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MAIN ASPECTS OF FORMING A PRODUCTION STRATEGY FOR THE DEVELOPMENT OF DAIRY GOAT BREEDING

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Abstract

Improving the food supply of the population with livestock products can be achieved by increasing the efficiency of production in individual sub-sectors, including dairy goat breeding. The purpose of the work: to study theoretical approaches to managing production processes in dairy goat breeding in Russia and to substantiate the production strategy for the development of the industry at the level of the country and individual regions. A study of individual aspects of the Russian and global goat milk and processed products market has been conducted. An assessment of the efficiency of milk production using Saanen and Nubian goat breeds in the Saratov region has been presented. The need for further improvement of goat milk production and processing technologies has been substantiated. A project for the production of goat milk on a farm for various breeds has been substantiated. Based on the calculation results, a conclusion was made about a higher level of productivity and profitability of milk production by goats of the Saanen breed. In order to increase production, the author's concept of a production strategy for the dairy goat breeding industry based on a multi-level approach is proposed. The concept is aimed at increasing production volumes primarily in farms and households. The practical value of the obtained results lies in the possibility of using them in the development of regional strategies for the development of dairy goat farming in small businesses in order to meet the population's demand for dietary products.

Key words: *dairy goat farming, production strategies, concept, Nubian and Saanen breeds, productivity, efficiency*

INTRODUCTION

Scientific and technological development of agriculture in Russia is aimed at developing and implementing modern production technologies aimed at increasing animal productivity [6]. Dairy goat farming has a wide distribution area in most countries of the world. The prospects for its further development will be determined by the growing demand for hypoallergenic products and healthy nutrition.

Dairy goat farming has limited production areas and is concentrated in small farms. The extremely low marketability of goat milk limits the possibilities of its industrial processing.

The development of dairy goat breeding in Russia largely depends on the state of selection and breeding work and the adaptation of goat breeds to the conditions of specific regions. To improve the efficiency of production and the competitiveness of goat milk and its processed products, it is necessary to develop industry and regional modernization strategies [23].

The works of authors such as M. Dayoub, Saida Shnaigat, Radi Tarawneh et al. [4] Biswas, C., Nagarajan, V.,& Biswas, D. [1]. present various approaches to choosing the appropriate strategy for a particular enterprise.

The main trends of the modern livestock industry are increasing productivity, improving product quality, reducing labor, energy and resource costs. To achieve this, it is important to develop and use innovative technologies, automated control and monitoring systems, digital technologies and the Internet of Things [7, 24]. It is also necessary to improve breeding work in order to increase the genetic potential of animals, improve their health and other indicators.

Scientific articles [5] present an assessment of the results of the application of digital technologies in dairy cattle breeding in foreign countries. In particular, precision livestock farming technologies are aimed at improving production management, monitoring the health and productivity of livestock. Particular attention is paid to interaction with animals, optimization of production systems to achieve environmental sustainability [14].

In Brazilian agriculture, artificial intelligence technologies and the development of computer vision algorithms are quite popular. [5]. Promising areas of agricultural research include the transformation of the production structure to meet consumer demand for certain types of products,development and adaptation of marketing strategies that will allow the sale of the created products on the market and obtain maximum revenue.

A. Latif, M.F. Cahyandito consider the most promising technology for dairy farming to be a closed-loop economy based on the most efficient use of available resources [15].

As a rule, large livestock farms have a shorter payback period for investments, which is confirmed by research by scientists [8, 18]. In small and medium-sized agricultural businesses, due to high investment risks, as well as the risks of feed shortages, it is necessary to introduce innovative management methods. The purpose of the work is to study theoretical approaches to managing production processes in dairy goat breeding in Russia and to substantiate a production strategy for the development of the industry at the level of the country and individual regions.

MATERIALS AND METHODS

As an information base, the authors used scientific publications on the topic of the study, statistical data, as well as the results of expert assessments.

New data on actual indicators of production and productivity of dairy goat farming in Russia and around the world were used. A detailed analysis of the market for raw goat milk and its processed products in Russia and around the world was conducted. Regional differentiation and localization of dairy goat farming in Russia is reflected. The author's concept of the production strategy of the dairy goat farming industry based on a multi-level approach is presented.

