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# COMPETITIVENESS OF LIVESTOCK FARMING: AN ESG ASSESSMENT IN THE CONTEXT OF THE DIGITAL ECONOMY

# МАЛ ШАРУАШЫЛЫҒЫНЫҢ БӘСЕКЕГЕ ҚАБІЛЕТТІЛІГІ: ESG-ЦИФРЛЫҚ ЭКОНОМИКА ЖАҒДАЙЫНДА БАҒАЛАУ

# КОНКУРЕНТОСПОСОБНОСТЬ ЖИВОТНОВОДСТВА: ESG-ОЦЕНКА В УСЛОВИЯХ ЦИФРОВОЙ ЭКОНОМИКИ

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**Abstract.** ***The objective*** **– is to evaluate the efficiency of the livestock sector and identify directions for strengthening its competitiveness by taking into account ESG (Environmental, Social, and Governance) factors within the context of the digital economy, which is particularly relevant in light of global challenges and the transformation of the business environment.** ***Methods*** **– comparative analysis, financial and economic analysis, and a systematic examination of ESG criteria were employed to identify differences and common trends and to verify the reliability of accounting information.** ***Results*** **– the study demonstrates the impact of digital technologies, including digital control systems, on the operation of livestock enterprises, enabling greater accuracy in managerial decision-making. The principal socio-economic and environmental priorities for optimizing the livestock sector were identified. The interrelationship between accounting tools, auditing, business investment, and ESG assessment was substantiated, strengthening the conceptual foundation of management. It was demonstrated that the implementation of digital innovations enhances transparency, reduces risks, and improves the quality of organizational decision-making.** ***Conclusions*** **indicate the necessity of the systematic application of ESG**

indicators, the improvement of environmental reporting, the digitalization of expert assessment, and the use of integrated accounting and analytical models. The practical implementation of the proposed approaches will strengthen the investment attractiveness of the livestock sub-sector, contribute to capacity enhancement and stakeholder engagement, while standardized ESG parameters and the promotion of innovation activity will support the formation of sustainable supply chains and ensure dynamic economic growth in both the regions and the production sector. The implementation of ESG standards plays an important role in the development of the industry, contributes to improving the financial performance of agricultural enterprises, creates favorable conditions for attracting investors and maintaining a strong reputation in domestic and international markets, and promotes the preservation of biological and natural diversity.

**Аңдатпа.** ***Мақсаты*** **- мал шаруашылығы саласының тиімділігін бағалау және цифрлық экономика контекстіндегі ESG (экологиялық, әлеуметтік және басқару) факторларын ескере отырып, бәсекеге қабілеттілікті нығайту бағыттарын айқындау, бұл әсіресе жаһандық сын-қатерлер мен бизнес-ортаны түрлендіру шындықтарында өзекті болып табылады.** ***Әдістері*** **- салыстырмалы, қаржылық-экономикалық талдау, бухгалтерлік ақпараттың дұрыстығын тексеру кезінде айырмашылықтар мен жалпы үрдістерді анықтауға арналған ESG критерийлерін жүйелі зерттеу.** ***Нәтижелер*** **- цифрлық технологиялардың, соның ішінде цифрлық бақылау жүйелерінің мал шаруашылығы кәсіпорындарының қызметіне әсері көрсетілген, бұл менеджмент шешімдерінің дәлдігін арттыруға мүмкіндік береді. Мал шаруашылығы секторын оңтайландырудың негізгі әлеуметтік-экономикалық және табиғатты қорғау бағдарлары көрсетілген. Бухгалтерлік есеп, аудит және бизнесті инвестициялау құралдарының ESG бағалауымен байланысы негізделген, бұл басқарудың тұжырымдамалық негізін күшейтеді. Цифрлық инновацияларды енгізу ашықтықты арттыруға, тәуекелдерді азайтуға және ұйымдастыру шараларының сапасын жақсартуға ықпал ететіні дәлелденді.** ***Қорытындылар*** **ESG-көрсеткіштерін жүйелі қолдану, экологиялық есептілікті жетілдіру, сараптаманы цифрландыру және интеграцияланған есепке алу-талдау модельдерін пайдалану қажеттілігін айғақтайды. Ұсынылған тәсілдерді практикалық іске асыру мал шаруашылығы кіші кешенінің инвестициялық тартымдылығын нығайтады, әлеуетті арттыруға, мүдделі тараптарды тартуға ықпал етеді, ал стандартталған ESG-параметрлері, инновациялық белсенділікті ынталандыру тұрақты жеткізу тізбегін қалыптастыруға және өңірлер мен өндіріс сегментінің экономикалық өсу серпінін қамтамасыз етуге жәрдемдесетін болады. ESG-стандарттарын имплементациялау саланы дамытуда маңызды рөл атқарады, қаржы ауыл шаруашылығы құрылымдарын жақсартуға, инвесторларды тарту үшін оңтайлы алғышарттар беруге және отандық және халықаралық нарықтарда беделді сақтауға, биологиялық және табиғи әртүрлілікті сақтауға ықпал етеді.**

