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THE IMPACT OF DIGITAL TECHNOLOGIES ON THE EFFICIENCY OF MILK AND MEAT PRODUCTION IN SMALL BUSINESSES

Abstract.

The article raises the problem of the impact of digital technologies on the efficiency of milk and meat production in small businesses. The authors argue that the future of milk and meat production at small businesses in Kazakhstan will be determined by the introduction of innovative technologies, sustainable farming methods and the development of new markets. Small farms have the opportunity to use new technologies to increase efficiency, improve product quality and expand their market presence. Government support and investment also play a key role in the development of the sector.

Innovations in meat production in Kazakhstan play a key role in increasing the competitiveness of local farms in the domestic and international markets. The introduction of modern technologies such as automation, digitalization and the use of biotechnologies makes it possible to improve product quality, reduce costs and minimize the negative impact on the environment. Government support and private investment in these technologies will also contribute to the development of the country's meat industry.

Key words: small business, rural entrepreneurship, beef cattle breeding, innovation, digital technologies, organic production.

Introduction.

Digitalization refers to incorporating digital technologies into businesses. It converts analog information to digital format and includes various technologies. Digital technologies improve production, communication, and reduce costs, enhancing productivity and competitiveness. [1].

For farmers, the potential of digital technologies lies in their capacity to render production processes less labor-intensive and less tied to traditional processes, as well as their ability to provide better insights into activities. Technologies such as automation and robotics can substitute for physical labor, and sensors, vision systems, and digital platforms can do the same for cognitive labor. Data-based technologies can become a source of insights into performance and activities, while also improving the design and adaptability of processes.

The agriculture sector has been slow to adopt advanced digital technologies in comparison to other sectors. For many small family farms, the investment costs are prohibitive, while the payoffs are uncertain. Technologies also affect working conditions, labor needs, and social relationships, rendering digitalization a political issue. Nevertheless, the process of digitalization has begun, and it is expected to continue. The discourse on the so-called Industry 4.0 envisions that farms can substantially benefit from using digital technologies. Many existing digital technologies are being marketed to farmers.

Milk and meat production are two essential elements of food production. These processes were taken up to investigate the impact of digital technologies on efficient production in family farms. To this end, a framework was developed and devised for three types of digital technologies: data-based technologies, automation, robotics, and smart machinery, and sensors and vision systems, to analyze their potential impact.

Materials and methods of research.

1.1. Background and Rationale

The development of digital technologies has become an integral part of the modern agricultural sector. Their introduction is a twofold process that includes an appropriate change in the rural lifestyle as well as the technological uptake of services in areas that enhance economic and social connectivity with urban areas. The growing urbanization, together with the structural change in agriculture, promotes the dynamics of spatial variation in the intensity of agricultural production. In this context, substantial efforts are made to sustain the existing sector and to ensure competitive, socio-spatially balanced, and sustainable rural areas. The digital revolution is expected to provide opportunities for the rising global economic competitiveness of the agriculture sector. Digital technologies or solutions offer a wide range of opportunities for flexible and targeted support of sustainable food production, agroecology, precision agriculture, and the measurement of complex business models. Precision livestock farming is expected to sustain the transition towards sustainable livestock production systems. It raises competency requirements for farmers. In line with the digital revolution, a similar transformation is expected in food product safety, tending towards objective and quantifiable parameters. The functioning of food product safety control systems will be amended by the increased reliance on technologies, networks, and sources of information.

Milk and meat production are vital economic activities within agriculture and rural regions, and the consumer goods sectors are the largest in the world. Employment and income generated by consumer goods production have been essential for the vitality of rural areas in the economy. The existing consumer goods shopping market is substantially characterized by global supply chains from developing countries and competition within economically connected agricultural product processing and retailing industries. Such structural adjustments, including geographical sectoral concentration, agglomeration, and off-farming sector transfers, challenge the competition of agricultural production from developed countries. Rising competition and consumer concerns about food quality, together with global challenges such as climate change and resource scarcity, pose challenges to the sustainability of the livestock sector. Adverse market integration trends, such as convergence of farm animal prices and diverging farm output indicators, indicate regional re-specialization. The competitiveness of the consumer goods economic sectors and associated employment within rural areas is reduced due to the outpacing sectoral divergence. Consequently, the livestock production sector could inhibit the socio-spatial sustainability of rural areas. Implementing digital technologies and broadband internet services uptake would provide opportunities for the diversification and re-specialization of the livestock sector. Strategies, directives, policies, and funding would support programs for the implementation and uptake of broadband technologies in rural areas.

