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IMPROVEMENT OF THE EFFICIENCY OF RESOURCE POTENTIAL USE OF AGRICULTURAL ORGANIZATIONS IN THE NOVOSIBIRSK REGION, RUSSIA

Alexander B. VOLKOV, Sergei A. SHELKOVNIKOV, Anastasia A. SAMOKHVALOVA, Denis A. DENISOV, Olga G. ANTOSHKINA, Alexey I. GOLIKOV

Novosibirsk State Agrarian University, 160 Dobrolyubova Str., 6300039, Novosibirsk, Russia, Emails: volkov.y.g@bk.ru, Shelkovnikov1@rambler.ru, aasamokhvalova@mail.ru, kp_i_yp@mail.ru

Corresponding author: aasamokhvalova@mail.ru

Abstract

Higher output of competitive and high-quality agricultural products implies the more efficient use of the resource potential held by agricultural organizations. In the modern conditions, it is essential to substantiate indicators and conditions in order to improve the efficiency of the resource potential and to determine resource potential needs for the manufacture of agricultural products. The agroindustrial complex resource system aims to improve the efficiency of its use. The entry into the resource potential system includes the attraction of main production factors (labor, land, capital, entrepreneurship). The resource potential system is used as a subsystem of a region's economic potential. The exit from the system constitutes the more efficient use of the resource potential. The exit from the resource potential system is the entry into the production potential system with a view to manufacturing agricultural products. An agricultural organization's resource potential is a transparent production system, in which entrepreneurship, taking into account the prevailing market conditions, the modern development level of production forces and production relations, unites, in an optimal combination, in an organization of the relevant organizational-legal form and puts into action technologically dependent factors of agricultural production (labor, land, capital). In the article, the authors substantiate conditions and targets for the efficient use of the resource potential. Taking into account innovative development and achievements of leading companies, resource needs for grain and milk output have been determined.

Key words**:** *agriculture, efficiency of use, resource potential, agricultural organization, production forecast*

INTRODUCTION

Improved qualitative features of the agroindustrial complex and higher quantitative numbers of economic efficiency are directly related to improved efficiency and use of the resource potential in agricultural organizations [15, 16].

The economic efficiency of agriculture is expressed in its designation, i.e. to provide the country's population with food in compliance with the recommended consumption rates [1, 2].

In order to protect national interests, it is necessary to provide the country's food security, to increase the output of agricultural products at domestic agricultural facilities [4].

The development of the market economy and Russia's integration into the global economic space have made it necessary to enhance competitiveness and quality of manufactured agricultural products, which implies a much higher efficiency of resource potential use in agricultural organizations [5, 6].

Investment policy, scientific-technical achievements and the pace of their introduction to agricultural production, the efficiency of work performed by senior executives and some other factors influence the efficiency of resource use. In modern conditions, it is necessary to substantiate indicators and conditions for the more efficient use of the resource potential and to determine resource potential needs for the manufacture of agricultural products [9, 10].

Studies that are aimed to improve the efficiency of resource potential use and to create conditions for stable production are, therefore, relevant and important for the national economy.

MATERIALS AND METHODS

The research aims to develop theoretical provisions and practical recommendations on measures to improve the efficiency of resource potential use in agricultural organizations for the purpose of manufacturing quality and competitive agricultural products to satisfy the needs of the population.

The object of the research is economic and organizational relations that arise in the course of agricultural production in the region.

The subject of the research is conditions, factors, and principles that contribute to improving the efficiency of resource potential use.

Agricultural organizations in the Novosibirsk region are facilities under review.

The theoretical basis of the research included fundamental provisions of the economic theory, works written by scientists about the problem under review, legislative acts adopted by the Russian Federation, including in the Novosibirsk region.

The methodological basis of the study is the dialectic principles and methods of scientific knowledge, a systematic approach to the study of problems of managing agricultural production. Concepts and conclusions, developed by the classical and modern economic theory of the fundamentals of agricultural development, as well as the methods of its management, became the theoretical basis of this study.

