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## ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК  
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## NEWS

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OF THE REPUBLIC OF KAZAKHSTAN  
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**PROSPECTS OF INNOVATIVE DEVELOPMENT  
OF RURAL ANIMAL BREEDING COMPLEX OF RK**

**Abstract.** The livestock sector plays a central role in the development of food systems. It is distinguished by its special dynamism and complex nature, responding for approximately one third of the global GDP of agriculture in Kazakhstan. It influences aspects such as the demand for animal feed, market concentration in the chains of agricultural trade, intensification of production at the level of agricultural enterprises, income of farmers, land use, as well as nutrition and human and animal health. In order to increase the efficiency of state support for enterprises in the industry, the Ministry of Agriculture presented Road maps for the development of priority areas of agriculture and the improvement of state support for the agro industrial complex of the Republic of Kazakhstan. About which, the authors write in more detail in this article, analyzing the dynamics of the increase/decrease in the results to date.

**Keywords:** agriculture, innovations, cattle breeding, agriculture, technologies.

**INTRODUCTION**

The livestock sector plays a central role in the development of food systems. It is distinguished by its special dynamism and complex nature, responsible for approximately one third of the global GDP of agriculture. It influences aspects such as the demand for animal feed, market concentration in the chains of agricultural trade, intensification of production at the level of agricultural enterprises, income of farmers, land use, as well as nutrition and human and animal health. In recent decades, livestock often determines the pace of changes in agriculture, as there are enormous prospects for the sale of livestock products, and the introduction of new technologies is required.

Today, virtually everything that speaks about Digital Kazakhstan is what really confirms the relevance of the adopted state program. The words “digitalization”, “automation”, “modernization”, and “transformation” are becoming more and more popular today in Kazakhstani media. In a special way, this issue concerns agriculture as one of the main drivers of the economy of Kazakhstan. Thanks to digitalization in agriculture, conditions are created for increasing production volumes and increasing the country's export potential.

**MAIN PART**

One of the most important problems of the development of human civilization is the need to provide the growing population of the globe (today 6.7 billion people) with affordable, natural and high-quality food. But how to achieve further intensification of agriculture as a whole and at the same time minimize the harmful effects of man on the environment? This is impossible without the use of highly efficient resource-saving technologies. New technologies not only minimize the harm to the environment, but are also very beneficial from an economic point of view, as they allow efficient use of available resources.

The forum presented the basic principles, technologies and equipment for the control and management of livestock production on the basis of the ideas of "precise agriculture".

In the conditions of the modern market, the speed and maximum automation of all processes of the enterprise have become the main competitive advantage, allowing to reduce costs and ensure maximum efficiency of operations.

Automation and modernization of the grain elevator allows to solve the following tasks:

- Ensuring reliable operation, increased productivity and increased safety of operation of the grain elevator / mill;

Monitoring, analysis and visualization in real time of the state of the technological process of the grain elevator;

Management of grain movement routes at the production facility;

Improving the efficiency of working personnel, minimizing the influence of the "human factor".

Thus, the popularity of search queries reflects the reality. Kazakhstanis are not yet sufficiently informed about the existing technologies for the automation of the agro-industrial sector and the stages of a gradual transition to the digitization of agricultural enterprises.

The main and constant problem of animal husbandry is fodder base. Ecological animal husbandry is focused primarily on a high-quality and efficient feeding system that ensures high quality meat and dairy products. By improving breeds with breeding, it is possible to effectively improve the quality of meat and reduce its cost. This idea is not new in itself, but you can use cutting-edge methods to implement it. This problem was solved by the embryo freezing method. The invention relates to the field of cellular engineering, namely, to methods for the cultivation of animal cells - eggs and embryos of pigs - outside the body, in vitro. Egg cells are extracted from the ovaries (after slaughter) and cultured until a certain stage of the cell cycle - metaphase II. At the same time, boar spermatozoa are prepared and, using a special technique, they are fused with eggs in vitro. ADN, established in 1981, works closely with the French Agricultural Research Institute INRA. Volumes of poultry production are growing around the world. First of all, this is dictated by an increase in demand - the population grows, and the need for food increases. The basis of modern production is the use of modern technology of growing poultry using high-quality resource-saving equipment.

