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Analysis of economics and management of crop and livestock husbandry production in Kazakhstan

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ORIGINAL ARTICLE

Abstract. Crop production and livestock husbandry sector are key branches of Kazakhstan's agro-industrial complex. They play an important role in ensuring food security and economic stability of the country. The relevance of the study is due to the need to identify factors affecting the efficiency and sustainable development of these industries in terms of the global climate change, economic instability, and growing demand for agricultural products. Although there are significant achievements in production volumes, regional disparities, infrastructure deficiencies and technological gaps persist, hindering the development of these industries. An analysis of the current state of crop and livestock production shows a decrease in gross output in 2023 due to rising production costs, unfavourable climatic conditions, and economic factors. Indeed, Turkestan, North Kazakhstan, Kostanay, and Akmola have advanced crop production. Almaty, Turkestan, Akmola, and East Kazakhstan regions have advances livestock production. 2023 had a decrease in gross output, deterioration in per capita indicators, and an increase in livestock mortality. To address the above problems, there is a need to implement the integrated approach including technology modernisation, cost optimisation, and infrastructure development. The research suggests to introduce innovative production methods, increase the level of agronomic and veterinary support, and extra financing and investment into the industry. Moreover, the favourable conditions for the sale of products, improving agricultural policy, and developing government support programs are very relevant issues. An analysis of crop and livestock husbandry production dynamics from 2010 to 2023 revealed key factors affecting the development of industries: climate change, insufficient agricultural technologies, financing problems, shortage of qualified personnel, weak logistics infrastructure, etc. Despite the negative trends in 2023, 2024 shows an increase in livestock husbandry and an improvement in production indicators, such as average milk and egg yield. In crop production, there has been an increase in gross output until 2022; in 2023 its decline is associated with rising costs and unfavourable economic conditions. To ensure the sustainable development of crop and livestock husbandry production in Kazakhstan, it is necessary to focus on the modernisation of industries, the introduction of innovative technologies, professional development, and optimisation of government support. An integrated approach, including the development of strategies to increase profitability and sustainability of production, will help stabilise the economy of these industries and strengthen the country's food security.

Keywords: crop production; livestock husbandry; climate change; food security; agricultural policy; Kazakhstan

JEL codes: Z32, L83

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Introduction

Kazakhstan's agricultural sector plays a key role in the country's economy, ensuring food security, and

contributing to rural development. Crop production and animal husbandry are the main components of this industry; they form the basis of food production and export potential. Both directions have a significant impact on economic development, providing the country with basic food products and raw materials for the processing industry. However, the development of the agricultural sector is challenged with the climate change, absence of modern technology, limited access to investment, and underdeveloped infrastructure.

The subject of this research is a comprehensive analysis of the economy of crop and livestock husbandry production in Kazakhstan, identifying their current problems and development prospects. The research focuses on the economic and social factors affecting the effectiveness of both industries, the development of recommendations for improving management, and increasing their competitiveness.

Recently, there has been an increasing interest of scientists in the study of economics and management of these industries, due to the need to adapt to global challenges, including climate change, digitalisation, reducing resource dependence, and increasing the sustainability of the agricultural sector. The literature review is aimed at systematising scientific papers on the issues and prospects of crop and livestock husbandry production in Kazakhstan, identifying key approaches and methodologies used in the economic and managerial analysis of these industries.

Scientific publications on crop production focus on its role in providing the population with basic foodstuffs and raw materials for the processing industry. According to research, the industry's potential is significantly limited due to the absence of modern technologies and insufficient infrastructure [31]. Climate change, soil degradation and inefficient use of water resources are key factors negatively affecting the yield and sustainability of the industry. The authors emphasise the urgency to introduce resource-saving technologies and innovations, precision farming and automation of agrotechnical processes. They can increase productivity and sustainability of crop production.

The research in animal husbandry focuses on the analysis of production and economic indicators, its management, and modernisation of the industry. Animal husbandry in Kazakhstan has significant potential due to its natural conditions and extensive pasture lands. However, the outdated technologies for keeping and feeding animals, high mortality rates of young animals, weak integration into global supply chains significantly limit the development of the industry. According to our analysis, efficiency improvement is possible through the introduction of digital management systems, including animal health monitoring, rational use of feed, and automation of production processes.

Modern research highlights the importance of government regulation and support of the agricultural sector. The development of crop production and animal husbandry requires attracting investments, improving the subsidy system, and forming the favourable conditions for innovation [5]. Special attention is paid to issues of sustainable development, including maintaining ecological balance and ensuring biosafety.

According to Tyupakov K.E., Batrakova N.V., Mertins Yu.V., «a precision agriculture system is being actively introduced into global agricultural production. It includes two subsystems – precision agriculture and precision animal husbandry. The use of such agricultural production technology in the crop industry allows agricultural producers to increase gross production, increase profitability, and reduce unit costs. Precision agriculture is an agricultural production system aimed at optimising agrotechnological processes in the crop industry through automatic control and regulation of agricultural machinery and equipment based on data from information and analytical analysis of production with minimal environmental impact» [31].

Indeed, Kadomtseva M.E., Neufeld V.V. consider «the main directions of modernisation of agriculture and its sub-sectors in terms of the large-scale introduction of digital technologies. Global experience shows that digitalisation of crop production provides a significant increase in yields while reducing costs and environmental damage due to the selective use of machinery and fertilizers. This is achieved through the most rational, «targeted» use of each unit of resources (machine hours of machinery, kilograms of fertilizers applied) based on a large amount of information about complex processes occurring in soils and plants. The issues of increasing the efficiency of crop production based on the use of precision farming technologies are closely related to the need to overcome constraints such as low-quality field work, non-compliance with agricultural techniques, limited use of plant protection products, low efficiency of fertilizers, drawing up

technical charts for crops regardless of the potential of fields, the use of outdated technologies, insufficient productivity of new crops, absence of qualified personnel, high costs due to poor consideration of natural and climatic conditions» [13].

According to Oleinik A.N. et al. «the main ways to increase the efficiency of crop production are as follows: 1) the use of intensive crop cultivation technology; 2) the use of advanced technology, anti-erosion measures; 3) modernisation of the material and technical base by improving tractors, combines, etc.; 4) compliance with consumption standards for raw materials; 5) improvement of the on-farm mechanism of financial incentives. Therefore, currently agriculture continues to be one of the most important sectors of both the national and global economies and is included in the list of main issues considered at the state level. High-quality, timely and comprehensive implementation of measures aimed at improving crop production can make it more efficient, and, subsequently, increase the profits from the sale of the products. This will have a positive impact both on the functioning of the organisation as a whole and on the country's economy» [24].

According to Alekseeva S.N., Volkov G.A., «to introduce a new crop into crop rotation, it is necessary to lay down production experience using this crop, including various schemes of chemical plant protection, the optimal composition of agricultural aggregates necessary for growing this crop. The profitability of growing a crop after harvesting determines the economically profitability for the organisation. Currently, the priority areas of strategic and innovative development can increase the volume and quality of products in a relatively short time, reduce production costs, and ensure a quick return on investment in the development and assimilation of innovations» [6].

According to Aimurzina B.T., Kamenova M.Zh., Bektenova D.Ch., «an increase in the inflow of investment into agriculture is one of the financial factors of agricultural development. In this regard, the authors forecast the growth of agricultural production by 2027» [1].

As it was noted by Ibrishev N.N., Kalguova R.Zh., Ayypova T.A., «to implement precision farming technology, it is necessary to consider the costs of navigation system equipment, software, and personnel» [12].

Nurzhanova G.I., Kasenova A.Zh., Suleymanov R.E. dwell on «the growth of livestock husbandry production. It is associated with the successful implementation of its lending programmes. In households, the output of gross livestock production shows significantly positive trends – by 39%; in crop production – by 18% in 2019 compared to 2015» [23].

According to Shaikanova N.K., Kaigorodtsev A.A., Apysheva A.A., «to improve the quality characteristics of farm animals and increase livestock productivity on this basis, increase the utilisation of production capacities of dairy processing enterprises, it is advisable to consolidate small farms, including family farms, combining them into agricultural cooperatives with a significant number of animals» [26].

As stated by K.G. Ibraimov, «the new conditions require volumes of domestic investments for the complete replacement of agricultural machinery during the planned period are compared with the planned ones. If the available funds, together with the bank loans, are insufficient to achieve this minimum, there is a reason to contact the authorities to provide assistance from the national fund» [11].

According to Narynbayeva A.S., Amirova M.A., Bespaly S.V., «the additional monetary income from 1 hectare could be provided through the use of a unique method of wheat cultivation» [21].

Tusayeva A.K., Uteev B.Zh., Nurgozhaev A.S. study «the process of digitisation of land plots. It is very well implemented in the Almaty region. It simplifies the paperwork for farmers when applying for industry subsidies in the future» [30].

According to Saiganov A.S., Chabatul V.V. «the costs of innovation in the food industry do not meet the real needs of the industry in ensuring sustainable innovative development and expanding the production of fundamentally new competitive products. Investing in innovative projects will be a priori more effective in regions or enterprises with high investment attractiveness» [25].

As stated by Aitkhozhayeva G.S., «calculating the integral indicator of agricultural land efficiency should include the volume of sales of agricultural products in monetary terms, since this indicator characterises the volume of cash flows received as a result of land use» [2].

According to Aitkhozhayeva G.S., Anarbayev E.A., Nilipovsky V.I., «the agro-industrial complex is

the main industry of the Turkestan region, providing the population with essential food products, having significant export potential. Therefore, the rational use of agricultural land is of strategic importance for the region» [3].

However, conforming to Kashakova G.A., Rustembayev B.E., Aimurzinov M.S. «the processing of meat and milk is very important. Therefore, it is necessary to finance equipment leasing on a budgetary basis» [15].