The study also used generally accepted methods used by scientists and experts dealing with agricultural issues. Such methods as monographic analysis, synthesis, critical assessment and compilation of scientific approaches by other authors, comparison, and visualization of statistical data were used. For the development of the Russian dairy goat breeding sub-sector, it is of great importance to study the experience of European countries in organizing the production and processing of milk. This will allow developing effective management strategies for different regions

RESULTS AND DISCUSSIONS

Currently, about 19.5 million tons of goat milk are produced in the world, which is 2.5% of the world's total production of milk of all types. The bulk of this product is produced in two groups of countries: poor developing countries (African countries and India) and countries with a developed consumer culture (mainly Europe). Studies devoted to the study of the beneficial properties of products made from goat milk confirm their easier and better digestibility in comparison with similar dairy products made from the milk of other animal species.

Russian scientists have discovered the qualitative advantages of goat milk kefir in the course of experimental tests [13]. Compared to cow's milk, the fat content of

goat milk ensures better absorption by the human body [2, 3].

Cheeses are a key product of goat milk processing.

They occupy a significant place in the human diet due to their high nutritional and biological value [22]. The undisputed leader in goat milk processing is France, which produces 100 thousand tons of goat cheese. This product is used primarily to meet the needs of the country's population, and only 10% of the production is exported. Greece and Spain also have historical traditions of goat milk consumption[17]. Spain is a major exporter of goat cheese and supplies a large volume of goat milk to France [12]. The Netherlands is a major exporter of dry goat milk, supplying products mainly to China.

The cheese market in Russia is developing dynamically; according to experts, in the long term, the culture of consumption of goat and sheep cheeses can reach the level of European countries (1.5-2%) of the level of consumption of cheese of all types.

In Russia, about 740 thousand tons of raw goat milk were produced in 2020-2022; more than 90% is non-commercial milk from small peasant farms and private subsidiary farms [9,16]. According to experts, the annual commercial volume is 20-30 thousand tons. About 50% of goat milk is pasteurized and directly bottled, the rest is for cheeses. The production of fermented milk products, primarily yoghurts, is becoming more popular. An important trend is the production of baby and healthy food from goat milk. A study was conducted on the state of raw goat milk production in the world.

Figure 1 presents data on the key countries producing raw goat milk for 2020-2022. India ranks first among the countries. In the period under review, the volume of goat milk production in India was more than 20 times greater than in Russia. However, dairy goat farming in India is carried out extensively, and the marketing system remains imperfect. Increased funding and government support for the industry is required. Improving the efficiency of dairy goat farming requires a mandatory transition to intensive and semi-intensive goat farming technologies. Dairy goat farming plays a key role in the agricultural economy of many developing countries. The main areas of scientific research in these countries should cover animal health issues, production technologies, resource use, and population demand for products [10].

The main potential of the goat milk market is hidden in the segment of hypoallergenic dairy products for children, since 28% of babies under one year of age suffer from intolerance to cow's milk. However, there is no practice of using goat milk and recommendations from the Ministry of Health in the Russian Federation yet.

The market for hypoallergenic infant formula is highly concentrated. The capacity of the Russian market is more than 1 billion rubles, and the market itself is controlled by the largest company DGC, which produces dry mixtures from goat milk. In the world market, the demand for hypoallergenic infant formula is gradually increasing, especially in developing countries.

For large farms with breeding stock, significant additional income can be provided by selling breeding animals to farmers and private farms.

The state provides support to family farms and beginning farmers engaged in breeding dairy goats. For example, large farms are compensated for part of the production costs [1].

The volumes of goat milk and processed products are small. According to Soyuzmoloko experts, the goat milk market accounts for only about 1% of the total amount of commercial milk of all types.

Among the regions, the leaders in milk production in agricultural organizations are the Leningrad, Pskov, Sverdlovsk and Chelyabinsk regions. Commercial resources of goat milk of large and medium-sized enterprises are estimated at 3.5 - 4 thousand tons.