Livestock production is characterized by a wide range of different agricultural systems: extensive (for example, grazing animals for ruminants or feeding for pastures for poultry and pigs), intensive (when thousands of animals are feeding concentrated feed in confined spaces) and numerous intermediate systems between the first two.

In livestock production, it is necessary to increase the efficiency of resource use in order to solve the following tasks: maintaining production systems within key global limit parameters; preservation of ecosystem services upon which agricultural production relies; reduction of soil degradation, biodiversity loss and deficits associated with water use and its quality. Acting as a contributing factor to deforestation, as well as determining the demand for feed, transport and processing infrastructure, the livestock sector directly and indirectly accounts for 14.5% of GHG emissions. At the same time, some livestock systems are among the most vulnerable to climate change (especially in arid zones) and to the spread of new diseases related to environmental factors. These problems are large-scale, but the livestock sector also has great potential for improvement if it is possible to provide opportunities for a wider fruitful exchange of best practice experiences within a particular system and region.

The gross output of products (services) of agriculture, forestry and fisheries in January 2019 in the republic as a whole amounted to 128.8 billion tenge, which is 3.5% higher than January 2018.

Growth in agricultural, forestry and fisheries production in January 2019 due to an increase in the volume of slaughter of livestock and poultry in live weight by 4.5%, milk yield of raw cow milk by 3.3%, increase in the number of chicken eggs produced by 4.5%.

Table 1 - Gross output of products (services) of agriculture, forestry and fisheries in January 2019  
million tenge

|                            | Agriculture,<br>forestry and<br>fisheries | in:         |                 |                 |
|----------------------------|---|-------------|-----------------|-----------------|
|                            |   | agriculture | in:             |                 |
|                            |   |             | crop production | animal breeding |
| The Republic of Kazakhstan | 128 761,1                                 | 126 976,5   | 4 527,4         | 122 411,8       |
| Akmola                     | 10 601,6                                  | 10 325,0    | 119,3           | 10 205,4        |
| Aktobe                     | 8 402,0                                   | 8 341,9     | 203,4           | 8 138,6         |
| Almaty                     | 21 667,1                                  | 21 462,6    | 1 067,2         | 20 390,1        |
| Atyrau                     | 2 526,5                                   | 2 403,9     | 80,8            | 2 323,0         |
| West Kazakhstan            | 3 422,9                                   | 3 415,0     | 9,1             | 3 404,8         |
| Zhambylskaya               | 7 446,5                                   | 7 339,0     | 61,2            | 7 273,6         |
| Karaganda                  | 8 268,6                                   | 8 219,8     | 214,4           | 8 003,3         |
| Kostanay                   | 8 554,0                                   | 8 506,9     | 1,0             | 8 505,9         |
| Kyzylorda                  | 3 476,8                                   | 3 386,4     | 8,3             | 3 377,3         |
| Mangystau                  | 788,2                                     | 729,2       | 32,1            | 694,8           |
| Turkestan                  | 21 288,2                                  | 21 161,3    | 2 113,0         | 19 045,7        |
| Pavlodar                   | 7 450,8                                   | 7 397,3     | 229,7           | 7 167,6         |
| North Kazakhstan           | 9 579,8                                   | 9 429,1     | 3,2             | 9 425,9         |
| East Kazakhstan            | 13 362,2                                  | 13 161,0    | 35,0            | 13 124,4        |
| Astana                     | 196,7                                     | 23,9        | 14,4            | 9,5             |
| Almaty city                | 390,1                                     | 341,8       | 204,0           | 137,8           |
| Shymkent                   | 1 339,2                                   | 1 332,3     | 131,4           | 1 184,1         |

The growth of agricultural production in January 2019 compared with January 2018 was observed in 14 regions of the country.

In Akmola region, the growth of agricultural production is due to an increase in the production of meat of all kinds - by 28.9%, cow's milk - by 3.6% and chicken eggs - by 2.5%. In the West Kazakhstan region, the growth in agricultural output was affected by an increase in the production of meat of all kinds - by 8.6%, chicken eggs - by 3.2% and cow's milk - by 1.9%.

