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Article

A Study of Ukrainian Dairy Industry: Financial Performance and Trends

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Abstract: Production of milk and dairy products is one of the key directions of the Ukrainian food industry. The development of this sector contributes to the food security of the state, as well as contributes to the development of its export potential. However, Ukraine's dairy industry has experienced substantial structural transformations, with milk production declining to 9.8 million tonnes in 2020 – the lowest level since the country's independence. The export of dairy products decreased by 33%, dropping to 541 thousand tonnes, while imports surged by 90% to 335 thousand tonnes. Therefore, the study aims to conduct a comprehensive assessment of milk and dairy production in Ukraine, evaluating the economic efficiency, concentration of dairy enterprises, and their financial performance. Utilising secondary data from the State Statistical Service of Ukraine and Emerging Markets Information System (EMIS), the research employs multivariate statistical methods to analyse industry trends. The practical importance of the study lies in providing actionable insights for industry stakeholders to improve milk production efficiency, dairy product competitiveness, and market stability.

Keywords: Dairy Industry, Milk Production, Ukraine, Efficiency, Profitability, EMIS Database,

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INTRODUCTION

The dairy industry, as strategically important in terms of ensuring food security in Ukraine, is also one of the most problematic components of the agro-industrial sector (Keranchuk, 2017; OECD-FAO, 2018). With significant potential, in 30 years it has not been possible to stop the reduction of milk production and avoid its deficit, to involve households in family farming with their appropriate inclusion in the food chain "production-processing-sales", to address milk quality and insufficient consumption of dairy products (Fedulova, 2018). Negative trends in the industry are exacerbated by the impact of a series of internal and external crises that occur periodically, and, as a rule, slow down or even stop some positive dynamics of development (Kozachenko and Cheban, 2017). In the context of Ukraine's integration into the European and global market, the relevance of the studied issues is growing significantly.

With the current shortage of raw milk in the country, there are real threats to food security of foreign economic nature, due to dependence on imports of dairy products. This requires the development of appropriate methods, levers and tools for adequate and balanced management decisions by stakeholders for the further development of the dairy industry.

At the present stage, the development of the dairy subcomplex is under the influence of organizational and economic transformations. After the rupture of intersectoral relations due to the crisis of the 1990s, the production and processing spheres began to function inconsistently and separately from each other. Subsequent transformations indicate the incompatibility of periods of organizational and economic transformation. There are two periods in the field of milk production (agricultural sector) (Fedulova, 2018; Kozachenko and Cheban, 2017): the first – from 1990 to 2006 – unprofitable milk production, mass slaughter, reduction of milk production, dismantling of dairy farms, the formation of a dual model of production, increasing production by households; the second – from 2007 to the present – the profitability of milk production, the introduction of new technologies, reconstruction and construction of dairy farms, the transition to the same type of feeding, improving genetics and herd management. In the dairy industry (processing sector), the first period (1990-1999) is associated with the loss of raw material zones, bankruptcy and enterprises' liquidation, unprofitable activities, reduction of dairy production; the second (2000-2013) – with export activity, modernization of production lines, increase in production of dairy products and expansion of their range by distribution of raw material zones; the third (2014 and to this day) – a ban on the sale of dairy products in Russia, the search for new partners, the shortage of raw milk (Keranchuk, 2017).

The importance of the dairy subcomplex is in consequence of the importance of dairy products in the diet of Ukrainians, which consistently ranks second after bread and bakery products in the daily diet and is the main source of protein, the cheapest among animal products (Keranchuk, 2017; Fedulova, 2018). Ukraine is a world leader in terms of consumption of whole milk products per capita, and the norm of 380 kg per capita per year in terms of milk (State Statistic Service of Ukraine, 2019). This high consumption rate reflects both the cultural significance of dairy products and the historical agricultural development of the country (Kozachenko and Cheban, 2017).

Global milk production for the period of 2008-2018 is characterized by an increase from 700 to 843 million tons, or 20.4% with an average annual increase of 1.9%. A significant share of milk produced (63.5%) is in 10 countries: India, USA, Pakistan, China, Brazil, Germany, Russia, France, Turkey and New Zealand. Ukraine ranks 18th among milk producers, accounting for 1.2% of world volume (OECD-FAO, 2018), a significant decline from its 1992 position when it held 3.6% of global milk production and ranked sixth worldwide. This positioning highlights both the country's historical potential and the profound challenges facing its dairy sector over the past two decades (Keranchuk, 2017), with the market share steadily decreasing from 3.6% in 1992 to 1.7% in 2008 and further to 1.2% in 2018. Strong dairy regions become stronger, and weak ones reduce production. The growth of dairy cattle in the world during the analysed period was 9% (from 307.2 to 334.7 million heads), productivity – 10.5% (from 2332 to 2577 kg/cow/year). Depending on the country, the productivity polarization is from less than 1,000 kg/cow/year to more than 10,000 kg/cow/year. In Ukraine, the productivity of cows increased by 30% during the period 2008-2018, and in the public sector – from 3966 to 6190 kg/cow/year, or 1.6 times, reaching the level of countries such as Australia (6100 kg/cow/year), New Zealand (5000 kg/cow/year), Lithuania (5900 kg/cow/year), Ireland (5800 kg/cow/year), Poland (6200 kg/cow/year).

Over the last 20 years, the world, including Ukraine, has undergone structural changes in the development of dairy farms – their number is declining and the average size is growing. At the same time, developed countries are characterized by a larger dairy farm (USA – 241 cows, New Zealand

– 416, Australia – 274 cows). In the next 10 years, the process of consolidating dairy farms will continue. Dairy production in the world is growing, and the dairy industry is characterized by consolidation processes. The 20 largest dairy companies process 211 million tons of milk, or 42% of world revenues from processing plants. In most countries of the world, the market is dominated by one to three dairy operators, whose share exceeds 50% of all processed products. According to this distribution, Ukraine is one of the countries with open competition, where the share of the three most powerful processing companies is 35%.

The world processing industry has significantly expanded the scale of trade in dairy products with the help of modern technologies. High-margin dairy products enter the international market, usually from countries with a high level of self-sufficiency: New Zealand (30.1% of all exported dairy products in terms of milk), the EU (22.3%), the United States (6.3%), Belarus (5.2%), Australia (2%). Ukraine, which has long been a world exporter of dairy products, is in the process of restoring this status. In 2021, 8 new international markets were opened for the Ukrainian exporters and 63 commodity positions in 11 countries and international economic organizations were renegotiated. In particular, the markets of Japan, Libya, Argentina and Lebanon were opened for the dairy products from Ukraine.

According to UBTA (UBTA, 2021), milk and dairy products account for 0.8% of Ukrainian agricultural exports. 145 dairy exporters sell Ukrainian dairy products on the international markets. The last record exports of milk and dairy products was listed in 2011 – $ 593 million, with imports of $133 million. In 2014-2019 gradual decrease in revenues from exports of dairy products from $ 324 million to $ 224 million. In 2016, the anti-record of exports of dairy products $ 158 million with imports of $ 42 million. In 2020, exports of milk and dairy products amounted $ 172 million, and imports exceeded this by almost 73% and amounted $ 297 million (negative balance of $ 125 million).