In the course of the research, we used data from the Federal State Statistics Service, including its directorate in the Novosibirsk region, plans and reports compiled by agricultural organizations, special literature and reference books.

The analysis and generalization of scientists' theoretical developments constitute the theoretical importance of the research.

As for the practical importance of the research, its results can be used for the more efficient use of the region's resource potential, to adjust agricultural development programs, and to correct the government program on agricultural organization development taking into account substantiated numbers of production efficiency. Materials of the research are used by the Ministry of Agriculture of the Novosibirsk region, large, medium and small businesses, executives of agricultural enterprises, and investors who inject funds into agricultural production and upgrade. The following methods were used in the course of the research: monographic, analytical, abstract logical, and calculation constructive.

RESULTS AND DISCUSSIONS

Targets and conditions for more efficient use of resource potential in agricultural organizations

The determination of the optimal ratio for resource potential in agricultural organizations is associated with a number of peculiarities, and for this reason, individual parameters of each enterprise are unique. However, the degree, in which agricultural organizations are provided with agricultural machinery, their performance and numbers of resource potential use should be reflected via specific numbers and economically justified. These numbers should be translated into corporate development strategies [11, 12].

We used experience amassed by the Novosibirsk region's leading companies to determine the efficiency of resource potential use. For this purpose, we chose agricultural organizations that are interested in unleashing possibilities of their HR potential and, as a consequence, in introducing scientific-technical achievements. They are agricultural organizations, which are part of consortium Scientific Educational Agroindustrial Cluster of the Novosibirsk region and cooperate with the Novosibirsk State Agrarian University (NSAU) in order to achieve the consortium's goals. NSAU is a key educational institution within the consortium which was established in 2012 [13].

Namely, they are agricultural organizations Lebedevskaya, Siberian Niva, Krutishinskoye, Pushkin Collective Farm, Politotdelskoye, Shipunovskoye, Kirov CJSC, Bobrovskoye,

Agricultural Production Complex Kirzinsky, Pedigree Farm Uchkhoz Tulinskoye, and Pedigree Farm Irmen. As Pedigree Farm Irmen numbers substantially differ from leading companies' average. They were put in a separate column and can be used as benchmarks for enterprises whose performance indicators are currently above the average (Table 1).

Table 1. Efficiency targets for resource potential use under various scenarios

Indicator	Pedigree Farm Irmen conditions	Leading agricultural organizations in the Central Eastern Zone
Strength of influence of entrepreneurship	1.05	0.82
Provision with funds, thousand rubles per person	902.0	1,167.5
Return on funds	1.70	0.75
Fund capacity	0.59	1.99
Profit (loss) per 100 hp, thousand rubles	409.7	93.2
Milk yield, kg	10,998	6,570
Expenses per 100 hp of energy facilities, thousand rubles per hp	1,546.5	1,535.3
Per-employee profit, thousand rubles	364	54.5
100 hectares of the agricultural land account for		
fixed assets, thousand rubles	3,806.1	3,209.1
investment, thousand rubles	1,010.2	270.9
operating expenses, thousand rubles	5,882.7	2,468.9
employees, persons	4.3	2.7
profit, thousand rubles	1,559.0	149.9
milk produced, tons	121.9	48.4
grain and beans produced, tons	184.5	73.7
labor productivity per 100 kg, man-hours		
of milk	0.89	2.1
of grain	0.35	0.38

Source: compiled by the authors.

Table 2. Conditions and factors for higher efficiency of the resource potential use and the assessment of their influence on the efficiency of resource potential use

