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## CURRENT STATE AND PERSPECTIVES OF SHEEP BREEDING DEVELOPMENT IN RUSSIAN MODERN ECONOMIC CONDITIONS

*Marina Lescheva<sup>1</sup>, Anna Ivolga<sup>2</sup>*

### Summary

*Sheep breeding is one of the most important branches of rural industry in Russia, which has deep historical roots, satisfies the needs of the population in wool, mutton, sheepskins and other products. The industry provides employment and incomes for considerable part of the rural population, allows preserving the traditional way of life in many rural regions. The branch of sheep breeding has been in depressive state for the last twenty years because of its unprofitability. The industry still lags behind in technological, technical, organizational and economic indicators. The nature of reproduction of sheep is based on the extensive type of development; and the field has been narrowed down compared to previously years. The negative consequences of this are manifested in economic and social aspects that lead to incomplete use of rangelands. As a result, situation does not meet the national interests, and regional governmental authorities and research community are especially focused on the sheep breeding industry.*

**Key words:** sheep breeding, economic analysis, market, wool, mutton, innovations, improvement, directions of development.

**JEL:** Q17, Q18

### Introduction

Organizational and economic aspects of development of the Russian sheep breeding were considered in the works of such scientists as Gezihanov S. A. (Gezihanov, 2013), Aboneev V. V., Kvitko J. D. and Kulakov B. S. (Aboneev et al., 2013), Erokhin A. I., Uldashbaev J. A. and Rybin G. I. (Erokhin et al., 2013), Ulyanov A. N. and Kulikova A. Y. (Ulyanov, Kulikova, 2013), Khanmagomedov S. G., Alieva O. J. and Orudzhev Z. A. (Khanmagomedov et al., 2013), Lescheva M. and Ivolga A. ( Leschev, Ivolga, 2013).

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The organization and management of industry in the small farms of ownership was studied by Kiryanov D. A. (Kiryanov, 2013). The problems of assessing and improving the economic efficiency of sheep farming were reflected in the writings of Petrova T. A. (Petrova, 2012), Revyakina E. L., Chistyakova N. D. and Mirzoyanz Y. A. (Revyakina et al., 2007), and Sharipov I. (Sharipov, 2000). Assessment of competitiveness of sheep production in Russia was conducted by Urbanskaya G. G. (Urbanskaya, 2009). The impact of Russia's membership in World Trade Organization (WTO) on the development perspectives of the industry were considered by Aboneeva (2013). Activization of the main problems of innovative activity in modern sheep farming was also reflected in the researches (Yuldashev, Lescheva, 2013). Foreign experience in efficient production of sheep products was studied in the works of Scherbakova (2006), Petrovic et al. (2013) and other scientists.

Despite amount of work, economic analysis of the state of the industry needs to actualize this sphere, requires adaptation of the previously areas, which was developed earlier to specific conditions of the modern market. These aspects determined the purpose and objectives of the present study.

The purpose of the study was to analyze the current state of sheep breeding, assessment of current trends, structural changes and justification for promising perspective direction of development of the industry.

### **Conditions, materials and methods**

The research was based on dialectic, abstract-logical, comparative methods with active using of index analysis, official information of statistic, compilation of data for scientific publications. In the paper were used material from Food and Agriculture Organization of the United Nations (FAO), Federal State Statistics Service of Russian Federation (ROSSTAT), as well as methodical and analytical materials of the Ministry of Agriculture of Russian Federation.