In 2020, Ukraine supplied dairy products to 107 markets. Main destinations are Europe (41.8%), the countries of the Eurasian Economic Union (EAEU) (17.4%), the countries of Asia (14.8%) and the Middle East (10.9%). Dominating commodities in the structure of dairy exports are butter, milk and cream (dry or condensed), and cheese. Whey, non-concentrated milk and cream take a minor share in the export sales.

The aims of the article are to determine Ukraine's place in the world market of milk and dairy products; to characterize the Ukrainian dairy industry by means of a comprehensive assessment of milk and dairy production; evaluate economic efficiency and financial performance of milk and dairy enterprises of different sizes and ownership types; assess the country's competitiveness and investment attractiveness of the dairy industry.

MATERIALS AND METHODS

The research country was chosen because Ukraine ranked among the 20 largest milk producing countries in 2020, based on the Dairy Report 2020 by IFCN experts (IFN, 2020). The IFCN study provides a detailed analysis of 124 countries – the largest milk producers (98% of world production). The analysis of the dairy sector covered over 200 countries. The experts compared the profitability and productivity of dairy farms, milk and feed prices in different countries.

Secondary data collection, both historical and up-to-date, is based on official statistics, provided by Food and Agriculture Organization of the United Nations (FAO), Emerging Markets Information System (EMIS), State Statistic Service of Ukraine, Ukrainian Association of Milk Producers (AMP) and Ukrainian Association of Business and Trade (UBTA). EMIS database was used to gather generalised company information and financial data from Ukrainian dairy sector representatives. The studied enterprises were selected according to their main activity, particularly from the two industries with the following main activities – Raising of Dairy Cattle (NAICS - North American Industry Classification System 11212) and Operation of Dairies and Cheese Making (NAICS 31151). As the result 161 companies were filtered from the database, which annual financial statements were provided for 2017-2020 years due to limited data availability in the post-pandemic period and disruptions in data collection systems during a full-scale war. All figures from this database were indicated in thousands UAH, except for number of employees. The indicators ROS and ROA were selected to assess profitability, while the operating result was used as a performance category to concentrate on the operations of the selected enterprises. The operating ROS indicator was applied following Maziarczyk (2020), while the ROA indicator was applied in line with the work of Malik et al. (2016). Since the beginning of the full-scale invasion in Ukraine on February 24, 2022, martial law has been in effect, therefore, managers of public statistical information, including the State Statistic Service of Ukraine, do not update or provide public information in response to a request, including in the form of open data, and also have the

right to restrict access to data via API within the framework of information security measures in wartime. Therefore, the data presented in this article includes only available data for Ukraine in EMIS for 2017-2020 which were reported by the Ukrainian dairy companies.

To maintain methodological consistency and facilitate meaningful comparative analysis, all global market trends and comparisons were deliberately aligned to correspond with approximately the same analytical timeframe. This methodological approach ensures uniformity in the periods under examination throughout the study, mitigating potential temporal discrepancies that might otherwise compromise the validity of cross-market comparisons. The absence of more recent statistical data, whilst regrettable, was unavoidable given the aforementioned extraordinary circumstances.

Descriptive statistical methods were chosen as a main research methodology that is commonly used in economic sciences, along with time series and financial indicators within industry trend analysis. Descriptive statistics and time series were used to analyse major characteristics, financial performance and trends of the Ukrainian dairy industry. According to the literature dealing with the correlation among financial performance indicators, development on the return on equity can be influenced by return on sales (ROS), the turnover rate reflecting the efficiency of asset management and the rate of indebtedness (external capital/equity), however, this is not proven to be significant for all factors (Fenyves et al., 2019).

RESULTS AND DISCUSSION

This chapter is structured to provide a comprehensive assessment of the Ukrainian dairy industry. First, we analyze Ukraine's position in the global milk and dairy market, examining production trends and international trade dynamics. Next, we explore the main trends in the development and profitability of the dairy industry in Ukraine, analyzing structural changes in production, processing capacity, and financial performance of enterprises of different sizes. Data availability varied by source, with complete datasets available through 2021 from the State Statistics Service of Ukraine and the Association of Milk Producers. EMIS financial data was limited to 2017-2020 due to the full-scale war and reporting delays. FAO and OECD-FAO data was available through 2008-2020 for most indicators, though some specific metrics were only available through 2019. All analyses maintain timeline consistency within each dataset to ensure accurate trend assessment.

According to published preliminary data of the State Statistic Service of Ukraine, the total number of cows in Ukraine as of January 1, 2022, decreased by 6.6% – to 1 million 563.3 thousand heads (Ukrainian Association of Milk Producers, 2022). In particular, 422.1 thousand cows were housing in industrial farms, which is 0.4% or 1.8 thousand less than on the corresponding date last year.

The experts of Ukrainian Association of Milk Producers noted that a significant decline is noted in households. They housing 1 million 141.2 thousand cows, which is 8.6% or 107.9 thousand less than last year (Association of Milk Producers, 2022). In general, the whole market expected such results, and the Association of Milk Producers predicted an annual reduction in the number of cows in the industrial sector within 1%, and in the population – within 9% (Association of Milk Producers, 2022). In general, the distribution of forces is as follows: 27% of the total livestock is concentrated in industrial farms and 73% in households (Figure 1). Five years earlier, the picture was as follows: 22.8% to 77.2%. As we can see, the industry is undergoing an evolutionary transformation on the way to better milk production – the number of cows in the industrial sector is increasing, and the population is declining. In our opinion, in the next few years, this trend will only intensify.

According to the results of 2021 year (State Statistic Service of Ukraine, 2022), the largest number of cows was housing by industrial farms: Poltava (54.2 thousand), Cherkasy (42.6 thousand) and Chernihiv (39.6 thousand) Regions. At the same time, dairy farms in Kherson (6.6 thousand; +11.9%), Mykolaiv (6.5 thousand; +6.6%) and Volyn (18.5 thousand; +5.7%) regions managed to increase the number of cows the most compared to last year. At the same time, the leaders of housing cows in the households were the following Regions: Khmelnytsky (95.7 thousand), Odessa (77.5 thousand) and Transcarpathian (77.1 thousand). None of the Regions increased the number of livestock during the analysed period.

From this perspective, 2022 year should be a turning point in determining the further vector of the dairy industry. Whether it will be able to continue the qualitative transformation in the future or stop halfway, it will be seen in the first half of this year. The biggest role here is assigned to the state. Will there be enough support (direct and indirect) for the development of the dairy industry, will emergency measures be effective during the global energy crisis and inflation, will there be a balance of trade practices in the “producer-processor-sales” chain, or

will there be political measures to defend domestic market through control of non-competitive dairy imports? – The whole range of measures, their efficiency and balance will determine the future of Ukrainian dairy farming.

Current tendencies in the global markets of milk and dairy products and a place of Ukraine

The global dairy sector is experiencing significant growth. During the period 2008-2018 (FAO, 2018), milk production of all types increased by 20.4% from 700.2 million tons to 843 million tons (Figure 2). The largest share in 2018 is cow's milk – 81% (683.2 million tons), buffalo – 15.1% (127.3 million tons), goat – 2.2% (18.7 million tons), sheep – 1.3 10.6), camel – 0.4% (3.1 million tons). World milk production is characterized by a slight annual increase of 1.9%. Specifically, the annual production increase in 2018 was 1.4%, which is lower than the average annual increase of 1.9% for the period 2008-2018 (Figure 2).