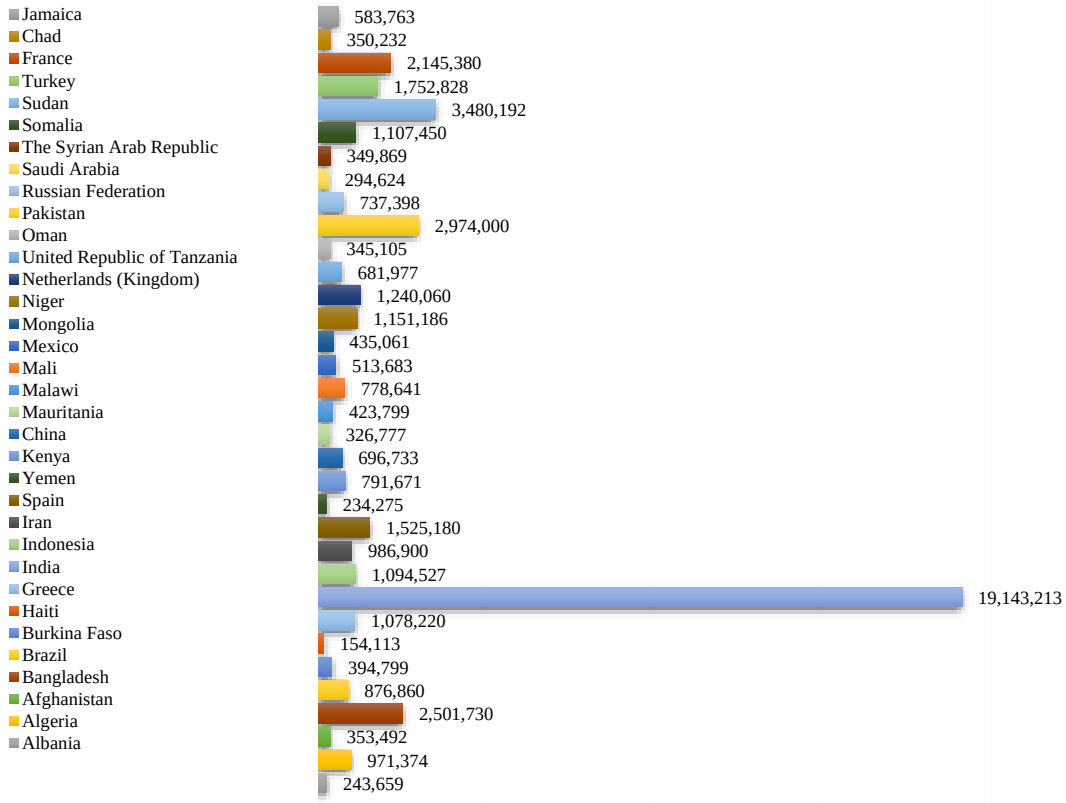

Fig. 1. Goat milk production volumes in major producing countries, 2020-2022
Source: Own calculations based on data [11].

The market has a certain niche mainly for people with allergies to cow's milk. About 70% of purchases are made by residents of large cities with higher incomes. The high cost of production and the price of the final product remain a restraining factor [19].

The structure of the goat milk and processed products market is presented in Fig. 2.

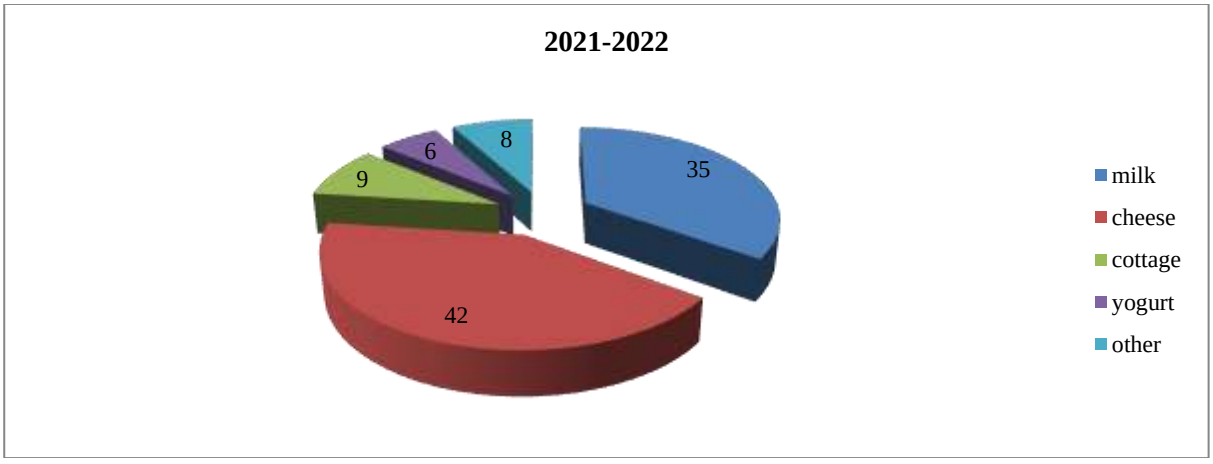

Fig. 2. The structure of the goat's milk and processed products market in Russia
Source: Own calculations based on data [20].

