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Dairy industry as a driver of economic growth

Chinara Adamkulova*

Doctor of Economic Sciences, Professor
Kyrgyz National University named after Jusup Balasagyn
720033, 547 Frunze Str., Bishkek, Kyrgyz Republic
<https://orcid.org/0009-0003-2172-7831>

Kishimzhan Zhakshylykova

PhD in Pedagogical Sciences, Associate Professor
Arabaev Kyrgyz State University
720026, 51A Razzakov Str., Bishkek, Kyrgyz Republic
<https://orcid.org/0009-0005-8075-6565>

Rustambek Asanov

PhD in Economic Sciences, Associate Professor
Arabaev Kyrgyz State University
720026, 51A Razzakov Str., Bishkek, Kyrgyz Republic
<https://orcid.org/0009-0005-0166-9229>

Nelli Akylbekova

Doctor of Economic Sciences, Professor
Kyrgyz National University named after Jusup Balasagyn
720033, 547 Frunze Str., Bishkek, Kyrgyz Republic
<https://orcid.org/0000-0002-8829-0094>

Nuri Mambetkazieva

Doctoral Student
Kyrgyz National University named after Jusup Balasagyn
720033, 547 Frunze Str., Bishkek, Kyrgyz Republic
<https://orcid.org/0009-0000-6722-3936>

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Abstract. The aim of the study was to examine the current state of the dairy industry in Kyrgyzstan, assess its economic impact, and identify the main challenges and opportunities for further development. The dynamics of milk production in the country in 2016-2024 were analysed, regional peculiarities of development were assessed, trends in import and export operations and their impact on the economic growth of Kyrgyzstan were identified. The factors of increasing the competitiveness of domestic dairy products are studied, and forecast estimates are made for the

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*Corresponding author

volumes of its imports and exports for the period 2025-2028. It was established that the total volume of milk production in the Kyrgyz Republic increased by 16.6%, reaching 1823 thousand tonnes in 2024, which indicates a positive trend in the development of the industry. Regional differences in production rates were found, with the highest volumes in Issyk-Kul and Jalal-Abad regions and lower volumes in the cities of Bishkek and Osh, which could be due to structural issues or changes in consumer preferences. Dairy production increased overall, especially in the ice cream, butter, cheese, and yoghurt segments. However, production of cream was volatile due to fluctuations in demand and raw material supplies. According to the SWOT analysis, Kyrgyzstan's dairy industry has its advantages: environmental friendliness, high demand and processing infrastructure, but faces low levels of technology, fragmented production and quality issues. Opportunities include export development, investment and growing demand for organic products, while threats include import competition, high costs and unstable regulation. Development requires government support, modernisation and improved product quality. The forecast for the period 2025-2028 showed positive trends for the dairy industry in the Kyrgyz Republic. The volume of imports is expected to decrease by 4% annually, indicating a strengthening of domestic production and a decrease in dependence on imported products. The obtained results contribute to the formation of scientifically based recommendations for improving the efficiency of dairy production, reducing risks and strengthening its competitive advantages

Keywords: export; domestic production; competitiveness; forecast; diversification of the product range

INTRODUCTION

The dairy industry is an important component of the agro-industrial complex, providing a wide range of food products, creating jobs and developing rural areas. It contributes to food security, economic stability and the competitiveness of the national economy. The development of the dairy sector in different countries has its own peculiarities, which are determined by the level of technological development, access to finance, government regulation and the state of the domestic and foreign markets.

Scientific research shows a significant economic impact of the dairy sector. In particular, L.J. Banda *et al.* (2021) note that the stable development of the industry has a positive impact on rural employment and increases farmers' incomes. In addition, it stimulates the development of related sectors, such as food processing, transportation, and sales, which improves the economy as a whole. Research from European countries also confirms that the stable development of the dairy sector has a favourable impact on the level of economic activity and social stability of regions (Matkovski *et al.*, 2022). A significant impact on the study of economic aspects of dairy development was made by Z. Gołaś (2020) and V. Fiorillo and B.M. Amico (2024), who analysed the effect of state support on the competitiveness of dairy products. They found that subsidies and financing programmes significantly increase the level of production efficiency and allow farmers to reduce the cost of feed and veterinary care.

At the same time, M.F. Azooz *et al.* (2020) point out the importance of technological modernisation to improve the efficiency of dairy production. According to the authors, the introduction of the latest technologies, such as process automation, the use of digital technologies to monitor animal welfare and production processes, as well as innovations in feed and veterinary

medicine, can significantly improve productivity and reduce costs. A. Otunchieva *et al.* (2021) draw attention to the problem of uneven development of the dairy sector in different countries. In particular, the researchers note that countries with a high level of agricultural infrastructure development demonstrate significantly higher productivity and profitability compared to countries with insufficient investment in dairy production. This view is confirmed by N.L. Kim *et al.* (2021), who believe that the lack of modern technology and weak logistics infrastructure are the main barriers to dairy exports. The authors also emphasise that the limited availability of cooling systems and the lack of modern processing facilities lead to high milk losses during storage and transportation.

In addition, a number of researchers emphasise the existence of serious challenges in the industry. In particular, M. Hladiy and O. Prosovych (2022) analyse the impact of price volatility for milk and feed, which creates financial difficulties for producers. High price fluctuations can lead to instability in farmers' incomes and limit their ability to invest in the production process (Gutsul *et al.*, 2023). G. Koutouzidou *et al.* (2022) find that there is a problem of access to investment, which limits the ability to modernise production and adopt environmentally friendly technologies. Lack of financing also reduces the ability of enterprises to adapt to changes in market conditions and meet international product quality standards. According to a study by P. Shah *et al.* (2023), one of the key challenges to attracting investment in the dairy sector is high lending rates and the lack of government support programmes, which makes it difficult to access financial resources.