The slowdown is due to adverse weather conditions and lower margins, which have affected milk production in the northern hemisphere, as well as the political and macroeconomic shocks that have hit South American countries (OECD-FAO Agricultural Outlook, 2018). Adverse weather conditions in Europe and Australia had a significant impact on production, leading to higher feed prices and access. In the US and the EU, milk production grew at a moderate pace, in New Zealand compared to 2017 there was a significant increase.

The largest increase in production was in 2014, when the increase was 25 million tons. This record was no longer reached. The weakest years in terms of the growth were 2009, 2013, 2015 and 2016, characterized by poor economic conditions (OECD-FAO, 2018). Low purchase prices, reflecting global market trends, combined with higher production costs related to fuel and feed prices, and adverse weather conditions significantly impacted milk production. In contrast, good weather conditions, high milk prices, and political decisions, such as the abolition of milk quotas in the EU, have led to particular growth periods.

In 2018 milk was produced by 200 countries, the number of consumers amounted to more than 7 billion people. According to the FAO (2019), 63.5% of world milk production in 2018 accounted for 10 countries, which produced 535.5 million tons out of 843 million tons. In first place is India, where production is 22.3% of the world. On the second – the United States (11.7), on the third – Pakistan (5.4). In 1992, Ukraine ranked sixth in the world and fourth in Europe in terms of milk production, behind countries such as the United States, Russia, Germany, France and India, and its share was then – 3.6% of total world milk production. In 2008, the share of Ukraine decreased to 1.7%, in 2018 – to 1.2%. However, it is still among the 20 largest milk producers.

Different countries have shown different increase rates of milk production (Table 1). The largest increase in the period 2008-2018 occurred in South Asia, which produced 248.5 million tons of milk, or 57.1% more than in 2008. In India, the increase was 67.3%, in Pakistan – 37.5%. The increase is observed in Oceania (+25.3%), North America (+12.5%), Western Europe (+10.4%) and Africa (+6.4%). The increase was due to the expansion of the dairy herd and the improvement of milk collection processes in India and Pakistan (FAO, 2019), increased efficiency in integrated production systems in Turkey (OECD-FAO, 2018), increased productivity of cows in the EU and US (IFCN, 2020), and use of idle capacity and growing demand in Argentina (OECD-FAO, 2018). Analysis of the milk production dynamics in the world shows that strong dairy regions are becoming even stronger, and weak ones are reducing production by 3-5% annually (FAO, 2019).

Between 2008 and 2018, the number of cows increased from 251.4 million up to 265.1 million heads, or 5.4%, sheep – from 213.5 to 251 million heads, goats – from 179.3 to 216.2, buffaloes – from 55.8 to 69.6 million heads, or 24.7%, camels – from 5.6 to 7.8 million heads. The increase in the number of cows occurs mainly in developing countries (India (+40.3%), Pakistan (+44.7%), Kenya (+31.4%), Turkey (+56.1%), Colombia (+42.5%), Uzbekistan (+64.5%), Uganda (+28.2%) (Table 2).

In 2018, 135.5 million cows, or 51.1% of this herd, will be concentrated in 10 countries with more than 6 million cows. Another group consists of 10 countries with more than 2.5 million cows (16.2%).

Productivity of cows on average in 2018 in the world remains low – 2577 kg/cow/year, although among the countries there is a large polarity: from less than 1000 kg/cow/year to more than 10000 kg/cow/year. The largest increase was in China (almost 2 times), Thailand (58.6%), South Africa (44%), Latvia (41.3%), Poland (39.6%) and Ukraine (35.5%). During the period 2008-2018, the number of cows increased by 9%, productivity – by 10.5% (from 2332 to 2577 kg/cow/year). Milk production increased more due to increased productivity than due to an increase in livestock. This was facilitated by: improvement of breeding work, technological progress, consolidation processes. In developing countries, the increase in production was due to an increase in livestock, in developed countries – due to increased productivity.

Over the last 20 years, the world has undergone significant structural changes in the dairy industry, which have increased the herd on the farm and its productivity. The driving force has been the introduction of technologies that require large investments and depend on large herds to make a profit. The world is experiencing a decrease in the number of small farms and the growth of large-scale enterprises for milk production.

In 2018, there were 112 million dairy farms with an average farm size of 3.2 cows and significant regional differences. Most farms (73 million, or 65%) are located in South Asia, less than 2 animals in size, in Africa, the Middle East, Eastern Europe, Central Asia – from 2 to 4 animals, in East Asia and the Pacific – about 9 animals, in Latin America and the Caribbean, from 15 to 42 (IFCN, 2020). The more developed the country, the larger the size of the dairy farm. The average farm size in the world has been growing by 1.7% annually since 2011. Growth is especially observed in developed countries. In Africa and South Asia, the number of dairy farms has almost doubled, due to population growth.

According to the share of processed milk, all countries are divided into three groups: first – more than 50%, second – 30-50%, third – less than 30%. There is a close relationship between the level of economic development of the country and the share of processed milk. The higher the first, the greater the proportion of processed milk. This is also due to the role of small farms in the development of the dairy sector. As a rule, a strict state policy to improve the quality of milk leads to the displacement of even traditional small farms outside the organized market (IFCN, 2020). The share of milk from small farms in the world is constantly declining. With the development of the country, the role of small farms decreases. However, there is the opposite opinion. FAO experts note that trade in surplus milk increases income, promotes employment through the processing, sale and distribution of products, and addresses food security issues in rural areas (FAO, 2019).

In line with the growth of revenues to processing enterprises, the production of dairy products by all types in the world also increased (Table 3).

For each type of product, their leading countries stood out. In 2019, the main producers of whole milk products were: India, Pakistan, the EU, China, the United States with a share of 60% in total production. Among the largest butter producers: India, EU, USA, Pakistan, New Zealand with a share of 76%. Leading cheese producers: the EU and the US, which accounted for 66%. Skimmed milk powder was mostly produced in the EU, the USA and New Zealand with a share of 66%. In terms of whole milk powder, the leaders in production were: New Zealand, China, the EU with a share of 65%. Dry whey was produced mainly by EU countries, or 52% of the total. At the same time, Ukraine is among the five leaders in the production of this type of dairy products with a volume of 66.6 thousand tons, or 2% of the world level. By other types of products, the share of Ukraine was: 1.7% – whole milk products, 1% – butter, 1.1% – cheese, 2.6% – skimmed milk powder and 0.1% – whole milk powder. The world produces 0.35 million tons of casein, of which 57% is New Zealand.

Main trends in the development and profitability of dairy industry in Ukraine

The dairy industry of Ukraine is one of the leading industries, the main purpose of which is to increase the efficiency of raw milk processing, expand the range of high quality and competitive products. Over the last three decades, Ukraine's dairy industry has undergone significant economic transformations as a result of a series of crises (internal and external) that have periodically arisen and continue to arise in the dairy market. Due to the lack of purposeful state policy, a large number of problems in the field of milk production over the years has not been solved, but accumulated. Under the lever of unresolved issues, the dairy industry is evolving too evolutionarily. Qualitative changes are taking place at a very slow pace, especially in the field of milk production. At the same time, the chosen European vector of Ukraine's development puts it in conditions of fierce competition, which requires the formation of an adaptive ideology of agricultural development with the EU, including the dairy industry (Keranchuk, 2017). Global competition is becoming the most influential factor in qualitative changes in dairy production.