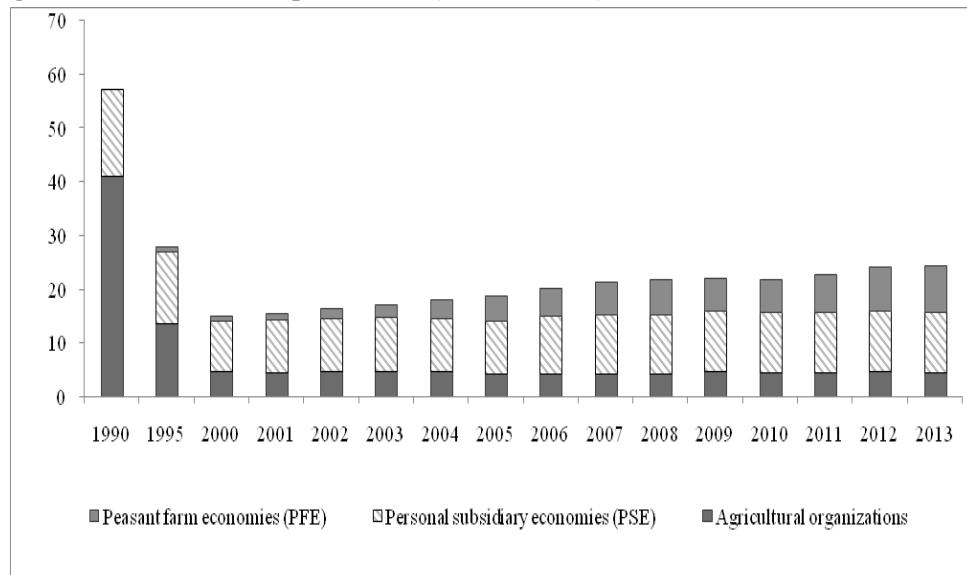
### **Results and discussion**

The number of sheep, mostly fine-wool sheep, in Russia was relatively stable and amounted to more than 58 million heads in 1985-1991, in the agricultural organizations were 42 million heads and in the private sector were more than 16 million sheep. In the process of agrarian reform was implemented land privatization, reorganization of collective and state farms.

State regulation of the agricultural sector has changed significantly, that has led to a new economic behavior of producers, the formation of different agrarian structures, which naturally affected on sheep breeding. The general crisis of agriculture is especially apparent in the industry of sheep breeding. As a result, the number of sheep decreased to 14.8 million heads in the country in 1999.

Sheep breeding was included in the priority national project of development of the agrarian complex of the Russian Federation in 2006-2007 and in the state Program of development of agriculture for 2008-2012, that allows Russia to overcome critical minimum. The number of animals increased to 9.5 million heads in 2013. Currently the number of sheep and goats is 24.3 million heads in all categories of farms of the country (Figure 1).

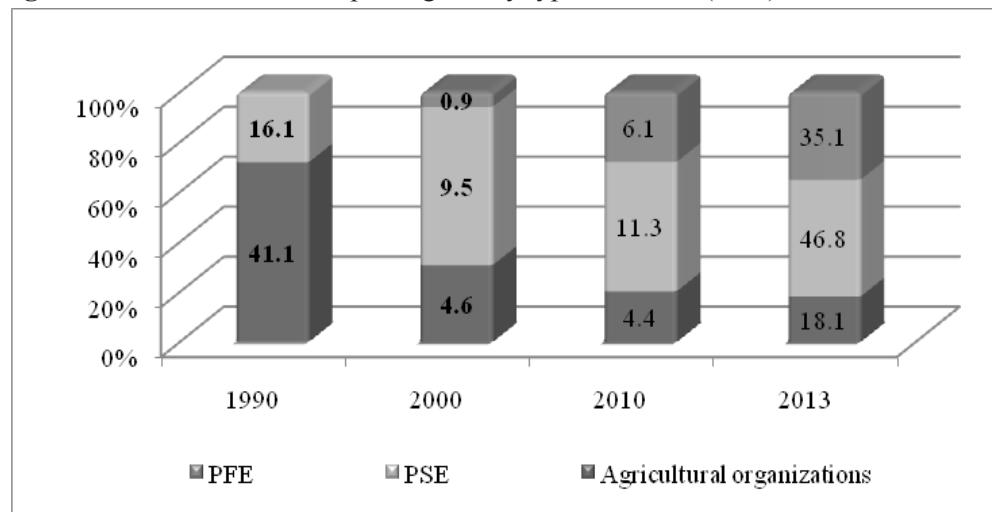
**Figure 1.** Number of sheep in Russia (in mln. heads)



*Source:* Authors calculation according to data from ROSSTAT, 2015.