Other authors, in particular N. Clay *et al.* (2020) and M. Krstić and A. Gawel (2023), draw attention to the threat of increased competition from plant-based

alternatives to dairy products, which affects the structure of market demand. In many countries, there is an increase in the popularity of plant-based milk, such as soya, almond or oat milk, which reduces the consumption of traditional dairy products (Dudarev, 2024). Studies show that the main drivers of the growth in demand for plant-based alternatives are changing consumer preferences related to healthy eating, environmental considerations and ethical issues regarding animal agriculture. According to estimates by A. Nurullaev *et al.* (2025), dairy producers need to adapt their strategies, in particular to expand their product range to include functional dairy products containing additional beneficial ingredients such as probiotics, vitamins and protein supplements.

It is worth noting that Kyrgyzstan is an example of a country where the dairy industry plays a key role in agriculture and the economy as a whole. According to D. Sakkaræva and M. Kumashev (2024), dairy production in Kyrgyzstan is showing gradual growth, but at the same time faces a number of challenges, including low livestock productivity, limited financial resources for farm modernisation, and underdeveloped marketing infrastructure. The study by V. Kozhogulova *et al.* (2023) shows that Kyrgyzstan's dairy industry has the potential to expand exports, in particular to the Eurasian Economic Union, but needs to improve quality standards and product certification. At the same time, L. Euna and S. Mah (2024) and A. Kuipers *et al.* (2024) note that the development of the dairy sector in Central Asian countries is limited by the lack of modern technologies and weak logistics infrastructure, which are the main barriers to dairy exports.

Despite a substantial volume of research, the integration of the dairy industry into global value chains, assessment of the environmental and economic impact of the industry, and the role of government support in improving its competitiveness remain insufficiently studied. The aim of the study was to analyse the current state of the dairy industry in Kyrgyzstan, determine its economic contribution and assess the main challenges and opportunities for further development.

MATERIALS AND METHODS

The methodology for studying the development of the dairy industry in the Kyrgyz Republic was based on an integrated approach that included the collection and analysis of data for 2016-2024. Official statistical sources and publications of the National Statistical Committee of the Kyrgyz Republic (2025; n.d.), Statista (2025), the International Trade Administration (2024) and the evaluation data of the International Fund for Agricultural Development (2024), which allowed to identify key trends and structure of the country's dairy market. The dynamics of milk production in 2016-2024 was analysed. This approach made it possible to identify the main trends in the industry and assess the growth or

decline in production, as well as the sustainability of the dairy industry in the Kyrgyz Republic.

To analyse the long-term changes in the country's dairy production, the method of building a linear trend was applied using the R software in the stats package and the Excel "Linear Trend" tool. This allows building a model that reflects general trends in the industry dynamics. Calculations were made on the basis of official statistical data, and the model was evaluated using the coefficient of determination (R^2), which ensured the reliability of the results. This approach made it possible not only to assess the current state of the industry, but also to make forecasts for the further development of dairy production, taking into account economic and climatic stability. Particular attention was paid to regional differences in milk production, as dairy production in the Kyrgyz Republic has a distinct territorial specificity. This approach made it possible not only to compare the dynamics of dairy production in different oblasts, but also to identify strong and weak regions. A cause-and-effect analysis was carried out, which helped identify key barriers to the industry's growth and formulate recommendations for their elimination. For a more in-depth analysis, the methods of a systematic approach to assessing exports and imports of milk and dairy products were applied, which made it possible not only to study the current market situation but also to determine the prospects for the development of the dairy industry in the country. This contributed to a comprehensive understanding of the challenges facing the industry and opportunities for its further growth.

A SWOT analysis was conducted to systematically study the characteristics of the dairy industry and its prospects. This method allowed identifying the industry's strengths and weaknesses, as well as potential opportunities and threats that could affect its development. Based on the results of the SWOT analysis, the key factors that can provide competitive advantages to the dairy sector in Kyrgyzstan were formulated, and problems that need to be addressed urgently to improve production efficiency and ensure sustainable growth of the industry were identified.

RESULTS

The results demonstrate the stable growth of the dairy industry in Kyrgyzstan. Thus, in 2016, the value of milk production was 1,524.6 million tonnes, while in 2024 it increased to 1,823 million tonnes, indicating a total increase of 299 million tonnes or 15.5% over the entire analysed period. The average annual growth rate was approximately 1.9%, which indicates the progressive development of the dairy industry (Janob, 2024). The growth rate exceeded 100% throughout the entire period, which underlines the positive dynamics. The highest growth rate was recorded in 2016 (102.9%), and the lowest in 2021 (101.9%). Starting in 2021, there was a

gradual recovery in growth rates, which was reflected in an increase in this indicator to 102.8% in 2024. This data demonstrates the resilience of the sector and its ability to adapt to economic changes (Fig. 1). The trend in milk production in the Kyrgyz Republic is described by a linear function of the form $y = 36.289x + 1,486.3$. The linear relationship indicates a steady increase in milk production in the country. Such dynamics may be

associated with improved processing technologies, an increase in the number of farms and growing demand for dairy products. At the same time, the coefficient of determination $R^2 = 0.9905$ indicates that the linear model accurately reflects the dynamics of the data, and this trend can be used for forecasting. Thus, this model is reliable for describing and forecasting milk production volumes under stable economic and climatic conditions.

