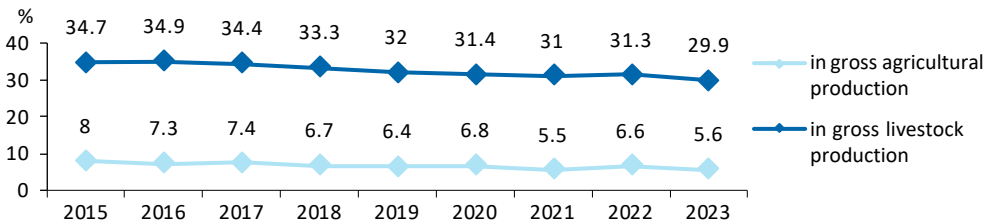


Figure 1. Share of milk production in total agricultural production (share in the overall structure of livestock production)

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

According to the study, it was found that compared to 2015, it decreased by 3.4% and 1.4%. This negatively affected the milk market, consumption, sales, and exports. The development of the dairy industry is influenced by the state of the production base, consumer solvency, market infrastructure, etc. In 2019-2023, the effects of the COVID-19 pandemic, martial law and, as a result, a decline in milk production were added to the factors (Kozak & Hryshchenko, 2022). Countries around the world have different attitudes towards milk consumption and production. For example, in China, which is the largest importer, consumption is 260 ml per person per year (Ukraine: Milk Production, 2020). This is conditioned by the fact that the Chinese tradition of consuming dairy products is still being formed, and there is a shortage of dairy products on the market, which is why China is dependent on imports of dairy products. The Ministry of Health of New Zealand suggests consuming dairy products at least twice a day, giving preference to low-fat dairy products, including "alternative" milk (rice, coconut, and soy) in the diet. It is recommended to consume 1 glass of milk (250 ml), 1 package of yoghurt (125-150 g), 2 slices of cheese (40 g) and 1 glass of soy milk (250 ml) per day. The daily milk consumption rate (in terms of raw milk) in New Zealand is 108.88 kg/person, in Canada – 76.18 kg/person, Australia – 99.14 kg/person, the USA – 64.05 kg/person, and in India the consumption rate is 58.70 kg/person, according to 2020 data (Ukraine: Milk Production, 2020).

The WHO recommends consuming 330 kg of milk and dairy products per person per year (How much dairy products should be consumed, 2022). According to the recommendations of the Institute of Nutrition, the WHO recommends a daily intake of 3-4 glasses of milk per day for a child, or it can be replaced with kefir, yoghurt, hard and cottage cheese, because at a young age the body needs to be saturated with calcium, the consumption of which affects bone density. An adult's daily intake of dairy products is 2 glasses of milk, kefir, ryazhanka (baked milk) or 500 g of cottage cheese, and it is recommended that elderly people consume up to 3 glasses of fermented milk products such as yoghurt and kefir per day. In the United States, the Department of Agriculture recommends consuming three servings of dairy products per day (one serving is a glass of liquid milk or yoghurt or 40 g of hard cheese). The Ministry of Health of Ukraine recommends consuming one glass of milk (250 ml), one serving of yoghurt (200 ml), 40 g of hard cheese, and 120 g of cottage cheese (How much dairy products should be consumed, 2022). The rational, scientifically sound annual consumption rate of milk and dairy products per person in Ukraine is 350-380 kg per year. Studies have shown that the consumption of dairy products in Ukraine decreased by 1.08 times in 2015-2021 (from 8,995 thsd tonnes in 2015 to 8,337 thsd tonnes in 2021). Analysing the production and consumption of milk and dairy products per capita in Ukraine, its decrease can be observed. The study showed that in 2015-2023, milk production per capita decreased by 24 kg, while consumption in 2015-2021 decreased by 8.4 kg and amounted to 201.5 kg (Table 1).

Table 1. Dynamics of production and consumption of milk and dairy products per capita, kg

Year	Production		Consumption	
	kg	to the previous year	kg	to the previous year
2015	248	–	209.9	–
2016	243	98.0	209.5	99.8
2017	242	99.6	200.0	95.5
2018	238	98.4	197.7	98.9
2019	230	96.6	200.5	101.4
2020	222	96.5	201.9	100.7
2021	211	95.1	201.5	99.8
2022	222	105.2	–	–
2023	224	100.9	–	–
Consumption norm	–	–	380.0	–

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

In 2021, the per capita consumption of dairy products in Ukraine was 26.27% of the physiological norm of 380 kg of the Ministry of Health. Compared to WHO standards (330 kg), this is 30.25%. The decline in milk consumption per capita is caused by a decrease in milk production, which in all categories of farms decreased by 30% or 1.4 times from 10.6 million tonnes to 7.4 million tonnes in 2015-2023 (Table 2).

Table 2. Milk production in Ukraine, 2015-2022

Indicator	Year							2023 in % to	
	2015	2016	2019	2020	2021	2022	2023	2015	2022
thsd. t	10,615	10,064	9,663	9,264	8,714	7,768	7,430	70.0	95.7
%	100	100	100	100	100	100	100		
Agricultural enterprises:									
thsd. t	2,669	2,756	2,729	2,761	2,768	2,621	2,810	105.3	107.2
%	25.1	27.4	28.2	29.8	31.8	33.8	37.8		
Household farms:									
thsd. t	7,946	7,309	6,935	6,502	5,946	5,147	4,621	58.1	89.8
%	74.9	72.6	71.8	70.2	68.2	66.2	62.2		
Milk production in all categories of farms:									
Milk production per capita, kg	247.8	238.1	229.9	221.9	210.6	221.9	223.8	101.1	95.7

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

At the same time, production in agricultural enterprises increased by 5.3% or 141 thsd tonnes, while households saw a faster decline in milk production – by 41.9% or 3,325 thsd tonnes. With the outbreak of hostilities in 2022, milk production in all categories of farms decreased by 10.9% compared to 2021, due to a 20% decrease in milk production in households and a 10% decrease in agricultural enterprises. It was found that a considerable share of milk production (66.2%) is accounted for by household farms, while agricultural enterprises account for 33.8%. According to statistics from 2015-2022, the functioning of the dairy market under comparable production and marketing conditions shows serious structural problems and requires urgent reforms to ensure stability and efficiency. In the long term, it is the development of dairy farming through large, specialised enterprises that can produce quality milk, improve technological conditions, attract investment in the construction of new farms and improve existing ones. According to official data, in 2022, almost a third of milk production in Ukraine was provided by agricultural enterprises, while in 2015 it was only 25% (Official website of the State Statistics of Ukraine, 2023).