The number of sheep was redistributed by farms' categories. About 70.6% of the sheep were kept in agricultural organizations and 29.4% in personal subsidiary economies (PSE) in 1990. This ratio has changed radically over the past 25 years. The total number of sheep and goats in agricultural enterprises amounted to 4.4 million (18%), 11.4 million heads (47%) is found in the possession of the population (PSE), 8.6 million (35%) in peasant farm economies (PFE), (Figure 2).

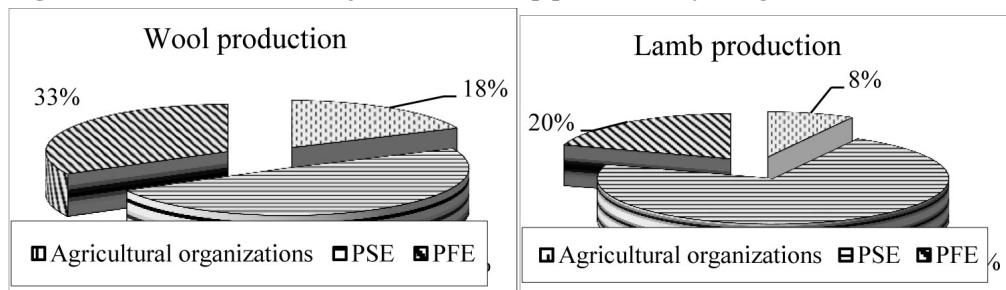
**Figure 2.** Distribution of sheep and goats by types of farms (in %)



Source: Authors calculation according to data from ROSSTAT, 2015.

Production of the main kinds of sheep products is proportional to their numbers in different categories of farms. Currently, productions which are in possession of the population produce 49% wool, 72% of lamb; the proportion of PFEs is respectively 33% and 20%, when agricultural organizations make only 18% and 8% correspondingly.

**Figure 3.** Production of the major kinds of sheep production by categories of farms in 2013

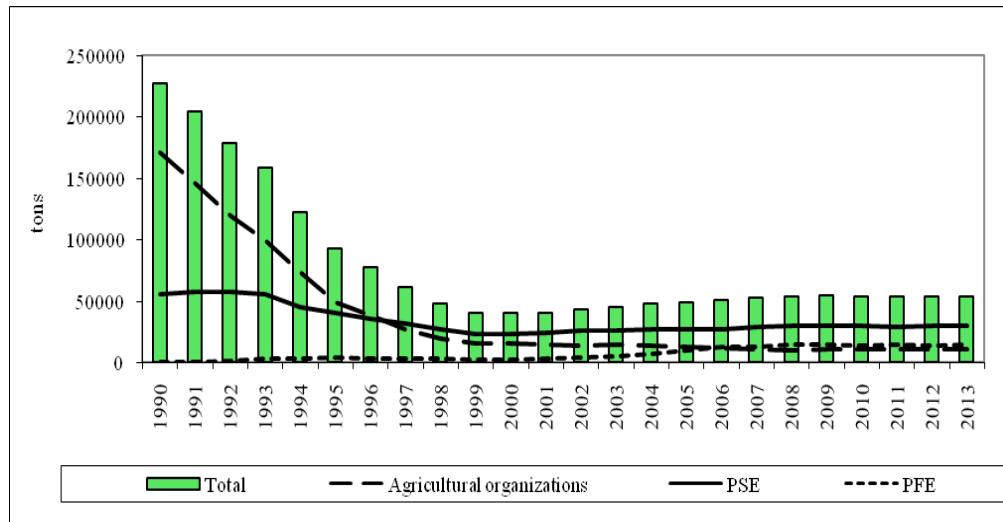


Source: Authors calculation according to data from ROSSTAT, 2015.

Agriculture organization lost its leading role in the production of wool and meat sheep. Many sheep breeding farms were liquidated and lost its significant portion of the most genetically valuable livestock. Rural organization fully reduced the livestock of sheep of such breeds as Askaniiskaya, Vyatskaya; Gorkovskaya; Kochugurovskaya. Valuable breeds of Kuibyshev and Russian longhair are on the verge of extinction. The number of sheep breeds Salskaya is 2.1 thousand heads and Lincoln Kuban are only 800 heads. The small number of these sheep breeds, in future, will lead to their extinction from the territory of the Russian Federation, which will damage to the gene pool of sheep for our country.