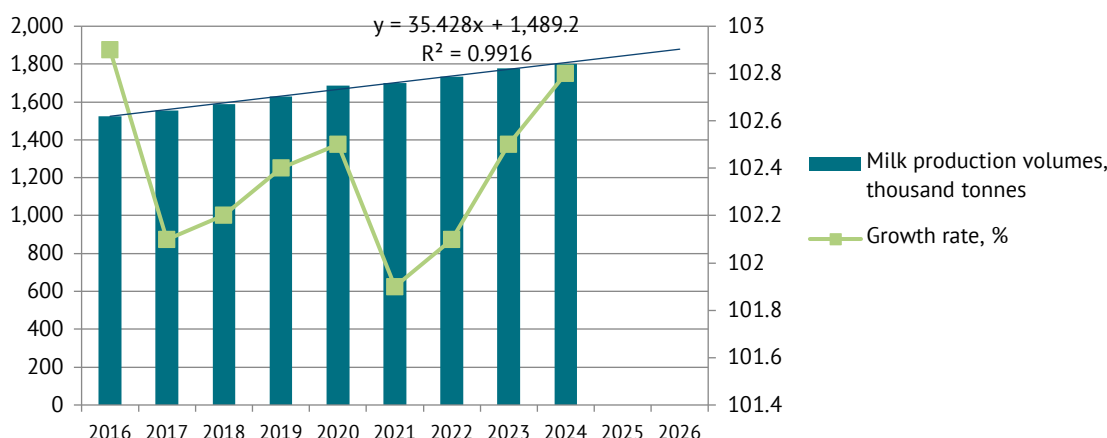


Figure 1. Milk production volumes and growth rate in 2016-2024

Source: developed by the authors on the basis of *Kyrgyzstan: A Comprehensive Overview of the Dairy Industry (2025)*, *Kyrgyzstan Increases Milk Production by 2.6% in 2024 (2025)*, National Statistical Committee of the Kyrgyz Republic (n.d.), Statista (2025)

An analysis of milk production volumes by region of the Kyrgyz Republic shows a mixed development of the industry depending on local conditions and economic factors (Fig. 2). In the Batken region, milk production showed moderate growth. However, the growth rate is lower than in most other regions; this

may be due to limited infrastructure development, which hinders access to modern dairy farming technologies. In addition, the population of the region is relatively small, which may affect the level of local demand for dairy products and limit the prospects for expanding production.

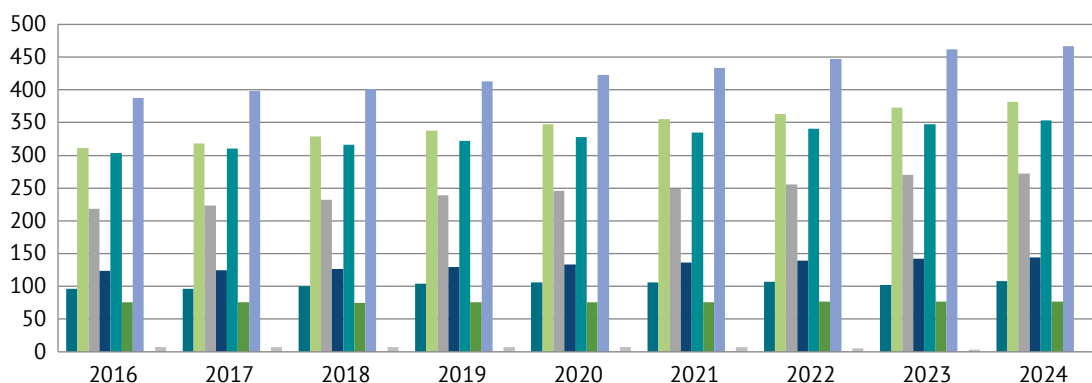


Figure 2. Milk production by regions of the Kyrgyz Republic, thousand tonnes

Source: developed by the authors on the basis of *Kyrgyzstan: A Comprehensive Overview of the Dairy Industry (2025)*, *Kyrgyzstan Increases Milk Production by 2.6% in 2024 (2025)*, Statista (2025)

The Jalal-Abad region has one of the highest milk production growth rates, which is due to the active development of the agricultural sector, including the introduction of new technologies in livestock farming, which increases productivity. The region also enjoys a

convenient geographical location, which facilitates efficient sales of products both domestically and internationally. In the Issyk-Kul region, the stable growth in milk production is due to favourable natural conditions for livestock farming. Due to the availability of pastures

and the tradition of livestock breeding, dairy production here has high potential. In addition, the developed tourism industry creates additional demand for dairy products, which stimulates the development of the industry. Milk production is also gradually increasing in the Naryn region. The region has traditionally specialised in livestock farming, but the introduction of new technologies is slower here due to its distance from major economic centres and limited opportunities to invest in farm modernisation, which explains the relatively slow pace of development in the industry.

The Osh region has seen a moderate increase in milk production, which may be due to the high population density. A significant part of agricultural land is used for growing grain and other crops, which limits the opportunities for expanding dairy production. In Talas region, milk production has remained virtually unchanged in recent years, as a result of structural constraints in local livestock production, low investment in the development of the dairy industry and a relatively small consumer market, which does not encourage producers to increase production. The Chui region has experienced a significant increase in milk production, which is explained by favourable agricultural conditions, well-developed infrastructure and proximity to major markets, including the capital city. Significant investments in production have also contributed to the modernisation of the industry and increased its efficiency.

The city of Osh has seen a significant decline in milk production, which is typical for urbanised areas. The decrease of the agricultural land area due to urban expansion and rising land prices make dairy farming within the city economically unviable. Consequently, milk production is gradually declining, and its main supply is provided by other regions of the country (Production of meat..., 2025). Thus, the data obtained confirm the existence of significant regional differences in milk production volumes, which are caused by various factors, such as the level of investment, natural conditions and agricultural development policies in each region. In particular, regions with higher levels of investment and favourable climatic conditions, such as Jalal-Abad, Issyk-Kul and Chui regions, have shown significant growth in milk production. In Jalal-Abad, the high rate of development is driven by the active introduction of new technologies in livestock farming and favourable natural conditions that allow for efficient marketing of products both on the domestic and foreign markets. The Issyk-Kul region, due to its natural pastures and livestock breeding traditions, ensures stable growth in milk production and also benefits from a developed tourism industry that stimulates demand for dairy products. The Chui region has enjoyed high growth rates due to investments in modernisation and infrastructure development, which has increased the efficiency of dairy production and provided easier

access to markets due to its proximity to the capital. In summary, these regions have enjoyed high growth rates due to a combination of favourable natural conditions and high levels of investment, which have significantly increased dairy productivity.