It should be noted that today Ukraine has a dual structure of production, where both agricultural enterprises, represented by large-scale dairy farms, operate and even compete with each other, and on the other – a large number of very small producers with 1-2 cows. There is a significant difference between these forms. The first, despite all the existing difficulties, demonstrate the growth of milk production, the availability of advanced technologies, modernization, increasing the productivity of cows, automation of production, improvement of management systems and more. The second is natural production in order to provide dairy products for own families and the sale of the balance in rural markets, intermediaries and processing enterprises. With the reduction of milk production in the population, the share of domestic consumption is growing. In 2019, it amounted to

40.3% (State Statistic Service of Ukraine, 2019). At the same time, the share of milk sold to processing enterprises decreases from year to year. Gradually, households are being completely pushed out of the system of organized milk processing. This is while the whole progressive world, on the contrary, is introducing mechanisms to increase the involvement of the population in food chains with milk processing and the corresponding formation of value added of dairy products.

Our analysis shows, that milk production during 1990-2019 decreased from 24.5 million tons in 1990 to 9.7 million in 2019, or 60.6%. 78.9% of the cows were lost. As for the statistical data on the volume of livestock and milk production, according to the State Statistics Committee of Ukraine (State Statistic Service of Ukraine, 2019) during 1990-2019, the number of cows in agricultural enterprises decreased significantly. Thus, in 2019 there were 438.3 thousand heads, which was only 7.1% to the level of 1990. That is, the level of this indicator has decreased more than 10 times. As a result, the share of agricultural enterprises in the gross structure of the cow population in Ukraine decreased from 73.9% in 1990 to 24.2% in 2019. The productivity of cows during the study period in all categories of farms increased significantly. The growth of this indicator was observed both in agricultural enterprises and in households. Growth in agricultural enterprises was particularly rapid. In 2000 the lowest level for many years (1588 kg/cow/year) was noted. After that, during 2005-2019, there was a steady increase in milk yield. In 2019, its value was already 6224 kg/cow/year. This trend can be called positive. The reasons for this are primarily related to scientific and technological progress. These are the achievements of animal breeding, modern methods of disease diagnosis and treatment of animals, scientific approaches to optimization and control of feed ration. But the level of this indicator is still lower than in the European Union, the United States and Israel. Thus, the leading countries of the EU and the world have already reached 8000 kg/cow/year, and some of them are approaching yearly 10-12 tons of milk per cow. In particular, in Israel in 2014, the average productivity already exceeded 11000 kg/cow/year (IFCN, 2020).

As a result of these trends, milk production in all categories of farms has more than halved. It should be also noted that in recent years there has been a reduction in milk production. Thus, in particular, in 2016, 10,381 thousand tons of milk were received, which is 6.8% less than in 2014. Of course, milk producers focus on the real demand for their products. Without its rise, it is impossible to really revive dairy production. According to the experts of Association of Milk Producers (2022) in 2019, the total demand for milk was 10022 thousand tons, remaining at the level of 2018.

In addition to a number of natural indicators, the economic efficiency of milk production is revealed by a number of financial indicators (Table 4). The profitability of the industry remains unstable, as it is formed not so much by the amount of costs or the level of purchase prices, but by their ratio. Considering the indicators of economic efficiency of milk production are given in Table 4, it can be noted that the main reason for the increase in its level during the period under review was the rapid increase in the selling price, the growth rate of which exceeded the growth rate of the cost of one quintal of milk. The profitability of agricultural enterprises increased and reached 28.5% in 2017, but in 2018 and 2019 it decreased to 18.5% and 20.6%, respectively.

Although personal households remain the main producers, their role has been gradually declining. Between 2005-2019, agricultural enterprises increased their share in total milk production from 18.8% to 28.1%, while household production decreased proportionally. This shift indicates a gradual return to more formal production systems, though personal households still account for about 71.9% of total production. This transition, while positive for quality standards, is occurring slowly and alongside an overall reduction in cattle numbers across the country. The data suggest a steady evolution towards more organised milk production systems, with larger farms gaining importance while household production remains significant.

The main directions of dairy production in Ukraine are: whole milk products, including fermented milk products, animal butter, hard cheese, production of dried dairy products, production of canned milk, etc. As part of the dairy industry of Ukraine in 2006 there were 457 enterprises, of which unharvested dairy products were produced by 441 enterprises, butter – 254, hard cheese – 111 (Keranchuk, 2017). In 2019, according to official statistics, there were 412 enterprises in Ukraine specialised in the production of dairy products, of which 377 are for milk processing, butter and cheese production. Out of the 412 plants, 167 are located in rural areas (State Statistic Service of Ukraine, 2019). However, according to the experts of Association of Milk Producers (2022), no one can give a definite number of operating plants. According to their official information, 192 enterprises were employed at the beginning of 2020.

The distribution of milk processing enterprises showed that the number is dominated by small and

micro enterprises, which all together amounted as 66.3% of all enterprises. Large enterprises occupy only 12% (Table 5). The peculiarity of Ukrainian dairy industry is that one company produces several types of dairy products. The specialization of such enterprise is determined based on the largest share of products produced or for the production of which the largest amount of raw materials was used.

The overall reduction in milk production has affected the reduction in processing revenues. If in 1990 the volume of delivered milk was 18 million tons, in 2019 – 3.5 million tons, or decreased by more than 5 times (Table 6). The share of milk received from the population, which in 2008 was 66%, gradually decreased to 24.6% in 2019, and since 2012 the main suppliers of milk for processing have been agricultural enterprises, but even taking into account the growth of production, the amount of revenue is critically lacking. To meet domestic demand and export dairy products, 5 million tons of milk need to be processed.

Powerful operators have consolidated their positions in the market and their sphere of influence is expanding. Such enterprises are best able to meet the demand of the region, reduce transportation costs, and generally pursue a successful market policy. However, as can be seen from the table, production on most major items is declining. The largest reductions were in the production of canned milk and fatty cheeses.

In well-known Ukrainian dairy industry researchers' opinion (Fedulova, 2018; Keranchuk, 2017; Kozachenko, and Cheban, 2017), it was determined that according to the level of consolidation of the dairy industry, Ukraine has a fragmented dairy market, where there are no processors with a share of more than 50%, and the market is characterized by open competition. Figure 3 shows the 10 most powerful dairy producers in Ukraine as of 2019 in terms of milk processing and consumer market share. The largest share (11.3%) belongs to Vinnytsia Dairy Plant Roshen. Among the leaders in dairy production are multinational companies. The top 10 companies provide only 50% of the total dairy market, and the rest are a large number of small producers.

To defend the interests of milk producers in 2009, the Association of Milk Producers was launched, which as of 2018 united 150 dairy farms that produce 20% of all industrial milk. The main purpose was to overcome the negative phenomena in the market of milk and dairy products (Association of Milk Producers, 2019). These included periodic bans on the export of certain products by the main importer – Russia (for example, in 2005), and global milk crises that occurred from time to time (for example, 2014-2016), causing price shocks, and most importantly – the search for raw materials, which became less and less every year. Beginning in 2005, the dairy industry began to form a base of competitive enterprises that relied on the dairy business, introduced new technologies and increased production.

The ban on Russian imports has affected the economic activity of dairy companies. The economic efficiency of dairy production decreased, as the domestic level of consumption did not increase, but even decreased, and it was not possible to conquer new markets at a rapid pace (Figure 4).