The greatest demand on the market is for milk (35%) and cheeses (42%). To a lesser extent, consumers buy cottage cheese and yogurt (9% and 7%).

[2] The main dairy goat breeds bred in Russia are the Saanen and Alpine. Currently, the use of a meat and dairy breed in goat farms is gaining momentum - the Nubian, or it is also called the Anglo-Nubian breed of goats. In 2022, the total number of dairy goats was 51 thousand heads. There are regional differences

in the distribution of dairy goat populations across the regions of Russia (Fig. 3).

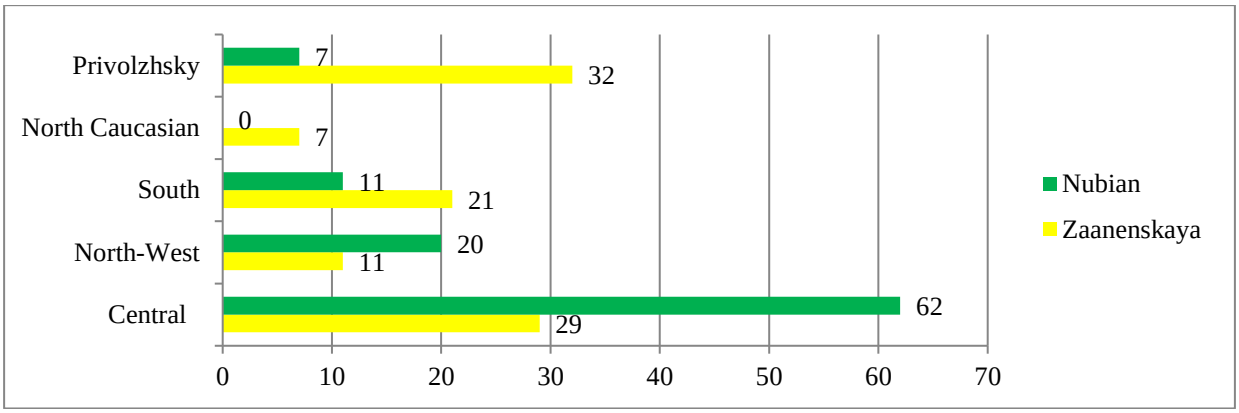

Fig.3. Distribution of dairy goat population by federal districts of Russia, 2022 ,%
Source: Own calculations based on data [25].

In 2022, the largest share of the Nubian goat population was in the Central Federal District (62% of the total population), while Saanen goats predominated in the Volga Federal District (32%). The Saanen breed was found in 24 regions, the Alpine breed in 10 regions, and the Nubian breed in 8 regions. Among the regions of Russia, the largest population of Saanen goats in 2022 was concentrated in the Republic of Adygea (5.6 thousand heads), Leningrad and Moscow regions (3.1–3.8 thousand heads, respectively). Alpine and Nubian goats were characterized by a lower degree of concentration. In the Nizhny Novgorod and Sverdlovsk regions, the leaders in raising the Alpine breed, the goat population was 1–1.9 thousand heads. The Kostroma and Tula regions had the maximum number of Nubian goats, 0.2-0.3 thousand heads, respectively [3].

The dynamics of goat milk production in Russia is shown in Fig. 4.