As stated by Akhmetova V.Ya. and Galikeeva R.N. «the digitalisation of the agricultural sector eliminates its disadvantages associated with a long production and technological cycle, natural and climatic risks, large crop losses during cultivation, harvesting, and storage. It allows ones to quickly monitor acreage, update field maps to set up navigation systems, and reduce theft of property, fuel, plant protection products, and seed materials» [4].

In consonance with Kurnosova V.S. and Azatyan H.S., «increasing the economic efficiency of livestock husbandry production in agricultural sector of the Krasnodar Krai allows ones to modernise the technical base and increase production efficiency. However, it also provides the population of the region and the country with high-quality agricultural products» [19].

As stated by Kuraeva A.N. et al., «addressing of these problems requires consolidating the efforts of district and regional governments to promote and support the cooperative movement, find incentives for medium-sized businesses, cooperation with the small suppliers of agricultural raw materials, and training specialists» [18].

According to Buyarova A.V. and Buyarova V.S., «there are many unresolved problems in the poultry industry significantly hinder the competitiveness of products. They are as follows: high cost of resources used (feed, energy resources, feed additives, breeding products), including related to the devaluation of the national currency. It followed by an increase in the cost of eggs and poultry meat, a decrease in company profitability, a shortage of breeding products, a weak material and technical base of organisations engaged in breeding work and, as a result, its low level. As a result, the technological processes of poultry farming are disrupted and it is impossible to conduct extended reproduction. It also causes the high dependence on imports of hatching eggs, day-old chickens, technological equipment, veterinary drugs, and disinfectants. Therefore, food security is being threatened, and the cost of poultry products is increasing» [9].

Nechaeva M.L., Antonova D.A., Shkileva N.P., consider the following «measures to increase production capacity are as follows: 1. The introduction of the highest quality feed into the diet to increase productivity; 2. Search for new sales channels; 3. Improving the quality of animal husbandry conditions. Moreover, to improve the resource potential factor, we propose the following measures: 1. The use of resource-saving technologies; 2. Participation in government programmes for additional financing; 3. The introduction of technologies ensuring the environmentally safe production of livestock products» [22].

As stated by Tsyguleva M.I., Karagodina D.A., Fedorova O.A., «the successful addressing the problems of cattle breeding development is ensured by the rationalisation of production management, strengthening the effectiveness of its economic methods, and preventing the use of material, labour, and financial resources in agricultural organisations» [28].

By Chernov V.A., «regions with free soil areas suitable for pastures, haymaking and growing animal feed should be allocated for the cultivation of large-horned dairy cattle. Therefore, deforestation for livestock farms will not be required. Zones with preferential taxation and tax incentives can be established in these regions» [10].

In consonance with Shulenbayeva F.A., Okutaeva S.T., Madenova K.M., «many factors affect the volume of meat production: livestock husbandry and its productivity – offspring yield, average live weight of livestock; feed quality, feeding ration, care and maintenance of livestock; genetic potential, etc. Using econometric methods, we investigated the influence of some factors on the formation of others. The following are considered as the main ones: the number of cattle, the availability of feed in farms, the yield of offspring, the average live weight of livestock sold» [27].

According to Kazhieva Zh.Kh. and Agumbayeva A.E., the one of the issues of regional livestock husbandry development is low labour productivity, as a result of small-scale production. To improve the

labour productivity, it is necessary to increase the level of capitalisation (mechanisation) in agriculture. It is impossible without investment capital and working capital. Therefore, retained earnings or borrowed funds provided by the financial sector can be used as a source of financing. These measures stimulate the growth of the financial sector and the accumulation of wealth within the country» [16].

Belgibayeva A.S., Mukhanova A.E. and Smagulova Zh.B., dwell on «the introduction of innovations in dairy farming. It is hampered by limited financial resources of agricultural producers for systematic development of innovations, as well as low motivation of external investors caused by low profitability of investments in dairy farming cattle breeding» [8].

In consonance with Kydyrbaeva E.O., Baydybekova S.K., Tolamisova A.G., «raising cattle is the main goal of animal husbandry. It provides the agro-food market with necessary and affordable food products: milk and meat. To increase the production of livestock husbandry products, agricultural enterprises strive to form the conditions conducive to the growth of the number of cattle» [20].

According to Kamysbaev M.K., Moldashev A.B., Berdykulova G.M., «the destabilisation of the global economy, rational diversification of production, improvement of inter-economic relations, and effective government support are the basis for a sustainable strategy for the economic development of agricultural producers, ensuring an increase in profits and profitability» [14].

As stated by Kazhieva Zh.Kh., «to develop farms, preferential financing is also provided with a loan term of up to 15 years and a remuneration rate of up to 4%. The successful implementation of this programme will increase the efficiency of regional livestock husbandry production and addressed the problems hindering the development of the industry» [16].

According to Amirbayev S., «direct subsidies allocated to reduce the cost of livestock husbandry products (including beef) are not enough to equalise the competitive advantages of domestic products compared with imported analogues. It determines the preservation of a high share of its imports» [7].

As stated by Turisbekova G. and Aitmukhanbetova D. «to achieve a balanced development of meat production and processing of meat products in the future, it is necessary to form a cluster. Cluster integration in the meat processing industry will increase the demand for meat and ensure the utilisation of production capacities of meat processing enterprises» [29].

According to Akimbekova G.U., Baymukhanov A.B., Kaskabaev U.R., «the economic effect of using the dairy herd management system is formed by changing the qualitative and quantitative indicators of the dairy farm through additional production due to preclinical diagnosis of diseases; reducing the cost of veterinary drugs; saving the cost of keeping cow calves; reducing the duration of the service period; saving seed consumption for artificial insemination, etc.» [5].

A literature review shows Kazakhstan's significant agricultural potential, including fertile lands and a variety of climatic zones. However, both industries have systemic problems such as outdated technologies, absence of investment, and changing climatic conditions. The research also highlights the importance of government intervention to modernise infrastructure, support farmers, and introduce modern agricultural technologies.

The purpose of the research is to conduct an in-depth analysis of crop and livestock husbandry production, identify key problems and factors determining their development, propose strategies aimed at increasing the sustainability and modernisation of the industry.

Therefore, we studied the following issues:

– The dynamics and structure of crop and livestock husbandry production, the analysis of statistical data for the period 2010-2024.

– Identification of agricultural producers' key problems.

– Assessment of the impact of economic, social, and environmental factors on the development of both industries.

– Development of practical recommendations for improving the efficiency of crop and livestock husbandry management.

The results of the analysis could develop effective strategies and programmes to increase the

competitiveness and sustainability of crop and livestock husbandry production. It will contribute to strengthening the agricultural sector, the development of the economy, ensuring food security and stable rural development.

Methods

The following methods were used in the study:

– Statistical analysis. We used statistical data to study the dynamics of crop and livestock husbandry production. We analyse the time series of key indicators were, including the gross output of industries, their share in GDP, productivity per unit area of agricultural land and per capita. We used the official data of the Committee on Statistics of the Republic of Kazakhstan and the Ministry of Agriculture for the period from 2010 to 2023.

– Graphical visualisation. We used it for visual presentation of the research results (graphical visualisation methods, the construction of time series, diagrams, and cartographic data display). It allows us to identify regional differences and trends in the development of industries.

– Factor analysis. We used it to identify key factors affecting crop and livestock husbandry productivity. We considered the quality and availability of resources, the level of mechanisation, climatic conditions, investments, personnel policy, and technology. This method made it possible to quantify the contribution of each factor to the overall result.

– SWOT analysis. We use SWOT analysis to identify strengths and weaknesses, opportunities and threats in each of the industries. We identify low labour productivity, insufficient technological equipment, personnel shortages, market price instability, and changing climatic conditions.

– Comparative analysis. A comparative analysis of crop and livestock husbandry production indicators in various regions of Kazakhstan has revealed imbalances in the development of industries and assessed the effectiveness of their functioning in various climatic and economic conditions.

– The modelling method. We used regression and trend analysis models to forecast the dynamics of industry development. It allows us to assess the impact of various factors on the development of crop and livestock husbandry production, and propose optimal management strategies.

Results

The analysis of the dynamics of gross crop and livestock husbandry production in the Republic of Kazakhstan in 2010-2023 shows significant fluctuations requiring the detailed analysis to identify the causes of their occurrence and develop effective response measures. During the period under study, there was a general increase in gross output in both crop and livestock husbandry production. However, in 2023 there was a significant decline.

According to Figure 1, gross crop production in Kazakhstan shows steady growth in 2010-2022. However, there is a decline in 2023. It correlates with the issue of current management model sustainability. The reasons for this decline may be related to both climatic conditions and insufficient diversification of production. It causes the vulnerability of the industry to external and internal challenges. Indeed, in 2023, the maximum indicators of gross crop production were recorded in Turkestan, North Kazakhstan, Kostanay, and Akmola regions (Figure 2). It confirms the existence of regional differences in production efficiency. The lowest results are in Mangystau, Ulytau, Atyrau, and West Kazakhstan regions (Figure 3). It highlights the urgency of the regional approach in planning and supporting agricultural production.

The analysis of gross output per capita (Figure 4) and per 100 hectares (Figure 5) confirms the general growth trend until 2022. However, the decline in 2023 raises concerns about the long-term sustainability of production. It also indicates the urgency of production and investment strategies; the use of new technologies could ensure long-term segment profitability.

The cost of crop production per 100 hectares (Figure 6) recorded a moderate increase until 2022. However, there was a decline in 2023. This may indicate inefficient use of resources or negative economic factors, such as rising prices for agricultural materials and energy resources. The cost reduction in 2023 is also due to a reduction in production volumes and a review of production capacities.