Condition	Factors and reserves	Growth factor for the efficiency of resource potential use	Value, %
1.Presence of a long-term development strategy (up to 20 years)	presence of a target, mobilization of the team's possibilities	profit growth	80%
		production growth	60%
		expansion of the market share	60%
2.Organization of a system aimed to train staff and improve their qualification, with an equal attitude to the training of executives, specialists and workers	guarantee of the quality of production processes; improved quality of products; improved seed grain; rational fertilizer use; safety of machinery and equipment; longer operating potential of vehicles; lower consumption of resources, labor satisfaction	higher class of grain and milk; higher selling prices	30%
		lower production costs	30%
		higher labor productivity	20%
		higher wages	15%
		higher milk yield per cow	40%
		higher grain crop	20%
3. Forward-looking introduction of high-efficiency technologies when operating modern equipment	higher labor productivity; formation of careful attitude to resources; "anchoring" of employees in an enterprise	lower production costs	30%
		higher labor productivity	80%
		higher milk yield per cow	40%
4. Investment activities (presence of economically justified investment projects)	higher labor productivity; formation of careful attitude to resource potential elements; "anchoring" of employees in an enterprise	higher grain crop	20%
		higher wages	75%
5. Creation of youth-friendly jobs and safe working conditions			
6. Introduction of the measures aimed to raise wages			
7. Development of the measures focused on the social support of employees			

Source: compiled by the authors.

Of the aggregate of the relevant agricultural organizations that meet the main requirement, leading enterprises in the Central Eastern nature economic zone were differentiated on the basis of the following criteria: the factor that influences entrepreneurship of above 0.75, annual revenue of RUB 100+ million, the presence of dairy cattle and grain production, 100+ on payrolls, and the presence of a development strategy [14].

Upon analysis of the strategies in cooperation with specialists and executives of agricultural organizations that take an active part in the consortium's operation, generalized conditions and factors that contribute to improving the efficiency of resource potential use and the economically justified results of their influence (Table 2).

Resource needs for grain and milk production until 2025

The calculated efficiency targets for the use of production resources in agricultural organizations that operate in the Novosibirsk region make it possible to apply them as one of the tools for modeling a development scenario for agricultural production in the region.

The region produces various agricultural goods. Two types of products (grain and milk) will be used as the basis for calculations. We use one ton of grain per capita as a ratio of full satisfaction of the needs of the national economy. Pursuant to the recommendations given by the Ministry of Healthcare and Social Development of the Russian Federation, we took needs for milk and dairy products per capita at the upper bound, i.e. 340 kg [17, 18].

The Novosibirsk region's population in the future is calculated using the extrapolation method on the basis of the identified tendency according to an equation of the trend:

$$y_t = a + bt = 2{,}687.27 + 7.6t.$$

Agricultural organizations covered 78% of all areas under crop in 2014. Consequently, their needs for milk and grain production should be at least 78%. Milk and grain produced by agricultural organizations in 2014 accounted for 66.3% and 68.9% of the production needs, as we calculated, taking into account the area under crop equal to 78% [19, 20].

We will calculate two scenarios for three development models (the first one for milk production, and the second one for grain output) (Table 3).

Table 3. Calculation of resource potential needs aimed to satisfy the needs for the manufacture of main types of products under various scenarios

Indicator	In the conditions of the Novosibirsk region		In the conditions of Pedigree Farm Irmen		In the conditions of leading agricultural organizations	
	Model 1		Model 2		Model 3	
	Option 1	Option 2	Option 1	Option 2	Option 1	Option 2
Output (growth), thousand tons						
grain and beans, thousand tons	590.2					
milk, thousand tons	245.3					
Additional needs for						
agricultural needs, thousand hectares	1,931.5	1,725.7	201.2	320.8	506.8	800.8
employees, persons	19,315	17,257	8,653	13,793	13,684	21,621
fixed assets, RUB million	16,672.7	14,896.5	7,659.0	12,208.4	16,263.7	25,698.5
annual investment, RUB million	1,778.9	1,589.4	2,032.8	3,240.3	1,372.9	2,169.4
Investment needs for						
fixed assets, RUB million	18,451.6	16,485.9	9,691.8	15,448.7	17,636.6	27,867.9
working capital, RUB million	19,351.7	17,289.8	11,836.0	18,871.7	12,512.4	19,771.0
Total needs for financial resources, RUB million	37,803.3	33,775.7	21,527.8	34,320.4	30,149.0	47,638.9
Expected results: profit, RUB million	2,646.1	2,364.2	3,136.7	5,001.3	759.7	1,200.4

Source: compiled by the authors.