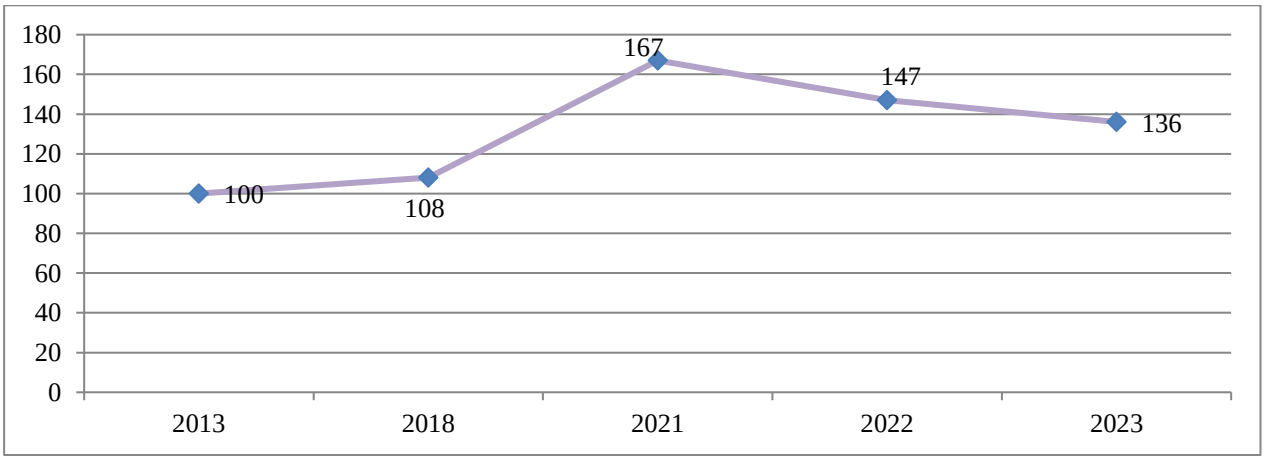

Fig. 4. Growth rates of raw goat's milk production in Russia, %
Source: Own calculations based on data [21].

According to official statistics, in 2023, the volume of Russian goat milk production amounted to 320 thousand tons, increasing by 36% over 10 years. In the period under review, the highest growth rates were observed in 2021.

[4]The level of profitability of the industry as a whole in Russia in 2019 was -8.3%, and in 2020 -16.5% [20].

The efficiency of goat milk production is largely determined by the size of the farm and the breed composition. Large farms with processing capabilities have clear advantages.

[5] On the Russian market, the production of baby food based on goat's milk has not yet received sufficient development; mainly imported products predominate. Processing enterprises of the Stavropol Territory plan to

develop a range of baby products from goat's milk in the coming years.

In the production strategy for the development of dairy goat farming, an important place is given to selection work in order to develop the most productive breeds. Attention should be paid to improving the conditions of keeping and preserving the offspring.

To improve the conditions of keeping goats, it is necessary to provide them with high-quality feed and water, reduce stress, which often occurs during periods of moving. An important component of improving the production strategy is improving the process of processing goat milk.

Improving the production strategy of dairy goat farming in Russia will improve the production indicators of the industry in accordance with the increasing demand for goat milk. In order to strengthen and develop the material and technical base of the industry, it is necessary to improve the supply system, improve quality control of raw materials and finished products, and increase the efficiency of standardization systemof production stocks; improving operational planning and production management in accordance with the corporate development strategy, marketing program, production base development strategy; ensuring a more complete equipment load; improving and timely updating the material base of production; joint work of technologists and production managers in the direction of improving production technology, using the latest equipment, materials, and raw material processing methods.

The concept of modernization of the production strategy of the goat breeding industry in the Russian Federation based on a multi-level approach includes several levels of action, each of which is aimed at improving processes and improving results in this industry:

1. The level of genetic potential of goats. It involves work on selection and selection of breeds that show the best indicators of milk and meat productivity. Modern goat breeding technologies must be used to improve survival conditions.

2. The level of goat keeping conditions. It involves providing high-quality feed and water, improving the conditions of animal keeping (especially in winter), as well as reducing stress, which often occurs during periods of driving, weaning of kids and other moments related to production.

3. The level of goat milk processing at which it is proposed to improve production technologies and intensify quality control of the final product.

4.Organizational level. It includes managing and improving production processes, optimizing business models, implementing effective management and marketing systems, as well as training personnel and supporting local goat breeders. A multi-level approach to the development of the goat breeding industry allows for the improvement and enhancement of all aspects of the production process, which should ultimately lead to increased efficiency and productivity of the industry, improved product quality, and meeting the growing demand for goat milk.It is also advisable to develop a production strategy through the following activities:

1. Developing a personnel policy for enterprise development, reviewing the personnel composition of departments, clarifying the staffing schedule;

2. Developing a system for coordinating actions between departments, possibly introducing an appropriate coordinating position;

3. Developing and implementing an effective personnel service for the selection and placement of personnel at workplaces;

4. Improving the criteria and requirements applied for the selection of personnel at the level of executive positions, paying special attention to managerial positions;

5. Conducting certification of enterprise management personnel, assessing their performance, possibly replacing some employees in key positions and other activities;

6. Developing measures to implement a non-material system of employee motivation.

The production strategy for dairy goat breeding was developed based on the author’s concept of modernization of the production strategy for the goat breeding industry in

Russia based on a multi-level approach (Fig. 5).