The vector's change in the activity of milk processing enterprises together with the impoverished consumer from another, but in the presence of the need for products, launched a new food category – dairy products. Thus, the volume of milk production in 2019 amounted to 118.3 thousand tons. At the same time, if sour milk products are produced about 16 thousand tons, or 4% of real, then hard cheese 62%, and milk-containing canned milk produced more than real. In addition to dairy products, which are appropriately labelled so that the consumer can choose the alternative, falsification of dairy products has become widespread. This allowed processing plants to produce more dairy products with less use of milk. This practice quickly spread throughout Ukraine.

Among other problems in the industry, there is an urgent need to address the issue of counterfeiting dairy products, which has become an alternative strategy for some processing plants. The situation has especially worsened with the ban on business inspections. In addition, the penalty for counterfeit products is at most a fine of 10-20 minimum wages, which was 5000 UAH in 2020 (around 167 EUR in 2020). Given the turnover of processing enterprises, the fines are meager. This impunity has led to the fact that the degree of falsification of oil is 30-40%. The percentage of falsification of sour milk cheese is even higher. In general, 80% of Ukrainian dairy products do not live up to their name, and 20% are counterfeit (Fedulova, 2018).

It can be stated that milk production in agricultural enterprises has become an efficient business. The purchase price covered the rising costs. This factor, among other things, was the most important and stimulating for attracting investment in production. The diversity of the profitability of milk was the result of the influence of various factors, both internal and external. Each successive crisis had a negative impact on the efficiency of dairy production, although in general it was profitable. Effective indicators of milk production depend on

changes in the cost of input material and technical resources and services used in production (Table 7). The cost of milk production is constantly rising for all articles without exception. The largest share in the cost structure is traditionally feed – 52%. This indicates the awareness of farmers to invest in a balanced and high-quality diet in order to obtain greater productivity, which is clearly correlated with increasing economic efficiency of milk production (Figure 5). According to the regression equation, an increase in milk yield per cow per 1 unit leads to an increase in profitability by 0.42%. Following the next stage of our research the EMIS database was used to gather generalised company information and financial data from Ukrainian dairy sector representatives, and was applied in a similar way to Fenyves et al. (2019, 2020). The EMIS database analysis of 161 Ukrainian dairy companies revealed significant variations in profitability during the 2017-2020 period. The sample distribution was consistent across all financial indicators to ensure reliable comparisons.

Table 8 presents the distribution of Operating Return on Sales (ROS) across the dairy sector. For the studied period, the average ROS was 5.56%, which is higher than the median value (2.80%), indicating that a small number of high-performing companies pull up the average. It also shows that 23.6% (38 enterprises) of the studied companies were unprofitable during 2017-2020, with negative ROS values. The largest segment, comprising 32.3% (52 enterprises), had an operating ROS between 0-5%. Overall, 47.8% of companies operated with modest ROS values between 0-10%. At the upper end of the performance spectrum, 18.1% of companies (29 enterprises) demonstrated strong performance with ROS values exceeding 20%, including a small but notable group (1.9%, 3 enterprises) achieving exceptional ROS values of 50% or higher. These high-performing outliers significantly influence the industry average and highlight the heterogeneity in operational efficiency across the sector.

Table 9 illustrates the Return on Assets (ROA) distribution, which provides insights into how effectively companies utilize their assets to generate profits. The average ROA of the examined enterprises was 8.27% between 2017 and 2020, slightly higher than the median value (7.80%), suggesting a more balanced distribution compared to ROS. Approximately 19.3% (31 enterprises) reported negative ROA values, while the majority (47.2%) achieved ROA values between 0-10%. Impressively, 29.9% of the companies demonstrated superior asset utilization, with ROA values exceeding 10%.

The distribution patterns in both indicators suggest substantial heterogeneity in financial performance across the Ukrainian dairy sector. While nearly a quarter of companies operated with negative profitability on sales, and approximately 19% struggled to generate positive returns on assets, there exists a significant segment of high-performing enterprises that demonstrate strong financial management and operational efficiency despite challenging market conditions. This performance gap presents opportunities for industry benchmarking, knowledge transfer, and best practice sharing to elevate the overall competitiveness of the Ukrainian dairy industry.

CONCLUSIONS

The Ukrainian dairy industry faces major challenges despite its historical importance in global markets. The decline in Ukraine's share of global production from 3.6% in 1992 to 1.2% in 2018 reflects this weakened position. The steady shift from household-dominated to enterprise-based production represents a positive yet slow change towards better quality and efficiency. This transition needs to move faster through targeted policies to ensure industry sustainability.

Key priorities should include promoting agricultural enterprises while creating pathways for household producers to integrate into formal milk processing and distribution networks. The significant drop in milk production since 1990 highlights the urgent need for revitalisation. The scattered processing sector would benefit from consolidation to improve scale and competitiveness. The industry also needs better quality controls to address counterfeiting, which affects a substantial portion of dairy products in the market.

Financial analysis shows modest but unstable profitability across the sector. The profitability of milk production has fluctuated, with feed costs representing the largest share of production expenses. To improve financial strength, dairy businesses must focus on operational efficiency and productivity improvements, as higher milk yields correlate directly with increased profitability.

The financial analysis of 161 Ukrainian dairy companies during 2017-2020 reveals considerable performance diversity across the sector. The mean Return on Sales (ROS) of 5.56% compared to a median of 2.80% demonstrates that a minority of high performers significantly influence sector averages, whilst nearly a quarter of enterprises operated at a loss. Similarly, Return on Assets (ROA) patterns indicate widespread variation, with

an 8.27% mean slightly exceeding the 7.80% median. The largest proportion of companies (32.3%) achieved modest ROS values between 0-5%, whilst 18.1% demonstrated exceptional performance with ROS exceeding 20%. Regarding asset utilisation, 47.2% of enterprises-maintained ROA values between 0-10%, with approximately 30% achieving superior ROA beyond 10%. These disparities highlight significant operational efficiency differences within the Ukrainian dairy industry, suggesting that consolidation of processing enterprises, investment in modern production technologies, balancing feed costs with productivity gains, and implementing quality control measures could substantially improve profitability and strengthen Ukraine's position in both domestic and international dairy markets, particularly in European, Eurasian, Asian and Middle Eastern markets.