**Аннотация.** ***Цель*** **– оценка эффективности отрасли животноводства и определение направлений укрепления конкурентоспособности с учетом ESG (экологических, социальных и управленческих) факторов в контексте цифровой экономики, что особенно актуально в реалиях глобальных вызовов и трансформации бизнес-среды.** ***Методы*** **- сравнительного, финансово-экономического анализа, системного изучения ESG-критериев для выявления различий и общих тенденций, при проверке достоверности учетной информации.** ***Результаты*** **- показано влияние цифровых технологий, включая цифровые контрольные системы, на деятельность животноводческих предприятий, что позволяет повысить точность решений менеджмента. Обозначены основные социально-экономические и природоохранные ориентиры оптимизации животноводческого сектора. Обоснована взаимосвязь инструментов бухгалтерского учета, аудита и бизнес-инвестирования с ESG-оценкой, что усиливает концептуальную основу управления. Доказано, что внедрение цифровых инноваций способствует увеличению прозрачности, снижению рисков и улучшению качества организационных мер.** ***Выводы*** **свидетельствуют о необходимости системного применения ESG-показателей, совершенствования экологической отчетности, цифровизации экспертизы и использования интегрированных учетно-аналитических моделей. Практическая реализация предложенных подходов укрепит инвестиционную привлекательность животноводческого подкомплекса, будет способствовать наращиванию потенциала, вовлечению заинтересованных сторон, тогда как стандартизированные ESG-параметры, стимулирование инновационной активности будут содействовать формированию устойчивых цепочек поставок и обеспечению динамики экономического роста регионах и производственном сегменте. Имплементация ESG-стандартов играет важную роль в развитии отрасли, создает условия для улучшения финансового состояния сельхозформирований, формирования оптимальных предпосылок с целью привлечения инвесторов и поддержания репутации на отечественном и международном рынках, сохранения биологического и природного разнообразия.**

**Keywords: agrarian sector, livestock farming, ESG assessment, digital economy, accounting, auditing, environmental reporting, efficiency, investment attractiveness.**

**Түйінді сөздер: аграрлық сектор, мал шаруашылығы, ESG-бағалау, цифрлық экономика, бухгалтерлік есеп, аудит, экологиялық есеп беру, тиімділік, инвестициялық тартымдылық.**

**Ключевые слова: аграрный сектор, животноводство, ESG-оценка, цифровая экономика, бухгалтерский учет, аудит, экологическая отчетность, эффективность, инвестиционная привлекательность.**

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**Introduction**

Currently, ensuring food security at the global level has become an extremely pressing issue. The scarcity of irrigated land, soil erosion, climate change, and environmental degradation significantly increase the risks of declining agricultural production and destabilizing food supply systems. At the same time, the growing prevalence of genetically modified products and chemical additives has intensified consumer demand for environmentally friendly, organic, and safe food products. In this context, the livestock sector plays a crucial role as one of the key sources of high-quality protein and essential nutrients, ensuring food security and improving the quality of life of the population.