Research Objectives

The impact of digital technologies on the efficiency of milk and meat production is an innovative area of research and is important for small businesses, especially farms that produce and sell products essential for the daily food of each family. In this sense, the main objective is to establish the importance of these digital technologies in the production of milk and meat within small farms and investments. Various initiatives aim to boost the uptake of digital technologies on farms. The overall aim is to increase European digital sovereignty, which refers to the capacity of the EU and its member states to fully design, produce, and deploy digital technologies at a global scale, effectively controlling their impact on the economy and society, in order to protect fundamental rights and values, as well as guarantee democratic control of technology.

To this end, the steps taken to achieve the proposed objective are based on data collected via a questionnaire applied at farms that carry out milk and meat production processes. This questionnaire was prepared based on various studies in this area. In addition, the questionnaire will be applied to farms in the districts included in the Atyrau region of development of Kazakhstan, with the possibility of spreading to the whole country, depending on the results obtained.

Results and its discussion.

2. Digital technologies in agriculture

2.1. Overview of digital technologies

Digital technologies in the production of milk and meat play a key role in improving the efficiency and competitiveness of small businesses. These technologies cover many areas, from farm management and quality control to automation of production processes. An overview of the main digital solutions used in dairy and meat industries at small enterprises is presented.

1. Automation of farms.

Automation is one of the main areas that helps small milk and meat industries increase productivity and reduce costs. Technologies, tools for this:

• Robotic milking systems;

• Automatic feeding systems;

• Microclimate and ventilation control

2. Farm Management (Farm management software)

Farm management software solutions enable small businesses to track key performance indicators:

• Animal health monitoring;

• Feeding and productivity management;

• Integration with ERP systems

3. Internet of Things (IoT)

Internet of Things technologies provide the possibility of remote control and management of production processes:

• Sensors and sensors;

• GPS trackers

4. Blockchain

Blockchain technologies are becoming more modern to ensure transparency and identification of milk and meat supply chains:

• Product tracing;

• Ensuring food safety

5. Digitalization of herd management.

Herd management technologies help to monitor the state of health and reproduction

• Electronic identification tags;

• Early warning systems

6. Digital solutions for product processing and production.

Digital technologies are also used at the meat and milk processing stage:

• Automated processing lines;

• Quality and safety

7. Marketing and sales

Digital platforms provide small businesses with the opportunity to bring to market:

• Online stores and e-commerce platforms;

• Market analysis and creativity

8. Drones and satellite technologies

For small farmers, drones and satellite technologies can be useful for diptychs, to assess the condition of agricultural land and identify problems with land or feed.

Advantages of digitalization for balconies

• Increased productivity;

• Cost reduction;

• Product quality improvement

2.2. Application in the production of milk and meat

The use of digital technologies in the production of milk and meat in Kazakhstan is actively developing, especially given the country's desire to modernize the agro-industrial complex and increase its competitiveness at the industrial level. Kazakhstan invests resources in innovative technologies to increase production efficiency, improve product quality and reduce costs. This is how digital technologies are used in the dairy and meat industries.

1. Automation of production processes

Milking systems - with the help of digital milking systems, you can control the quality of milk, measure the amount of milk, adjust the milking schedule. This will automate the milking process on small farms, reduce labor costs and improve the quality of milk.

Gelling systems - digital fan systems allow you to control the feeding schedule, monitor feed quality and monitor animal feed intake. This helps to improve the health and productivity of animals.

Ram health control - with the help of digital technologies, it becomes possible to control the temperature, weight, and movement of cans. This can help monitor the health of sheep and detect the disease at an early stage.

2.Animal

Health Monitoring Health data monitoring - Digital technologies allow you to collect, analyze and track animal health data. This can help improve animal health, detect diseases at an early stage, and increase productivity.

Veterinary Service - digital technologies allow veterinarians to remotely monitor the health of animals and, if necessary, consult. This can help improve veterinary care and improve animal health.

Genetic selection - with the help of digital technologies, genetic selection can be improved. This helps to increase animal productivity, increase disease resistance and reduce breeding costs.

3. Increased Productivity

Nutrition control - digital technologies allow you to control the nutrition of animals, control the quality of feed and use feed effectively. This helps to increase animal productivity and reduce costs.