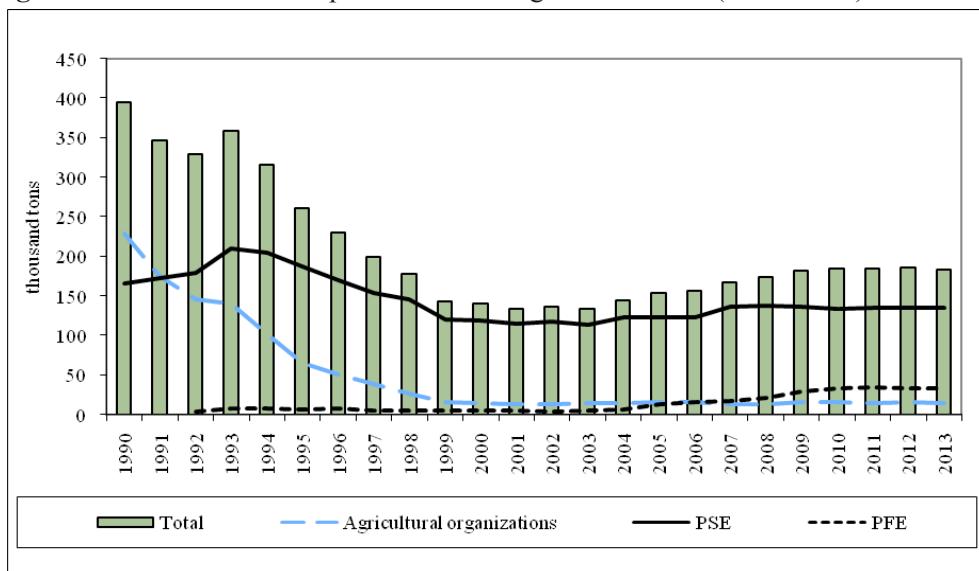
More than half of the sheep are concentrated in private subsidiary farms of the population with extremely low capacity for breeding work, intensification of production and science. The increase in the number of sheep in farms of the population is accompanied by spontaneous delivery of sheep of different breeds and quality, violation of the prevailing zonal rock zoning, with reduced role for the breeding of all breeds of sheep. Reproduction in PSEs is carried out by extensive and does not provide acceptable rates of growth and production (Figures 4 and 5).

**Figure 4.** Production of wool in all categories of farms (in tons)



*Source:* Authors calculation according to data from ROSSTAT, 2015.

The average annual growth rate of wool production amounted to 1.6%; mutton – 3.1% in 2005-2013. Sheep breeding on farms is developing very fast, but it is not able to compensate the decline in production in the public sector.

**Figure 5.** Production of sheep meat in all categories of farms (in 000 tons).

Source: Authors calculation according to data from ROSSTAT, 2015.

Productivity of animal production is very low. Average wool production from a single sheep steady decline in all categories of farms in 2013 and reached a minimum value of 2.4 kilogram per head. Average daily weight of sheep is only 35 grams (Table 1).

**Table 1.** Indicators of productivity of sheep in the Russian Federation

Indicators	2000	2008	2009	2010	2011	2012	2013
Average daily gain of sheep on growing, feeding and fattening in agricultural organizations, grams	26.0	30.0	30.0	32.0	36.0	36.0	35.0
Average wool clip per sheep in physical weight, kg:							
- in all categories of economies	3.1	2.7	2.8	2.6	2.6	2.6	2.4
- in agricultural organizations	3.2	2.5	2.8	2.3	2.2	2.3	2.3
- in PSEs	3.1	3.1	3.1	3.0	2.9	2.9	2.7
- in PFEs	2.9	2.3	2.3	2.4	2.4	2.4	2.2

Source: Authors calculation according to data from ROSSTAT, 2015.