An analysis of dairy production volumes in the Kyrgyz Republic for 2016-2024 showed significant changes in various product categories, reflecting both the industry's achievements and challenges. In particular, butter production increased from 3,130.6 tonnes in 2016 to 32,500 tonnes in 2024 (Butter production increased, 2025). As for the production of cream, there was an increase of 376.3% between 2016 and 2022, when the volume reached 5,101.1 tonnes. However, in 2024, there was a significant decline in cream production to 660 tonnes, indicating the instability of this market segment. This decline in cream production can be explained by several factors. The main reasons include a decrease in domestic demand due to economic difficulties, such as rising prices and reduced purchasing power, and limited supply of raw materials due to climatic conditions and disruptions in the supply chain, which contributed to the production decline. In addition, the decline in the cream market may be due to lower demand for this product and the unprofitability of its production. Therefore, the overall instability in the dairy market is the result of both economic factors and structural problems in the industry (International Trade Administration, 2024; Kyrgyzstan Increases Milk..., 2025).

At the same time, it should be noted that cheese production increased from 4,109.7 tonnes in 2016 to 15,255 tonnes in 2024 (+137.12%). Yoghurt production almost doubled between 2016 and 2024, growing by 195.4%. The highest production was achieved in 2021, when the volume was 2,499.6 tonnes, but in 2023 it dropped to 1,376.3 tonnes, indicating market saturation or a change in consumer preferences. In contrast, the ice cream segment showed significant growth, from 3,790.1 tonnes in 2016 to 11,941.3 tonnes in 2024, an increase of 315%. This is the highest growth rate among all categories, which indicates high demand for these products in both domestic and foreign markets (Kyrgyzstan: A Comprehensive..., 2025).

The dynamics of dairy imports in Kyrgyzstan showed an increase from 2016 to 2022, when imports increased from 9.4 thousand tonnes to 24.3 thousand tonnes. The growth was particularly sharp in 2021-2022. However, in 2023, imports began to decline, and in 2024 fell to 14.5 thousand tonnes, indicating a change in market conditions or increased domestic production. Dairy exports also tended to grow, reaching a peak in 2022 (54.3 thousand tonnes). However, in 2023, there was a sharp decline of almost half to 32.2 thousand tonnes. In 2024, the situation partially stabilised, and exports increased to 33.4 thousand tonnes, which may indicate that the market is adapting to new economic and trade

conditions (Growth of dairy..., 2025; Kyrgyzstan's Export of..., 2025; Stanbic Bank Group, 2025). The general trend shows that until 2022, there was an active increase in both imports and exports of dairy products. However, in 2023, both indicators declined significantly, which may be due to external economic factors, government regulation policies, or changes in demand. In 2024, the market is showing signs of stabilisation, with further prospects for domestic production and exports (Kyrgyzstan reduced imports..., 2025; Osmonalieva, 2025).

According to the Ministry of Agriculture of Kyrgyzstan, in 2024, the largest exports of dairy products were milk powder (7,634 tonnes), ice cream (4,448 tonnes), and butter (1,796.9 tonnes). Most of all, Kyrgyzstan imported cheese (1,160.6 tonnes), ice cream (1,933.7 tonnes) and milk powder (534.5 tonnes) (Kyrgyzstan has exported..., 2024). The large difference between exports and imports indicates the strengthening of the Kyrgyz Republic's position in foreign dairy markets (Fig. 3).

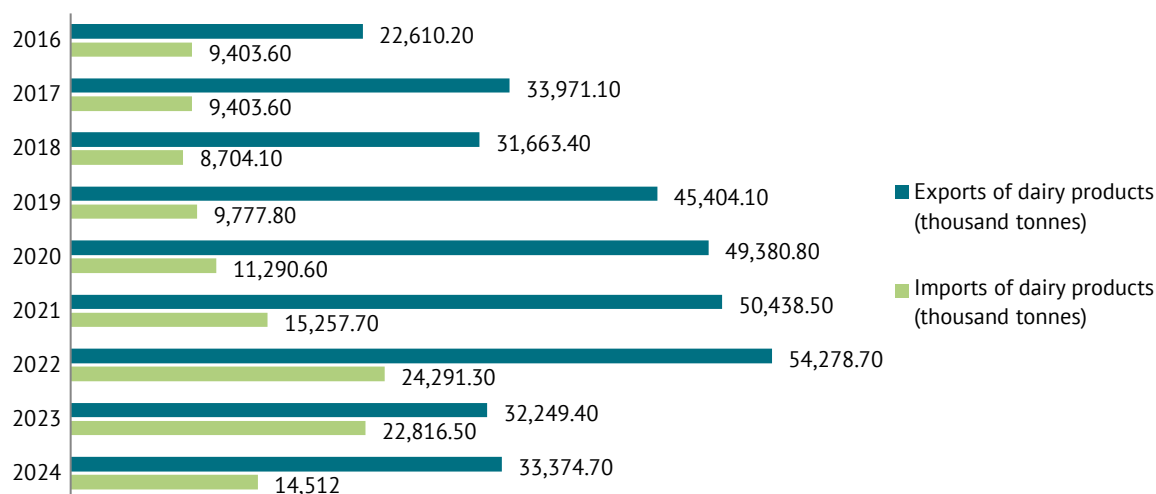


Figure 3. Exports and imports of milk and dairy products by the Kyrgyz Republic, thousand tonnes

Source: developed by the authors on the basis of Kyrgyzstan's Export of Milk and Cream to Uzbekistan Increased Eightfold in Seven Months of 2024 (2024), Stanbic Bank Group (2025), Growth of dairy exports from Kyrgyzstan to EAEU countries (2025), B. Osmonalieva (2025)

In the forecast period 2025-2028, the volume of imports shows a gradual downward trend. While in 2025 imports are expected to reach USD 12,779.3 thousand, by 2028 they will decrease to USD 11,223.2 thousand. The average annual decline is about 4%, which may be due to the strengthening of domestic production and reduced dependence on imported

products. This is a positive signal that indicates the development of the domestic dairy industry and an increase in the share of local products in the domestic market. In contrast to import, export is projected to grow steadily. The volume of exports is expected to increase from 46,910 thousand USD in 2025 to 55,113.8 thousand USD in 2028 (Fig. 4).

