Assessment of the resource potential of agricultural land use for land management purposes

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Abstract. In the article, the authors examined the role of assessing the resource potential of agricultural land use in the land management system. A literature review was carried out to determine the resource potential of agricultural land use. The concept of the resource potential of agricultural land use is clarified. The article proposes a methodology for assessing the integral resource potential of agricultural land use. It determines the resource potential of the specific agricultural land use of LLC Aurora of the Babyninsky district of the Kaluga region on the basis of financial, labor and land indicators. A classification of factors has been developed to assess the resource potential of agricultural land use. The article also proposes levels of assessing the resource potential of agricultural land use.

1. Introduction
Currently, when managing land resources, there is increased attention to the issue of the agricultural land use effectiveness, which at the same time remains unresolved. Improving the efficiency of agricultural land use is the basis of agricultural organization in various regions of the Russian Federation. Analysis of the effectiveness of the use of agricultural land plays an important role in the process of selecting promising areas of agricultural activity, developing scenarios for its development, as well as in substantiating the territorial concentration of production of certain types of agricultural products.

In modern conditions, problems arise in the development of rational managerial decisions in the system of agricultural land use. One of the most important unsolved problems of agricultural land use is to ensure the maximum use of all resources to realize the possibilities of production activities. Closely connected with this issue are the problems of decreasing land fertility, decreasing the capacity of fodder land, and increasing the area of unused agricultural land.

To solve these problems, it is necessary to assess the resource potential, which allows increasing the efficiency of agricultural land use. The resource potential of agricultural land use is determined by the specifics and characteristics of the region in which land use is located, as well as by the current state of land.

In different economic studies, the resource potential of agricultural land use is interpreted differently.

Many scientists define the resource potential as an element of production potential, so foreign economists D. Begg, Xu Fisher, R. Dornbusch consider the factor of production the main factor in determining the resource potential [1].

According to A. Sagaidak, the resource potential is a set of objective natural and economic conditions that affect the course of the reproduction process in agriculture [2].
A.P. Potapov believes that the level of agricultural land use, the resource potential is characterized by the inclusion of land, labor and material and technical resources in its composition [3].

The most popular among authors is the consideration of the resource potential as a complex system [4–8].

Summarizing various points of view regarding the economic content of the concept of resource potential, we conclude that the resource potential of agricultural land use is characterized by land, material, financial and labor resources in general and is determined by the totality of a certain quantity and quality of resources needed for reproduction.

2. Materials and methods

The agricultural organization Aurora LLC was selected as an object of study to assess the resource potential of agricultural land use, which sells crop and livestock products in the Babyninsky district of the Kaluga Region.

Kaluga Region is one of the leaders in the development of the agro-industrial complex and has a number of regional features that create favorable conditions for the development of agriculture in the long term. Kaluga region currently includes 225 organizations engaged in agricultural activities, 45 large and medium-sized enterprises of food and processing industries, 750 peasant (farmer) farms, 101.0 thousand personal subsidiary farms.

Babyninsky district of the Kaluga region is characterized by a stable socio-economic situation. Agriculture has a greater share in the structure of the economy of the region. So, in recent years, in the Babyninsky district, agricultural production is growing steady and the municipal program “Sustainable Development of Rural Territories of the Babyninsky District of the Kaluga Region for 2014–2020” is being implemented.

3. Results

Aurora LLC is one of the largest agricultural enterprises in the region, in which crop production is represented only by grain production, and in the livestock industry by the dairy and meat sector. To assess the resource potential of LLC Aurora, we used an algorithm for generating indicators of the balance of the resource potential according to formula 1.

\[
I_{int} = \sqrt[3]{I_{lp} \cdot I_{fp} \cdot I_{landp}},
\]

where \( I_{lp} \) is an indicator of the effectiveness of labor potential; \( I_{fp} \) – indicator of the effectiveness of financial potential; \( I_{landp} \) – an indicator of the effectiveness of land potential.

The integral indicators for assessing the resource potential are factors that evaluate the agricultural land use of Aurora LLC over the past three years, table 1.

When assessing labor potential, it is necessary to characterize its quantitative and qualitative sides. The quantitative indicators characterizing the level of labor potential include: the number of employees, wages, the amount of actual working time [9].

To quality indicators: personal and professional qualities of employees, physical and psychophysiological potential of the organization’s personnel; the volume of general and special knowledge, labor skills, and skills that determine the ability to work. Assessment of quality indicators is carried out by an expert method and is subjective. Assessment of the state of labor potential can be determined by different methods, the most common is the index method and the control questions method.
### Table 1. Indicators for determining the resource potential of LLC Aurora

| Indicator                                                                 | 2017     | 2018     | 2019     |
|---------------------------------------------------------------------------|----------|----------|----------|
| Labor remuneration with deductions for social needs, thousand rubles     | 7477     | 7854     | 7963     |
| The average annual salary per employee, thousand rubles                   | 90.08    | 102.30   | 104.10   |
| The average annual number of employees, people                            | 49       | 82       | 85       |
| Agricultural workers, persons                                            | 49       | 82       | 85       |
| Financial                                                                 |          |          |          |
| The average annual value of fixed assets, thousand rubles                 | 22155    | 42520    | 106644   |
| The average annual value of working capital, thousand rubles              | 10459.5  | 1172.5   | 11946.5  |
| Revenue from the sale of products, thousand rubles                        | 9898     | 14086    | 19327    |
| Conversion factor in agriculture                                          | 0.15     | 0.15     | 0.15     |
| Total area, ha                                                            | 2604     | 4196     | 4912     |
| Cadastral value of land, thousand rubles / ha                            | 67.4     | 67.4     | 67.4     |
| Revenue from the sale of products, thousand rubles                        | 9898     | 14086    | 19327    |

In this study, we used the following indicators to assess labor potential: salary with deductions for social needs; average annual wage per employee, average annual number of employees and the number of workers employed in agricultural production. The calculation was performed according to the formula 2:

\[ I_{lp} = \frac{GO}{As} \times Ne, \]

where \( GO \) is gross output; \( As \) – the average annual salary of one employee; \( Ne \) – the number of workers employed in agricultural production.