At the same time, the physical volume index (Figure 7) and the cost of agricultural products sold (Figure 8) confirm Kazakhstan's crop and livestock husbandry production are fluctuating. These fluctuations can be caused by both external economic factors (for example, price fluctuations in global agricultural markets) and internal problems, including imperfect infrastructure and production technology.

A similar situation is observed in livestock husbandry (Figure 11). Gross livestock husbandry production also tended to increase in 2010-2022. However, there was a decline in 2023. It could be caused by livestock deaths, decreased productivity, etc. The decrease in meat and wool production, livestock husbandry deaths (Table 1 and Figure 12) require an in-depth analysis of the current livestock husbandry farming conditions and the development of more effective management methods.

The decrease in the cost of meat sold (Figure 15) and the increase in livestock husbandry mortality in 2023 are also indicate on the instability of the industry. According to Table 2, livestock husbandry deaths in 2024 increased compared to the previous year. It provided reducing of livestock husbandry productivity.

Nevertheless, in 2024 there was an improvement in the number of livestock husbandry and poultry (Figure 17). It may indicate attempts to stabilise the situation in the livestock husbandry sector. Moreover, the productivity of dairy cattle and poultry, despite general fluctuations, continues to increase (Figure 18). It indicates the successful application of some management and technological practices.

Therefore, the challenges in crop and livestock husbandry production in Kazakhstan in 2023 require an integrated approach. Our scientific research aimed at eliminating these negative trends. To ensure sustainable growth and increase the competitiveness of agricultural sectors, it is necessary to make changes to the existing management system, introduce innovative technologies and develop new strategies to stimulate the production process in a changing external and internal economic environment.

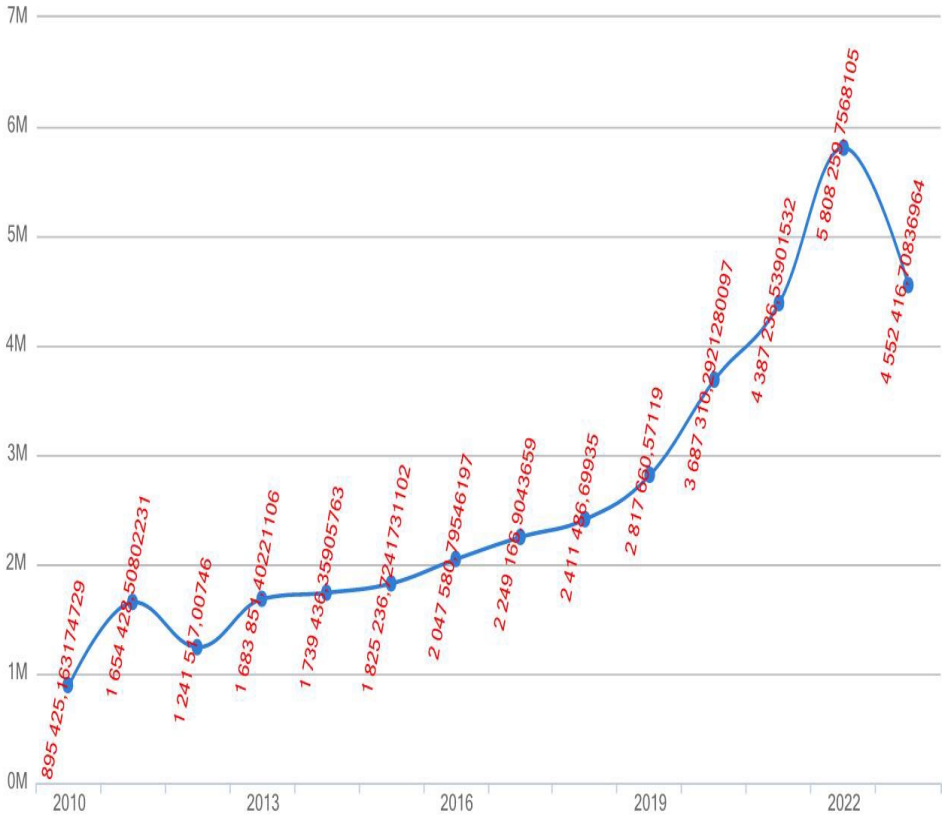

Figure 1. Gross crop production of the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[1]

According to Figure 1, the gross crop production of the Republic of Kazakhstan has increased significantly

[1] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

in 2010 2022. However, there was a significant decrease in 2023. The analysis of the gross crop production of the Republic of Kazakhstan in 2010-2023 shows significant growth. However, there was a significant decrease in 2023.

According to Figure, in 2023, maximum indicators of gross crop production in the Republic of Kazakhstan were recorded in Turkestan, North Kazakhstan, Kostanay, and Akmola regions.

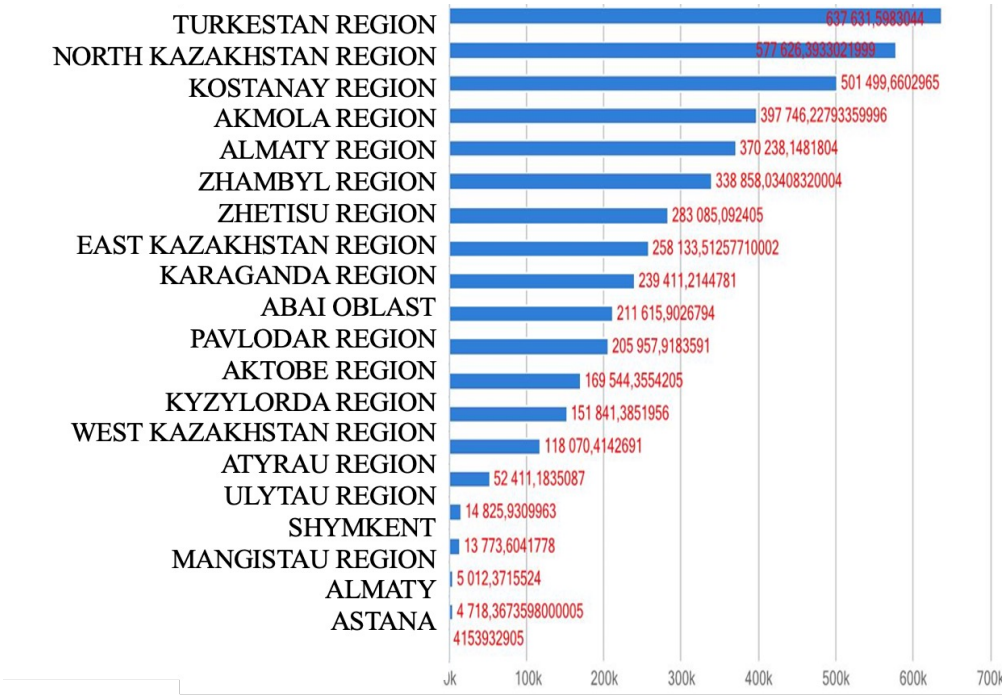

Figure 2. Gross crop production of the Republic of Kazakhstan in Almaty, Shymkent, and Astana, 2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[2]

According to Figure 3, in 2023, the minimum indicators of gross crop production in the Republic of Kazakhstan were recorded in Mangystau, Ulytau, Atarau, and West Kazakhstan regions.

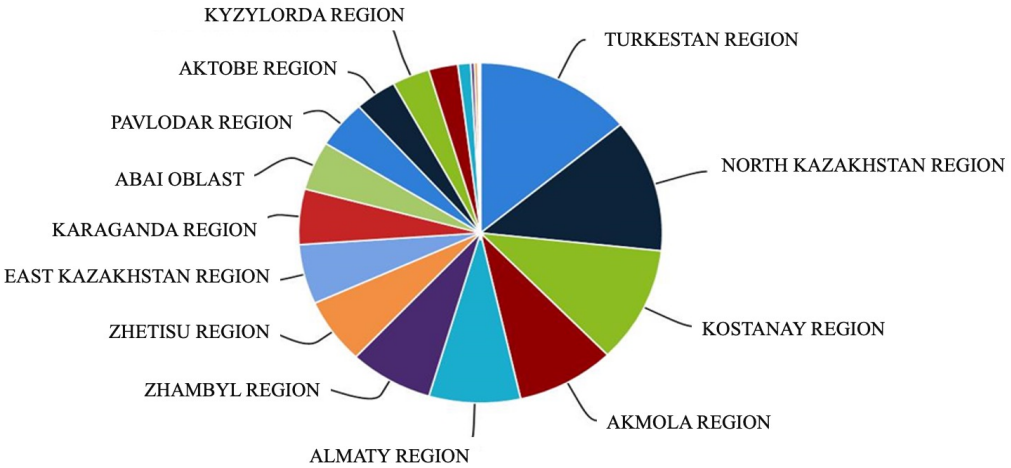

Figure 3. Gross crop production of the Republic of Kazakhstan in Almaty, Shymkent, and Astana, 2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[3]

[2] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[3] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