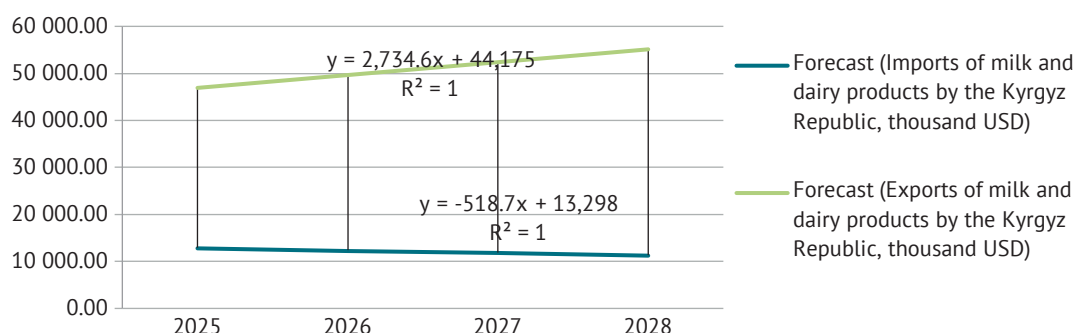


Figure 4. Forecast estimates of imports and exports of milk and dairy products by the Kyrgyz Republic, thousand USD

Source: developed by the authors

The average annual growth rate of exports is about 14.4%, which indicates the high competitiveness of Kyrgyz dairy products on international markets. The export

growth is likely to be driven by increased productivity, improved product quality, and expanded access to new exports markets. The gap between exports and imports

will increase in the coming years: in 2025, export will exceed import by 4 times, and in 2028 – by almost 5 times. This imbalance indicates positive changes in the industry, where exports are becoming the main driver of economic growth. Thus, Kyrgyzstan's dairy industry has great potential, but in order to realise this potential, significant challenges need to be overcome, particularly in the areas of technology, financing and production organisation. In the area of technology, the main problem is the low level of automation and the insufficient use of modern milk processing equipment. Many farms continue to use outdated livestock husbandry methods, which negatively affects productivity. The absence of effective quality control systems also creates risks in terms of product compliance with international standards.

Financial difficulties are associated with limited access to credit and investment. High interest rates on loans make it difficult to modernise production, and the lack of government support programmes does not contribute to the development of the dairy industry (CEIC, 2025). In addition, volatile milk prices and exchange rate instability make business less predictable for farmers and processors. Underdeveloped

co-operation between farmers and processors leads to instability in the supply of raw materials. Lack of proper logistics complicates the transportation and storage of dairy products, leading to high losses. In addition, low staff qualifications and a shortage of veterinary and dairy specialists limit the potential for improving farm efficiency. At the same time, existing development opportunities in the domestic and foreign markets, as well as infrastructure modernisation, can help to increase the competitiveness and efficiency of the industry. The SWOT-analysis of the dairy industry in Kyrgyzstan shows that this sector has several important aspects that require attention for further development (Fig. 5). For example, the country's strengths include the fact that Kyrgyzstan has favourable conditions for the development of dairy farming due to the large area of highland pastures known as zhailau, which provide cattle with high-quality natural fodder. Due to the clean environment of the mountainous regions, dairy products produced in the country do not contain any harmful impurities, which makes them competitive. The temperate climate means that cattle can graze outdoors for most of the year, reducing feed and housing costs.

<p>Strengths</p> <p>Favourable natural conditions for pasture farming. Traditions and experience in cattle breeding. Pure dairy products without harmful impurities. High domestic demand for dairy products. Developed infrastructure of dairy plants. Local cattle breeds with high milk production.</p>	<p>Weaknesses</p> <p>Low level of technology Disorganisation and fragmentation of production Restrictions on access to finance Problems with quality</p>
<p>Opportunities</p> <p>Development of organic dairy production Investments in infrastructure and technology Growing demand for dairy products: Export development</p>	<p>Threats</p> <p>Competition with imported products Climate change and environmental factors High production costs Uncertainty in law and the political situation</p>

Figure 5. SWOT analysis of the dairy industry in Kyrgyzstan

Source: developed by the authors

Kyrgyzstan's long tradition of livestock farming ensures that farmers are highly competent in caring for cattle. The country breeds that are well adapted to local environmental conditions, including Alaatai and Kazakh Whitehead, which are highly productive in the dairy sector. Strong domestic demand for dairy products drives the industry, as milk and its derivatives are an important part of the national diet. Dairy production plays a key role in the country's agriculture. Many rural households derive their main income from livestock farming, which provides employment and stability to regional economies. Kyrgyzstan also has a well-developed processing infrastructure, which allows it not only to supply the domestic market but also to export to neighbouring countries, including Kazakhstan, Uzbekistan and China.