In the Pavlodar region, the growth of agricultural production is due to an increase in the production of meat of all kinds - by 2.6%, cow's milk - by 3.5% and chicken eggs - by 23.6%.

The focus of investment interest in agriculture is increasingly shifting toward livestock, the growth rate of investment in the cultivation of seasonal crops is slowing. For 8 months of this year, 162.4 billion tenge was invested in the development of enterprises and other participants in the agricultural market, or by 7.2% more than in the same period last year.

To improve the effectiveness of state support for industry enterprises, last week the Ministry of Agriculture presented Road maps for the development of priority areas of agriculture and the improvement of government support for the agro-industrial complex.

Road maps were developed in the following main areas of development: seed farming, agrochemistry, production of plant protection products, intensive technical re-equipment of the agro-industrial complex, fodder production (fodder balance), involvement of arable land in turnover, distant sheep breeding, development of a network of distribution centers.

The introduction of digitalization technology can have the following economic effect:

- Reducing the trade margin on food products in the wholesale and retail sector while maintaining product quality.

- The increase in the volume of food consumption in Kazakhstan in physical terms more than doubled with the current level of income of the population.

- A significant increase in labor productivity in the agribusiness sector, a reduction in the cost of production and an increase in the margins of agribusiness.

According to Kazakhstani experts, the positive effect from the introduction of new technologies and, in general, the digitalization of agriculture is tentatively estimated at 40 billion tenge until 2020.

Livestock plays an important economic role in many food systems: it is a source of income, well-being and employment of the population, has a buffer effect in price shocks, increases the value of feed, is a source of organic fertilizers and harness.

Food markets face three challenges:

i) imperfect conditions of competition due to lack of information, barriers to entry into the market and infrastructure constraints;

ii) external influences that are a source of additional costs not covered by manufacturers;

(iii) Market imbalances arising from unsatisfactory government policies, including subsidies and taxes that encourage unsustainable practices.

In particular, agricultural markets are subject to unpredictable forces, such as the weather, and are characterized by a long time interval between investment in production and sales readiness, which forces manufacturers, with no support from social protection systems, to resort to risk avoidance tactics.

International trade opens up opportunities, but also creates new challenges, including increased potential for the spread of disease. It is also accompanied by the growing influence of multinational private actors on investment decisions in agricultural systems. With unequal access to market information and technology, concentrated corporate control over agriculture has also intensified, which undermines competition.

In this general context, different livestock systems are subject to different economic risks and have different capabilities. Determining factors include: degree of integration into international markets and urban distribution systems; degree of dependence on external resources (such as feed); the degree of market concentration both at the stages preceding the livestock production, and in the processes of subsequent processing of livestock products and their sale.

Improving resource efficiency. There is considerable potential for improving the efficiency of resource use through the dissemination and implementation of best practices and technologies in this context and through the use of various approaches (including such as "sustainable intensification", the principle of "maintain and increase", "environmental intensification" and "agroecology"), combined by growing attention to ecosystem services. This will allow in parallel to increase productivity, ensure the conservation and more efficient use of limited resources and reduce GHG emissions.

Resource efficiency can be improved through a variety of technical means, including improved livestock management, rational breed selection, effective health protection and feed utilization, maintaining a closed nutrient cycle, reducing food waste and waste.

- Increased resistance to adverse external influences. Responding to changing risks and shocks — environmental, economic, financial, or related to human and animal health — requires increasing the resilience of livestock systems to adverse external influences. Diversification of production and the integration of farming and animal husbandry at all levels (farm, grassland, community, region) contribute to strengthening resilience to external influences and increasing the efficiency of resource use.

- Improving social justice/responsibility indicators. The failure to protect social justice and cultural integrity creates some of the most widespread and politically sensitive barriers to sustainability. The norms, practices and priorities of social justice / responsibility, land tenure rights and existing traditions all vary between countries and communities and change over time. It is necessary to improve working conditions at all levels of the value chain in food production.