For the Republic of Kazakhstan, livestock farming represents a strategically important branch of the national economy. Favorable natural and climatic conditions, vast pasture resources, and an extensive feed base create strong prerequisites for the sustainable development of the sector and the expansion of its export potential. Livestock production constitutes a significant share of total agricultural output, supplying domestic markets with meat, milk, eggs, and other essential products, while also providing raw materials for the food processing industry. Moreover, the sector contributes to employment in rural areas and supports socio-economic stability.

Under modern conditions, the development of the livestock industry is assessed not only by quantitative growth indicators but also by qualitative parameters such as efficiency, competitiveness, and sustainability. In this regard, the integration of ESG (Environmental, Social, and Governance) principles is becoming increasingly relevant. Environmental aspects include the rational use of natural resources, reduction of emissions, and minimization of environmental damage. Social aspects focus on improving living standards in rural areas, ensuring safe working conditions, and enhancing human capital. Governance aspects emphasize transparency, accountability, and the effectiveness of management systems.

In the context of the digital economy, the transformation of the livestock sector is emerging as a strategic priority. The implementation of advanced digital technologies-such as big data analytics, automated accounting systems, precision livestock farming tools, and digital monitoring platforms-enables optimization of production processes, reduction of operational costs, and improvement of decision-making quality. As a result, enterprises can increase productivity, strengthen financial stability, and enhance resilience to external shocks. Ultimately, digitalization contributes to improving investment attractiveness, fostering innovation, and ensuring the long-term sustainable development of the livestock sector in both national and global markets.

**Literature review**

Issues related to enhancing the sustainable development and competitiveness of the livestock sector are widely discussed in contemporary scientific research. In the context of the digital economy, the implementation of ESG (environmental, social, and governance) principles is recognized as one of the key directions for improving the efficiency of the agro-industrial complex.

The improvement of management accounting systems in agriculture has been examined in the works of Baidakov A.K., Sarsembayeva G.B., Vakhrushina M.A. [1], where approaches to increasing production efficiency through effective cost management have been proposed. These approaches can also be applied in the livestock sector to ensure optimal use of resources.

Issues of environmental sustainability and production waste management have been analyzed in the studies of Korabayev B., Amanova G., Abuselidze G. et al. [2] and coauthors, substantiating the importance of “greening” production processes. In addition, the implementation of advanced technologies has been explored in the works of Nurgaliyeva A., Korabayev B., Matenova Z. et al. [3], where the impact of digital technologies on environmental efficiency has been identified.

The role of environmental accounting and auditing has been extensively studied in the works of Korabayev B., Amanova G., Akimova B. et al. [4] and colleagues, highlighting their importance in improving the quality of managerial decision-making. This direction substantiates the necessity of integrating ESG assessment into accounting and auditing systems.

The digital transformation of the agro-industrial complex in Kazakhstan has been examined in the studies of Kalieva N., Amanova G., Muguaina R. et al. [5], which identify the impact of digitalization on sectoral competitiveness. Furthermore, issues of investment attractiveness and risk assessment have been explored in the works of (Abuselidze G., Zharlikenova A., Korabayev B. A.) [6].

Studies by international organizations such as Food and Agriculture Organization and World Bank emphasize the importance of digitalization and ESG factors for sustainable agricultural development (Food and Agriculture Organization…; World Bank. Agriculture…) [7,8]. The works of Porter M. E., Kramer M. R. [9] highlight the role of social responsibility in building sustainable competitive advantages.

Kaplan R. S., Norton D. P. [10] proposed a methodology for evaluating the strategic development of enterprises through the Balanced Scorecard (BSC). In addition, International Accounting Standards (IAS 41) Agriculture defines modern approaches to the accounting of agricultural assets (International Financial Reporting Standards…) [11].