Even though agricultural enterprises reduced their milk production in 2015-2022, their share in total production began to shift upwards, from 25.1% to 33.8%, due to improved conditions for keeping cows and milk yield. In 2022, the company produced 5,147 thsd tonnes of the product, which is 20% less than in 2021. It is highlighted that a large share of production in households in Ukraine (66.26%) is not due to an increase in production but is the result of a decrease in production in the public sector (Kozak & Hryshchenko, 2022). Gradually, the bulk of milk production in Ukraine is shifting towards large enterprises. Household farms are characterised by labour market shortages and production costs. Due to the lack of mechanisation of production, small livestock sizes (mainly 1-2 cows), insufficient feed supply, and low development of breeding. Farms cannot guarantee the proper quality of milk due to the inability to ensure proper sanitary and hygienic standards of its production or in the absence of primary processing (cooling), and therefore they continue to actively get rid of cows, which affects the decline in milk production in the country (Shpychak, 2021). It was found that a decrease in

the share of households in the milk market will lead to an increase in product quality and prices. An analysis of the balance of production and consumption of dairy products in all categories of Ukrainian farms showed that its volumes decreased (Table 3).

Table 3. Balance of milk and dairy products in all categories of Ukrainian farms, thsd tonnes

Indicators	Year						
	2015	2016	2017	2018	2019	2020	2021
Production	10,615	10,382	10,281	10,064	9,663	9,264	8,714
Changes in inventory	-41	28	33	74	-1	171	-26
Import	78	105	132	180	337	691	781
Total resources	10,734	10,459	10,380	10,170	10,001	9,784	9,521
Export	464	434	835	807	593	440	369
Spent on feed	1,097	1,069	1,036	996	969	904	805
Losses	15	14	13	12	11	10	10
Consumption fund	8,995	8,942	8,496	8,355	8,428	8,430	8,337
per 1 person, kg	209.9	209.5	200	197.7	200.5	201.9	201.5
Level of self-sufficiency	105.0	103.6	107.7	107.5	102.7	99.1	95.2
Market capacity	10,220	10,053	9,578	9,437	9,407	9,515	9,126
Degree of market openness, %	0.76	1.04	1.38	1.91	3.58	7.26	8.56

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

It was found that milk production exceeds the consumption fund, but consumption itself does not meet the standards. In 2015-2021, milk consumption per capita ranged within 200-209 kg (Official website of the State Statistics Services of Ukraine, 2023). The loss of control over part of the country's territory as a result of hostilities, a decline in the purchasing power of the country's population, and a reduction in the size of the market have all contributed to a reduction in the capacity of the internal dairy market. In 2021, the share of milk produced in Ukraine that was used for domestic consumption in the dairy sector was 9.2%, and 95.7% for household consumption. In 2021, the market capacity was 9,126 thsd tonnes, down 10.8% compared to 2015 due to a decrease in production and exports (by 17.9% and 20.5%, respectively).

In 2015-2021, imports increased 10-fold to 9% of commodity production, or 2.3 times higher than exports. The degree of openness of the dairy market increased from 0.76% in 2015 to 8.56% in 2021 due to increased imports of products and a decrease in market capacity, which shows Ukraine's import dependence on other countries. However, the level of self-sufficiency in milk and dairy products in 2021 was 95.2%. The highest self-sufficiency rates in 2015 and 2021 were in Poltava, Khmelnytskyi, Chernihiv, and Vinnytsia regions, while the lowest were in Kyiv, Luhansk, Dnipro, and Donetsk regions (Fig. 2). At the same time, in 2021, Ternopil region met the demand for dairy products by 174%, Zakarpattia region – by 94%, Zaporizhzhia region – by 57%, Lviv region – by 71%, Odesa region – by 65%, Kharkiv region – by 76%, Cherkasy region – by 151%, Sumy region – by 164%. Insufficient coverage of milk and dairy products consumption is related to household incomes, rising prices for milk and dairy products, and production volumes of milk and dairy products. The largest volumes of milk production per capita in 2015-2021 were also observed on dairy farms in Khmelnytskyi, Poltava, Chernihiv, Vinnytsia, Ternopil, Zhytomyr, and Cherkasy regions (Table 4).