Optimization of labor processes - digital technologies allow you to optimize labor processes, reduce working hours and increase efficiency. This helps farmers make the most of their working hours and increase yields.

Product Sales- Digital technologies make it easier to sell products, find sellers and track prices. This helps small farms to sell products and increase their income.

Performance Analysis - Digital technologies allow you to analyze performance, identify inefficiencies and take measures to improve productivity. This helps farmers to increase yields and maximize profits.

4. Financial Management

Cost control - Digital technologies allow you to track costs, identify inefficiencies and reduce costs. This helps small farms to increase their financial efficiency.

Revenue Control - digital technologies allow you to track revenue, analyze sales and increase profits. This helps small farms improve their financial situation.

5. Financial planning

Digital technologies make it possible to simplify financial planning, manage investments and ensure financial stability. This helps ensure the long-term sustainability of small farms.

Product quality control - allows you to control the quality of products using digital technologies, verify compliance with standards and improve its quality.

Product analysis-digital technologies allow you to analyze, determine the composition and evaluate the quality of products.

Safety standards-digital technologies allow you to monitor product safety, verify compliance with hygiene standards and ensure food safety.

6.Communication With Customers

Sales channels - digital technologies allow you to open new sales channels, develop online sales and communicate directly with customers.

Collecting feedback - Digital technologies allow you to collect customer reviews, analyze them and improve products.

Marketing- digital technologies allow you to conduct effective marketing campaigns, find new customers and promote your brand.

7. Difficulties Of Digital Transformation

Technological infrastructure - Effective technological infrastructure is necessary for the introduction of digital technologies. This can cause financial problems for small farms.

The brevity of specialists - to use digital technologies, it is necessary to train specialists. This can lead to a shortage of specialists for small farms.

Financial pressure-The introduction of digital technologies can be difficult financially. This can create financial problems for small farms.

3. Problems in the production of milk and meat in small enterprises

Small enterprises in Kazakhstan engaged in the production of milk and meat face a number of problems that slow down their development and contribute to competitiveness. These problems are related both to the inequality of factors and to macroeconomic and institutional constraints. The main directions of digitalization of beef cattle breeding are veterinary control, automation of feeding and maintenance, control of the safety of livestock and products, automation of logistics [2]. These are the main difficulties faced by small farms.

1. Lack of funds and access to loans

One of the key problems for small businesses is limited access to finance:

-Difficulties in obtaining loans;

- Lack of natural means for modernization.

2. The lack of modern technology.

Many small farms in Kazakhstan operate using outdated technologies.

- Poor technological equipment;
- Lack of qualified personnel.

3. Problems with product sales

Small businesses face difficulties in selling their products:

- Lack of marketing knowledge and market access;
- Competition with large manufacturers;
- Undeveloped infrastructure.

4. Low level of digitalization

- Many small enterprises have poorly implemented
- Lack of knowledge and skills;
- Expensive technologies.

5. Problems with access to high-quality feed and veterinary services.

In addition, a factor analysis of the safety zone was performed and forecast calculations were made to increase the efficiency of livestock production by changing the structure of its implementation. The results obtained indicate the need to reduce the cost of agricultural production and to revise the commodity orientation of the enterprise [3]. Animal feeding and health care remain among the most expensive items:

- High cost of feed;
- Lack of veterinary care.

6. Lack of access to government subsidies and support.

Although programs to support the agricultural sector are currently being implemented, small farmers are not always able to take advantage of this assistance:

- Complexity of bureaucratic procedures;

- Underdevelopment of cooperation.

7. Climatic and environmental problems.

Climatic conditions in Kazakhstan also pose a challenge for dairy and meat production:

- Droughts and extreme weather conditions;
- Problems with the water supply.

8. Low specialist level in the value chain.

Small businesses often cannot integrate into larger value chains [4]:

- Lack of processing facilities;
- Lack of connections with processors and distributors.

9. Product quality and safety.

- Difficulty in meeting standards;
- Lack of modern laboratories and control systems.

4. Advantages of digital technologies for small businesses

Digital technologies play a key role in the development of small businesses, providing them with many advantages that help optimize processes, improve competitiveness and increase efficiency. The development of digitalization will require the creation of modern computer and mobile technologies based on the continuous digitalization of agricultural producers, providing specialists who are able to work effectively with innovative digital technologies, training and advanced training of personnel, overcoming digital inequality between agricultural entities, rural areas and the city, strengthening state support for digital transformation [5]. Here are the main ones:

1. Cost reduction:

Automation: Digital technologies allow you to automate routine tasks such as accounting, inventory management, customer service, etc., which reduces staff costs and increases productivity.