The works of Kazakhstani researchers address the development of the agrarian sector, including the economic efficiency of livestock production, state support, and digitalizetion issues (Bureau of National Statistics of the Agency…; Ministry of Agriculture…) [12,13]. ESG reporting and sustainable development are also extensively analyzed in international reports by (KPMG. ESG Reporting…; PwC. Sustainability and ESG…) [14,15].

Based on the literature review, it can be concluded that ensuring the sustainable development and competitiveness of the livestock sector requires an integrated approach combining accounting, auditing, financial analysis, and ESG assessment.

**Materials and methods**

To assess the development of the livestock sector in the Republic of Kazakhstan, official statistical data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan and the Ministry of Agriculture of the Republic of Kazakhstan were used, along with reports from international organizations such as the Food and Agriculture Organization of the United Nations (FAO) and the World Bank, as well as relevant scientific literature. In addition, financial statements and accounting data of livestock enterprises were analyzed to ensure the reliability and completeness of the empirical base. Particular attention was paid to the consistency of statistical indicators and their comparability over time, which allowed for identifying stable trends and structural shifts in the sector.

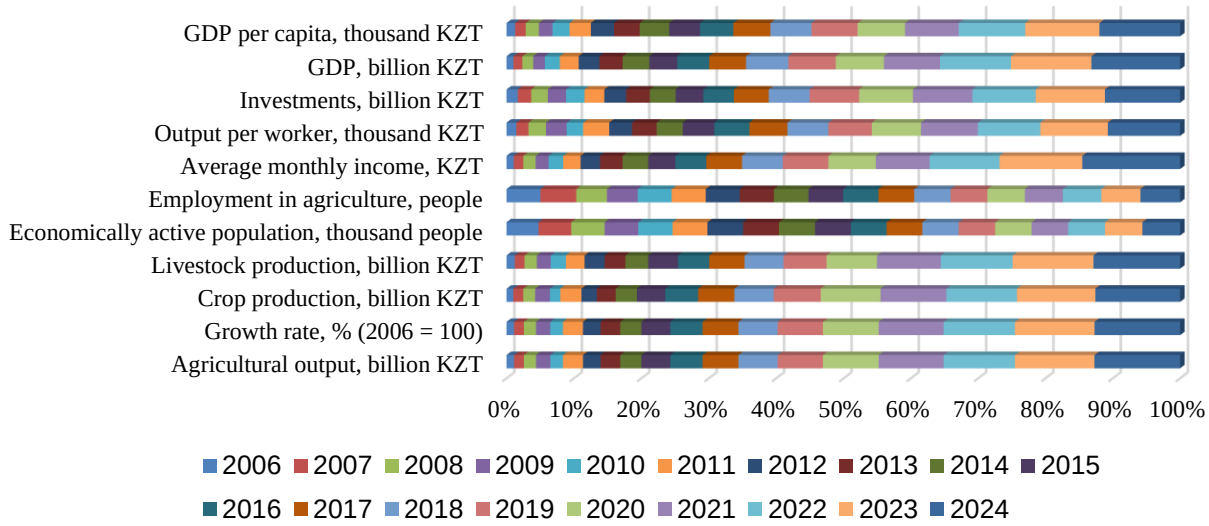
The research methods included comparative analysis and economic-statistical analysis, as well as financial and economic evaluation. To determine sector efficiency, key performance indicators such as return on sales (ROS), return on assets (ROA), profitability levels, and cost efficiency ratios were calculated. The dynamics of production volumes, productivity indicators, and resource utilization efficiency were also examined. Furthermore, correlation and trend analysis techniques were applied to identify relationships between key variables and to assess the impact of internal and external factors on sector performance.

A systems analysis approach was applied to assess ESG (environmental, social, and governance) factors, with particular emphasis on environmental sustainability, social responsibility, and the effectiveness of corporate governance mechanisms. The impact of digital technologies, including data analytics, digital accounting systems, and elements of automated monitoring, was also examined in order to evaluate their role in enhancing transparency and management efficiency. In addition, methods of induction, deduction, and logical generalization were used to synthesize the findings. The integration of these methodological approaches made it possible to conduct a comprehensive and objective assessment of the sustainable development and competitiveness of the livestock sector in Kazakhstan.