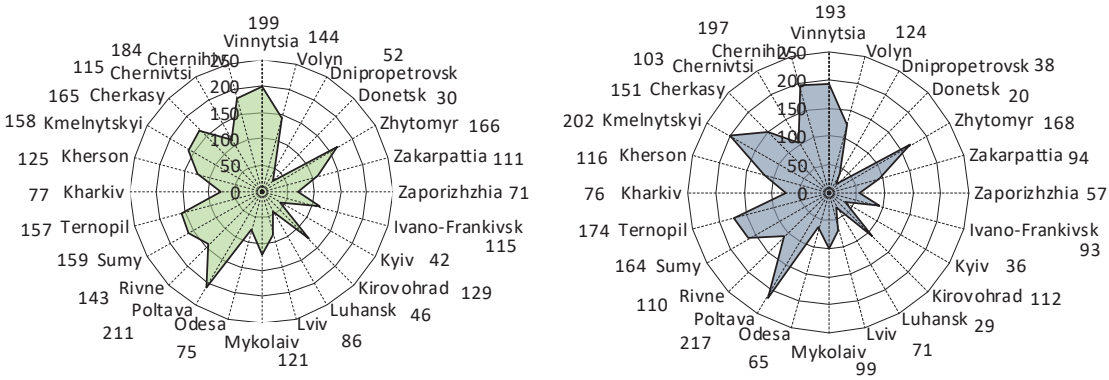


Figure 2. Distribution of Ukrainian regions by level of milk self-sufficiency

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

Table 4. Milk production per capita, kg

Regions of Ukraine	2015	2016	2017	2018	2019	2020	2017	2021 to 2015, %
	248	243	242	238	230	222	211	85.0
Vinnytsia	522	535	538	526	492	475	452	86.5
Volyn	408	396	396	377	357	344	330	80.9
Dnipropetrovsk	106	99	93	91	89	87	79	74.8
Donetsk	53	45	45	45	42	38	35	66.4
Zhytomyr	462	456	443	451	426	421	411	88.9
Zakarpattia	284	255	258	275	279	269	250	88.1
Zaporizhzhia	148	149	151	142	130	121	109	73.8
Ivano-Frankivsk	343	338	336	321	313	301	290	84.5
Kyiv	96	94	93	92	84	81	78	80.5
Kirovohrad	318	317	318	324	320	294	296	93.0
Luhansk	72	56	57	59	53	52	48	67.4
Lviv	225	214	209	201	191	184	171	75.9
Mykolaiv	296	296	299	286	266	250	223	75.4
Odesa	161	152	146	141	135	130	124	76.7
Poltava	550	556	558	542	544	532	507	92.2
Rivne	376	376	373	343	310	293	247	65.7
Sumy	373	374	378	377	369	364	340	90.9
Ternopil	431	427	428	429	437	452	451	104.6
Kharkiv	193	195	194	196	195	178	163	84.9
Kherson	282	280	279	273	274	260	235	83.5
Khmelnytskyi	448	457	466	492	505	522	529	118.0
Cherkasy	425	420	414	399	390	389	373	87.7
Chernivtsi	323	316	310	302	288	276	264	81.7
Chernihiv	526	529	535	530	511	464	456	86.7

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

According to Table 4, the lowest volumes in 2015-2021 were observed in dairy farms in Donetsk, Luhansk, Kyiv, Dnipro, Zaporizhzhia, Odesa, and Kharkiv regions. In terms of regions, it was found that the largest milk producers in 2022 were Khmelnytskyi (673 thsd tonnes

or 8.7% of the total milk produced in Ukraine), Poltava (663 thsd tonnes or 8.5%) and Vinnytsia (631 thsd tonnes or 8.1%) regions.

At the same time, due to the full-scale invasion of Russia, Ukraine's dairy industry did not receive 1 million tonnes of raw milk in 2022, and the volume of milk produced was 10.9% less than in 2021. Among the regions, the lowest milk production volumes in 2022 were in Lviv (388 thsd tonnes), Ivano-Frankivsk (370 thsd tonnes), Volyn (324 thsd tonnes), Zakarpattia (298 thsd tonnes), Odesa (287 thsd tonnes), Kirovohrad (273 thsd tonnes), Chernivtsi (227 thsd tonnes), Mykolaiv (197 thsd tonnes), Zaporizhzhia (106 thsd tonnes), and Kherson (65 thsd tonnes). The highest level of decrease in milk production during 2015-2021 was observed in Donetsk region – by 36.7%, Luhansk region – by 35.7%, and during 2021-2022 in Zaporizhzhia region – by 41.1%, Kharkiv region – by 50.4%, Donetsk region – by 57.4%, Kherson region – by 72.5%, due to anti-terrorist operations and military operations (Official website of the State Statistics Services of Ukraine, 2023).

In 2015-2021, milk production in the region decreased by 19.5%, while consumption of milk and dairy products decreased by 4.8%, which led to structural shifts in production and supply to the market. In 2015, the supply of milk for processing was 8,492 thsd tonnes and 2,123 thsd tonnes for on-farm consumption, and in 2021, respectively, 6,971.2 thsd tonnes and 1,742.8 thsd tonnes. In 2015, including milk imports, the supply of milk was 10,734 thsd tonnes, while production was 10,615 thsd tonnes (Fig. 3), meaning that supply exceeded production. In 2021, it was 9,521 and 8,714 thsd tonnes, respectively.

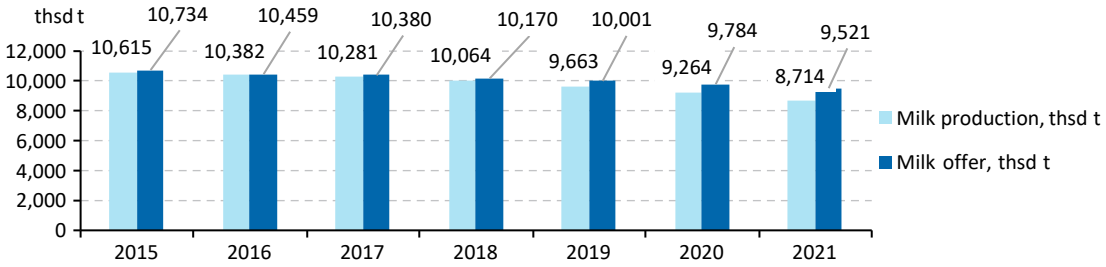


Figure 3. Supply of milk by Ukrainian farms

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

The decline in raw milk production by all categories of farms was caused by a reduction in the number of cows, despite an increase in cow productivity (Table 5).