Lamb production per capita is 1.2 kg, while in 1990 it reached 2.5 kg. For comparison, in Australia the average lamb production per capita is 25.3 kg, in New Zealand – 104.5 kg. The share of lamb meat in the overall meat production in Russia is insignificant, and is reducing year by year, in 1990 – 3.7%; in 2008 – 2.9%; in 2013 – 2.3%.

Import of mutton in Russia has increased threefold during 2000-2013, reaching 11 thousand tons (value is comparable to the volume of the mutton production in the rural organizations of the country). Russia imports wool and lamb, having 80.4 million hectares of natural grasslands, pastures and fallow lands.

The most important economic task is to dive a new impetus to development of sheep production. It is necessary to make some restoration and qualitative updates in the industry of sheep breeding. It is important to make the new base of it, paying special attention on structural, typical and technological changes.

Light industry has limited demand for raw wool that does not stimulate its production, estimating possibilities of the industry to adapt to current economic conditions.

The changing structure of the consumption of light industry of the fibers has led to in a significant reduction in the capacity of the wool market associated with large-scale substitution of natural fabrics of artificial (Table 2).

**Table 2.** Production of textile fibers in the world

Years	Clean wool		Cotton		Linen		Silk		Man-made fiber		Total
	thous. tons	%	thous. tons	%	thous. tons	%	thous. tons	%	thous. tons	%	
1970	1,701	7.7	11,379	51.2	703	3.2	41	0.2	8,397	37.8	22,221
1980	1,646	5.4	14,084	46.0	620	2.0	56	0.2	14,182	46.4	30,588
1990	2,007	5.2	17,362	44.9	688	1.8	66	0.2	18,519	47.9	38,642
1995	1,520	3.5	18,762	43.3	740	1.7	92	0.2	22,204	51.3	43,318
2000	1,343	2.7	19,095	38.6	479	1.0	96	0.2	28,434	57.5	49,447
2005	1,220	1.9	26,193	41.9	760	1.2	120	0.2	34,290	54.8	62,583
2012	1,136	1.3	27,181	31.1	263	0.3	175	0.2	58,645	67.1	87,400

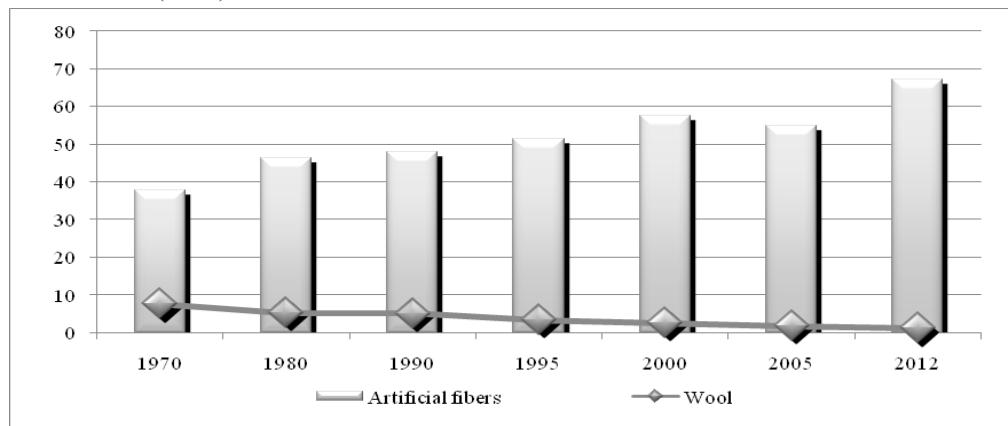
*Source:* Authors calculation according to FAO, 2015.

According to the information, we see that the wool's share decreased almost sixfold from 1970 to 2012 in the total production of textile fibers, while the share of synthetic fibers of all kinds has increased twofold. Currently, the proportion of wool in the manufacture of all textile fibers is 1.3%, of artificial fibers – 67.1% (Figure 6).

Despite the contraction in demand, the domestic sheep does not cover the needs of the textile industry in raw wool. The share of imported products in terms of pure fiber is more than 20% in the formation of wool resources.