**Results**

Although the livestock sector in Kazakhstan has demonstrated positive development dynamics in recent years, a number of systemic issues persist. In particular, the insufficient level of production efficiency, high costs, limited implementation of innovative technologies, and incomplete compliance with environmental requirements hinder the sector's sustainable development. In this regard, improving accounting, auditing, and financial-economic analysis systems, as well as introducing ESG assessment methods, represents one of the key scientific and practical challenges.

Ensuring the sustainable development and competitiveness of the livestock sector today is closely associated not only with economic indicators but also with the application of ESG principles, digital technologies, and integrated accounting and analytical systems. This study comprehensively examines these areas and provides an opportunity to develop scientifically grounded recommendations aimed at enhancing the effective development of the sector (figure).




Note: compiled by the authors based on data from the (Bureau of National Statistics of the Agency…) [12].

Figure - Key socio-economic indicators of the Republic of Kazakhstan (2006–2024)

A SWOT analysis of Kazakhstan's livestock sector highlights its key strengths, weaknesses, and development prospects, providing a basis for improving sustainability and competitiveness.

The sector benefits from favorable natural and climatic conditions, vast pastures, and strong potential for producing environmentally friendly products, which is increasingly important amid global demand for organic goods. Livestock farming also plays a crucial role in ensuring food security, while government support and growing investments positively influence its development.

At the same time, the sector faces weaknesses such as low productivity, technological lag, limited adoption of digital and automated systems, and underdeveloped accounting and auditing practices, which reduce management efficiency. High production costs and a low level of ESG implementation further constrain development.

Kazakhstan's livestock sector holds a strategically important position in the agricultural economy, supported by favorable natural conditions, vast pastures, steady growth (averaging 3.3% annually since 1999), and strong export potential.

At the same time, it faces significant challenges, including climate change, water scarcity, pasture degradation, global competetion, price volatility, stricter environmental regu-la-tions, and labor shortages.

Despite these risks, the sector has high development potential, and its sustainable growth depends on digital transformation, ESG integration, improved accounting and auditing systems, and cost optimization.

Forecasts suggest that the sector will maintain strong growth momentum, supported by enhanced government measures, improved agricultural policy, and rising domestic demand. As a result, the investment attractiveness of livestock farming continues to increase, positioning it as a promising sector of the economy.

Under current conditions, the development of the livestock sector is assessed not only by production indicators but also by the level of ESG implementation. This includes efficient use of natural resources, prevention of pasture degradation, reduction of carbon emissions, improvement of rural employment and quality of life, and strengthening transparency and corporate governance.

At the same time, digital technologies play an increasing role in enhancing efficiency. The automation of production processes, use of Big Data analytics, digital livestock identification, and the introduction of digital accounting and auditing systems help reduce costs and improve managerial decision-making, thereby

increasing competitiveness in international markets.

Overall, the sustainable development of the livestock sector depends on the effective integration of ESG principles and the level of digital transformation, which together ensure long-term stability and contribute to the sustainable growth of Kazakhstan's economy.

Thus, the sustainable development and competitiveness of the livestock sector depend not only on the potential of natural resources but also directly on the effective implementation of ESG principles and the level of digital transformation. Comprehensive measures in this direction will ensure the long-term sustainability of the sector and make a significant contribution to the sustainable development of Kazakhstan's economy (table 1).