Table 5. Number of cows by farm category in Ukraine (beginning of the year), thsd heads

Indicator	Year							2023 in % to	
	2015	2018	2019	2020	2021	2022	2023	2015	2022
Number of cows in all categories of farms	2,262.7	2,017.8	1,919.4	1,788.5	1,673.0	1,544.0	1,352.8	59.8	87.6
%	100	100	100	100	100	100	100	x	x
including:									
in agricultural enterprises	529.2	466.6	467.8	438.6	423.9	424.6	394.2	74.5	92.8
%	23.4	23.1	24.4	24.5	25.3	27.5	29.1	x	x
in household farms	1,733.5	1,551.2	1,451.6	1,349.6	1,249.1	1,119.4	958.6	55.3	85.6
%	76.6	76.8	75.6	75.5	74.7	72.5	70.9	x	x

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

The study found that the vast majority of cows are concentrated in households. Thus, in 2022, the number of cows in Ukraine was 1,352.8 thsd heads, of which 394.2 thsd heads, or 29.14%, were kept in agricultural enterprises, and 958.6 thsd heads, or 70.9% – in household farms. Many economic experts do not understand this correlation, as Ukraine has a developed food sector that can provide the country's population with food, form an active position in international agri-food markets, and dairy business in Ukraine is a profitable enterprise. This is facilitated by the availability of land, low rents, the absence of milk quotas (restrictions) and, compared to other countries, a relatively lenient taxation system, and the availability of feed, as all types of feed are produced in the country (The agricultural sector of Ukraine..., 2024).

In 2015-2023, the number of cows decreased by 909.9 thsd heads, or 1.67 times, including 135 thsd heads, or 1.3 times, in agricultural enterprises, and 774.9 thsd heads, or 1.81 times, in household farms. In 2023, compared to 2022, the number of cows decreased by 12.38% across all categories of farms, mainly due to 14.36% decrease in households. The number of companies specialising in milk production in Ukraine decreased from 2,614 to 1,309, or by 1,305 companies, in 2015-2023. There is also a change in the concentration of milk production. Thus, while in 2015 there were 64 enterprises with more than 1,000 cows, in 2023 there were only 73 enterprises (Fig. 4).

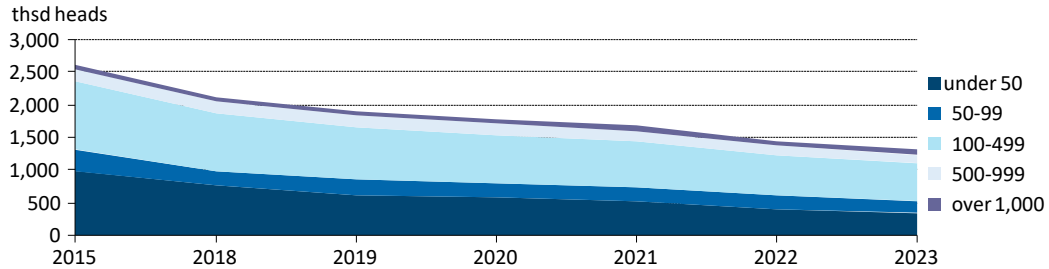


Figure 4. Number of cows on farms, heads

Source: created by the authors of this study based on the Official website of the State Statistics of Ukraine (2023)

A grouping of enterprises by number of cows showed that in 2023, farms with up to 50 cows accounted for 26.51%, 50-90 cows – 13.67%, 100-499 cows – 44.16%, 500-999 cows – 9.78%, and over 1,000 cows – 5.58%. In 2015-2022, the bulk of animals were concentrated in farms with 100-499 heads (Fig. 4), while the largest number of animals was over 1,000 heads (Kozak, 2018). There has been a gradual increase in the number of enterprises with over 1,000 heads. During 2010-2022, 43 farms with over 1,000 cows were opened in Ukraine (Global challenge: Why milk production..., 2023). There is a distinction between large milk producers with over 3,000 cows using modern scientific and technological advances and small milk producers, households with 1-2 cows and a much lower level of organisation and technical equipment.

The international market is witnessing a process of dairy farm consolidation, as small businesses are struggling with rising production costs. According to the IFCN results, the share of enterprises with over 1,000 heads has been growing in recent years. Large farms are more resilient to challenges and are attractive to investors. This trend is typical even for EU countries (with mostly small and medium-sized farms), which in 2022 increased the number of cows with more than 100 cows by 1.8% compared to 2021, although the total number of farms decreased by 3.5% in 2022 compared to 2021, mainly due to small farms leaving the dairy industry. IFC (World Bank Group) experts note that a sustainable model for Ukraine is a dairy industry with farm sizes of 2,000 heads and an annual production of 9 tonnes of milk per cow (Global challenge: Why milk production..., 2023). During the study period, the average herd size in agricultural enterprises increased from 193 heads in 2015 to 274 heads in

2022, or by 41.97% or 1.4 times. Scientists have proven that an increase in the number of cows in a herd increases the efficiency and competitiveness of production.

Meanwhile, in 2015-2021, herd reproduction rates deteriorated in all categories of farms, as the number of calves per 100 cows decreased, with the number of calves decreasing from 71 to 67. Moreover, this trend is also observed in the regional context, with the highest calf crop in 2021 in Volyn (73 heads), Ternopil (72 heads), Kharkiv (72 heads), Chernihiv (71 heads), Kyiv (70 heads), Poltava (70 heads), and the lowest – in Zakarpattia (46 heads), Ivano-Frankivsk (55 heads), Chernivtsi (60 heads), and Sumy (60 heads) regions. According to the State Statistics Service of Ukraine, as of 1 January 2023, there were 1,353 thsd cows in all categories of farms (Official website of the State Statistics Services of Ukraine, 2023). The leaders in terms of the number of cows in 2023 were Khmelnytskyi, Vinnytsia, and Poltava regions (Fig. 5).