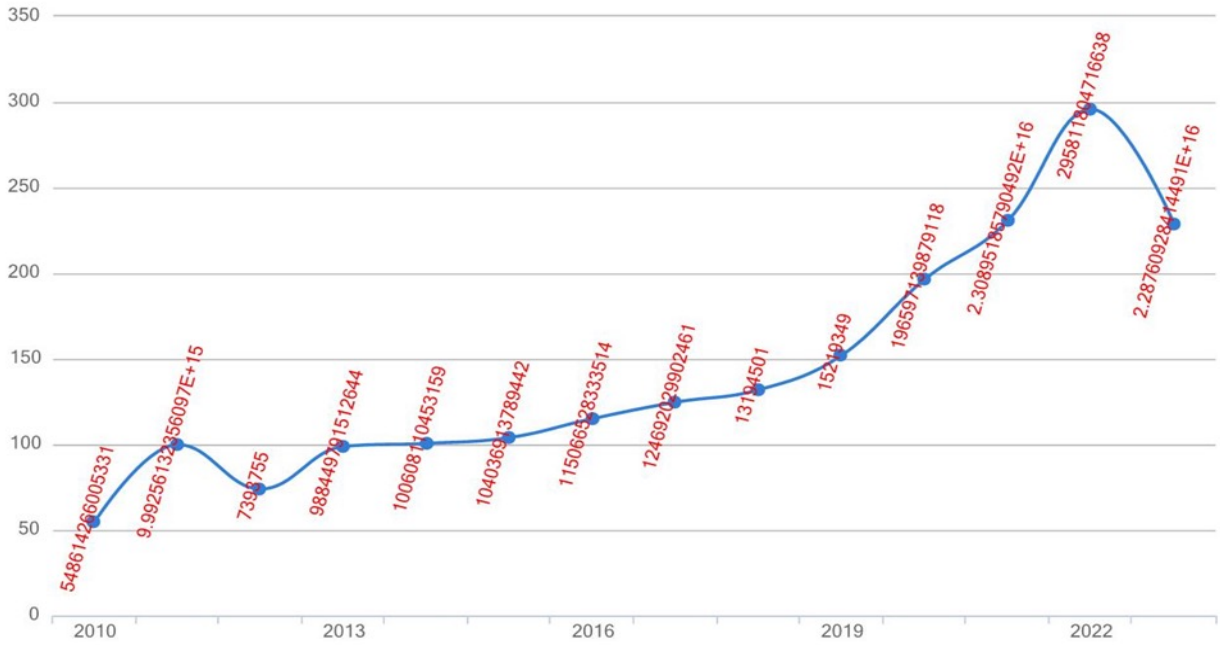

Figure 4. Gross crop production per capita in the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[4]

According to Figure 4, the gross crop production per capita in the Republic of Kazakhstan increased in 2010-2022. However, there was a significant decrease in 2023.

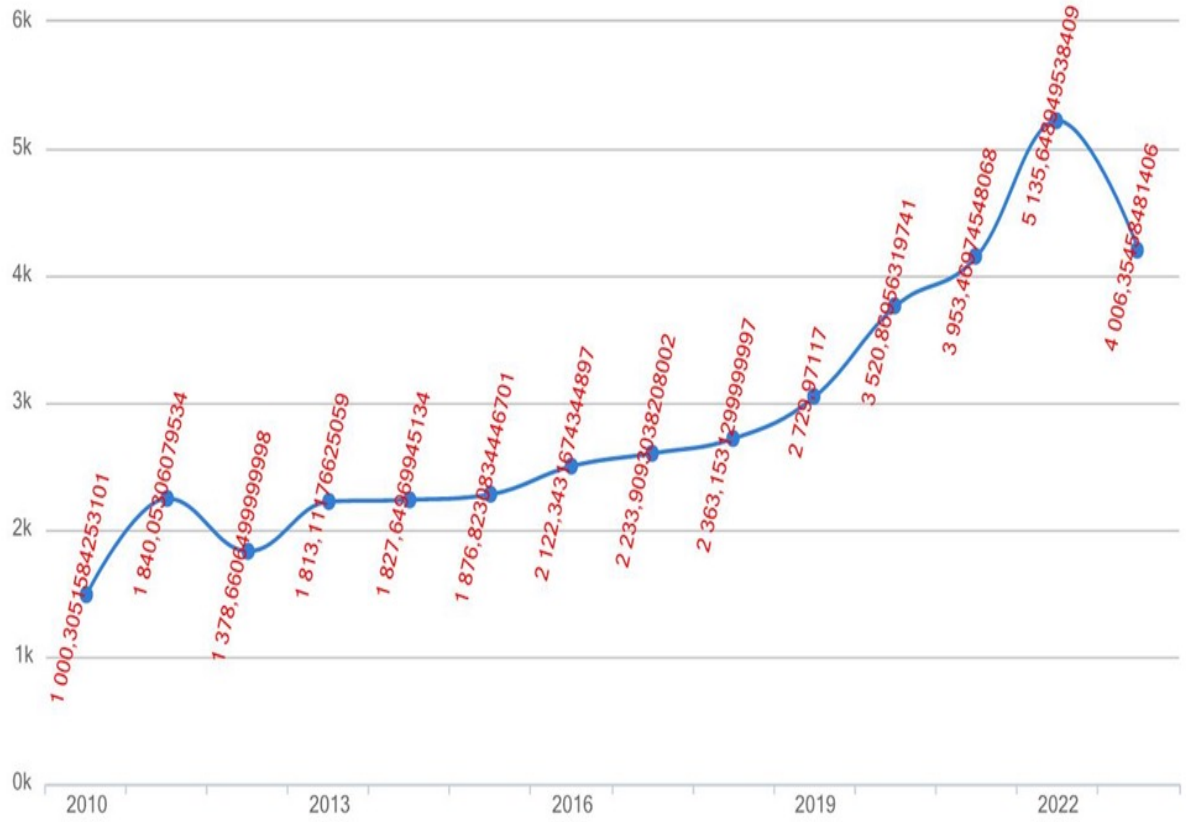

Figure 5. Gross crop production per 100 hectares in the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[5]

[4] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[5] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

According to Figure 5, the gross crop production per 100 hectares in the Republic of Kazakhstan increased in 2010-2022. However, there was a significant decrease in 2024.

Figure 6 shows a slightly increase in the cost of crop production per 100 hectares in the Republic of Kazakhstan in 2001-2021. However, there was a significant increase in 2022 compared to previous periods. In 2023, there was a decline compared to the previous year.

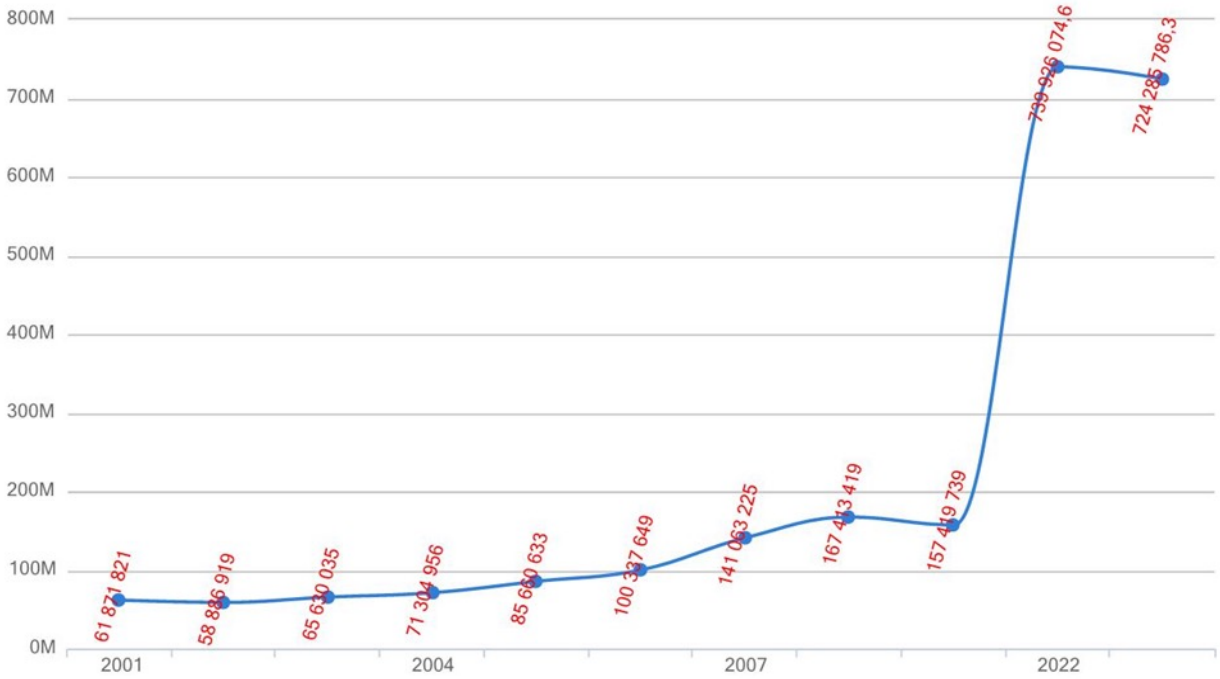

Figure 6. Costs of crop production per 100 hectares in the Republic of Kazakhstan, 2001-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[6]

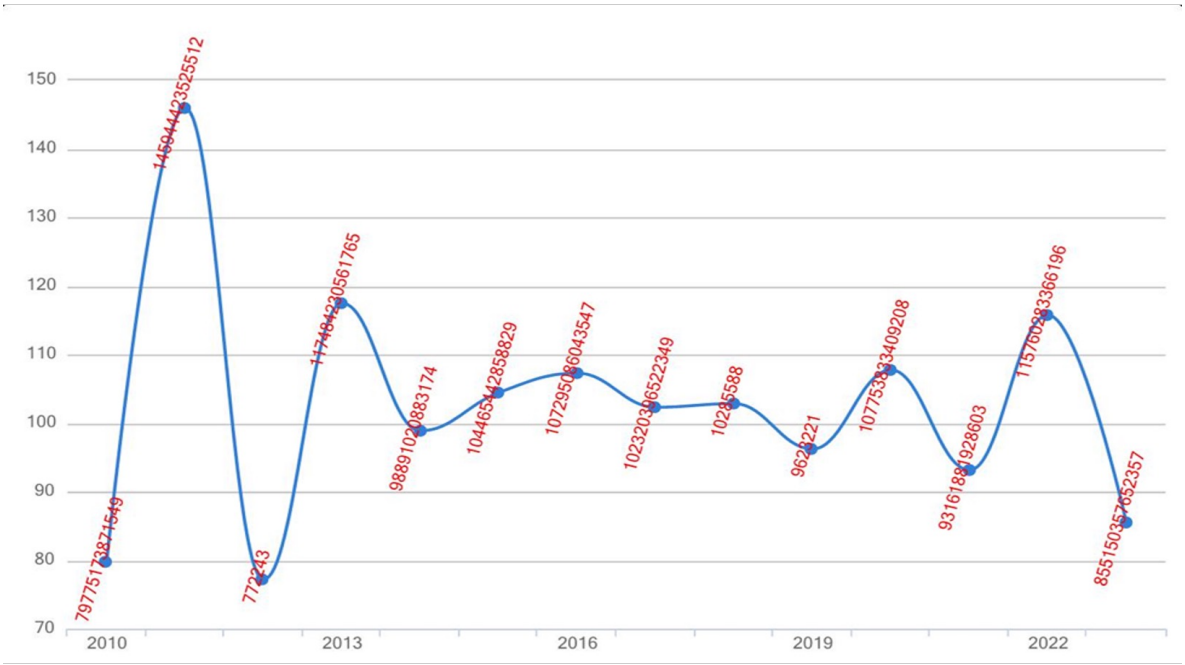

Figure 7. Index of physical volume of crop production in the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[7]

[6] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[7] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

Figure 7 shows the oscillatory trend for the index of crop production physical volume in the Republic of Kazakhstan as it increases and decreases periodically. However, it increased slightly in 2023 compared to 2010.