Table 1 – Share of agriculture in GDP and the role of livestock farming in the Republic of Kazakhstan (2006–2024)

| Indicator | 2006 | 2022 | 2023 | 2024 |
|---|---|---|---|---|
| GDP, billion KZT | 10 213.7 | 104 000 | 118 000 | 130 000 |
| Agriculture, billion KZT | 853.3 | 8 150 | 9 100 | 9 800 |
| Share in GDP, % | 8.3 | 7.8 | 7.7 | 7.5 |
| Livestock, billion KZT | 420.8 | 3 650 | 4 100 | 4 400 |
| Share of livestock in agriculture, % | 49.4 | 44.8 | 45.0 | 44.9 |
| Note: compiled by the authors based on data from the (Bureau of National Statistics of the Agency…; Ministry of Agriculture…) [12,13]. | | | | |

The analysis confirms the significant role of agriculture in Kazakhstan's economy, with its share in gross domestic product (GDP) remaining stable at 6–9%. Within this structure, the livestock sector is a key driver, accounting for 40–50% of agricultural output and playing a crucial role in ensuring food security and macroeconomic stability.

Despite its growth potential, Kazakhstan's livestock sector remains constrained by structural imbalances-around 80% of production is concentrated in private households, which increases social significance but limits efficiency, industrialization, digitalization, and modern management-highlighting the need for ESG integration and systemic modernization.

The livestock sector in Kazakhstan faces several key challenges. One of the most significant is the low share of pedigree livestock (only 5–8%), which limits genetic improvement, productivity growth, and the production of high-quality products. In addition, outdated feeding and husbandry technologies, along with insufficient mechanization and automation, reduce overall efficiency.

From an ESG perspective, these issues manifest across all dimensions. Environmentally, there are problems such as pasture degradation, inefficient resource use, and weak control of carbon emissions. Socially, although small farms support rural employment, they are associated with relatively low income levels. From a governance standpoint, underdeveloped accounting systems and low levels of digitalization in accounting and auditing reduce transparency and management effectiveness.

Kazakhstan's share in global livestock production remains low (0.6% for beef, 0.9% for mutton, and 0.2% for pork), indicating that its significant natural potential is not fully utilized. Therefore, enhancing competitiveness requires comparative analysis with neighboring countries and the active implementation of digital technologies - such as automated production, digital accounting systems, electronic livestock identification, and Big Data analytics-along with ESG-based approaches to support sustainable development and investment attractiveness.

To ensure the sustainable development and competitiveness of the livestock sector, it is necessary to improve production structures, promote consolidation, expand digitalization, and widely implement ESG principles. Systematic measures in these areas will not only increase productivity but also strengthen the sector's competitiveness in international markets (table 2).

Table 2 – Production volume of livestock and poultry for slaughter, million tons (2004–2024)

| Country | 2004 | 2022 | 2023 | 2024 |
|---|---|---|---|---|
| Russia | 4.4 | 11.8 | 12.0 | 12.2 |
| % (2004=100) | 100 | 268 | 273 | 277 |
| Ukraine | 1.7 | 1.6 | 1.5 | 1.5 |
| % (2004=100) | 100 | 94 | 88 | 88 |

| | | | | |
|---|---|---|---|---|
| Kazakhstan | 0.6 | 2.3 | 2.4 | 2.5 |
| % (2004=100) | 100 | 383 | 400 | 416 |
| China | 62.1 | 99.0 | 101.0 | 103.0 |
| % (2004=100) | 100 | 159 | 162 | 166 |
| Worldwide | 233 | 345 | 350 | 355 |
| % (2004=100) | 100 | 148 | 150 | 152 |

Note: compiled by the authors based on data from the (Bureau of National Statistics of the Agency…; Ministry of Agriculture…) [12,13].

The conducted comparative analysis shows that, at the global level, meat production demonstrates a stable growth trend. In particular, China occupies a leading position in the global market, accounting for a significant share of total production. In Russia, production volumes have also been steadily increasing, having grown by approximately 2.7 times compared to 2004.

In Kazakhstan, although the volume of meat production remains relatively low, its growth rate is notably high. Specifically, over the period 2004–2024, production increased more than fourfold, reaching 2.5 million tons. This indicator confirms the high development potential of the sector.

In Ukraine, a declining trend in production has been observed in recent years, which can be explained by geopolitical and economic factors.

Kazakhstan's share in global production remains relatively low; however, given its abundant natural resources, government support, and the introduction of digital technologies, there is significant potential to enhance its competitiveness.