To ensure required grain and milk output in the real development conditions, the agricultural sector's investment needs vary from RUB 16.5 billion to RUB 18.5 billion in fixed assets and from RUB 17.3 billion to RUB 19.4 billion in working capital. All in all, under Model 1, agricultural organizations' investment needs for production range from RUB 33.8 billion to RUB 37.8 billion.

Based on the achievements made by leading agricultural organizations in the Central Eastern Zone the agricultural sector's investment needs range from RUB 30.1 billion to RUB 47.6 billion, including from RUB 17.6 billion to RUB 18.5 billion in fixed assets, and from RUB 12.5 billion to RUB 19.8 billion in working capital.

The most favorable option is Option 1 of Model 2 in the conditions of intensified production based on the Pedigree Farm Irmen option. This option offers the most acceptable conditions in terms of both the area of agricultural land (201,200 hectares are required) and financial resources (RUB 21.5 billion) [3]. In the current conditions of the region's development, it is not reasonable to apply the calculated Model 1 options because this requires more resources.

The most realistic option in the current conditions is given in Option 1 of Model 3, with the needs for agricultural land equal to 506,800 hectares, and RUB 30.1 bn of financial resources.

The implementation of the State Program also implies the intensification of production. However, funds are used more efficiently when introducing advanced experience. Under Model 2 (Pedigree Farm Irmen conditions), grain output will increase by 62.1%, milk production will increase by 70.2%, i.e. above the numbers as provided for in the State Program (14.8%). Labor productivity in grain output will grow by 6.3% and milk output will rise by 38.9%, while financial needs will be lower by RUB 4 billion, and workforce needs will be higher by 4,787 people. However, this company's indicators are currently not typical for the region.

In modern conditions, the most preferable development scenario is the one that was calculated based on Model 3. In this model, grain and milk production will expand by 60%, labor productivity will double, financial needs in this development model are higher by RUB 4.6 billion, and workforce needs are higher by 9,815 people.

Table 4. Forecast for grain and milk output by agricultural organizations in the Novosibirsk region until 2025 under various models for higher efficiency of resource potential use, thousand tons

Period	Output				Deficit (-) or surplus (+) of production			
	Model 2		Model 3		Model 2		Model 3	
	milk	grain	milk	grain	milk	grain	milk	grain
2014	483.2	1,304.7	483.2	1,304.7	-245.3	-590.2	-245.3	-590.2
2015	507.1	1,363.3	504.3	1,361.7	-221.7	-532.4	-224.5	-534.0
2016	532.3	1,424.5	526.3	1,421.1	-198.5	-476.4	-204.5	-479.8
2017	558.6	1,488.4	549.3	1,483.1	-174.2	-417.8	-183.5	-423.1
2018	586.3	1,555.2	573.3	1,547.9	-148.5	-356.3	-161.5	-363.6
2019	615.3	1,625.0	598.3	1,615.4	-121.6	-291.7	-138.6	-301.3
2020	645.8	1,698.0	624.4	1,686.0	-93.1	-223.9	-114.5	-235.9
2021	677.8	1,774.2	651.7	1,759.6	-63.1	-152.9	-89.2	-167.5
2022	711.4	1,853.9	680.1	1,836.4	-31.5	-78.6	-62.8	-96.1
2023	746.6	1,937.1	709.8	1,916.5	1.7	-0.6	-35.1	-21.2
2024	783.6	2,024.1	740.8	2,000.2	36.7	81.2	-6.1	57.3
2025	822.4	2,114.9	773.1	2,087.5	73.4	166.8	24.1	139.4
2020 as % vs. 2014	133.7	130.1	129.2	129.2	-	-	-	-
2025 as % vs. 2014	170.2	162.1	160.0	160.0	-	-	-	-

Source: compiled by the authors.

