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ТЕНДЕНЦИИ ОБЕСПЕЧЕННОСТИ ТЕХНИКОЙ АПК ОМСКОЙ ОБЛАСТИ

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Представлены результаты анализа технической оснащенности производителей сельскохозяйственной продукции мобильными энергетическими средствами и технологическими машинами в зависимости от площадей возделываемых культур. Изучены данные 2008–2020 гг. государственной статистики Министерства сельского хозяйства и продовольствия Омской области. Общие посевные площади региона составляют 2881,2 тыс. га. Отмечено незначительное сокращение площади под зерновыми культурами на 2,9 тыс. га, под кормовыми культурами на 75,2 тыс. га, или 0,14 и 13,2%, соответственно. Показано значительное изменение количественного состава машинно-тракторного парка. Отмечено ежегодное сокращение количества тракторов, кормозаготовительных и зерноуборочных комбайнов. Количество тракторов уменьшилось на 2811 ед., или 26,6%. По состоянию на декабрь 2020 г. эксплуатация 30,6% зерноуборочных и 56,7% кормозаготовительных самоходных комбайнов не превышает 10 лет. Уменьшение количества сельскохозяйственных тракторов связано с использованием минимальной технологии обработки почвы, сокращением энергетических затрат и средств для проведения агротехнических операций по сравнению с традиционной технологией. Сокращение количества тракторов и комбайнов приводит к возрастанию средней нагрузки на машину. Данная тенденция определяет увеличение сроков проведения основных агротехнических операций, что сказывается на количестве и качестве конечной продукции. Определение оптимального состава тракторного парка должно проводиться для каждого конкретного хозяйства с учетом местных условий, структуры хозяйственной деятельности и его специализации.

Ключевые слова: техника, обеспеченность, тракторы, комбайны, посевные площади

TRENDS IN MACHINERY AVAILABILITY IN AGRO-INDUSTRIAL COMPLEX OF OMSK REGION

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The results of the analysis on the assessment of technical equipment of agricultural producers with mobile power facilities and technological machines depending on the area of cultivated crops in the Omsk region are presented. The state statistics data of the Ministry of Agriculture and Food of Omsk Region were studied for the period of 2008-2020. The total cultivation area of the region is 2881.2 thousand hectares. There was a slight decrease in the area under grain crops by 2.9 thousand hectares, under fodder crops by 75.2 thousand hectares, or by 0.14 and 13.2%, respectively. A significant change in the quantitative composition of the machine and tractor fleet is shown. An annual reduction in the number of tractors, forage harvesters and grain harvesters was noted. The number of tractors decreased by 2811 units, or by 26.6%. As of December 2020, the operation of 30.6% of grain harvesters and 56.7% of self-propelled forage harvesters does not exceed 10 years. A decrease in the number of agricultural tractors is connected with the use of a minimum tillage technology, a reduction in energy costs and funds for carrying out agrotechnical operations in comparison with traditional technology. Reducing the number of tractors and combines leads to an increase in the average load on the machine. This tendency leads to increasing the terms of the main agrotechnical operations, which affects the quantity and quality of the final product. The determination of the optimal composition of the tractor fleet should be carried out for each specific farm, taking into account local conditions, the structure of economic activity and its specialization.

Keywords: machinery, equipment, tractors, combine harvesters, cultivation areas

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The current state of the Russian agro-industrial complex is characterized by an outdated production and technical base, lack of investment attractiveness and competition. The regional agro-industrial complex influences the economic, political and social situation in the regions; agro-industrial enterprises produce more than 70% of consumer goods for the population and one third of the gross product[1,2] [1-3].

The level of development of the agro-industrial complex is largely determined by its technical equipment, which depends on the availability and volume of purchase of agricultural machinery and energy resources, as well as on their quality. Currently, there has been a significant reduction in the number of agricultural machinery and equipment supplied to agricultural production[3] [4–6].

In the course of reforming the economy of the country and the agro-industrial complex, there was an absolute and relative reduction in the number of machine and tractor fleet (MTF), its moral and physical aging, deterioration of the technical condition, deviation of the structure of the fleet of equipment from the optimal parameters. Optimization of the quantitative and qualitative composition of MTF is the initial condition for carrying out all the necessary agrotechnical operations on the areas available on the farm within optimal agrotechnical terms with minimum costs and maximum production profitability [7–9].