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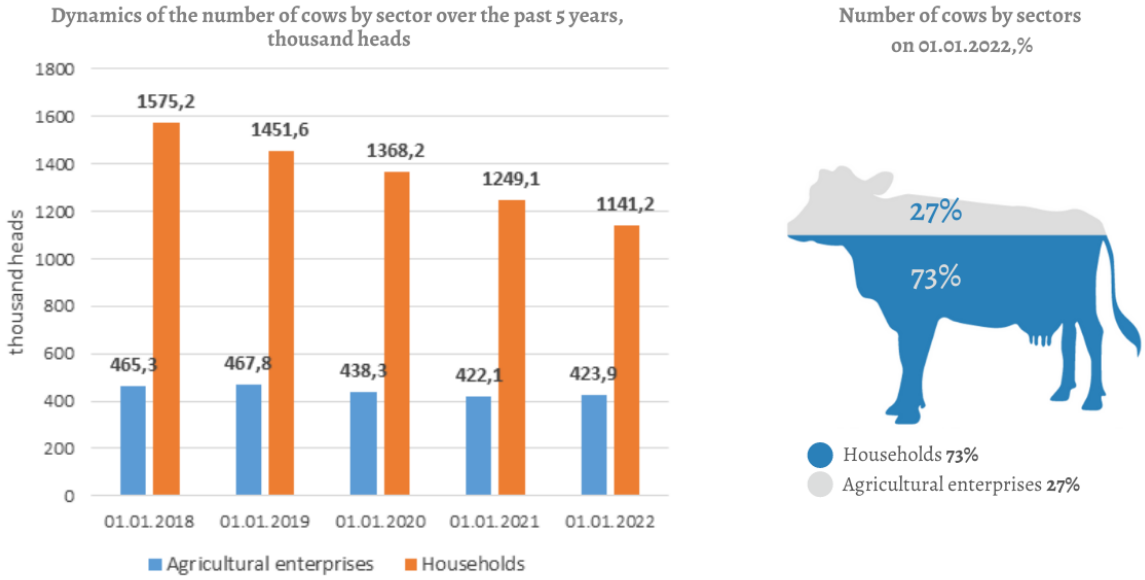

Figure 1.
Number of cows in Ukrainian dairy sector, 2018-2022
Source: State Statistic Service of Ukraine, 2021

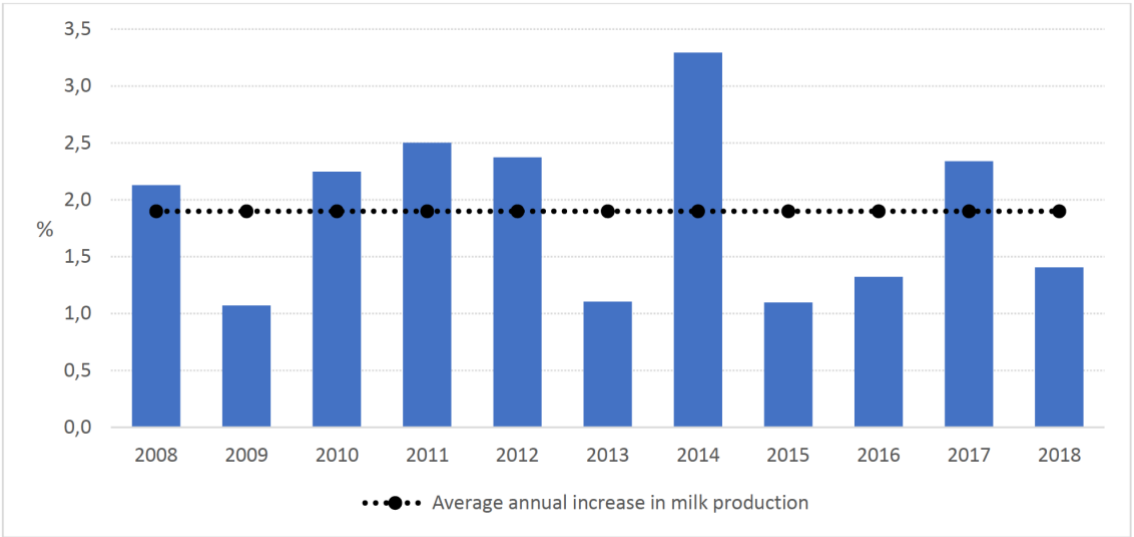

Figure 2.
World increase in milk production, % per year, 2008-2019
Source: FAO, 2019

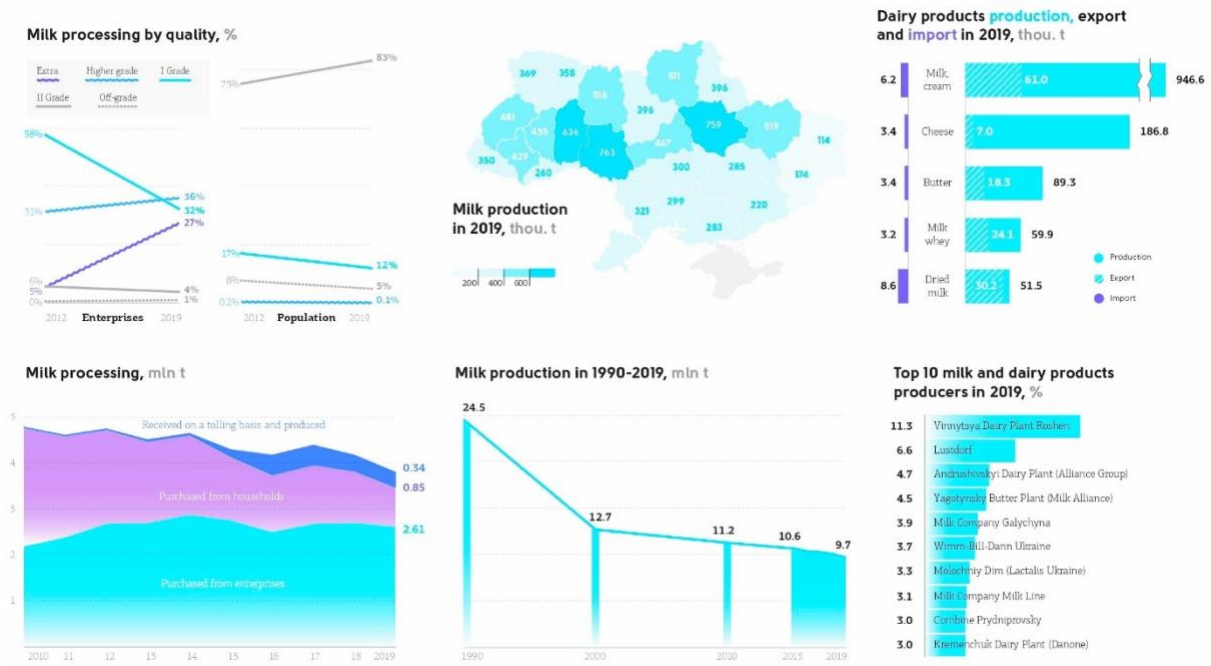

Figure 3.
Main figures of milk and dairy production in Ukraine, export and import, 1990-2019
Source: State Statistic Service of Ukraine (2019), Ukrainian Association of Business and Trade (2021), Association of Milk Producers (2022)

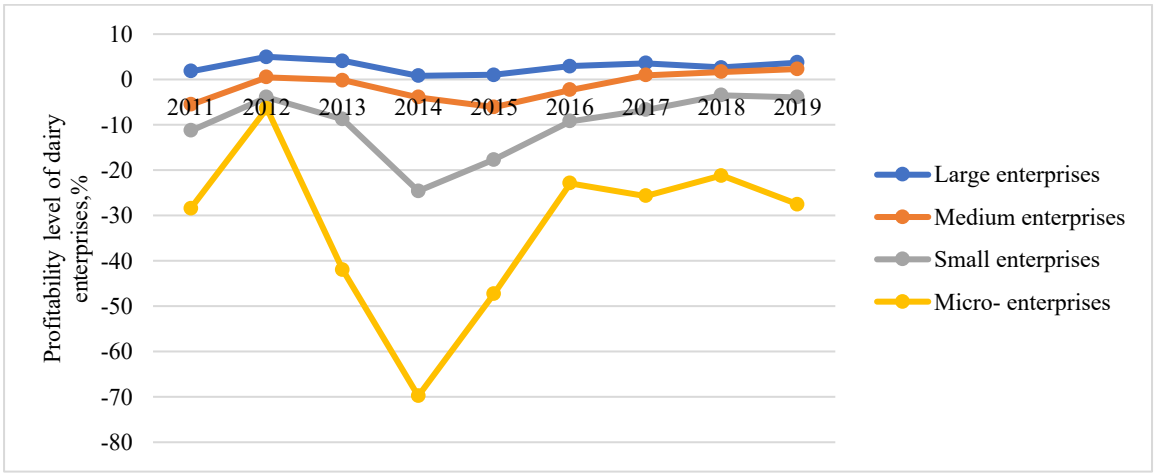

Figure 4.
Profitability* level of dairy enterprises, %, 2011-2019
*Profitability is calculated as the profit-to-cost ratio, representing the return on invested costs
Source: Compilated and calculated based on State Statistic Service of Ukraine, 2019