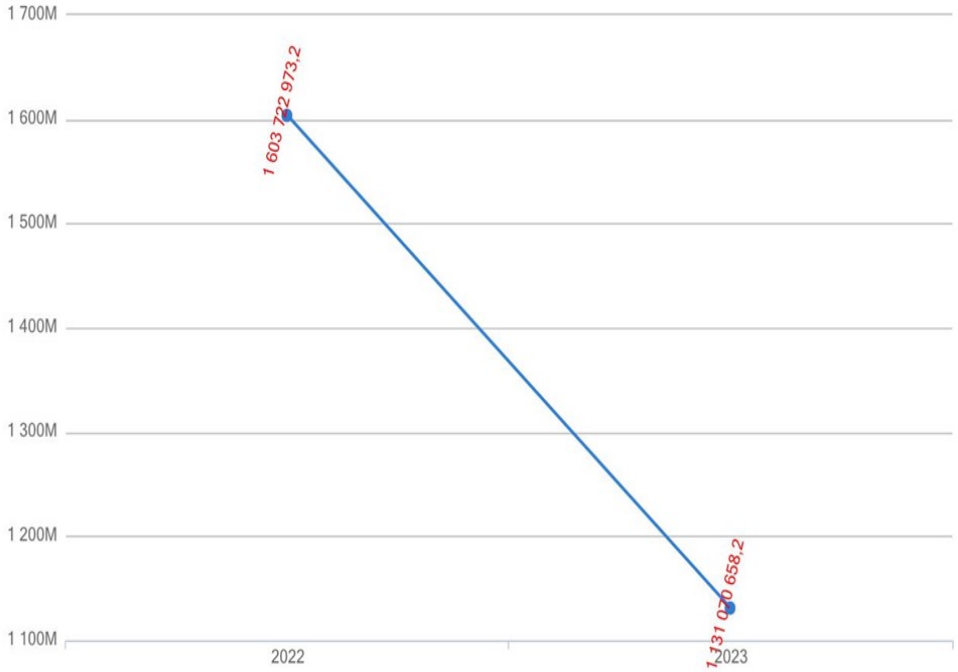

Figure 8. The cost of agricultural products sold in the Republic of Kazakhstan, 2022-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[8]

Figure 8 shows a decrease in the cost of agricultural products sold in the Republic of Kazakhstan in 2023 compared to 2022.

Figure 9 shows the largest volume of crop production services in Zhambyl, Almaty, Kostanay, Atyrau and West Kazakhstan regions.

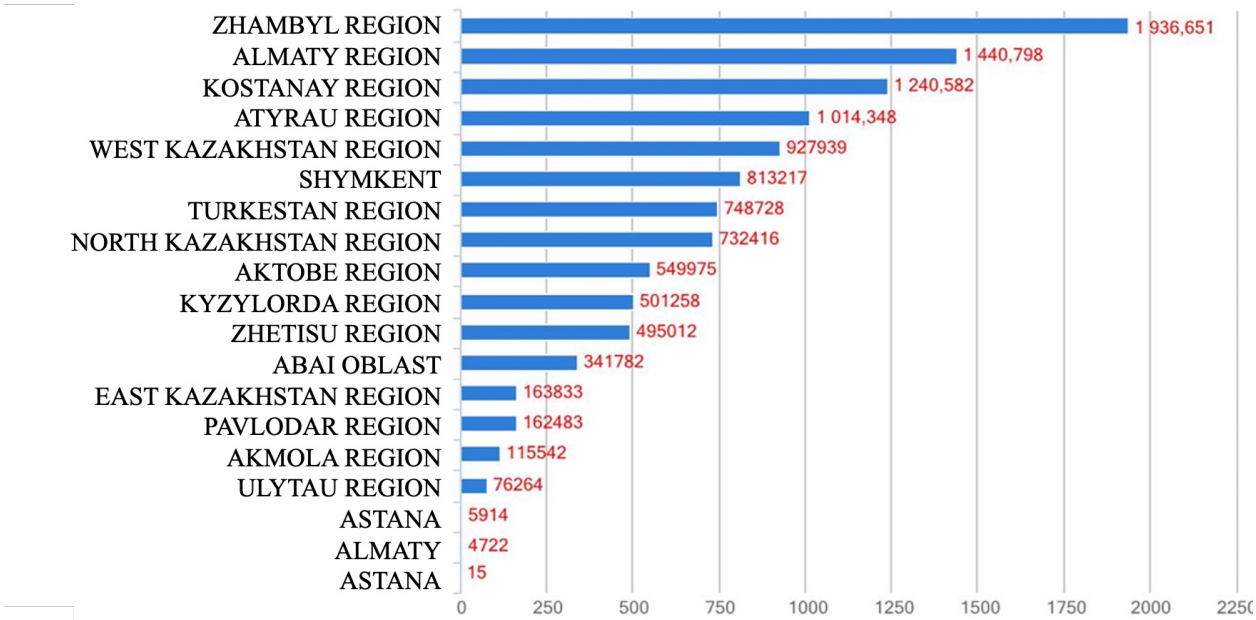

Figure 9. Services in crop production in Almaty, Shymkent, and Astana, the Republic of Kazakhstan, 2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[9]

[8] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[9] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.*

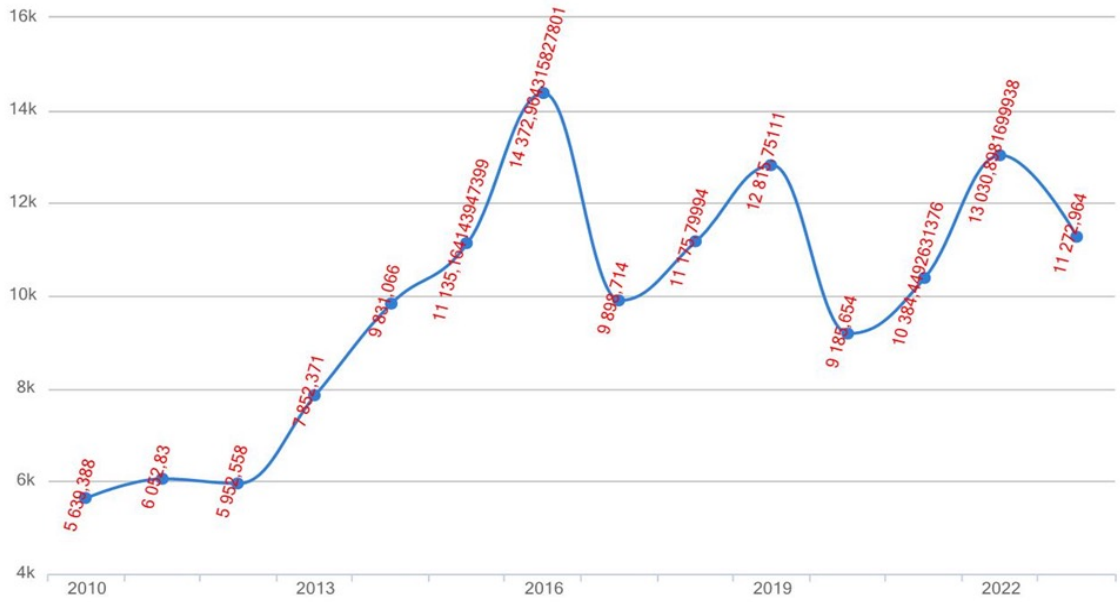

Figure 10. Services in crop production in Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[10]

Figure 10 the oscillatory trend for the index of crop production volume of services in the Republic of Kazakhstan as it increases and decreases periodically. However, it increased slightly in 2023 compared to 2010.