Cloud services: The use of cloud technologies allows small businesses to save on the purchase and maintenance of server equipment, as well as provide access to data from anywhere in the world.

2. Increasing audience reach:

Internet marketing: Social networks, contextual advertising and SEO provide an opportunity to promote your products and services on the global market, reach the target audience with minimal costs.

Online platforms and marketplaces: Small businesses can sell their products through platforms such as Amazon, eBay, Etsy, and others, which increases access to consumers.

3. Improving customer interaction:

CRM systems (customer relationship management systems) help to collect and analyze customer data, which allows you to more effectively manage sales, customize personalized offers and improve customer service.

Chatbots and online support: Fast and high-quality communication with customers is possible thanks to chatbots that automate answers to frequently asked questions, reducing waiting times and improving customer satisfaction.

4. Increased flexibility and mobility:

Remote work: Digital technologies allow employees to work remotely, which is especially useful for small businesses with limited resources. This makes it possible to attract the best specialists, without being limited by geographical boundaries.

Mobile applications: The development and use of mobile applications helps small businesses to ensure constant access to services or products for their customers.

5. Data analysis and decision-making:

Big Data and Analytics: Digital technologies enable small businesses to collect data on purchases, consumer preferences and trends, which helps them make more informed and effective decisions.

Forecasting: Data analysis and forecasting tools help small businesses anticipate changes in demand and market trends, allowing them to adapt more flexibly.

6. Easier access to finance:

Digital payment systems: Using electronic payment systems such as PayPal, Stripe, Square, etc., allows you to speed up payments and make them more convenient for customers.

Crowdfunding and online loans: Small companies can obtain financing through online crowdfunding platforms or microcredit services, bypassing traditional banks.

7. Increasing the speed and quality of production:

3D printing and robotization: These technologies allow small businesses to produce prototypes and finished products faster and cheaper.

Internet of Things (IoT): The use of smart sensors and IoT devices allows you to control production processes and optimize resource management.

8. Improving competitiveness:

Digital transformation helps small businesses respond faster to changes in the market environment, innovate and remain competitive compared to large companies.

Online trading: The creation of online stores allows small businesses to compete with large retail chains by providing convenient shopping conditions for consumers [6].

5. Case studies

5.1. Successful implementation on small dairy farms

Successful implementation of digital technologies and modern solutions on small dairy farms in Kazakhstan can significantly increase their competitiveness, production efficiency and product quality. In the context of Kazakhstan's agricultural sector, this is especially important for improving the productivity of small and medium-sized farms, which may face a number of challenges, such as limited resources, outdated farming methods and a shortage of qualified personnel. Here are the key aspects of successful implementation on dairy farms:

1. Automation and digitalization of processes:

Automated milking systems: Modern milking robots or automatic milking systems can help reduce labor costs and improve milk quality through more precise and careful handling of animals. This reduces the risk of udder diseases and increases milk yield.

Digital herd management systems: Using software to monitor the health, reproductive cycles and productivity of cows allows farmers to make more informed decisions and respond to possible problems in a timely manner.

2. Feeding control and management:

Automated feed distribution systems: Digital systems can accurately dose feed, which contributes to optimal nutrition of animals and reduces feed losses. This leads to increased productivity and lower costs.

The use of sensors and IoT: Sensors placed in feed machines can monitor the amount of feed consumed, its quality, as well as timely warn of the need for replenishment.

3. Herd health management through technology:

Biometric sensors: Small devices attached to cows can measure body temperature, activity levels and other health indicators. This helps to diagnose diseases early and prevent epidemics among the herd.

Reproductive health tracking systems: Special programs allow farmers to monitor the reproductive condition of cows, detect the ovulation cycle in time, which increases the efficiency of breeding and reduces time loss.

4. Resource efficiency:

Optimization of water and energy resources: The introduction of water and energy consumption monitoring systems makes it possible to use these resources more efficiently, which is especially important for small farms with a limited budget.

Waste management systems: Digital systems can control the processing and disposal of manure, which improves the environmental sustainability of the farm and can become a source of additional income, for example, in the production of biogas.