The imposition of sanctions and the fall of the ruble in 2014, serving as a signal for import substitution and increased export supplies of wool, and therefore, the restoration of the wool of sheep Russia. However, the market of sheep production is currently focused primarily on the production of meat sheep.

**Figure 6.** Percentage of wool and artificial fibers in the manufacture of all textile fibers in the world (in %)

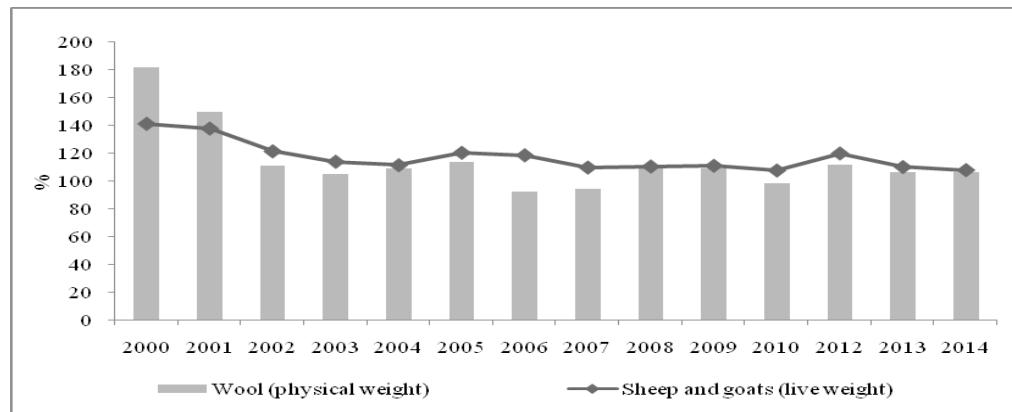


Source: Authors calculation according to data from ROSSTAT, 2015.

The industrial crisis of the country for wool processing, the destruction of the system of preparation of wool for implementation significantly reduced its economic importance. Selling price of 1 ton of raw wool on the average in the Russian Federation amounted to 35,329 ruble (varying by region) in 2014, while the average revenue per 1 ton of meat (in live weight) amounted to 101,463 ruble. The price ratio reduces the economic value of wool productivity of sheep. At a cost of wool production 85-95 rubles per 1 kg, a loss from its sale varies from 50% to 90% and even more.

According to Figure 7, the price indices for sheep meat on average over the last 15 years amounted to 118%, the price index for wool – 114%.

**Figure 7.** Indices of producers' prices of sheep products (in % to previous year)



Source: Authors calculation according to data from ROSSTAT, 2015.

These changes are consistent with global trends. According to the FAO, the price of mutton increased almost linearly up to 2000 with an average absolute increase 0.05 dollar for a year. Then they abruptly increased, reaching back to 2005 value of 4.2 dollars per kilogram. The price of washed wool grew faster than the prices of mutton in 1990, but the pace of growth gradually slowed down. The price of mutton was higher wool prices in 2005 and this relationship holds at the present time. Selling price of wool is prevailing in the Russian market, close to the world level of prices for fine and semi-fine wool of satisfactory quality. At the same time, revenue for the annual wool production from one head (2.9 – 3.9 kg) provides coverage only 5–9% of direct expenses (from 760 to 1,500 rubles). Increasing the economic efficiency of the industry is not provided morphological characters of the domestic sheep by improving the quantitative and qualitative characteristics of coat.

Reorientation of the industry with a primary coat of direction on local meat-coat and meat directions will be kind of response to these market signals. Currently, for meat breeds can only be attributed to 24.7 thousand heads of rocks as Lincoln, Dorset, Romney-Marsh, Suffolk, Texel, Tashlinskaya, southern meat, which comprise only 0.6% of the sheep population in the agricultural organizations of the country. A number of breeds of meat and wool production efficiency (Gornoaltaiskaya, Kuibyshevskaya, Russian long-haired, Sovietskayameat-coat, Tsigayskaya and others), make up another 6% of the total number of sheep in agricultural organizations and need to improve meat forms and increase energy growth. The share of fine-wool sheep areas accounted for 58.9% of the cattle and coarse wool fat-tailed sheep (31.1%), and 3.4% – unidentified animals. About the breed composition of the animals kept in households and PFEs, there is no exact information, but it can be assumed that more than 80% of them are low productive animals, or hybrids of different species and productivity trends.