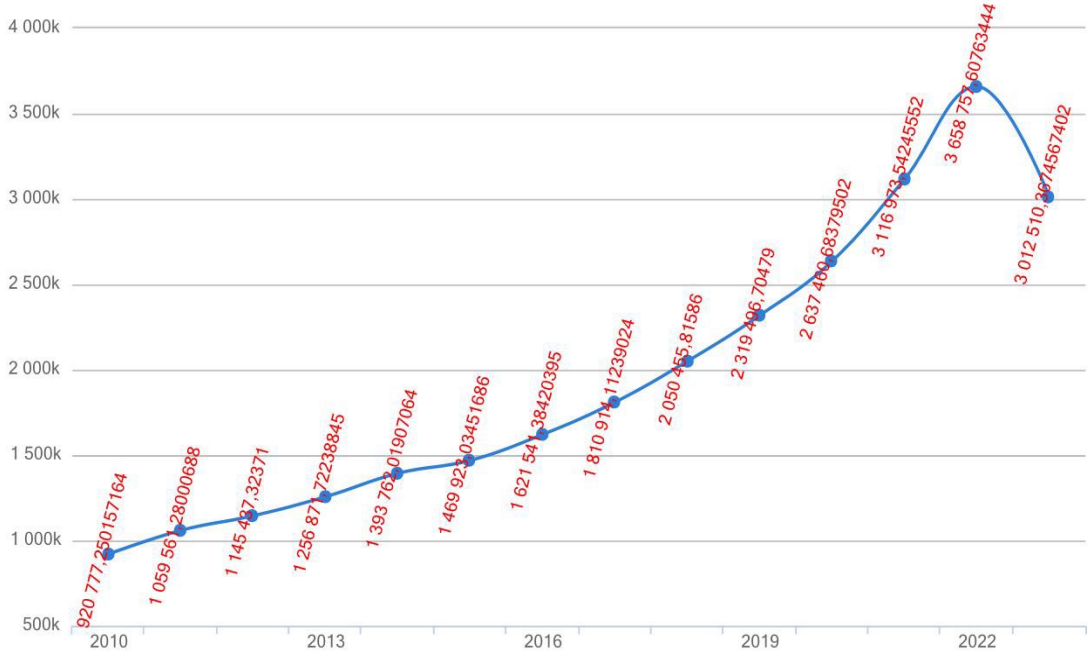

Figure 11. Gross livestock husbandry production of the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[11]

Figure 11 shows an increase of the gross livestock husbandry production of the Republic of Kazakhstan in 2010-2022. However, it decreased in 2023.

Figure 12 an increase in the gross livestock husbandry production per capita in the Republic of Kazakhstan in 2010-2022. However, it decreased in 2023.

gov.kz/ru / (accessed on 10.01.2025)

[10] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

[11] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

Figure 11 shows an increase of the gross livestock husbandry production per capita of rural resident of the Republic of Kazakhstan in 2010-2022. However, it decreased in 2023.

Figure 12 shows an increase in the gross livestock husbandry production per 100 hectares in the Republic of Kazakhstan in 2010-2022. However, it decreased in 2023.

Figure 15 shows a decrease in the cost of 1 hundredweight of meat sold (in live weight) in the Republic of Kazakhstan. However, it increased in 2023 compared to 2022.

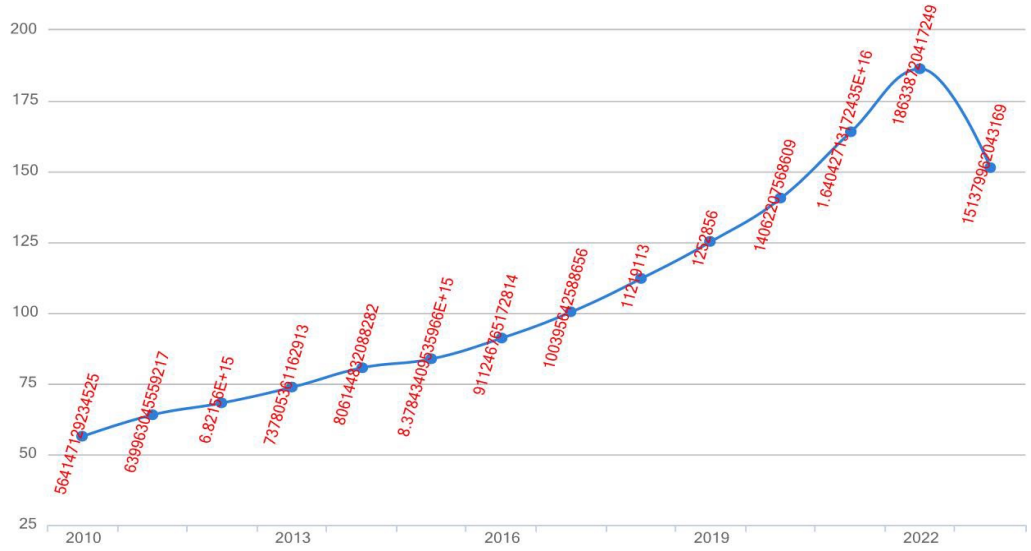

Figure 12. The gross livestock husbandry production per capita in the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[12]

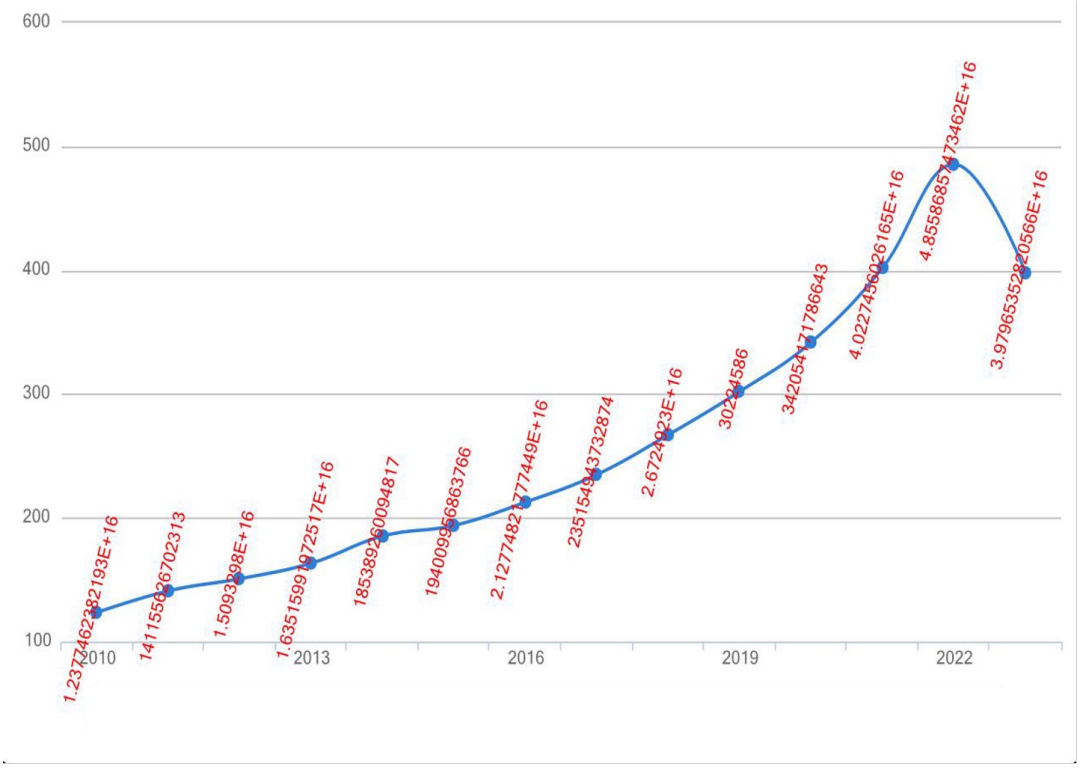

Figure 13. The gross livestock husbandry production per capita in the Republic of Kazakhstan, 2010-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[13]

[12] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[13] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

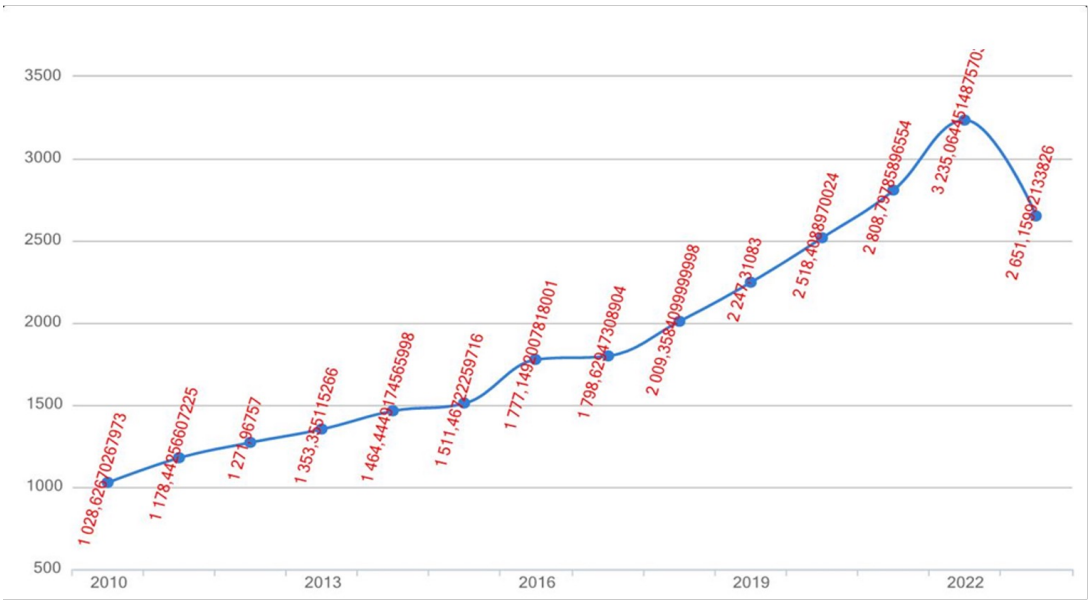

Figure 14. The gross livestock husbandry output per 100 hectares of agricultural land
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[14]