5. Improving the quality of dairy products:

Milk quality monitoring systems: Modern technologies allow you to control milk parameters such as fat content, protein composition and the presence of impurities, which helps to maintain high quality standards and meet market requirements.

Certification Management Software: Systems help small farms meet certification requirements, which is important for entering larger markets.

6. Digital marketing and product sales:

Online platforms for the sale of milk and dairy products: The use of Internet platforms and social networks helps small farms expand their customer base and sell products directly to consumers or retailers without intermediaries.

E-commerce and Mobile Applications: Farms can use mobile applications to manage orders, track shipments, and interact with customers, which greatly improves the convenience and speed of sales.

7. Financial and information technologies:

Access to microcredit and government subsidies through online platforms: Small farms can access support programs through digital platforms, which simplifies the process of applying for subsidies and grants.

Financial planning using software: Cost and income accounting programs help small farms better manage their finances, keep more accurate records, and plan a budget.

8. Training and consulting through digital channels:

Online training and webinars: Small farmers can access educational programs and consultations through online resources, which helps to increase their knowledge in the field of modern technologies, herd management and quality production.

Digital platforms for sharing experiences: Communities of farmers on social networks and on specialized platforms allow the exchange of knowledge, experience and best practices.

9. Environmental sustainability and bioenergy:

Use of renewable energy sources: Solar panels or bioenergy systems can be implemented on farms to generate energy from waste, which reduces dependence on traditional energy sources and reduces the environmental footprint.

5.2. Application of innovations in meat production

The application of innovations in meat production in Kazakhstan is becoming a key factor for improving agricultural efficiency and meeting the growing demand for high-quality products. Through the introduction of new technologies and methods, it is possible to significantly increase productivity, improve product quality, reduce costs and strengthen the country's position in the international market. Let's consider the main innovations used in the meat industry of Kazakhstan.

1. Genetic technologies and breeding:

Modern breeding methods: The use of genetic research and technology to improve the breed of animals contributes to improving the quality of meat, accelerating growth and increasing the resistance of livestock to diseases. This helps farmers get more productive livestock with better feed conversion rates.

Genomic research: The introduction of genetic analysis to select individuals with the best characteristics (meat quality, endurance) makes it possible to improve breeding programs and increase the profitability of farms.

2. Automation and robotization of processes:

Automated feeding and watering systems: Such systems provide accurate feed and water supply depending on the needs of animals, which improves their health and increases productivity.

Robots for manure harvesting and monitoring of housing conditions: These technologies make it possible to maintain cleanliness and optimal conditions in the premises, which reduces the risk of diseases and increases the comfort of animals [7].

3. Innovations in feed production:

The use of highly effective feed additives: Modern feed additives help to improve the digestibility of feed, which contributes to faster weight gain by animals and improves the quality of meat.

Hydroponic and aquaponic feed cultivation: These technologies allow the production of feed with high nutritional value and at the same time reduce the consumption of water and land.

4. Digital technologies and farm management:

Herd Management software: Digital systems allow farmers to track the growth, health, reproductive cycles and productivity of each animal. This helps to optimize herd management processes and increase production efficiency.

Blockchain for tracking the supply chain: This technology allows for transparency and traceability of the entire meat production chain – from farm to table. This is especially important for export shipments, where quality control plays a key role.

5. Bioenergy and waste recycling:

Biogas plants: These plants allow the processing of livestock waste into biogas, which can be used for heating, electricity or as fuel. This reduces energy costs and reduces the ecological footprint of farms.

Processing of manure into organic fertilizers: The use of modern technologies for processing manure into fertilizers helps to reduce the environmental effects of animal husbandry and creates an additional source of income for farmers.

6. Sustainable animal husbandry and ecology:

Biological methods of protection and control: The use of biological drugs and technologies to protect animals from diseases without the use of antibiotics helps to improve the quality of meat and reduce the negative impact on the environment.

Artificial intelligence provides information on all the processes that occur in the enterprise. All information on milk yields, the quality of animal care by farm workers and many other reports necessary for each enterprise are available from analytical reports [8].

Sustainable animal husbandry practices: Reducing the use of chemicals, controlling greenhouse gas emissions and using renewable energy sources (such as solar panels) help make meat production more environmentally friendly.

7. Development of export infrastructure:

Construction of modern meat processing plants: Modernization of processing facilities equipped with innovative equipment for slaughtering and processing meat, improves product quality and allows compliance with international standards, which contributes to an increase in exports.