For the agricultural industry, the provision of tractors and other self-propelled machines is relevant, since most of the mechanized work is carried out in crop production with mobile energy resources [10–12]. The main reason for the deterioration in the state of technical provision of agriculture is the lack of funds for the purchase of machinery and equipment, and the reduction in investment in the industry.

The provision of agricultural organizations of the Omsk region with tractors and self-propelled agricultural combines is decreasing, but the number of total sown areas remains at the same level. As a result of the low rates of renewal of MTF, the load on morally and physically obsolete means of mechanization increases. This leads to an increase in the timing of agrotechnical operations for the cultivation of crops and a decrease in the quality of products. In modern conditions, it becomes relevant to search for ways to acquire and modernize the technical provision of agriculture [13].

As of 2020, there are more than 300 agricultural organizations, 2.3 thousand peasant farms and more than 333 thousand personal subsidiary plots in the Omsk region[4]. The process of consolidation of agricultural enterprises is gradually underway. Dynamics of changes in sown areas of agricultural crops in 2008–2020. is shown in Fig. 1.

The analysis of the presented material indicates that the cultivated areas during the period under review have changed insignificantly. In

[1]Draft strategy for innovative development of the agro-industrial complex of the Russian Federation for the period up to 2020 by the Ministry of Agriculture of the Russian Federation dated 13.09.2011.

[2]State program for the development of agriculture and regulation of agricultural products, raw materials and food for 2013–2020, approved by the Decree No. 747 of the Government of the Russian Federation of July 14, 2012.

[3]Forecast of scientific and technological development of the agro-industrial complex of the Russian Federation for the period up to 2030 by the Ministry of Agriculture of the Russian Federation dated December 13, 2016.

2020, they occupied 2,881.2 thousand hectares. Areas under grain crops in 2008–2020 decreased by 2.9 thousand hectares, under fodder crops - by 75.2 thousand hectares, or 0.14 and 13.2%, respectively.

Despite small changes in the volume of cultivated areas, the quantitative composition of the Omsk Region's commercial and industrial sectors has significantly decreased over the specified period[5]. The decrease in the availability of tractors in the agro-industrial complex is due to the reduction in the livestock section. The number of wheeled tractors in operation in the agricultural sector has decreased by 2,811 units over 12 years, or 26.6% (see Fig. 2). Changes in the number of tracked tractors are not considered in this article, since in the Omsk region this type of tractors is currently practically not used, mainly due to unreliability.

The reduction in the number of equipment is also associated with its re-registration as the property of individuals. After the change of ownership, machines for the most part no longer participate in the commercial production of agricultural products. Changes in the qualitative composition of the machine and tractor fleet in most farms, as a rule, do not occur due to the financial instability of most farms and their lack of the opportunity to purchase new energy-packed, highly efficient machines to replace old ones.

A decrease in the number of agricultural tractors is associated with the transition from soil cultivation technology with soil overturning to minimal cultivation, which requires less energy consumption and the composition of energy resources for carrying out all the necessary agrotechnical operations included in the technology [14].

The machine and tractor fleet of the Omsk region is characterized by long service life of equipment and significant worn-out state. The data on the service life of various types of mobile agricultural machinery in the Omsk region are given in the table.

The greatest worn-out state is characteristic of the fleet of tractors and combine harvesters - 88.0 and 68.8%, respectively (see table).

Intensive renewal of such universal technical means as self-propelled mowers was noted.