Further, according to the methodology, it is necessary to assess the financial potential of agricultural land use, including the average annual value of fixed assets, average annual value of working capital, output from sales of products and the coefficient of reduction in agriculture. Define the financial potential of agricultural land use by the formula 3:

\[ I_{fp} = \frac{GO}{P} + (Afa + Awc) \times Cr, \]

where \( P \) – pay with deductions for social needs; \( Afa \) – the average annual value of fixed assets; \( Awc \) – the average annual value of working capital; \( Cr \) – coefficient of reduction in agriculture.

Assessment of the land potential of agricultural land use is the most important component of the resource potential and is determined by the formula 4. Indicators of land potential revenue from the sale of agricultural products, total land use and its cadastral value.

\[ I_{landp} = \frac{R}{Ta \times Cv}, \]

where \( R \) is the revenue from the sale of products; \( Ta \) – total area; \( Cv \) – Cadastral value.

Assessing the labor, financial and land potential of agricultural land use, we determine the integral indicator of the resource potential of LLC Aurora.

The effective indicators for assessing the resource potential of LLC Aurora and the effectiveness of its use are presented in table 2.

These tables indicate a slight increase in the economic efficiency of the resource potential of Aurora LLC and the ability of agricultural land use to function on the market. In addition, this indicator determines the degree to which the resource potential in the conditions of the development of the innovation process will ensure an increase in the volume of production due to intensive and extensive factors.
Table 2. Indicators of a comprehensive assessment of the resource potential of LLC Aurora

| Indicator                          | 2017 | 2018 | 2019 |
|-----------------------------------|------|------|------|
| Labor productivity indicator      | 3.5  | 3.7  | 3.8  |
| Financial performance indicator   | 4.7  | 4.9  | 5.8  |
| Land Potential Performance Indicator | 0.05 | 0.05 | 0.06 |
| Integral indicator of resource potential | 1.78 | 1.83 | 1.91 |

4. Conclusion

As the study showed, the resource potential of agricultural land use varies over time and is not a constant. When determining it, it is necessary to take into account the impact of external and internal factors.

Currently, there are three laws that determine the nature of the influence of factors [10]:
- the law of minimum, which shows that the level of development of each land use is determined by the factors that it has in the minimum;
- the law of interchangeability of factors, according to which there are groups of factors interchangeably;
- the law of optimum, according to which the greatest efficiency of agricultural land use is achieved with an optimal combination of factors that determine it.

The composition and nature of factors affecting the assessment of the resource potential of agricultural land use currently requires a detailed study. The authors compiled a classification of factors that must be taken into account when assessing the resource potential of agricultural land use:
- environmental factors;
- production factors;
- production costs;
- organizational and technological factors.

The first group includes factors that are not directly involved in the production cycle, but have a direct impact on it. These are the conditions in which agricultural land use is located: political, economic, social and environmental conditions. Let's consider them in more detail.

Political conditions – the existence of effective laws and other regulatory documents on the procedure for the disposal of land and its use, agricultural production.

Economic conditions are characterized by the general economic situation in the country and the object of study, credit and financing conditions. Social conditions are characterized by the ability of the main consumers of agricultural products to purchase it at a certain price. Natural conditions determine the conditions for performing field work and growing crops for different regions of the Russian Federation. Environmental factors can be divided into factors formed outside agricultural land use, this is soil pollution by industrial, transport and other enterprises. And factors formed within agricultural land use, for example, soil pollution by pesticides.

The second group includes material and labor resources that characterize the production potential in agricultural land use. The factors of production include staffing (number of employees, skill level of workers), the cost of fixed assets.

The third group includes direct costs. They represent the resources actually involved in production and used to produce one or another type of agricultural product: labor costs, materials, production costs in absolute terms or per unit of output.

The fourth group is represented by factors related to the organization of production processes, applied technology and risks. Their optimal use is the main condition for a high return on production costs and an increase in the economic efficiency of agricultural land use.

I would also like to note the influence of the time factor. When assessing the resource potential of agricultural land use, one should take into account dynamism (time-varying parameters of the land use system) and the time gap (lag between completed cadastral actions, monitoring work and investment
in agricultural production and income from these actions). It is clear that the resource potential of agricultural land use is a complex system. In our opinion, it is necessary to evaluate it in mutual relation with the assessment of the sustainability of agricultural land use. The assessment of the resource potential of agricultural land use should be carried out at four levels:

- at the level of the Russian Federation;
- at the level of the subject of the Russian Federation;
- at the level of the municipal entity;
- at the level of a specific agricultural enterprise.

At the federal level, the assessment of the resource potential of agricultural land use will solve the national economic problems in the field of land management. At the level of the subject of the Russian Federation, an assessment of the resource potential should proceed from regional characteristics and conditions of the agro-industrial complex. At the local level, it is necessary to proceed from the fact that agricultural enterprises located on the territory of the municipal entity are its strategic potential. The most important level of assessing the resource potential in our opinion is the level of a specific agricultural enterprise, regardless of the form of management. To assess each of the levels of resource potential of agricultural land use, it is possible to use various indicators.

Thus, the assessment of the resource potential of agricultural land use should be considered as the most important task facing the land management system at different administrative and territorial levels.

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