However, there are several weaknesses that hinder the development of the industry. In particular, the low level of technology in Kyrgyzstan's dairy production

significantly hinders the development of the industry. The main problem is the use of outdated or manual milking methods, as most small farmers do not have access to modern milking machines. This leads to low productivity and possible problems with milk quality, including bacterial contamination. Another problem is the structure of milk supply, as most dairies purchase raw materials from small households. This makes it difficult to control the quality and safety standards of dairy products, which makes it difficult to enter export markets. The lack of adequate cooling infrastructure at the stage of milk collection also affects its quality, as without rapid cooling, milk spoils quickly, limiting its suitability for industrial processing. In addition, the imperfect certification system and the lack of modern laboratories to test product quality are significant obstacles. Many dairy enterprises do not meet international standards, which limits their ability to export to the

EU and other countries with strict quality requirements. Insufficient implementation of automated quality control systems at dairies also leads to losses and reduced competitiveness of Kyrgyz dairy products on the international market.

Many farms do not have access to modern equipment for storing, transporting and processing milk, which leads to a decrease in production efficiency. In addition, dairy production in the country remains fragmented and unorganised, in particular due to a lack of coordination between producers, which also makes it difficult to enter new markets and improve product quality. There are also problems with access to finance due to several factors. Firstly, high interest rates on loans make them unaffordable for farmers and dairy enterprises. Secondly, the lack of effective government support programmes and subsidies limits the opportunities for investment. In addition, insufficient financial literacy and limited access to information on financing opportunities are also obstacles to the development of the sector.

To improve the situation, government support programmes should be developed, including subsidising interest rates on loans, providing grants for production modernisation and the introduction of modern technologies. It is also important to improve the financial literacy of farmers and entrepreneurs so that they can effectively use available financial instruments. The dairy industry also faces threats that may affect its further development. One of the main threats is competition from imported dairy products, which may limit opportunities for local producers. High production costs, in particular for feed and other inputs, are a major challenge for farmers. In addition, climate change, which may lead to a reduction in pasture areas, as well as instability in the political and legislative environment, may complicate the business and cause uncertainty about the future of the industry. Despite these challenges, the dairy industry has significant growth potential due to a number of opportunities. In particular, the demand for organic products is growing in international markets, which opens up prospects for exports of organic milk and dairy products (Oliyynyk *et al.*, 2021). Investments in infrastructure, such as modernisation of processing facilities and milk storage systems, could significantly improve production efficiency and competitiveness of local farmers. In addition, the growing demand for dairy products in the domestic market and the development of exports create additional opportunities for expanding production volumes.

Thus, the dynamics of indicators of the dairy industry in the Kyrgyz Republic indicates a positive development trend, which indicates the growing competitiveness of dairy products in international markets. This confirms that the country's dairy products have the potential for further successful development and can become one of the key drivers of economic growth. Given the importance of this industry, strategic initiatives, including

strengthening ties with external partners, export development, and investment in innovative technologies, should be implemented to ensure its sustainable development and maintain competitive advantages in the market. Increased imports of dairy products underscore the need to support local producers through preferential programmes, subsidies and other incentives that would help reduce dependence on foreign suppliers and at the same time stimulate the development of domestic production. One of the most important aspects is to create conditions for improving the quality of dairy products, which will help them to be competitive on the international market. This can be achieved by modernising production technologies, introducing the latest milking systems, and aligning quality standards and certification of dairy products with international norms.

In addition, the dairy industry is closely linked to other sectors of the economy, including agriculture, food and processing. Therefore, the development of this industry not only contributes to the improvement of economic performance, but also stimulates the growth of related sectors, creating an efficient economic model that contributes to the improvement of the country's overall economic situation. The introduction of innovations in the industry, development of marketing strategies and integration of modern processing technologies can significantly increase the added value of products, contributing to the growth of exports and reducing dependence on imports (International Fund for Agricultural Development, 2024; Kyrgyzstan: A Comprehensive..., 2025).

Given these factors, an important step for the further development of the dairy industry is its integration into the national economic development strategy, which includes measures to support small and medium-sized businesses in rural areas, stimulate investment in modern production facilities, improve infrastructure, and provide access to finance and the latest technologies. In addition, the importance of training and professional development of dairy workers should be taken into account, which will increase overall productivity and quality. In the long term, the dairy industry in Kyrgyzstan has the potential to become not only an important component of the agricultural sector, but also a significant factor of economic growth at the national level, which can happen provided that there is effective resource management, a clear strategic focus on innovation, active support for local producers and the development of competitive products. Only with a comprehensive approach and the introduction of systemic changes will the dairy industry be able to fully realise its potential and become an important component of the country's economic development.

DISCUSSION

The findings of the study on the dairy sector of the Kyrgyz Republic for the period 2016-2024 indicate positive trends but also reveal several challenges that require

attention for further development. Firstly, the steady growth in milk production volumes, which increased from 1,524.6 thousand tonnes in 2016 to 1,823 thousand tonnes in 2024, demonstrates the stable development of the sector. The average annual growth rate of 1.9% suggests that the dairy industry is capable of adapting to changes in demand and economic conditions. However, despite the overall positive trend, there are significant regional disparities in growth rates, indicating uneven sectoral development across different parts of the country. In particular, regions such as Jalal-Abad and Issyk-Kul have shown substantial growth in milk production, linked to improved agricultural practices and investment. Meanwhile, Batken and Talas regions exhibit slower growth, suggesting constraints in resource access or insufficient demand for dairy products. This situation highlights the need for targeted measures to support less developed regions to ensure more balanced sectoral growth.

Secondly, the analysis of dairy product production reveals significant fluctuations in output across different categories. While some categories, such as ice cream, butter, and cheese, show impressive growth, others, like cream and yoghurt, experienced a decline in 2024, indicating market saturation or shifts in consumer preferences. This requires producers to be flexible and adapt to new conditions. Dairy trade reflects the strong position of the Kyrgyz Republic in foreign markets, as exports consistently exceed imports, underscoring the competitiveness of the country's dairy products. However, the rise in imports signals the need to enhance domestic production to meet growing demand for dairy goods (Florya *et al.*, 2023).