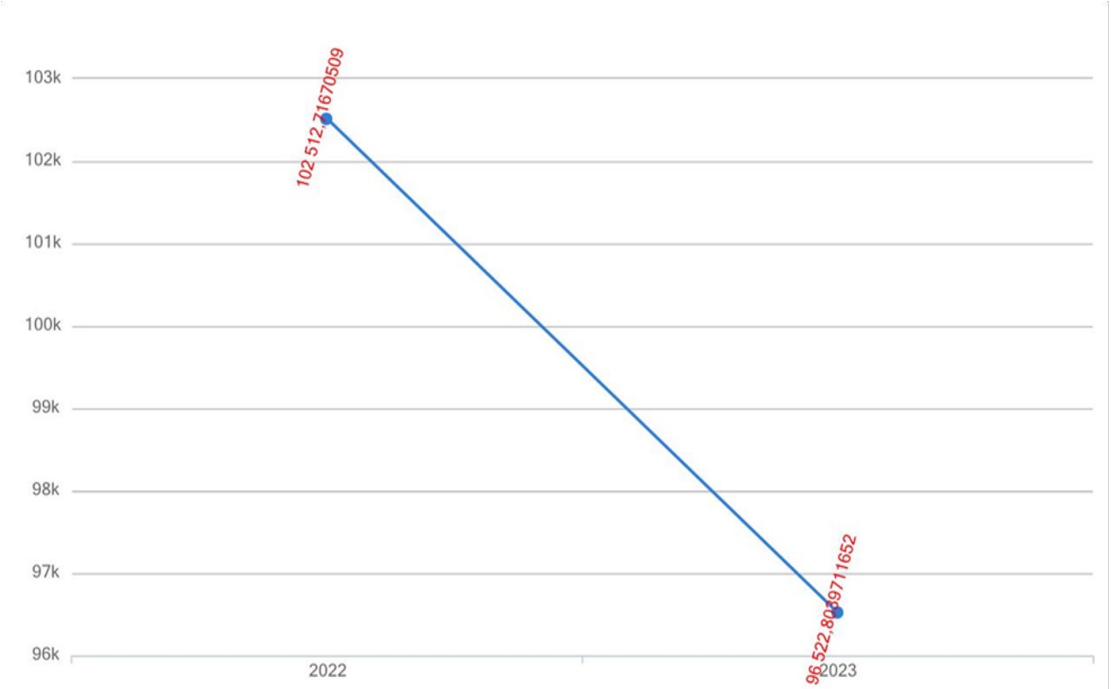

Figure 15. The cost of 1 hundredweight of meat sold (in live weight) Kazakhstan, 2022-2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[15]

Table 1 – Production of certain types of livestock products in the Republic of Kazakhstan, 1990-2023

Years	Meat (live weight), thousand tons	Meat (dead-weight), thousand tons	Milk, thousand tons	Eggs, million pieces	Wool, thousand tons	Karakul, thousand pieces
1990	2,633.7	1,559.6	5,641.6	4,185.1	107.9	1,821.4

[14] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[15] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

Years	Meat (live weight), thousand tons	Meat (dead-weight), thousand tons	Milk, thousand tons	Eggs, million pieces	Wool, thousand tons	Karakul, thousand pieces
1995	1,773.8	984.8	4,619.1	1,840.8	58.3	1,145.2
2000	1,054.1	569.4	3,730.2	1,692.2	22.9	129.9
2005	1,252.0	675.9	4,749.2	2,514.0	30.4	191.9
2010	1,501.2	834.4	5,381.2	3,720.3	37.6	49.4
2015	1,651.1	931.0	5,182.4	4,737.0	38.0	7.1
2020	2,058.5	1,168.6	6,051.4	5,065.8	40.2	1.3
2021	2,162.2	1,231.1	6,247.2	4,838.1	41.2	2.1
2022	1,799.1	1,044.7	3,354.6	4,526.7	35.6	0.5
2023	1,920.3	1,120.0	3,472.9	4,420.6	36.6	0.3

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[16]

Table 2 – Livestock deaths in the Republic of Kazakhstan, 2023-24

	Cattle			**Sheep**		
	in total			in total		
	2024	2023	2024 as a percentage by 2023	2024	2023	2024 as a percentage by 2023
	20,118	13,038	154.3	31,975	25,083	127.5
	Goats			**Pigs**		
	in total			in total		
Republic of Kazakhstan	2024	2023	2024 as a percentage by 2023	2024	2023	2024 as a percentage by 2023
	2,124	1,188	328.5	26,577	20,619	128.9
	Horses			**Camels**		
	in total			in total		
	2024	2023	2024 as a percentage by 2023	2024	2023	2024 as a percentage by 2023
	8,099	3,019	268.3	371	433	85.7

Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan [17]

According to Table 1, the production of the following livestock products decreased in 2023 compared to 1990: meat (in live weight), meat (in slaughter weight), wool, caracul, etc.

According to Table 2, in 2024, compared with 2023, the number of livestock increased: cattle, sheep, goats, pigs, horses.

According to Figure 16, the gross livestock production by regions and large cities of the Republic of Kazakhstan in 2023 has maximum values in the following regions: Almaty, Turkestan, Akmola, Abai, East Kazakhstan.

[16] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

[17] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

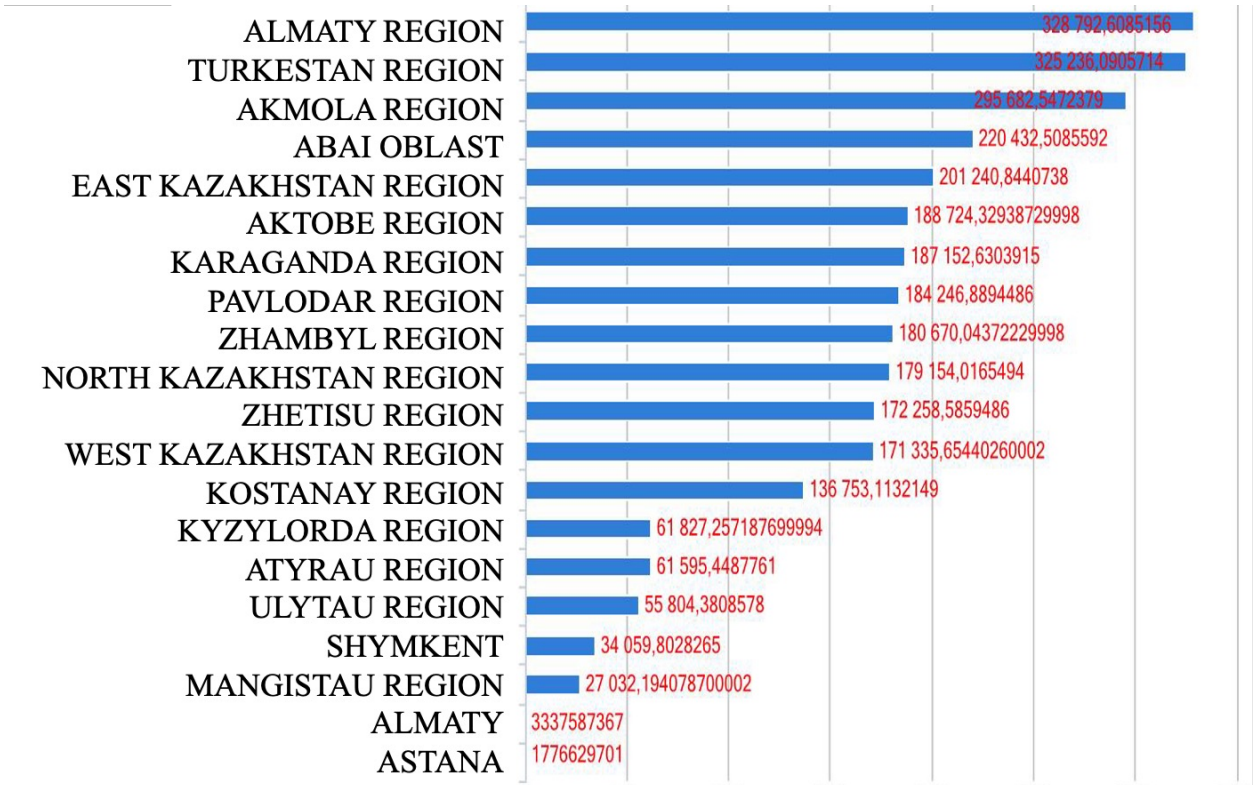

Figure 16. Gross livestock production by regions and major cities of the Republic of Kazakhstan in 2023
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[18]

According to Figure 17, the number of livestock and poultry in the Republic of Kazakhstan as of July 1, 2024 is higher than in 2023 for the following types of livestock: poultry, horses, sheep and goats, cattle.