Cold logistics technologies: In order to preserve the quality of meat during transportation, especially to export markets, it is important to introduce cold chain technologies that allow temperature control at all stages of logistics.

8. Development of alternative meat sources:

Cultured meat: The development and implementation of technologies for the production of cultured meat (meat grown in laboratory conditions) can be a breakthrough in the meat industry. This solution makes it possible to produce meat without the need to slaughter animals, which can be an environmentally sustainable and ethical way of production.

Vegetable meat substitutes: The introduction of innovations in the production of vegetable meat substitutes (for example, based on soy or peas) can meet the demand for alternatives to traditional meat and open new niches in the market.

6. Future trends and opportunities

Future trends and opportunities in the production of milk and meat for small businesses in Kazakhstan will be determined both by global trends in agriculture and by the specific needs and conditions of the local market. Here are the main trends and opportunities that can have a significant impact on small businesses in this area:

1. Innovative technologies and automation:

Process automation: The introduction of automated milking, feeding and animal health monitoring systems will help small businesses improve efficiency and reduce labor costs. Milking robots and automated feed dispensers are becoming more accessible and more efficient.

Internet of Things (IoT): The use of sensors and IoT technologies to monitor the condition of animals and their conditions will improve herd management, prevent diseases and increase productivity [9].

2. Digitalization and data management:

Farm Management software: Modern software and mobile applications will help small farms effectively manage their herd, keep feed records, monitor animal health and plan financial costs.

5. Product quality improvement and safety:

Modern methods of quality control: The introduction of technologies to control and improve the quality of milk and meat, such as monitoring systems and laboratory analyses, helps small farms meet high standards and market requirements.

Certification and standards: Small enterprises can obtain quality and safety certificates (for example, organic or antibiotic-free production), which will increase their competitiveness and open access to new markets.

6. Increased market presence and direct sales:

Online Sales and Marketing: Using online platforms and social networks for direct sales and product promotion allows small businesses to reach a wide audience and improve their financial performance.

Development of local markets and cooperatives: Cooperation with local shops, restaurants and markets, as well as participation in farmers' markets, can help small businesses find new customers and expand sales.

7. Government support and financing:

Government programs and subsidies: Small farming enterprises can benefit from government support programs and subsidies to introduce new technologies, modernize equipment and improve infrastructure.

Microcredit and investments: Access to micro-loans and investment programs allows small businesses to finance their projects and expand production.

8. Training and development of personnel:

Professional development and training: Investments in employee training and skills development will help small businesses use new technologies more effectively and improve production process management.

Cooperation with educational institutions: Partnerships with universities and research institutes can help to conduct research and develop innovative solutions to improve production.

Conclusion.

Digitalization of the food and meat industry in Kazakhstan is actively developing, which increases the efficiency and quality of products. The introduction of technology into small businesses helps Kazakhstani manufacturers to remain competitive both in the external and in the emerging market. Government support in the form of subsidies and program training also contributes to the further development of digital technologies in the agro-industrial sector.

Small enterprises in Kazakhstan face a number of serious problems in the production of milk and meat, including insufficient financing, access to modern technologies, the complexity of production life and limited opportunities to receive government support. Digital technologies provide small businesses with tools to increase efficiency, improve service quality and expand the market. They help to optimize business processes, reduce costs and open up new opportunities for growth and innovation.

Government support in the form of subsidies and farmer training programs is important for the successful implementation of digital technologies on small dairy farms in Kazakhstan. Digitalization and automation of processes contribute to increasing production efficiency, improving product quality, reducing costs and increasing competitiveness. This will allow small farms not only to maintain stability, but also to develop in the conditions of the modern market.

REFERENCES:

1 Martínez-Caro, E., Cegarra-Navarro, J.G. and Alfonso-Ruiz, F.J., (2020). Digital technologies and firm performance: The role of digital organisational culture. Technological Forecasting and Social Change, 154 p. Available at: — URL: https://www.sciencedirect.com/science/article/pii/S0040162519312193 (accessed: 17.09.2024).

2 Смирнова В. В. Сочетание цифровых технологий и органического производства в специализированном мясном скотоводстве. Аграрный вестник Урала — №8 (237). — 2023. — С. 101-109. Available at: — URL: https://cyberleninka.ru/article/n/sochetanie-tsifrovyh-tehnologiy-i-organicheskogo-proizvodstva-v-spetsializirovannom-myasnom-skotovodstve (accessed: 10.07.2024).