From an ESG perspective, the growth of meat production may be accompanied by an increase in environmental pressure; therefore, it is important to ensure environmental sustainability alongside production efficiency. At the same time, the implementation of digital technologies contributes to reducing production costs and improving product quality (table 3).

Table 3 – Production of livestock products in the East Kazakhstan region (slaughter weight), thousand tons

| Indicators | 2005 | 2006 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|
| All categories of farms | 91.3 | 99.9 | 187.4 | 195.8 | 204.3 |
| Growth rate (2005 = 100), % | 100 | 109.,4 | 205.2 | 214.4 | 223.8 |
| Agricultural enterprises | 14.4 | 16.5 | 51.6 | 54.5 | 57.8 |
| Growth rate (2005 = 100), % | 100 | 114.6 | 358.3 | 378.5 | 401.4 |
| Share, % | 15.8 | 15.,4 | 27.5 | 27.8 | 28.3 |
| Peasant (farm) households | 11.7 | 14.2 | 49.5 | 52.3 | 55.0 |
| Growth rate (2005 = 100), % | 100 | 127.3 | 423.1 | 447.0 | 470.1 |
| Share, % | 13.0 | 14.0 | 26.4 | 26.7 | 26.9 |
| Households (population farms) | 65.2 | 69.2 | 86.3 | 89.0 | 91.5 |
| Growth rate (2005 = 100), % | 100 | 106.2 | 1 32.4 | 136.5 | 140.3 |
| Share, % | 71.4 | 69.3 | 46.1 | 45.5 | 44.8 |

Note: compiled by the authors based on data from the (Bureau of National Statistics of the Agency…; Ministry of Agriculture…) [12,13].

The data in table 3 indicate a steady growth trend in livestock production in the East Kazakhstan region. Over the period 2005–2024, total production volume increased approximately 2.5 times, reaching 225 thousand tons.

The structural analysis shows a significant increase in the share of agricultural enterprises and farm households. In particular, the share of agricultural enterprises rose from 15.8% to 28.9%, while the share of farm households increased from 13% to 29.3%. This reflects institutional changes in the agricultural sector and a gradual process of production consolidation.

Although the share of household farms decreased from 71.4% to 41.8%, they still play an important role. This indicates that the social orientation of the sector is being maintained.

The changes in the production structure demonstrate that the livestock sector is moving toward industrialization and increased efficiency. This trend should be further strengthened through the implementation of ESG principles and the application of digital technologies (table 4).

Table 4 shows significant cross-country differences in cattle development trends. China remains the clear leader due to the scale of its population and agricultural sector, while Russia and Ukraine demonstrate a decline in livestock numbers driven by structural and institutional factors.

Table 4 – Number of cattle and growth rates in CIS countries and China, million head

| Ел | 2004 | 2005 | 2006 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|
| Russia | 27.5 | 21.6 | 21.6 | 19.2 | 19.0 | 18.8 |
| % compared to the previous year | 100 | 78.5 | 100 | 99 | 99 | 99 |
| Ukraine | 9.4 | 6.5 | 6.2 | 2.3 | 2.1 | 2.0 |
| % compared to the previous year | 100 | 69.1 | 95 | 92 | 91 | 95 |
| Kazakhstan | 5.7 | 5.8 | 5.9 | 8.5 | 8.8 | 9.1 |
| % compared to the previous year | 100 | 101 | 103.5 | 103.7 | 103.5 | 103.4 |
| China | 127 | 112 | 110 | 118 | 119 | 120 |
| % compared to the previous year | 100 | 88.2 | 98 | 101 | 101 | 101 |

Note: compiled by the authors based on data from the (Bureau of National Statistics of the Agency…; Ministry of Agriculture…) [12,13].

In contrast, Kazakhstan shows steady growth - from 5.8 million head in 2012 to 9.1 million in 2024 - reflecting strong development potential supported by government policies and rising domestic demand. However, the dominance of private households continues to limit industrialization and efficiency.