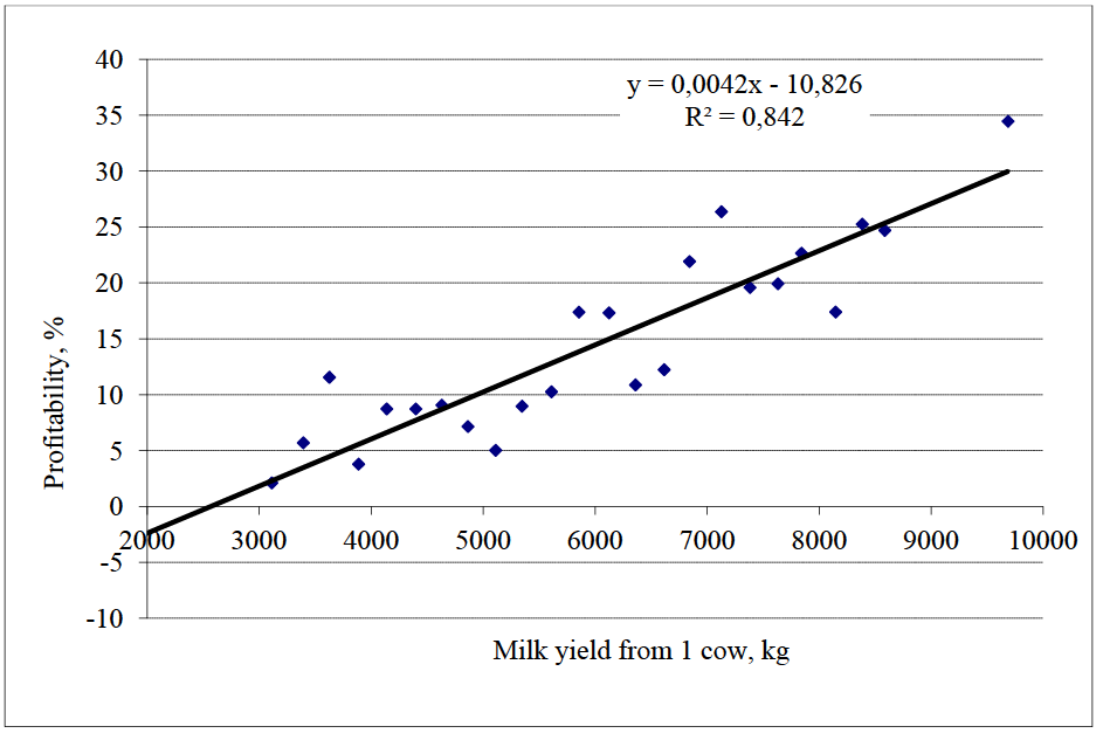

Figure 5.
Influence of milk yield on profitability* of milk production, 2018
*Profitability is calculated as the profit-to-cost ratio
Source: Own calculation based on State Statistic Service of Ukraine, 2019

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Table 1.

TOP-20 countries – milk producers in the world, million tons, 2008-2018

Country	2008	2010	2012	2014	2016	2018	2018 in % to 2008
India	112.4	122.1	132.6	146.5	165.3	188.0	167.3
USA	86.2	87.5	91.0	93.5	96.4	98.7	114.5
Pakistan	33.3	35.5	37.9	40.3	43.0	45.8	137.5
China	39.9	40.8	42.0	41.9	35.1	35.2	88.2
Brazil	28.7	31.0	32.6	35.4	33.9	34.1	118.8
Germany	28.7	29.6	30.7	32.4	32.7	33.1	115.3
Russia	32.4	31.8	31.7	30.8	29.8	30.6	94.4
France	24.4	24.2	24.9	25.8	25.8	26.5	108.6
Turkey	12.2	13.5	17.4	18.6	18.5	22.1	181.1
New Zealand	15.2	17.0	19.1	21.3	21.7	21.4	140.8
Great Britain	13.7	14.1	13.8	15.1	14.7	15.3	111.7
Poland	12.4	12.3	12.7	13.0	13.3	14.2	114.5
Italy	12.1	11.1	11.2	11.6	11.4	12.7	105.0
Mexico	10.8	10.9	11.1	11.3	11.8	12.2	113.0
The Netherlands	11.5	11.8	11.9	12.7	14.6	11.0	95.7
Argentina	10.3	10.6	11.3	11.0	10.3	10.5	101.9
Uzbekistan	5.4	6.2	7.3	8.4	9.7	10.4	192.6
Ukraine	11.8	11.2	11.4	11.1	10.4	10.3	87.3
Australia	9.2	9.0	9.5	9.5	10.0	9.3	101.1
Spain	7.3	7.5	7.5	7.9	8.2	8.1	111.0
other countries total	182.3	185.8	191.6	194.9	195.7	193.5	106.1
EU-28 total	155.5	152.9	155.6	163.4	167.6	168.4	108.3
World total	700.2	723.5	759.2	793.0	812.3	843.0	120.4

Source: Compilated and calculated based on FAO (2019)

Table 2.

Dynamics of cows' number in top-20 milk producer countries of the world, million heads, 2008-2018

Country	2008	2010	2012	2014	2016	2017	2018	2018 in % to 2008
India	40.5	42.8	44.5	46.0	49.1	50.9	52.8	130.4
Brazil	21.6	22.9	22.8	23.0	20.0	16.9	16.4	75.9
Pakistan	9.4	10.1	10.9	11.7	12.6	13.1	13.6	144.7
USA	9.3	9.1	9.2	9.3	9.3	9.4	9.4	101.1
Ethiopia	7.6	10.7	10.7	11.4	11.8	11.9	8.6	113.2
Sudan	14.6	14.7	7.4	7.7	7.9	8.0	8.1	55.5
Tanzania	6.6	6.9	6.9	7.0	6.9	6.8	6.9	104.5
Russia	8.9	8.4	8.1	7.6	7.2	7.0	6.7	75.3
Kenya	5.1	5.0	5.7	5.8	6.5	6.0	6.7	131.4
Turkey	4.1	4.4	5.4	5.6	5.4	6.0	6.4	156.1
Colombia	4.0	5.5	6.1	6.3	6.0	6.5	5.7	142.5
China	12.3	12.4	12.2	12.5	12.7	12.0	5.5	44.7
Uzbekistan	3.1	3.5	3.9	4.0	4.9	5.0	5.1	164.5
New Zealand	4.3	4.7	5.0	5.2	5.2	5.0	5.0	116.3
Uganda	3.2	3.4	3.5	3.5	3.9	4.0	4.1	128.2
Germany	4.2	4.2	4.2	4.3	4.2	4.2	4.1	97.6

Bangladesh	4.0	4.1	4.1	4.1	4.0	4.0	4.0	100.0
France	3.9	3.7	3.6	3.7	3.6	3.6	3.6	92.3
Afghanistan	3.3	3.9	4.0	4.1	3.5	3.4	3.4	103.0
Mexico	2.3	2.4	2.4	2.4	2.5	2.5	2.5	108.7
other countries total								
EU-28 total								
World total	251.4	261.4	268.2	273.0	276.6	275.4	265.1	105.4

Source: Compilated and calculated based on FAO (2019)

Table 3.