3 Гонов О.В. Маржинальный подход к оценке эффективности сельскохозяйственного производства: практический аспект. Региональное приложение — №2. — 2024. — С. 100-105.

4 Иванов В. А. Специфика цифровизации аграрной экономики северного региона. Аграрная наука на Севере–сельскому хозяйству. — №VI. — 2024. — С. 55-65.

5 Чупина И.П., Зарубина Е.Н., Симачкова Н.Н., Стахеева Л.М. Фатеева Н.Б. Применение новых технологий в молочном производстве для самообеспеченности регионов России отечественной продукцией. International agricultural journal — Vol 7. — №2. — (2024) P.680-690. Available at: — URL: http://iacj.eu/index.php/iacj/article/view/1026 (accessed: 16.08.2024).

6 Nemenuschaya L.A. (2022) Resource - saving technologies for milk production enterprises. Equipment and technologies in animal husbandry. №4. P. 105-108 Available at: — URL: https://en.foodprom.ru/magazines/food-processing-industry-rus/509-food-processing-industry-4-2023 (accessed: 19.06.2024).

7 Cao B., Cao J., Lee J., Guo A., Wang Z., Sun B., Chen Z. (2023). Beef yak Industry and Technology development Report. Chin. J. Anim. Sci. 60. P.335–338.

8 Cao B., Lee J., Wang Z., Guo, A., Chen Z., Sun B., Cao J. (2023). Development trend and policy suggestions of beef yak industry in 2023. Chin. J. Anim. Sci. 59. P. 323–329.

9 Chenyang Liu, Xinyao Wang, Ziming Bai, Hongye Wang, Cuixia Li. (2023). Does Digital Technology Application Promote Carbon Emission Efficiency in Dairy Farms? Evidence from China. College of Economics and Management, Northeast Agricultural University, Harbin 150030, China. Agriculture. 13(4). 904p. https://doi.org/10.3390/agriculture13040904

ШАҒЫН БИЗНЕС КӘСІПОРЫНДАРЫНДА СҮТ ПЕН ЕТ ӨНДІРІСІНІҢ ТИІМДІЛІГІНЕ ЦИФРЛЫҚ ТЕХНОЛОГИЯЛАРДЫҢ ӘСЕРІ

Аңдатпа.

Мақалада мәселе көтеріледі цифрлық технологияның шағын бизнес кәсіпорындарында сүт пен ет өндірісінің тиімділігіне әсері. Авторлар Қазақстандағы шағын бизнес кәсіпорындарында сүт және ет өндірісінің болашағын бекітеді, инновациялық технологияларды енгізу, шаруашылық жүргізудің тұрақты әдістері және жаңа нарықтарды дамыту арқылы айқындалатын болады. Шағын шаруа қожалықтары тиімділікті арттыру, өнім сапасын жақсарту және нарықтың қатысуын кеңейту үшін жаңа технологияларды қолдана алады. Секторды дамытуда мемлекеттік қолдау мен инвестициялар да шешуші рөл атқарады.

Қазақстандағы ет өндірісіндегі инновациялар жергілікті фермерлік шаруашылықтардың ішкі және халықаралық нарықтардағы бәсекеге қабілеттілігін арттыруда шешуші рөл атқарады. Автоматтандыру, цифрландыру және биотехнологияларды пайдалану сияқты заманауи технологияларды енгізу Өнімнің сапасын жақсартуға, шығындарды азайтуға және қоршаған ортаға теріс әсерді азайтуға мүмкіндік береді. Осы

технологияларға мемлекет пен жеке инвестицияларды қолдау да елдің ет өнеркәсібін дамытуға ықпал ететін болады.

Негізгі сөздер: шағын бизнес, ауыл кәсіпкерлігі, етті мал шаруашылығы, инновация, цифрлық технологиялар, органикалық өндіріс.

ВЛИЯНИЕ ЦИФРОВЫХ ТЕХНОЛОГИЙ НА ЭФФЕКТИВНОСТЬ ПРОИЗВОДСТВА МОЛОКА И МЯСА НА ПРЕДПРИЯТИЯХ МАЛОГО БИЗНЕСА

Аннотация.