In such a situation, it is difficult to expect high rates of industry development and implementation of target indicators of the state branch program “Development of sheep and goat breeding in the Russian Federation for 2012-2014 and the planning period until 2020”. It is necessary to identify the regions with predominant development of the Merino sheep and beef, to develop a perspective model of the interaction between large and small producers with each other, with servicing companies, with other market participants to overcome the spontaneity and restore science-based approach to the development of sheep breeding on the basis of zootechnical and economic recommendations.

Also, people need to make evidence-based decisions about using land for agricultural purposes, under the jurisdiction of municipalities, as more than 50% of the sheep population is located in the sector of private households and the increase in their numbers, as well as the development of dairy goat breeding. The use of land without control may narrow the already scarce food base small livestock private sector.

The concentration of a significant portion of sheep livestock on private farms must not impinge on the activities of state, tribal enterprises. It is necessary to develop

procedures and forms of control over the use of breeding animals in the private sector, to distribute grants for the maintenance and breeding of animals from the Federal budget for breeding sheep and goats contained in small holdings. Organization of breeding work in the private sector, the size and the mechanism of subsidy payments also need to be improved.

The technological shift from predominantly growing sheep predominant raw material to the production and processing primary and secondary raw materials to the final product should play a significant role in the development of the industry. This requires increased investment in processing industry, both primary and secondary raw materials. Additional income received from investments in these industries, will mean increased cost impact of raw sheep and correspondingly more full realization of sheep and goat economic potential.

An important condition for the development of the industry is the activation of innovative sector of science in the new conditions. If we want to solve the tasks in agrarian sphere, restore reproduction processes, to catch up with the advanced industrial countries they need to refocus the industry on the path of innovative development. This way will improve production efficiency, reduce dependence on imports, and ensure the competitiveness and sustainability of domestic agriculture in future. Also, solving of problems in sheep breeding requires special approaches.

In recent years scientists of the Russian Scientific Research Institute of Animal Production named after academician L.K. Ernst, Stavropol Research Institute of Livestock Breeding and Fodder Production, North Caucasus Research Institute of Animal Production, Russian Research Institute of Sheep Breeding, Krasnodar Research Institute of Agriculture named after P.P. Lukyanenko, Moscow State Academy of Veterinarian Medicine and Biotechnology named after K.I. Skryabin, Russian State Agrarian University named after K.A. Timiryazev, Stavropol State Agrarian University and other research institutions created fourteen new types and breeds of sheep with higher rates of productivity and consumer properties of products: southern meat; Booba; Aginskaya; Kulundinskaya, Tashlinskaya breed; type sun (tsigayskaya breed); type of mining (Tuvankoro-tkozirnovoystaya breed); steppe type (Tuvankorotkozernisty breed); sending type (Soviet mutton-wool breed); Udmurt type (Soviet mutton-wool breed); dogoiski type (Zabaykalsky breed); Argun type (Zabaykalsky breed); prikauntski type (gornoaltaiskii breed).

At the same time, the most important challenge of modern Russian sheep breeding is the development of desert, semi-desert mountain and Alpine pastures to obtain competitive sheep production through cultivation of local coarse-woolen and fat-tailed sheep breeds – Karachai, Andean, Buryat, Karakul, Kochugurovskoy, Kulundinskoy, Tushinskoy, edilbaevskaya, Romanovskoy and several others, most of which are small and require special measures for the conservation and breeding. The special value of them represent multiple Palestrina breed – Romanovskaya, Imeretinskaya, East Frisian, the gene pool which can be used to improve these symptoms and the most common

breeds of beef and mutton-wool productivity trends.