The state should ensure that SAD strategies and plans include an integrated FSM approach promoted by the Committee on World Food Security (CFS) and are in line with the SDGs. States need to more fully incorporate into their SAD strategies the contribution that livestock systems make to achieving FSN. Policies, strategies and programs should take into account the interconnections between different agricultural systems and their dynamic nature. They should, in particular, fully promote the integration of farming and animal husbandry on a scale and through mechanisms that are adapted to the diversity of existing systems. Ensure greater consistency between strategies and programs for sustainable agriculture, food systems, health care, social protection, education and nutrition, and between related agencies, agencies and ministries. Provide financial and technical support to improve animal health and welfare in agricultural development, including capacity building programs.

## CONCLUSION

All farm systems should have access to appropriate technologies for sustainable agriculture, taking into account specific circumstances and contexts. In all cases, technological choices must be supported by



a thorough assessment of risk and consequences. The use of information and communication technologies (ICT) in agriculture is becoming increasingly important, especially for introducing innovations that can strengthen positions and open up new opportunities for farmers (including small ones) and for the value chains that support them. The rapidly declining prices of ICTs can make them a more attractive tool for low-income farmers, thereby expanding the spread of such technologies.

Thus, it is necessary to develop innovative approaches with the participation of farmer organizations at various levels and at different scales in order to promote the use of manure as an organic fertilizer and promote the use of agricultural by-products or crop residues and waste as feed, including through technical innovation.

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### **ҚР АШЫҚ ХАЛЫҚАРАЛЫҚ ЖЕРЛЕРІНІҢ АУЫЛ ШАРУАШЫЛЫҚ КЕШЕНІНІҢ ИННОВАЦИЯЛЫҚ ДАМУ КЕЛЕШЕГІ**

**Аннотация.** Мал шаруашылығы секторы азық-түлік жүйесін дамытуда орталық рөл атқарады. Қазақстандағы ауыл шаруашылығының жаһандық ЖІӨ-нің шамамен үштен біріне жауап беретін оның ерекше динамизмі мен күрделі табиғаты ерекшеленеді. Бұл жануарларға арналған сұраныстың, ауылшаруашылық сауда тізбегіндегі нарықтық шоғырланудың, ауыл шаруашылығы кәсіпорындарының деңгейінде өндірісті күшейтудің, фермерлердің табыстарының, жерді пайдаланудың, сондай-ақ тамақтанудың, адам мен жануарлардың денсаулығының сияқты аспектілеріне әсер етеді. Өнеркәсіп кәсіпорындарын мемлекеттік қолдаудың тиімділігін арттыру мақсатында Ауыл шаруашылық министрлігі ауыл шаруашылығының басым бағыттарын дамыту және Қазақстан Республикасының агроөнеркәсіптік кешенін мемлекеттік қолдауды жетілдіру үшін Жол карталарын ұсынды. Бұл мақалада авторлар осы мақалада егжей-тегжейлі жазылып, бүгінгі күнге дейінгі нәтижелердің өсуі / азаю динамикасын талдайды.

**Түйін сөздер:** ауыл шаруашылығы, инновациялар, мал шаруашылығы, ауыл шаруашылығы, технологиялар.

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### **ПЕРСПЕКТИВЫ ИННОВАЦИОННОГО РАЗВИТИЯ СЕЛЬСКОГО ЖИВОТНОВОДЧЕСКОГО КОМПЛЕКСА РК**

**Аннотация.** Сектор животноводства играет центральную роль в развитии продовольственных систем. Он отличается особой динамичностью и комплексным характером, отвечая примерно за одну треть глобального ВВП сельского хозяйства РК. Он оказывает влияние на такие аспекты, как спрос на животные корма, рыночная концентрация в цепях сельскохозяйственного товарооборота, интенсификация производства на уровне сельскохозяйственных предприятий, доход фермеров, землепользование, а также питание и здоровье человека и животных. Для повышения эффективности государственной поддержки предприятий отрасли в Минсельхозе были презентованы Дорожные карты развития приоритетных направлений сельского хозяйства и совершенствование господдержки АПК РК. О которых, авторы пишут более подробно в данной статье, проанализировав в динамике увеличение/уменьшения по результатам на сегодняшний день.

**Ключевые слова:** сельское хозяйство, инновации, животноводство, агропромышленный комплекс, технологии.

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