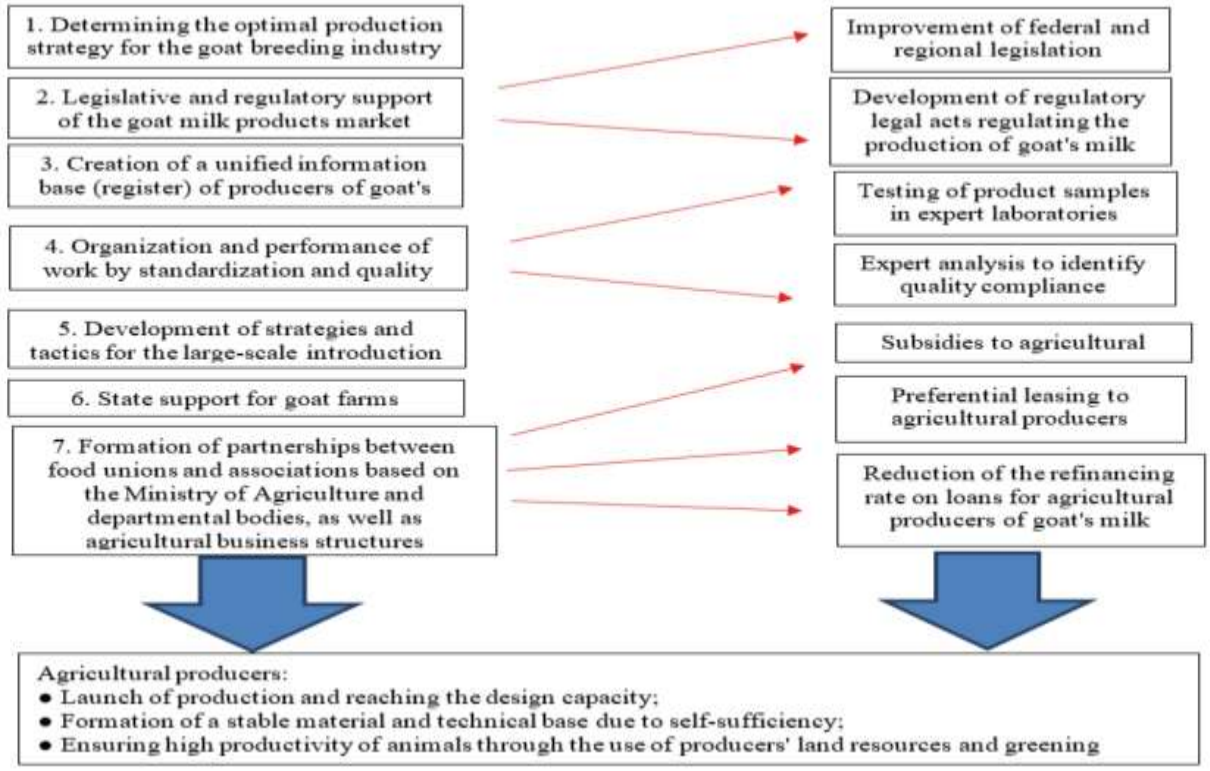

Fig. 5. The concept of modernization of the production strategy of the goat breeding industry
Source: Own conception.

Table 1. Feed costs per 1 kg of milk

Breed	Spent during lactation		Milk of basic fat content obtained (3.5%)	Feed costs per 1 kg of milk with basic fat content (3.5%)	
	Energy Feed Unit	Digestible protein, kg		Energy Feed Unit	Digestible protein, g
Saanen	543	52.4	600.28	0.91	87.29
Nubian	543	52.4	593.54	0.91	88.28

Source: Own calculations.

The Saratov region has significant resource potential for further development of the goat breeding industry in small business.

The authors substantiated the project for breeding various breeds of goats on farms for the Saratov region. The parameters of the project's efficiency are largely determined by the level of production costs.

In the design calculations, it was assumed that the energy feed costs were identical for goats of different breeds and amounted to 543 EFU and 52.4 kg of digestible protein per lactation.

During the same period, it is planned to obtain 600.28 kg of milk with basic fat content (3.5%) from Saanen goats, and 593.54 kg from Nubian animals (Table 1).

When analyzing feed costs for production, it was found that, per 1 kg of milk with basic fat content (3.5%), the EFU costs are the sameand Nubian goats consume only 0.99 g more digestible protein compared to Saanen goats.

Calculations of the efficiency of goat milk production are presented in Table 2.