Forecast grain and milk output by the Novosibirsk region's agricultural organizations until 2025

Scheduled growth of milk and grain output will exceed the indicators stipulated in the Forecast for Long-term Socio-Economic Development of the Russian Federation for the Period until 2020, which during the period from 2011 through 2030 should constitute 101.2% and 101.7% [7, 8]. Our forecast for Model 2 growth rates is 1.0495 for milk output and 1.04489 for grain production, and 1.04365% for Model 3. Under Model 2, a shortage in milk production, according to the forecast, will be eliminated by 2023, a shortage in grain output will disappear by 2024, and under Model 3, by 2025 and 2024, respectively (Table 4).

If the efficiency of resource potential use rises, agricultural product output in agricultural organizations can result in a surplus of milk and grain as of 2024. Milk exports will grow up to 73,000 tons and grain exports will increase to 166,800 tons by 2025.

CONCLUSIONS

In modern conditions, resource potential has been more efficiently used in the Novosibirsk region. Labor productivity in the manufacture of main categories of agricultural products is on the rise. Agricultural product output per 100 hp increased by 34.7 times from 2000 through 2014, while profit per 100 hp increased by 12.4 times and costs per 100 hp increased by 9.5 times.

For qualitative growth of the efficiency of resource potential use and higher output, the following conditions are necessary: presence of a long-term development strategy for the agricultural organization for 20+ years; organization of a personnel training system and improvement of their qualification; introduction of high-efficiency technologies and machinery; investment activities and equipment upgrade; creation of youth-friendly jobs and safe working conditions; higher wages; social support of employees.

The following targets for the efficiency of resource potential use have been calculated for agricultural organizations whose performance indicators are lower or higher than the numbers reported by leading enterprises. The strength ratio of influence of entrepreneurship is 0.82-1.05, the provision with funds is RUB 900,000 – RUB 1,200,000, return on funds is 1.99-0.59, profit per 100 hp is RUB 93,200 – RUB 409,700, milk yield is equal to 6.6-11 tons, expenses per 100 hp are RUB 1.5 million, and per-employee profit is RUB 55,000 – RUB 364,000, respectively. Per 100 hectares of agricultural land fixed assets total RUB 3.2-3.8 million, investment stands at RUB 270,000 – RUB 1,000,000, operating expenses amount to RUB 2.5-5.9 million, employees equal 2.7-4.3 persons, profit totals RUB 150,000 – RUB 1.6 million, milk output amounts to 48-122 tons, production of grain and grain legumes totals 74-185 tons, respectively. Labor productivity per 100 kg of milk is equal to 2.1-0.89, and 0.38-0.35 man-hour for grain output. These numbers should be taken into account by enterprises as benchmarks in the course of strategic planning.

Under Option 1 for the leading agricultural organization, Pedigree Farm Irmen, financial needs for grain and milk production equal RUB 21.5 billion, or lower by RUB 4 billion, while workforce needs are higher by 4,787 people compared to the numbers stipulated in the State Program "Development of Agriculture and Regulation of Agricultural Product, Raw Material and Food Markets in the Novosibirsk region for 2015-2020".

Under this model, grain and milk output will rise by 62.1% and 70%, respectively, by 2025, i.e. will exceed the production growth as stipulated in the State Program (14.8%). Labor productivity in grain output exceeds the Program-stipulated number by 6.3%, and milk production by 38.9%. According to this model of development, the deficit in milk output will be eliminated by 2023 and the deficit in grain production will disappear by 2024.

Financial needs for higher grain and milk production (+60%) on the basis of a development model for leading enterprises in the Central Eastern Zone are equal to RUB 30.1 billion, or higher than the amount

stipulated in the development program by RUB 4.6 billion, workforce needs are higher by 9,815 people, and labor productivity is 2 times higher compared with the program. Agricultural land needs to amount to 506,800 hectares. Under this model of development, a deficit in milk and grain production will be eliminated by 2025 and 2024, respectively.

If the resource potential is used more efficiently, higher agricultural product output will make it possible to raise milk and grain exports to 73,000 tons and 166,800 tons by 2025. However, the State Program needs adjusting.

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