The study's findings demonstrate positive dynamics in the development of the Kyrgyz Republic's dairy sector, particularly in the growth of milk production volumes and export potential, indicating the industry's capacity for further expansion and its importance for economic growth. Notably, the increase in dairy product exports in international markets and reduced import dependency highlight the growing competitiveness of Kyrgyz dairy products. These results align with the conclusions of J.V. Andrei *et al.* (2022), who note that high-quality dairy products can become a key component of foreign trade. They also emphasise that a well-developed dairy sector boosts exports and generates additional foreign currency earnings, positively impacting the economy by strengthening the national currency and fostering growth in other economic sectors.

The study found that milk production in Kyrgyzstan has grown steadily, with a 15.5% increase between 2016 and 2024. This confirms a positive trend in dairy sector development, resulting from technological improvements, an increase in the number of farms, and rising demand for dairy products. Similar trends have been observed in studies by other authors, such as A. Wahid and S. Srivastava (2023), who note that in Central Asian

countries, milk production growth is largely linked to infrastructure improvements and adaptation to changing climatic conditions. However, unlike authors who stress the need for government support in modernising the sector, the findings show steady growth without significant reliance on state subsidies, suggesting greater sectoral independence in Kyrgyzstan. Nevertheless, the results diverge from the conclusions of researchers studying other agricultural sectors in Kyrgyzstan, particularly A. Nurullaev *et al.* (2025), who argue that the dairy industry still faces major structural issues, including low investment levels and outdated technologies in some regions. Additionally, significant infrastructure modernisation is needed, which limits production growth potential.

It should also be noted that W. Czubak *et al.* (2021) argue that the decline in dairy production is not only due to economic difficulties but also structural shifts in the dairy market, where cream is being displaced by more popular products such as cheese and yoghurt. The scholars highlight that changing consumer preferences and unstable demand can significantly impact production. This aspect is also reflected in the study, where the drop in cream production in 2024 is linked to low demand and economic challenges in the domestic market. Forecasting based on the study's data suggests that technological modernisation could increase milk production volumes and improve quality, ensuring stability in the domestic market while strengthening the competitiveness of Kyrgyz dairy products internationally. This approach aligns with the arguments of A. Zimmermann and G. Rapsomanikis (2023), who state that innovation in dairy farming helps reduce costs and enhance sector efficiency – a key factor for sustainable development and economic resilience. Automation of farm processes, advances in animal genetics, and improved feed technologies can reduce energy, feed, water, and labour costs, thereby lowering production expenses (Alimardanova *et al.*, 2021). The study's findings can be compared to the conclusions of L. Čechura *et al.* (2021) regarding the importance of investment in dairy sector infrastructure. The scholars also emphasise the need for government support to attract private investment, particularly in improving production capacity, processing technologies, and logistics chains. The absence of such support may lead to inefficient resource allocation and reduced sector competitiveness in international markets (İsmayilov *et al.*, 2022).

Kyrgyzstan has favourable natural conditions for pasture-based livestock farming, with access to eco-friendly green fodder, which could become a key competitive advantage. This finding aligns with the research of E. Muunda *et al.* (2023) on sustainable dairy sector development, particularly in feed base improvement. E. Muunda *et al.* consider this issue critical, as feed quality and diversity affect not only milk yield but also animal health. Providing cattle with balanced, high-quality feed enhances productivity, reduces treatment

costs, and improves overall herd health. Such measures are essential for stable and sustainable dairy sector development amid changing economic conditions (Bórawski *et al.*, 2020, Zhu & Oude Lansink, 2022).

According to the study, weaknesses in Kyrgyzstan's dairy sector include disorganisation and production fragmentation due to non-compliance with international quality standards and inadequate infrastructure. Similar challenges have been noted by E.C. Okolo *et al.* (2025) and N. Ökten-Kemaloglu and E. Çoruk (2024), who link them to insufficient coordination and cooperation, hindering productivity growth and sectoral development. The authors stress that the lack of collaboration between producers and processors often leads to unstable raw material supplies, limiting the ability of processing plants to meet production demands and maintain high quality. Comparable trends are observed in European countries, where, as noted by W. Poczta *et al.* (2020), and A. Parzonko and P. Bórawski (2020), urbanisation and demographic changes contribute to dairy farm fragmentation. Researchers highlight that declining rural labour and urban migration create additional challenges for cooperation and efficient sector functioning. As a result, dairy farmers face supply constraints and labour shortages, potentially reducing output and product quality.

The study also identifies risks related to declining feed quality and animal health, possibly linked to shrinking pastureland due to climate change. This aligns with the conclusions of I. Cortés-Fernández *et al.* (2023), who stress the importance of adapting the dairy sector to new climatic conditions through innovative feed production and water management methods. As noted by I. Cortés-Fernández *et al.*, government support should extend beyond financial aid to creating favourable conditions for small and medium enterprises, a key factor in successful sectoral transformation. This conclusion aligns with the study's findings on the need for cooperation between government bodies and producers.

Thus, Kyrgyzstan's dairy sector, as a key driver of economic growth, shows positive trends. However, realising its full potential requires overcoming several major challenges. Key priorities include investment in modern technology and production automation to boost efficiency and reduce costs. Infrastructure modernisation – particularly in transport, storage, and milk processing – along with support for local producers through funding programmes and market access, will be crucial for sectoral development. Additionally, adapting to shifting consumer preferences, such as rising demand for organic and natural dairy products, could enhance competitiveness in domestic and international markets. Accounting for regional factors, including raw material availability and climatic conditions, is also vital for sustainable dairy industry growth. Only a comprehensive approach to addressing these issues will fully unlock the potential of Kyrgyzstan's dairy sector.