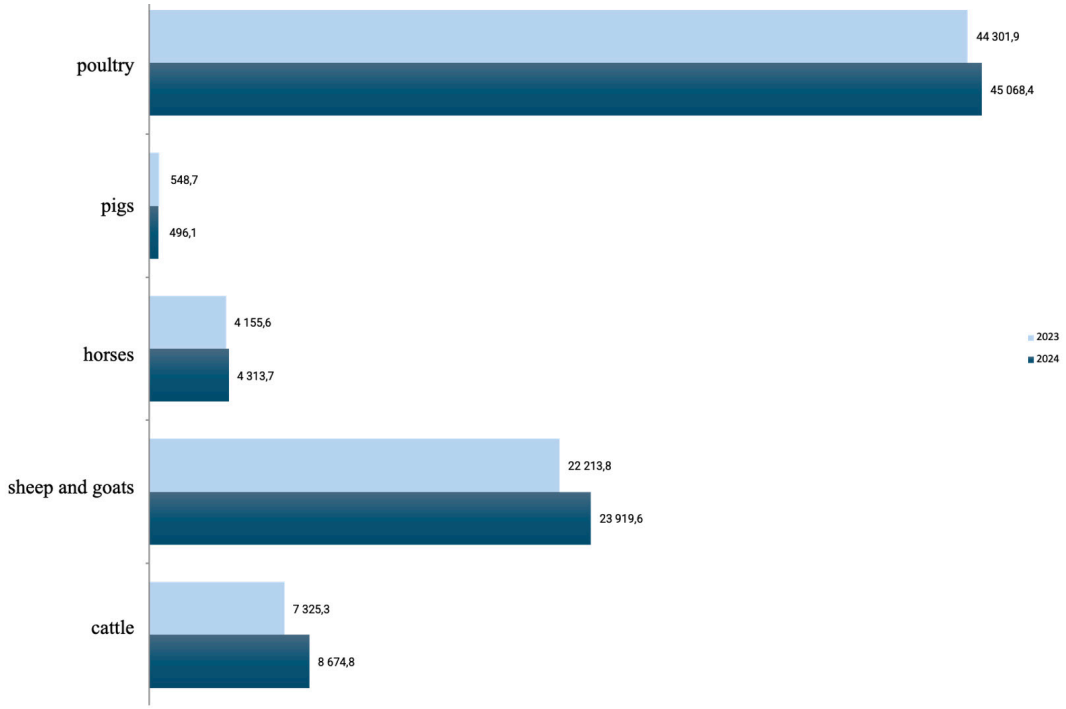

Figure 17. The number of livestock and poultry in the Republic of Kazakhstan as of July 1, 2024
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[19]

[18] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*
[19] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

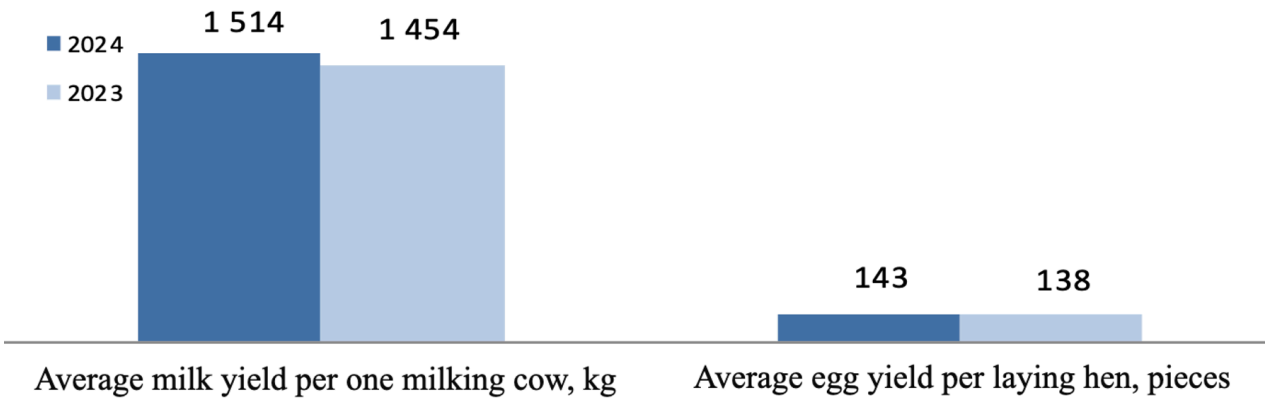

Figure 18. Productivity of livestock indicators in the Republic of Kazakhstan in January-July 2024
Source: Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan[20]

According to Figure 18, the productivity of livestock indicators in the Republic of Kazakhstan (average milk yield per dairy cow, average egg yield per laying hen) on July 1, 2024 is higher than on the same date of the previous year.

Discussion

Kazakhstan's economy, as a key element of Central Asia, includes critical sectors such as crop production and animal husbandry as a basis of the country's agriculture. These industries not only influence domestic economic development, but are also of strategic importance for food security, social stability, and exports. Despite the positive dynamics of production growth in recent years, 2023 revealed certain negative trends, such as a decrease in gross output in both industries. This article provides a comprehensive analysis of the economy and management of crop and livestock production in Kazakhstan, emphasises the external and internal factors influencing their development, a strategy for sustainable growth of these industries using SWOT analysis.

Issues of crop production and animal husbandry. However, Kazakhstan's crop production and animal husbandry are challenged. In crop production, despite the steady growth of gross output in 2010-2022, 2023 was the year of decline in terms of these indicators. The main challenges include climate change, insufficient water availability, and fluctuating product prices. It affects the sustainability of the sector. Similar trends are in animal husbandry. It is confirmed by a decrease in gross output and an increase in livestock mortality in 2023. The challenges are related to the low level of veterinary services, insufficient food supply, and the deterioration of pastures.

External factors affecting crop production and animal husbandry. External factors such as climate change, global price fluctuations for agricultural products, and international sanctions have a significant impact on the development of crop and livestock husbandry production in Kazakhstan. Climate changes, including droughts and extreme weather conditions, worsen conditions for agriculture, in particular, for the cultivation of grain and fodder crops. Fluctuations in world prices for grain and meat provide instability in the domestic market. It can both contribute to growth and decrease in production volumes. The external economic situation and competition in foreign markets also affect the export potential of products.

Internal factors include the level of government regulation, investments in infrastructure, the use of modern technologies, and management in the agricultural sector. In recent years, there has been an increase in government subsidies and support. However, their effective distribution and access for small and medium-sized agricultural producers still remain relevant. The introduction of new technologies and productivity improvements remain priorities for both industries. However, the insufficient level of technological equipment, especially in remote regions, hinders the development of the sector. An important aspect is the improvement

[20] *Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Source: https://stat.gov.kz/ru / (accessed on 10.01.2025)*

of the logistics infrastructure. It is crucial for ensuring the sustainable supply of agricultural products.

Table 3 – SWOT analysis of crop production and animal husbandry in the Republic of Kazakhstan

Strengths. Kazakhstan has significant natural resources, including vast agricultural lands and pastures. Crop production has good prospects for increasing the production of grain crops such as wheat and barley demanded worldwide. Animal husbandry also has high potential, especially in terms of sheep and cattle breeding.	Opportunities. Increasing government support, attracting investments in agricultural infrastructure, and introducing innovative technologies into crop production and animal husbandry. Development of environmentally friendly production methods and increasing demand for organic products on international markets.
Weaknesses. Insufficient modernisation of industries, problems with water resources and technical equipment slow down the development of agriculture. The absence of effective management systems and low-skilled labour in agriculture also provide barriers to increasing productivity.	Threats. Instability in world markets, climate change, livestock deaths and epidemics of animal diseases can significantly reduce productivity in animal husbandry.

Source: Authors

Development strategy of crop and livestock management. To achieve sustainable growth in crop and livestock production in Kazakhstan, it is necessary to focus on several strategic areas. Firstly, it is the introduction of innovative technologies and improvement of management efficiency. Secondly, infrastructure needs to be improved, especially water supply and irrigation. It will help reduce dependence on climate change. Third, the formation of mechanisms to improve product quality and competitiveness in international markets, including the introduction of certifications for organic products and improved logistics systems. Fourth, increased attention to issues of veterinary safety and improvement of the feed base for livestock.

To implement these strategies, it is necessary to cooperate comprehensively with private investors, scientific institutions, and international organisations. It will integrate best practices and technologies to improve agricultural efficiency in Kazakhstan.

Conclusion

Livestock and crop production in Kazakhstan represent key sectors of the agro-industrial complex, playing a significant role in ensuring food security, socio-economic development, and sustainable agricultural growth. These industries are characterised by a variety of natural and economic conditions. It determines their high regional differentiation. The situation in these industries is closely related to various factors, including climatic conditions, technological equipment, management efficiency, and infrastructure quality. In recent years, Kazakhstan has seen the dynamic development of both industries. However, against the background of positive trends, there are a number of problems requiring an integrated approach and innovative solutions. The purpose of this work is to analyse the current state of the crop and livestock economy in Kazakhstan, identify the main problems, and develop recommendations for their elimination and optimisation of processes in these sectors.

The analysis of the state of the economy and management in the agricultural sector of Kazakhstan, covering both crop production and animal husbandry. It also demonstrates the presence of both positive and negative trends requiring comprehensive measures to improve the situation. Between 2010 and 2022, both industries show the significant growth in gross output. However, a decline occurred in 2023, indicating the need for an in-depth analysis of the causes and effective decision-making.

In crop production, a decrease in gross output was recorded in 2023. It is due to a number of factors, including an uneven distribution of resources across regions, production costs, etc. Nevertheless, the maximum gross output figures were achieved in Turkestan, North Kazakhstan, Kostanay, and Akmola; the minimum values are observed in Mangystau and West Kazakhstan regions. The decrease in gross output per capita and per 100 hectares of agricultural land also reflects a general negative trend in crop production. At

the same time, despite these problems, there is an increase in the volume of services in crop production and positive changes in the cost structure.

The situation in animal husbandry also remains ambiguous: in 2023, there was a decrease in gross output. It also makes it difficult to implement long-term plans to ensure food security. Among the factors influencing the decline in production indicators, there is a high mortality rate of livestock and a decrease in productivity in some regions. There is an increase in the number of individual livestock species and in productivity in dairy and egg production. For instance, on July 1, 2024, the productivity of milk and eggs increased compared to the same period in 2023. It is a positive signal for industry development.

The main areas of improvement in both sectors are the enhancement of management mechanisms, introduction of innovative technologies, infrastructure development, and farm support. To increase the efficiency of crop and livestock production, it is necessary to improve cooperation between producers, optimize processes, and reduce costs. The key point is sustainable environmental regulation. It will ensure the long-term sustainability of Kazakhstan's agricultural sector.

Therefore, to ensure the sustainable development of crop and livestock production in Kazakhstan, a comprehensive reform programme is required. It is extremely important to increase productivity, optimise costs, and improve product quality. It will have a positive impact on the country's economy and provide its international competitiveness.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Zhanna R. Ashimova – conceptualization, project administration, writing – original draft.
Amina M. Uristembek – writing – review & editing.
Zhanay J. Abitov – investigation.
Diana Z. Abitova – formal analysis.

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