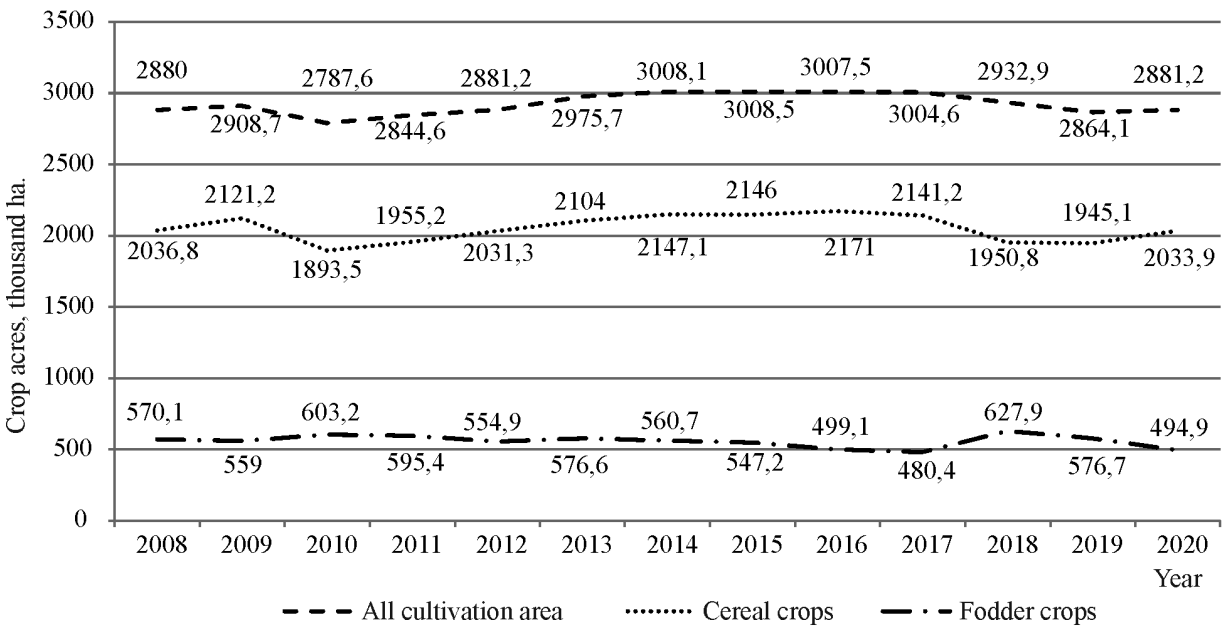

Рис. 1. Изменение посевных площадей в Омской области

Fig. 1. Changes in the cultivated areas in Omsk region

[4]Agriculture, hunting and forestry. URL: https://omsk.gks.ru/agriculture

[5]Availability of tractors, agricultural machines and energy capacities in agricultural organizations of the Omsk region as of January 1, 2019 Omsk: Omskstat, 2020.27 p.

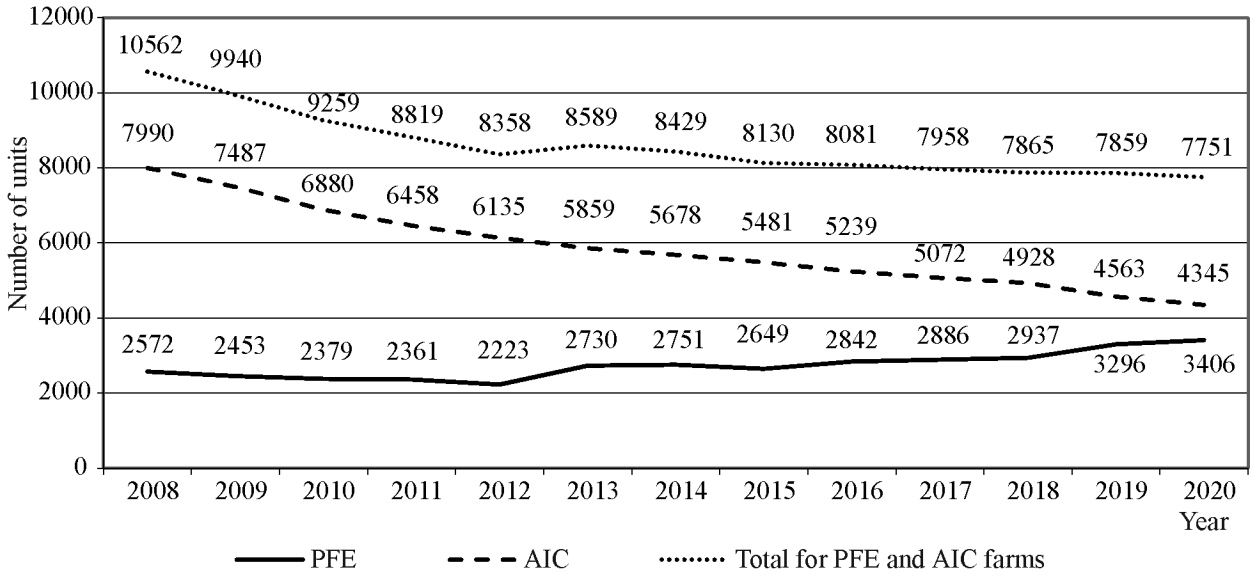

Рис. 2. Изменение количества колесных тракторов, зарегистрированных в собственности сельскохозяйственных товаропроизводителей, ед.