CONCLUSIONS

Obtained results indicate a stable growth of the dairy industry in Kyrgyzstan. Milk production volumes increased by 15.5% from 2016 to 2024, indicating the progressive development of the industry. The average annual growth rate was 1.9%, which confirms a steady increase in production. The positive dynamics of milk volume growth is sustainable, as the growth rate exceeded 100% throughout the period. The highest growth rate was recorded in 2016, and the lowest in 2021. However, after that, growth rates recovered, which demonstrates the industry's ability to adapt to changes. The growth trend in milk production in Kyrgyzstan is described by a linear function, which indicates a steady increase in production. The high coefficient of determination ($R^2 = 0.9905$) confirms the accuracy of this model in describing the dynamics of milk production and its potential for predicting further changes. Such stable dynamics may be due to improved milk processing technologies, an increase in the number of farms and growing demand for dairy products. An important characteristic is the regional disparity in milk production. The highest growth rates were recorded in Issyk-Kul and Jalal-Abad regions, indicating favourable conditions for dairy farming in these regions. At the same time, there is a decline in production in the cities of Bishkek and Osh, which indicates structural problems or changes in consumer preferences.

It has been established that the production of dairy products in the Kyrgyz Republic in 2016-2024 shows a general upward trend in volumes in most categories, especially in the ice cream segment (+315%), which indicates high demand. At the same time, there is instability in the production of butter, cheese and yoghurt, which may be due to fluctuations in the supply of raw materials, changes in consumer preferences and economic factors. A SWOT analysis of the Kyrgyz dairy industry has shown that its strengths include favourable natural conditions for livestock breeding, environmentally friendly products, long-standing livestock traditions, high domestic demand and the availability of processing infrastructure. At the same time, weaknesses include low levels of technology, fragmented production, milk quality issues, lack of modern infrastructure and limited access to finance. Opportunities include growing demand for organic products, investments in modernisation and export development, while threats include competition from imports, high production costs, climate change and an unstable regulatory environment. Government support programmes are needed to develop the dairy sector, including credit subsidies, grants for modernisation, improving financial literacy of farmers and improving quality control of dairy products. Further research should focus on analysing the efficiency of existing logistics channels and distribution routes for dairy products, including exploring opportunities to reduce transportation costs and

improve access of dairy products to various markets, both domestic and foreign. A limitation of the study is that data on milk and dairy production may be incomplete or insufficiently detailed, especially with regard to regional differences.

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CONFLICT OF INTEREST

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Молочна галузь як драйвер економічного зростання

Чинара Адамкулова

Доктор економічних наук, професор
Киргизький національний університет імені Жусупа Баласагіна
720033, вул. Фрунзе, 547, м. Бішкек, Киргизька Республіка
<https://orcid.org/0009-0003-2172-7831>

Кишимжан Жакшиликова

Кандидат педагогічних наук, доцент
Киргизький державний університет імені І. Арабаєва
720026, вул. Раззакова, 51А, м. Бішкек, Киргизька Республіка
<https://orcid.org/0009-0005-8075-6565>

Рустамбек Асанов

Кандидат економічних наук, доцент
Киргизький державний університет імені І. Арабаєва
720026, вул. Раззакова, 51А, м. Бішкек, Киргизька Республіка
<https://orcid.org/0009-0005-0166-9229>

Неллі Акилбекова

Доктор економічних наук, професор
Киргизький національний університет імені Жусупа Баласагіна
720033, вул. Фрунзе, 547, м. Бішкек, Киргизька Республіка
<https://orcid.org/0000-0002-8829-0094>

Нурі Мамбетказієва

Докторант
Киргизький національний університет імені Жусупа Баласагіна
720033, вул. Фрунзе, 547, м. Бішкек, Киргизька Республіка
<https://orcid.org/0009-0000-6722-3936>

Анотація. Метою дослідження було вивчення поточного стану молочної галузі Киргизстану, оцінка її впливу на економіку країни, визначення основних викликів та можливостей для подальшого розвитку. Проаналізовано динаміку виробництва молока в країні в 2016-2024 рр., оцінено регіональні особливості розвитку, виявлено тенденції в імпортно-експортних операціях та їх вплив на економічне зростання Киргизстану. Досліджено фактори підвищення конкурентоспроможності вітчизняної молочної продукції та зроблено прогнозні оцінки обсягів її імпорту та експорту на період 2025-2028 рр. Встановлено, що загальний обсяг виробництва молока в Киргизькій Республіці збільшився на 16,6 %, досягнувши 1823 тис. тонн у 2024 році, що свідчить про позитивну тенденцію розвитку галузі. Були виявлені регіональні відмінності в темпах виробництва, з найвищими обсягами в Іссик-Кульській та Джалал-Абадській областях та нижчими обсягами в містах Бішкек та Ош, що може бути пов'язано зі структурними проблемами або змінами в уподобаннях споживачів. Виробництво молочних продуктів загалом зросло, особливо в сегментах морозива, масла, сиру та йогуртів. Однак виробництво вершків було нестабільним через коливання попиту та поставок сировини. Згідно з SWOT-аналізом, молочна промисловість Киргизстану має свої переваги: екологічність, високий попит і переробну інфраструктуру, але стикається з низьким рівнем технологій, фрагментарним виробництвом і проблемами якості. Можливості включають розвиток експорту, інвестиції та зростаючий попит на органічні продукти, тоді як загрози включають конкуренцію з боку імпорту, високі витрати та нестабільне регулювання. Розвиток вимагає державної підтримки, модернізації та підвищення якості продукції. Прогноз на період 2025-2028 рр. показав позитивні тенденції для молочної галузі в Киргизькій Республіці. Очікується, що обсяг імпорту зменшуватиметься на 4 % щорічно, що свідчить про зміцнення внутрішнього виробництва та зменшення залежності від імпортової продукції. Отримані результати сприяють формуванню науково обґрунтованих рекомендацій щодо підвищення ефективності молочного виробництва, зниження ризиків та посилення його конкурентних переваг

Ключові слова: імпорт; експорт; внутрішнє виробництво; конкурентоспроможність; прогноз; диверсифікація асортименту