Further growth requires ESG-oriented approaches, including sustainable resource management, digitalization, improved livestock accounting, and the development of breeding systems.

In recent years, the total sown area in the Republic of Kazakhstan has shown steady growth. Over the period from 2003 to 2024, the total cultivated area increased by approximately 43%, reaching 25 million hectares.

Although the absolute area of forage crops has also gradually increased, their share in the overall cropping structure has not changed significantly and remains at approximately 11.8–12.0%. This indicates that, despite the development potential of the livestock sector, the feed base remains insufficiently developed.

Feed shortages increase production costs and reduce competitiveness, while from an ESG perspective they intensify environmental pressure through pasture overuse; therefore, sustainable development requires expanding forage production, optimizing cropping structures, improving agricultural technologies, and adopting digital solutions such as precision agriculture, satellite monitoring, and Big Data analytics.

**Discussions**

The results of the comprehensive study indicate that the livestock sector in the Republic of Kazakhstan is an important component of the national economy, and its sustainable development and competitiveness play a decisive role in ensuring the country's food security and export potential.

The analysis of key socio-economic indicators of the Republic of Kazakhstan for the period 2006–2024 revealed a positive trend not only in overall economic growth but also in the agricultural sector. However, although the share of agriculture in GDP remains relatively stable, the share of livestock farming within its structure continues to be high. This confirms the strategic importance of the sector.

The growth in the production volume of livestock and poultry meat (2004–2024) indicates an increase in the sector's production potential. In addition, the analysis conducted for the East Kazakhstan region revealed a steady growth trend in livestock production at the regional level and diversification of farm structures. Nevertheless, the majority of production is still concentrated in private household farms, which remains one of the factors limiting the improvement of sector efficiency.

A comparative analysis of cattle population dynamics in Commonwealth of Independent States (CIS) countries and China shows that Kazakhstan has significant potential in this area; however, challenges related to productivity and technological lag persist. Moreover, the insufficient share of forage crop cultivation indicates weaknesses in the feed base, which in turn affects production costs and product quality.

The sustainable development of the livestock sector is closely linked to the systematic implementation of ESG (environmental, social, and governance) principles. From an environmental perspective, efficient use of pasture resources and reduction of land degradation are essential. Social aspects are related to increasing employment in rural areas and improving the well-being of the population. From a governance perspective, key priorities include the introduction of digital technologies, improvement of accounting and auditing systems, and enhancement of transparency.

In the context of the digital economy, the implementation of data analytics, digital accounting systems, and ESG reporting tools enables livestock enterprises to improve efficiency, manage risks more effectively, and enhance their investment attractiveness.

**Conclusion**

The research findings substantiate the importance of the following directions for enhancing the competitiveness of the livestock sector:

1. Strengthen the feed base and improve resource efficiency to reduce costs and support sustainable production.

2. Accelerate digitalization through the adoption of innovative technologies (automation, Big Data, digital monitoring).

3. Integrate ESG principles into accounting, auditing, and management systems to enhance transparency and sustainability.

4. Enhance institutional capacity and increase investment attractiveness through effective policies and governance.

5. Ensure sustainable growth and strengthen global competitiveness of the livestock sector.

**Authors' contribution:** Korabayev Beibit Sybanbayevich: conducted a comprehensive analysis of the livestock sector within the framework of studying its sustainable development and competitiveness from an ESG perspective, systematized the research findings, and formulated the conclusions. In addition, he was responsible for developing the scientific ideas of the study, designing the research plan, conducting the literature review, and applying methods for assessing ESG factors in the context of the digital economy; Mugauina Raikhan Ulzhagalievna: contributed to improving the content of the study, refining and editing the scientific results. She also participated in developing practical recommendations aimed at ensuring the sustainable development of the livestock sector and in generalizing the research findings; Nurzhanova Gulmira: developed the research database, carried out the economic and statistical processing of empirical data, prepared analytical tables and graphical materials, ensured the interpretation of the obtained results in the context of livestock sector development, and contributed to their practical validation.

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