Scientists have created a new resource-saving technologies, have developed recommendations for the modernization of existing methods of production of sheep breeding products that significantly enhance the profitability of the industry, which was named as innovative technology for the production of broiler lamb; system feeding young sheep under intensive rearing and fattening; low-cost technology of pasture and the stabling of sheep; the evaluation system of hereditary qualities of breeding animals using genetic markers and DNA technology. In obtaining was developed a number of methods of freezing in cryobank that indicates seed of rare such breeds as snow sheep, Siberian ibex, Edilbaevskaya, Hissar and Romanov sheep. Scientists use the method of complex estimation of rams on the quality of offspring; the method of assessment and prediction of meat productivity at an early age on the basis of blood groups of DNA markers sheep; biotechnological methods for assessing the productivity of sheep, methodological and methodical recommendations on creation of systems of keeping and feeding of sheep, biotechnological approaches to the control of products and selection assessment using computer programs, methods of semen cryopreservation of rare and endangered breeds of sheep and goats, the mobile system chipping, improved systems of machinery and equipment, etc.

However, the efforts of Russian scientists are minimized by an ineffective system of management of innovative development of the industry. Industry government bodies, scientific and educational institutions, agricultural producers are coordinated community. The lack of a central guiding action of the branch research institutes and infrastructure is holding back innovation in practical sheep breeding, the rate of promotion of new products and processes in sheep is very low compared to the potentially possible.

In this area, was established the National Union of Sheep Breeding, developed the program "Development of sheep breeding 2010-2020, and plan of spoil placement sheep for Federal districts, given the organizational and economic evaluation model models sheep farms of industrial type farms and households, defined organizational and economic performance standards effective management of sheep, prepared for the introduction of information-analytical system "Selex-sheep"; the software is developed and formed the base breeding and genetic data.

However, the gap between the scientific support of sheep breeding and the practical implementation of innovations has not been overcome. The main problem of the implementation of the innovative strategy of development of the industry is that even in the presence of new breeds and technologies not developed channels of them in practical sheep breeding and no qualified personnel for their development. This determines the low susceptibility of rural producers to new developments.

Great value, in this regard, has organizational and economic support of development of innovations in mass production practices of sheep production by improving the organization of the innovation process and economic innovation.

It should be noted that in the agricultural sector financing of new development is limited by lack of financial resources, lack of necessary for the development of innovative areas of the institutional framework, weak market infrastructure, and the development and, as such, does not have a mass character, their share in the cost of rural products is very small. In this regard, the most relevant for the industry is the use of a wider approach, according to which, under the innovation refers not only to the investments in the creation of something new, but also investing in the acquisition of innovations, including the practical implementation of the global reserve of knowledge.

There is a constant trend of higher energy prices, and given the host specificity of sheep in distant pastures, certain important issues of the Autonomous power supply of sheep-breeding facilities. The use of wind generators, solar panels, other equipment and new energy sources (e.g. biogas) can contribute to the rational use of sheep those areas that cannot be used in another way. Addressing these issues requires careful and fully informed approach to the dissemination of domestic innovative developments in this field, or the corresponding import of foreign equipment and technologies.

Great opportunities in the development of sheep farming are realized through improving the information security industry. The website of the nonprofit organization the national Union of farmers does not address in this area of problems, because information is limited and is updated with a delay. The site does not contain on industry legislative and legal information, including on land use, subsidies and other issues. The website does not reflect information about the breeding farms and promising breeds of sheep and goats contains policy briefs on the state of the domestic and international markets, sheep, and other useful information.

### **Conclusions and perspectives for further research**

The crises in industry of the sheep breeding are in the process of overcoming. The level of financial, personnel, logistical and informational support for the sector is extremely low. Coordinating and catalytic role of the National Union of farmers are not implemented in full. There is a gap between the scientific development of the industry and its practical implementation, which constrains the capacity of production of sheep breeding.

The potential for further development is the availability of natural forage lands, the possibility of rapid reproduction, increasing demand for industry products in terms of import, state support in accordance with the adopted program “Development of sheep and goat breeding in the Russian Federation for 2012-2014 and the planning period until 2020”, the adaptation of innovations to the realities of the industry. Subsequent studies should be aimed at a detailed study of the market and improve the marketing of sheep products.

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