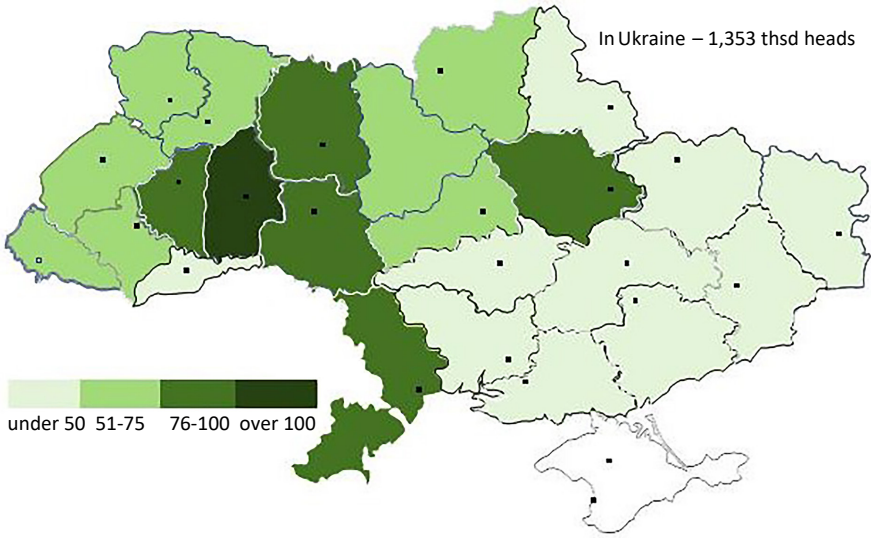


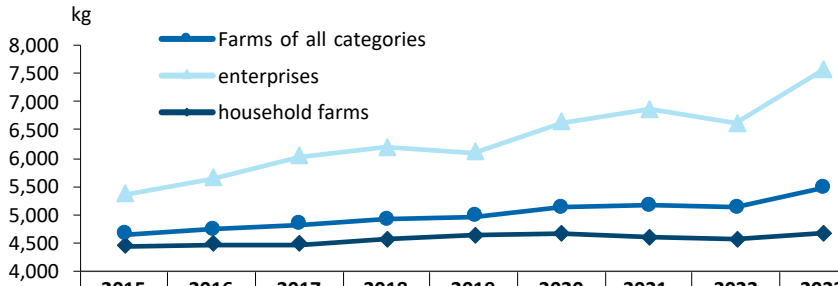
Figure 5. Number of cows in farms of all categories as of 1 January 2023, thsd heads

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

A small number of livestock is concentrated in Luhansk, Donetsk, Dnipro, Zaporizhzhia, Kherson, Mykolaiv, and Sumy regions. Studies show that there is a direct correlation in the regions between the decline in milk production and the decline in the number of cows. Thus, in Kyiv, Vinnytsia, Ivano-Frankivsk, and Dnipro regions, the number of cows in 2022 was less than 30.0-35.3% of the 2015 level. At the same time, in the Zakarpattia, Ternopil, Khmelnytskyi, Chernivtsi, Poltava, and Odesa regions, the number of cows decreased to only 13.8-20.9% during the study period, due to an increase in the number of cows in households. The study revealed a downward trend in the number of cows due to the loss of interest in keeping cows by all categories of farms due to the lack of an effective programme to stimulate the development of the dairy industry, climate change, annual increases in the cost of feed, fuel, and lubricants and electricity, an imperfect mechanism for subsidising producers and insufficient government support for dairy farming, a reduction in/receipt of calf crop, cow fatness, poor housing conditions, low head count and market conditions.

From 2021 to 2022, the frontline regions lost cattle – some stayed in the occupied territories without accounting and supervision, while some producers managed to rescue and transport livestock to central and western regions of Ukraine, where the security situation was

better than in the south and east (The number of cows on farms decreased to 387,000, 2023). In the context of the economic crisis and war, producers do not risk investing in increasing livestock, facing a shortage of staff, increased logistics costs, and deteriorating feeding conditions (Global challenge: Why milk production..., 2023). Ukraine's dairy sector has lost 50,000 cows, 100 dairy farms, a large part of the territory is under Russian occupation, and there is a lack of working capital, credit, and government subsidies. The cost of milk production is rising, and prices are rising. The number of cattle in Ukraine is expected to decline as a result of the negative effects of the war, increased slaughter volumes, and live exports. Calculations of the study's statistics confirmed that the decline in milk production is connected with cow productivity, which is twice as low in Ukraine as in developed countries (Fig. 6).



	2015	2016	2017	2018	2019	2020	2021	2022	2023
Farms of all categories	4,644	4,735	4,820	4,922	4,976	5,129	5,155	5,119	5,476
enterprises	5,352	5,643	6,025	6,190	6,101	6,634	6,863	6,611	7,568
household farms	4,437	4,473	4,480	4,559	4,630	4,666	4,604	4,569	4,664

Figure 6. Average annual milk yield per cow in all categories of farms in Ukraine

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

Despite a 30% decrease in milk production in Ukraine in 2015-2023 and a 40.2% decrease in the number of cows, the annual increase in their productivity from 4,644 kg to 5,476 kg is observed due to the purchase of high-yielding cows. Notably, milk yields in agricultural enterprises are growing faster than in households, which is caused by the use of more advanced technological means of production. Thus, in 2015, cow productivity at agricultural enterprises was 5,352 kg of milk, in 2019 it was over 6,101 kg of milk, in 2021 it was 6,863 kg, and in 2022, due to military operations, milk yields decreased to 6,611 kg per cow, i.e., 3%, while in 2023 it was 7,568 kg.

According to the State Statistics Service of Ukraine, at the beginning of February 2022, the average annual milk yield per cow in all categories of farms was 5,119 kg. The leaders in cow productivity were Kyiv (6,970 kg), Cherkasy (6,615 kg), Poltava (6,306 kg), and Vinnytsia (5,892 kg) regions. The lowest productivity was observed in Odesa (3,312 kg), Zakarpattia (3,474 kg), and Dnipro (3,770 kg) regions. It was clarified that developed countries have moved away from the concept of increasing the number of cows and are directing their resources to increasing milk yields while reducing the number of cows due to improved breeding, technological progress, cow housing conditions and improved diets (Kozak & Hryshchenko, 2022). The concentration of significant milk production in households (66% in 2022) does not allow for high-quality products. The supply of milk to dairy processing plants reaches only 17.3% of the total production process. The milk produced in households meets the requirements of the highest (in 2022, 3.9%) and first (in 2022, 77.1%) grades, while the milk produced in agricultural enterprises meets the requirements of extra (in 2022, 42.7%), highest (in 2022, 32.6%), and first (in 2022, 19.3%) grades (Official website of the State Statistics of Ukraine, 2023).