В статье поднимается проблема влияние цифровых технологий на эффективность производства молока и мяса на предприятиях малого бизнеса. Авторы утверждают будущее производства молока и мяса на предприятиях малого бизнеса в Казахстане будет определяться внедрением инновационных технологий, устойчивыми методами ведения хозяйства и развитием новых рынков. Малые фермерские хозяйства имеют возможность использовать новые технологии для повышения эффективности, улучшения качества продукции и расширения рыночного присутствия. Государственная поддержка и инвестиции также играют ключевую роль в развитии сектора.

Инновации в производстве мяса в Казахстане играют ключевую роль в повышении конкурентоспособности местных фермерских хозяйств на внутреннем и международном рынках. Внедрение современных технологий, таких как автоматизация, цифровизация и использование биотехнологий, позволяет улучшить качество продукции, снизить затраты и минимизировать негативное воздействие на окружающую среду. Поддержка государства и частных инвестиций в эти технологии также будет способствовать развитию мясной промышленности страны.

Ключевые слова: малый бизнес, сельское предпринимательство, мясное скотоводство, инновации, цифровые технологии, органическое производство.

REFERENCES

1 Martínez-Caro, E., Cegarra-Navarro, J.G. and Alfonso-Ruiz, F.J., (2020). Digital technologies and firm performance: The role of digital organisational culture. Technological Forecasting and Social Change. 154. p.119962. Available at: — URL: https://www.sciencedirect.com/science/article/pii/S0040162519312193 [In English] (accessed: 17.09.2024).

2 Smirnova V.V. Sochetanie cifrovyh tekhnologij i organicheskogo proizvodstva v specializirovannom myasnom skotovodstve. [*The combination of digital technologies and organic production in specialized beef cattle breeding*]. «Agrarnyj vestnik Urala №8 (237). 2023. P.101-109 Available at: — URL: https:// cyberleninka. ru/article/n/sochetanie-tsifrovyh-tehnologiy-i-organicheskogo-proizvodstva-v-spetsializirovannom-myasnom-skotovodstve [In Russian] (accessed: 10.07.2024).

3 Gonov O.V. Marzhinal'nyj podhod k ocenke effektivnosti sel'skohozyajstvennogo proizvodstva: prakticheskij aspekt. [*A marginal approach to assessing the efficiency of agricultural production: a practical aspect*]. Regional'noe prilozhenie №2. 2024. P.100-105 [In Russian]

4 Ivanov V.A. Specifika cifrovizacii agrarnoj ekonomiki severnogo regiona. [*The specifics of digitalization of the agricultural economy of the northern region*]. Agrarnaya nauka na Severe – sel'skomu hozyajstvu. Institut agrobiotekhnologij FIC Komi NC UrO RAN. №VI. 2024. C. 55-65. [In Russian].

5 CHupina I.P., Zarubina E.N., Simachkova N.N., Staheeva L.M. Fateeva N.B. Primenenie novyh tekhnologij v molochnom proizvodstve dlya samoobespechennosti regionov Rossii otechestvennoj produkciej [*Application of new technologies in dairy production for self-sufficiency of russian regions with domestic products*] Vol 7 No 2 (2024): International agricultural journal P. 680-690 Available at: — URL: http://iacj.eu/index.php/iacj/article/view/1026 [In Russian] (accessed: 16.08.2024).

6 Nemenuschaya L.A (2022). Resource - saving technologies for milk production enterprises. Equipment and technologies in animal husbandry. №4. P. 105-108 Available at: — URL:https://en.foodprom.ru/magazines/food-processing-industry-rus/509-food-processing-industry-4-2023 [In English] (accessed: 19.06.2024).

7 Cao B., Cao J., Lee J., Guo A., Wang Z., Sun B., Chen Z. (2023). Beef yak Industry and Technology development Report. Chin. J. Anim. Sci. 60. P.335–338. [In English].

8 Cao B., Lee J., Wang Z., Guo, A., Chen Z., Sun B., Cao J. (2023). Development trend and policy suggestions of beef yak industry in 2023. Chin. J. Anim. Sci. 59. P. 323–329. [In English].

9 Chenyang Liu, Xinyao Wang, Ziming Bai, Hongye Wang, Cuixia Li. (2023). Does Digital Technology Application Promote Carbon Emission Efficiency in Dairy Farms? Evidence from China. College of Economics and Management, Northeast Agricultural University, Harbin 150030, China. Agriculture. 13(4). 904p. https://doi.org/10.3390/agriculture13040904 [In English].

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