Production of the main types of dairy products in the world, thousand tons, 1990-2019

Product	1990	2000	2006	2017	2019	2019 in % to	
						1990	2006
Whole milk products	181 128.6	288 459.8	327 005.7	412 005.8	429 426.6	230	131.3
Butter	6 552.1	7 400.1	8 650.6	11 002.1	11 005.6	170	126.4
Cheese	6 150.1	16 480.6	19 439.8	23 417.3	23 986.3	390	123.7
Skimmed milk powder	1 237.9	3 210.5	3 154.7	4 419.0	4 394.2	370	137.5
Whole milk powder	1 783.4	2 316.2	4 038.9	5 386.5	5 477.6	310	137.5
Dry whey	903.9	2 750.3	2 912.6	3 370.0	3 463.7	390	120.7
Casein	69.3	282.3	320.4	346.9	339.9	490	106.1

Source: Compilated and calculated based on FAOSTAT (2020)

Table 4.

Economic efficiency of milk production in agricultural enterprises of Ukraine in 1995-2019

Years	Sales price, UAH / centner	Total costs, UAH / centner	Profit (loss), UAH / centner	Profitability level*, %
1995	12.54	16.41	-3.87	-23.6
2000	54.22	57.39	-3.17	-5.5
2005	103.34	92.08	11.26	12.2
2010	269.81	228.94	40.87	17.9
2011	313.12	264.30	48.82	18.5
2012	272.74	266.52	6.22	2.3
2013	304.25	345.75	41.5	13.6
2014	363.9	327.70	36.20	11.1
2015	405.1	359.77	45.33	12.6
2016	546.2	462.10	84.10	18.2
2017	723.4	562.84	160.56	28.5
2018	760.2	641.63	118.57	18.5
2019	819.8	650.9	168.9	20.6

*Profitability level is calculated as the profit-to-cost ratio (Profit ÷ Total costs × 100%)

Source: Own calculation based on State Statistic Service of Ukraine (2019)

Table 5.

Number and distribution of milk processing enterprises of Ukraine, 2009-2019

Year	Total number of enterprises	Share, %			
		Large enterprises	Medium enterprises	Small enterprises	Micro-enterprises
2010	449	2,2	41,4	14,9	41,4
2011	441	4,5	36,5	15,2	43,8
2012	417	5,3	36,0	18,9	39,8
2013	467	5,1	28,7	17,8	48,4
2014	401	2,2	33,2	17,7	46,9
2015	392	2,0	32,9	17,1	48,0
2016	355	1,7	36,6	18,0	43,7
2017	380	2,6	34,2	18,7	44,5
2018	401	2,5	31,9	18,0	47,6
2019	412	2,9	30,8	19,7	46,6

Source: Own calculation based on State Statistic Service of Ukraine (2019)

Table 6.

Production of the main types of dairy products in Ukraine, tons, 2013-2019

Products	Year						2019 in % to 2013
	2013	2015	2016	2017	2018	2019	
Processed liquid milk	906 691	933 441	929 922	942 520	939 357	907 811	100.1
Fermented milk products	488 170	405 015	405 380	368 447	400 445	410 922	84.2
Dry milk and cream	52 710	60 789	59 025	59 430	51 047	51 437	97.6
Butter	94 329	102 363	103 344	110 467	106 495	90 664	96.1
Fresh cheese	83 667	67 803	70 236	68 159	72 553	73 054	87.3
Fatty cheese	165 441	123 556	112 664	113 842	125 613	113 739	68.7
Canned milk	58 466	51 565	44 366	42 830	34 892	34 052	58.2
Ice-cream	172 668	134 753	148 870	151 814	156 262	156 882	90.9
Spreads and fat mixtures	53 052	36 280	29 351	24 840	35 389	30 336	66.7
Casein	2 742	5 619	6 177	7 203	7 405	5 330	194.4

Source: Compilated and calculated based on State Statistic Service of Ukraine (2019)

Table 7.

The main expenditures on milk production in agricultural enterprises in Ukraine and their structure, 2008-2019

Expenditures	2008		2015		2018		2019	
	mln UAH	%	mln UAH	%	mln UAH	%	mln UAH	%
Direct material costs – total	1908	64.8	6683	72.4	12202	72.3	12909	70.6
including: feed	1354	46.0	4755	51.5	9067	53.7	9548	52.2
fuels and lubricants	196	6.6	525	5.7	807	4.8	898	4.9
payment for services and works, third-party organizations	86	2.9	362	3.9	509	3.0	538	2.9
other material costs	272	9.2	1041	11.3	1820	10.8	1925	10.5

Direct labour costs	663	22.5	1347	14.6	2467	14.6	2893	15.8
Other direct and overhead costs	374	12.7	1203	13.0	2213	13.1	2485	13.6
of which: depreciation of non-current	122	4.1	382	4.1	778	4.6	851	4.7
Production costs	2945	100	9233	100	16882	100	18287	100

Source: Own calculation based on State Statistic Service of Ukraine, 2019

Table 8.

Operating ROS of companies within Ukrainian dairy industry, 2017-2020

Operating ROS, %	Number of enterprises	Distribution, %	Total assets per company, thsnd. UAH	Revenue per company, thsnd. UAH
< 0	38	23.6	150884.4	140553.9
0 - 5	52	32.3	562303.1	542997.2
5 - 10	25	15.5	637551.6	628136.3
10 - 20	17	10.6	289891.7	281499.9
20 - 30	18	11.2	197247.1	180328.9
30 - 50	8	5.0	202091.2	196310.5
≥ 50	3	1.9	175505.0	72790.6
Total	161	100.0	382190.8	367430.1
Mean	5.56%			
Standard deviation	15.82%			
Median	2.80%			

Source: Own calculation based on EMIS (2021)

Table 9.

Evolution of ROA of companies within Ukrainian dairy industry, 2017-2020

ROA, %	Number of enterprises	Distribution, %	Total assets per company, thsnd. UAH	Net sales revenue per company, thsnd. UAH
< 0	31	19.3	198742.5	197936.8
0 – 5	41	25.5	342568.9	329648.3
5 – 10	35	21.7	437492.1	408731.5
10 – 15	22	13.7	586329.4	576981.2
15 – 20	14	8.7	375641.8	502179.5
20 – 30	12	7.5	194275.6	298432.1
> 30	6	3.7	118652.3	195837.2
Total	161	100.0	352298.9	362965.4
Mean	8.27%			
Standard deviation	13.65%			
Median	7.80%			

Source: Own calculation based on EMIS (2021)