The study confirmed that milk quality is an important factor in the competitiveness of enterprises in the dairy market, and that the quality of milk is ensured by using the genetic potential of cows, a suitable level of veterinary care, the use of modern housing technologies, high-tech milking parlours, refrigeration equipment, and the provision of nutritious feed. O. Shpychak (2021) noted that the problem of milk quality can be solved by restructuring milk production by increasing the number of cows in households from 1-3 heads to 15 heads, which will help to eliminate anonymisation, create mini-farms, and ensure proper milk quality and combine the producer and the seller in one process – the main stage of improving milk quality by creating mini-farms. The experience of the effective existence of this type of farm with a number of cows (15-40 heads) is widespread in countries around the world, as the formation of small enterprises is not a strategic area of the organisational structure of market-type agriculture. The same opinion is shared by the scientists of the National Research Centre of the Institute of Agrarian Economics, who note that households cannot be the basis of the dairy industry, the revival and development of the country (Kozak, 2018). Age-related factors, increased costs of material and technical resources, migration, and inaccessible loans predict a further decline in the number of households. It is predicted that EU requirements for milk quality or a ban on the sale of milk produced by households will accelerate this process (Kozak, 2018). Among the factors that influence the increase in cow productivity, the most important is properly organised feeding of animals and their quality. Feed consumption of all types per head of cattle increased in all categories of farms from 3,078 kg feed units in 2015 to 3,135 kg feed units in 2021, while the cost of producing 100 kg of milk did not change in 2015-2021 and amounted to 96 kg feed units (Table 6).

Table 6. Feed costs per 100 kg of milk production in enterprises

	Feeds of all kinds					Of which concentrated				
	2010	**2015**	**2020**	**2021**	**2022**	**2010**	**2015**	**2020**	**2021**	**2022**
Ukraine	**1.18**	**1.00**	**0.84**	**0.86**	**0.86**	**0.37**	**0.41**	**0.46**	**0.47**	**0.48**
Vinnytsia	1.16	0.95	0.81	0.92	0.81	0.35	0.37	0.47	0.55	0.49
Volyn	1.28	1.26	0.88	0.88	0.83	0.27	0.41	0.44	0.47	0.46
Dnipropetrovsk	1.05	0.92	0.93	0.87	0.90	0.36	0.39	0.55	0.48	0.52
Donetsk	1.10	0.85	1.03	1.30	1.27	0.41	0.43	0.67	0.59	0.56
Zhytomyr	1.78	1.24	1.00	1.04	0.94	0.46	0.44	0.46	0.54	0.49
Zakarpattia	1.03	1.25	0.90	1.31	1.66	0.26	0.41	0.39	0.63	0.80
Zaporizhzhia	1.18	1.05	0.82	0.87	0.92	0.43	0.42	0.44	0.46	0.42
Ivano-Frankivsk	1.20	1.13	1.14	1.19	1.14	0.26	0.33	0.63	0.61	0.66
Kyiv	1.02	0.95	0.76	0.84	0.85	0.37	0.41	0.41	0.43	0.45
Kirovohrad	1.18	0.83	0.86	0.73	0.74	0.39	0.33	0.52	0.45	0.45
Luhansk	1.00	1.05	0.94	0.91	...	0.36	0.37	0.43	0.42	...
Lviv	1.23	1.06	1.11	1.12	0.86	0.30	0.37	0.47	0.57	0.42
Mykolaiv	1.10	0.86	0.71	0.73	0.74	0.39	0.40	0.46	0.48	0.46
Odesa	1.18	1.16	0.99	0.86	0.96	0.39	0.42	0.53	0.39	0.43
Poltava	1.10	1.05	0.82	0.83	0.80	0.37	0.51	0.46	0.48	0.45
Rivne	1.15	0.97	0.86	0.94	0.85	0.22	0.39	0.45	0.41	0.43
Sumy	1.07	0.92	0.92	0.97	0.95	0.29	0.30	0.44	0.47	0.48
Ternopil	1.09	0.87	0.69	0.68	0.59	0.31	0.33	0.42	0.42	0.36
Kharkiv	0.98	1.02	0.85	0.87	0.82	0.35	0.44	0.47	0.49	0.40

Table 6, Continued

	Feeds of all kinds					Of which concentrated				
	2010	2015	2020	2021	2022	2010	2015	2020	2021	2022
Kherson	1.12	1.05	0.75	0.71	...	0.35	0.42	0.44	0.44	...
Khmelnytskyi	1.20	0.99	0.80	0.80	0.98	0.30	0.34	0.45	0.43	0.61
Cherkasy	1.08	0.96	0.83	0.87	0.78	0.36	0.39	0.48	0.51	0.45
Chernivtsi	1.16	1.00	1.08	0.91	0.76	0.42	0.46	0.60	0.61	0.48
Chernihiv	1.24	1.07	0.78	0.81	0.87	0.37	0.38	0.41	0.43	0.51

Source: calculated by the authors of this study according to the Official website of the State Statistics of Ukraine (2023)

Feed consumption per head of cattle increased in all farms from 2,646 kg/ha in 2015 to 2,870 kg/ha in 2021, while the cost of producing 100 kg of milk decreased from 100 to 86 kg/ha in 2015-2022, but concentrate feed increased from 41 to 48 kg/ha. In terms of regions, the highest feed consumption in 2022 was observed in Zakarpattia, Donetsk, Sumy, and Khmelnytskyi regions, while the lowest – in Ternopil, Mykolaiv, and Kirovohrad regions. Feed consumption per head of cattle decreased in households from 3,430 kg feed units in 2015 to 3,389 kg feed units in 2021, while the cost of producing 100 kg of milk increased from 95 to 101 kg feed units in 2015-2021. The conducted study shows that with an increase in feed consumption per cow from 3,426 to 6,530 kg per cow on average, including concentrated feed from 1,779 to 3,626 kg per year, milk yields increased 2.2 times, i.e., from 3,469 kg to 7,614 kg, while the average in Ukraine was 6,863 kg. Irrational use of feed leads to an increase in the cost of feed and a reduction in the profitability of raw material production.