[4]The author's calculations of the efficiency indicators of goat milk production were carried out for the Saanen and Nubian breeds within the framework of the developed project for the creation of a farm in the Saratov region. It was found that the cost price of 1 kg of milk is slightly lower for the Saanen breed (42.14 rubles), and the profit per 1 kg of milk of basic fat content and per 1 head was higher than for the Nubian breed, by 1.5% and 2.6%, respectively.

Table 2. Economic efficiency of milk production

Indicator	Breed	
	Saanen	Nubian
Milk yield per lactation, kg	575.61	488.80
Fat content in milk, %	3.65	4.25
Milk yield in terms of basic fat content (3.5%)	600.28	593.54
Productioncosts, rubles	25, 299.25	25, 299.25
Cost of 1 kg of milk of basic fat content, rubles	42.14	42.62
Selling price of 1 kg of milk of basic fat content, rubles	75	75
Profit per 1 kg of milk of basic fat content, rubles	32.86	32.38
- per 1 head	19, 725.20	19, 218.82
Profitability of production of milk of basic fat content	77.96	75.96

Source: Own calculations
Note: Exchange rate Euro/Ruble: 1 Euro = 96.06 Russian ruble on February 24, 2025.

With the same production costs, the cost price of milk from Saanen goats was lower by 0.48 rubles compared to milk from Nubian goats.
The profitability of milk production with the accepted basic fat content (3.5%) from Saanen goats was higher by 2% and amounted to 77.96 versus 75.96 for goats of the Nubian breed. Thus, taking into account the fairly high milk yields, it can be concluded that keeping such animals seems promising to farmers, allowing them to fully, almost 1.5 times, recoup the costs of feed. It is also necessary to take into account the main risks that farms engaged in this area of cattle breeding will face. They arise at the stage of capital investments and can be classified as follows: excess of the estimated cost of the project; force majeure, material damage; risks associated with the functioning of the enterprise: failure to reach the design capacity (emergence of technological or raw material limitations); supply of low-quality raw materials; unsatisfactory organization of production; products are not sold in the required value terms and within the estimated time frame (emergence of price restrictions, overestimation of market capacity or underestimation of competition in sales); cost inflation (outstripping growth in prices for raw materials, electricity, water and other cost items); force majeure, material damage [8].
[6] The state provides support measures to producers of goat milk. The main ones are: subsidies to compensate for part of the costs associated with the production and sale of milk; subsidies to reimburse part of the costs of processing goat milk; subsidies for the purchase of new machinery and equipment. An important issue in the problem of ensuring food security in the Russian Federation is the provision of professional personnel. By 2030, it is planned to create 16 thousand new jobs in peasant (farming) households of all categories. Dairy goat breeding accounts for a small share, about 1%. Therefore, in the updated programs of state support for agricultural production in the Russian Federation, increasing the importance and significance of this sub-sector is given more and more attention. according to the policy of the ministry of agriculture of the Russian federation, these goals can be achieved by stimulating goat farms in terms of reimbursement of costs for improving the forage base, building new high-tech milk processing facilities, as well as stimulating breeding work aimed at increasing the milk productivity of animals.
There may be a wide variety of formsof guarantees for partners and investors: insurance, collateral of real estate and securities, bank guarantees.

CONCLUSIONS

A detailed analysis of the market for raw goat milk and its processed products in Russia and other countries is carried out. Regional differentiation and localization of dairy goat farming in Russia are reflected. The dynamics of production indicators for various goat breeds are studied. As a result of the analysis of the efficiency of dairy goat farming in Russia, the need to improve the process of milk production and processing in order to meet the growing demand of the population is

noted. The economic efficiency of the project for the production of goat milk in the Saratov region for various goat breeds is substantiated. Based on the calculation results, a conclusion is made about a higher level of productivity and profitability of milk production by goats of the Saanen breed: the profitability of basic fat milk production (3.5%) for Saanen goats was 2% higher.

The possibilities for developing the goat milk market in Russia in the direction of producing hypoallergenic dairy products for baby food are noted. Based on a multi-level approach, the author's concept of a production strategy for the dairy goat breeding industry is proposed, including the creation of a unified information base for goat milk producers, increasing the volume of production of goat milk products, and strengthening state support for milk producers.

The concept is aimed at increasing production volumes primarily in farms and households.

It can be used in developing regional strategies for the development of dairy goat farming in order to meet the population's demand for dietary products.

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