It is important to keep in mind the comfort of the animal, because for 24 hours they should be in optimised conditions, without restrictions on natural activity during the day, with proper nutrition and rest. The growth of cow productivity depends on the genetic potential of the breeds. This principle was also followed by American researchers V. Cabrera & L. Fadul-Pacheco (2021), Ch. Hudson & R. Laven (2019), who showed that it is possible to increase the milk production of cows due to progress in genetics and management. Scientists have shown that the growth in milk production has been driven by fewer cows, reduced use of water, land, and other natural resources, while increased fat and protein content in milk due to genetic improvements (Genetics and sustainable milk production, 2022). However, using the best genetic potential in dairy farming requires constant investment, and it is the most profitable investment, as genetics costs do not exceed 3% of the annual cost of keeping a cow, but the effect can exceed 30%. Improved animal welfare and the ability to breed animals with better physiological characteristics meet the needs of milk producers and their consumers. The traits "Feed Saved" and "Residual Feed Intake" allow genetically selecting animals for feed conversion, which is a very real factor that helps to optimise feed efficiency and reduce feed costs, which increases the overall productivity and economic benefits of livestock production (Genetics and sustainable milk production, 2022). Feed conversions are a win-win for dairy producers who want to control costs and for consumers who want a sustainable dairy product. By harnessing the genetic ability and trait of animals to produce the same amount of milk on less food, fewer natural resources are used for feed production. This will reduce the environmental impact of dairy farms. From this position, the US dairy community has united around the idea of achieving carbon neutrality, optimising water use, and improving water quality by 2050, supporting global sustainability initiatives and consumer expectations (Genetics and sustainable milk production, 2022; Global challenge: Why milk production..., 2023).

The study showed that the national programme for the development of dairy farming and processing enterprises in Ukraine until 2030 should be based on state support, which includes state subsidies (return of the special

VAT regime); use of the Agrarian Fund for financial and commodity interventions; state subsidies to stimulate dairy exports; conducting state tender purchases of dairy products only from producers; formation of import quotas; combating product falsification (Dairy industry of Ukraine and its future in 10 years: problems, national development program and state support, 2020; Strategy for the development of the dairy industry of Ukraine until 2030, 2020). It is also necessary to change the tax and criminal codes, reduce VAT on all dairy products, abolish VAT on imported innovative equipment, adopt the Law on Trade and the draft Law on Packaging and Waste, and review the terms of foreign trade with the EU (Strategy for the development of the dairy industry of Ukraine until 2030, 2020). The findings of the study showed that a mechanism is needed to assess the effectiveness of the dairy farming development programme, the possibility of its gradual implementation, and the cohesion of all participants and the understanding that this cannot be achieved without government support.

According to the strategies for the development of the dairy industry until 2030 (Dairy industry of Ukraine and its future in 10 years: problems, national development programme and state support, 2020; Strategy for the development of the dairy industry of Ukraine until 2030, 2020), milk producers and processors must improve milk quality to international standards, introduce a milk quality control system and increase the range of dairy products. Dairy entrepreneurs should also approve: the production of competitive products through the use of modern technologies, the production of organic products, functional products (with increased protein content, gerontological products, etc.), and the production of dairy products for HoReCa, to improve export opportunities to increase the production of dairy products with a long shelf life. Modernise processing plants to improve energy efficiency and environmental standards; create training centres for dairy specialists, as the number of specialists is decreasing and there are no training centres in Ukraine. Protect the domestic market from counterfeiting, introduce quotas and tariffs on imports of dairy products, and impose customs tariffs if quotas are exceeded. Establish a transparent procedure for tender purchases, concluding milk purchase agreements and ensuring cooperation between dairy producers and processors.

The results of the study correlate with the findings of Ukrainian scientists O. Shpychak (2021), A. Shevchenko & N. Tabachuk (2019) and A. Chmut & N. Antosh (2018) in terms of the manifestation of crisis phenomena in dairy farming and in methodological approaches to studying milk production trends. In milk production by large farms or the transformation of households into family farms, which, with financial resources, can improve the quality of raw milk through modernisation and the use of scientific and technological advances, and government support. The negative trends were observed in the dairy industry in 2015-2023, the excess of milk consumption over production leads to the growing share of imported milk and dairy products in the Ukrainian market. In 2022, the share of milk imports increased by almost 5% compared to 2021 (Donets *et al*., 2024). The share of milk production in households was high in 2023 (62.19%), and therefore the problem of competitiveness is becoming acute, and its solution is gaining importance, as Ukraine's integration into world markets depends on it (Gurska & Lukyanova, 2019). Only agricultural enterprises (33.8%) can supply milk of adequate quality – large producers that use mechanical milking, milk cleaning, and cooling can invest in modernising milk production processes to improve product quality and respond to changes in commodity markets. Household farms have neither the conditions nor the capacity to ensure proper production processes, and violate sanitary and hygienic standards, which cause high bacterial contamination of milk (Kozak, 2018; Gurska & Lukyanova, 2019). The concentration of milk production in households is the reason for the low quality of dairy products (Shevchenko & Tabachuk, 2019).

During 2015-2023, there was an increase in the quality of milk supplied for processing from agricultural enterprises of extra and higher grades, while households supplied milk for processing of higher, I and II grades (Shevchenko & Tabachuk, 2019; Gurska & Lukyanova, 2019). An essential condition for Ukrainian enterprises

to enter the European market is to ensure that their quality level meets European standards. It is possible to solve the problems of high-quality milk production, and for this purpose, it is necessary to direct all economic and organisational efforts to restructure milk production, increasing the number of cows on the farm from 1-3 heads to 15-40 heads, which will help to create mini-farms, eliminate the depersonalisation of milk sales, and combine the producer and the seller of dairy products in one process (Shpychak, 2021). Researchers from the International Dairy Farm Comparison Network have proposed the following classification of farms: households (1 to 10 cows), family farms (11-100 cows), business farms (over 100 cows) (Kozak & Hryshchenko, 2022). In countries around the world, the category of "household" is not found, and family farms are transforming into business farms, while in developing countries, household farms play a leading role in milk production. In 2021, the share of farms with more than 10 cows in the world was 3%, which kept 37% of the dairy herd and produced 63% of milk, while only 213 thsd farms, or 0.2%, are business farms, but their share in milk production is 42%. The largest proportion of cows is kept on business farms in New Zealand (99.7%) and South Africa (99%), while in Ukraine this figure is 28% (Kozak & Hryshchenko, 2022).

At the same time, the quality of products directly depends on the quality of raw materials, which needs to be improved by uniting small-scale producers (households) into private farms. To simplify the procedure for transforming peasant households into farms, the Law of Ukraine "On Farming" allows the establishment of family-type farms without their registration as legal entities, or into cooperatives based on an integrated system of milk production and processing. Cooperatives are viable, where, apart from procurement on a cooperative basis, milk is processed and dairy products are sold, and the products produced are jointly owned by the producers of raw milk. The alignment of interests of all cooperative members ensures proper coordination of their activities in milk production and processing. Raw milk is produced, the use of which ensures the production of dairy products that are competitive both on the internal and external markets (Poperechnyi & Salamin, 2022). High-quality dairy products can be obtained through the use of high technology in milk production, and as Ukraine integrates into the EU, it must adopt international standards. Due to the joint efforts of the state, milk producers and processors, the Ukrainian dairy market can be a profitable business and a powerful exporter of dairy products to the EU and global markets (Shevchenko & Tabachuk, 2019). It is particularly important to use comprehensive measures that include economic, legal, and government support.

CONCLUSIONS

Milk production in Ukraine during 2015-2023 shows a 40.2% decrease in the number of cows, which led to a 30% decrease in milk production; lack of working capital and credit facilities and lack of proper state support for the dairy industry. According to the analysis, in 2023, the bulk of milk production in Ukraine was concentrated in households, where 70.9% of cows are kept and 62.19% is produced. However, these farms sold only 6.89% of their milk to processing companies in 2022, which is caused by low labour productivity, lack of sanitary and hygienic conditions, resulting in poor milk quality and non-compliance with international product quality standards. It was proposed to solve the challenges and problems of milk production quality in households by increasing the number of cows from 1-2 heads to 50 heads, transforming households into family farms or merging them into cooperatives at the state level.

Large dairy producers can produce high quality raw milk, as they have the conditions to apply high technology and build new generation farms that meet modern requirements for the balanced use of all components to produce high quality and competitive dairy products on the internal and external markets. Government support is needed to improve the intensification of dairy farming. The state should facilitate cooperation, stimulate its creation with grants, loan programmes, subsidies, and investments to introduce advanced technologies and technological progress that is taking place in the world. The joint efforts of the government, producers, and processors will ensure the stable

development of high-quality milk production in line with international standards, and the dairy business will become a profitable business and a powerful exporter of dairy products to the global markets. The prospect of further research is the development of milk production under the conditions of its support by state authorities. It is also advisable to pay attention to innovations and marketing strategies in the development of the dairy industry.

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None.

CONFLICT OF INTEREST

None.

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Оксана Пащенко
Кандидат економічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 13, м. Київ, Україна
https://orcid.org/0000-0002-0603-8072
Олена Жарікова
Кандидат економічних наук, доцент
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 13, м. Київ, Україна
https://orcid.org/0000-0002-1259-1712
Олена Лимар
Викладач
Комунальний заклад вищої освіти «Вінницький гуманітарно-педагогічний коледж»
21019, вул. Нагірна, 13, м. Вінниця, Україна
https://orcid.org/0009-0003-1731-0312
Дмитро Александров
Аспірант
Національний університет біоресурсів і природокористування України
03041, вул. Героїв Оборони, 13, м. Київ, Україна
https://orcid.org/0009-0001-3820-1559

Тенденції розвитку виробництва молока в Україні

Анотація. Протягом 2015-2023 рр. у молочній галузі спостерігаються проблеми, які зумовили зменшення поголів'я корів, скорочення обсягів виробництва, зниження конкурентоспроможності, дисбаланс між попитом та пропозицією на ринку. Враховуючи політичну та економічну ситуацію, що склалася, необхідно було вирішити проблеми молочного виробництва, забезпечити населення країни високоякісними молочними продуктами, а також збільшити їх експорт на світові ринки. Дослідження здійснювалося з використанням абстрактно-логічного, статистичного й табличного методів із ціллю зібрання, обробки й аналізу інформації щодо виробництва молока, поголів'я корів і їх продуктивності, витрат кормів, формування ринкових пропозицій. Графічний метод був використаний для дослідження частки виробництва молока, розподілу рівня самозабезпеченості, динаміки утримання худоби та середньорічного надою. Було здійснено аналіз виробництва молока, досліджено частку виробництва в структурі валової продукції сільського господарства протягом 2015-2023 років. Проаналізовано баланс виробництва і споживання, досліджено розподіл регіонів України за рівнем самозабезпеченості молоком, сформовано рейтинг областей за виробництвом на особу у 2021 р. Проаналізовано й здійснено групування підприємств за поголів'ям, розроблено карту кількості корів у господарствах у 2023 р. та досліджено середньорічний надій протягом 2015-2023 рр. За результати дослідження виявлено, що для покращення ситуації у виробництві молока, необхідно комплексно розглядати державну підтримку, яка сприятиме збільшенню обсягу виробництва та формуватиме відповідні економічно-правові умови для поступової трансформації підприємств у сімейні фермерські господарства або ж у молочні кооперативи. Визначено основні проблеми виробництва молока в українських господарствах, розроблено шляхи їх вирішення та висвітлено практичну цінність підходу до заходів, які сприятимуть підвищенню якості та конкурентоспроможності молочної продукції

Ключові слова: споживання; поголів'я; продуктивність; господарства населення; підприємство; самозабезпеченість