Fig. 2. Change in the number of wheeled tractors registered in the ownership of agricultural producers, units

Currently, there are 285 mowers in the region's farms, of which 65.1% have been in operation for up to 3 years.

With the introduction of intensive technologies into production, 126 units of high-performance self-propelled sprayers work in the farms of the Omsk region.

For tillage and sowing in the fields of the Omsk region, more than 15,000 units of agricultural machinery are used annually. (see Fig. 3).

The park of self-propelled agricultural harvesters in the Omsk region is in a more favorable condition in comparison with the fleet of tractors (see Fig. 4.).

Currently, a significant part of both physically and morally obsolete cleaning machines has been replaced. As of December 2020, 30.6% of grain harvesters and 56.7% of self-propelled forage harvesters have terms not exceeding 10 years. In this case, we can talk about a qualitative leap in the provision of farmers with mod-

Обеспеченность хозяйств Омской области мобильной сельскохозяйственной техникой (2020 г.)
Provision of farms of the Omsk region with mobile agricultural machinery (2020)

Name title	Mashinery, units.	Equipment that has served its depreciation period, units. (% to the availability)
Tractors	26229	24183 (88)
Self-propelled mowers	285	84 (29,5)
Self-propelled spraying machines	126	20 (15,9)
Self-propelled cutters	301	36 (12,0)
Combine harvesters	4788	3296 (68,8)
Including foreign production	974	318 (32,6)
Forage harvesters	274	157 (57,3)
Including foreign production	93	32 (34,4)

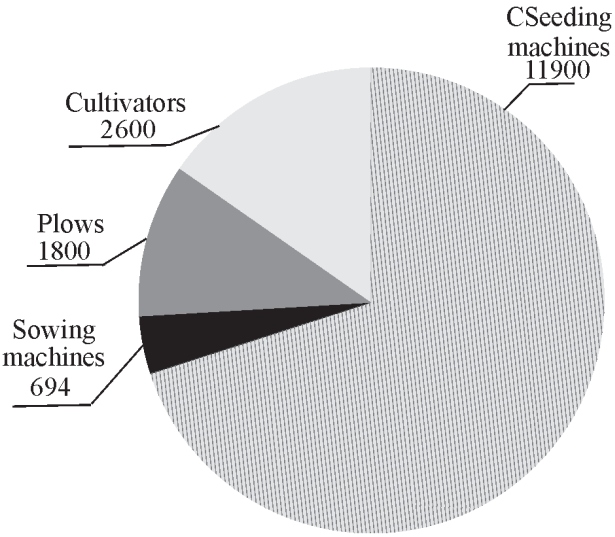

Рис. 3. Почвообрабатывающие и посевные орудия в Омской области, ед. (2020 г.)

Fig. 3. Tillage and sowing tools in Omsk region, units (2020)

ern high-performance equipment. Along with foreign equipment, domestic equipment (primarily produced by Rostselmash OJSC) [15] is also used in the fields. These machines are financially available mainly to farms located in the south of the Omsk region and specializing in grain cultivation.

Based on the analysis of data on the availability of combines among manufacturers of various forms of ownership, the load on one combine in the Omsk region in 2008–2020 is given. (see fig. 5).

The load on the combine harvester has increased from 402 to 543 hectares, while the load on forage machines has changed insignificantly (see Fig. 5).

To determine the number of mobile equipment in Western Siberia, the main criterion is the area that must be processed by one machine in the optimal agrotechnical period.

$$N = \frac{S_{\text{об.р}} \times k_{\text{т.г}}}{H_{\text{год}}},$$

The required number of agricultural machines to perform technological operations in crop production is calculated by the formula $N = S_{a.w} \times k_{t.r} H_{year}$, where $S_{a.w.}$ is the amount of work that needs to be carried out during the year, hectares; $k_{t.r}$ - coefficient of technical readiness (average values based on the results of technical inspection of the last 10 years for combine harvesters $k_{t.r} = 0.8$, for tractors $k_{t.r} = 0.7$); H_{year} - standard annual operating time for one machine or tool, ha.

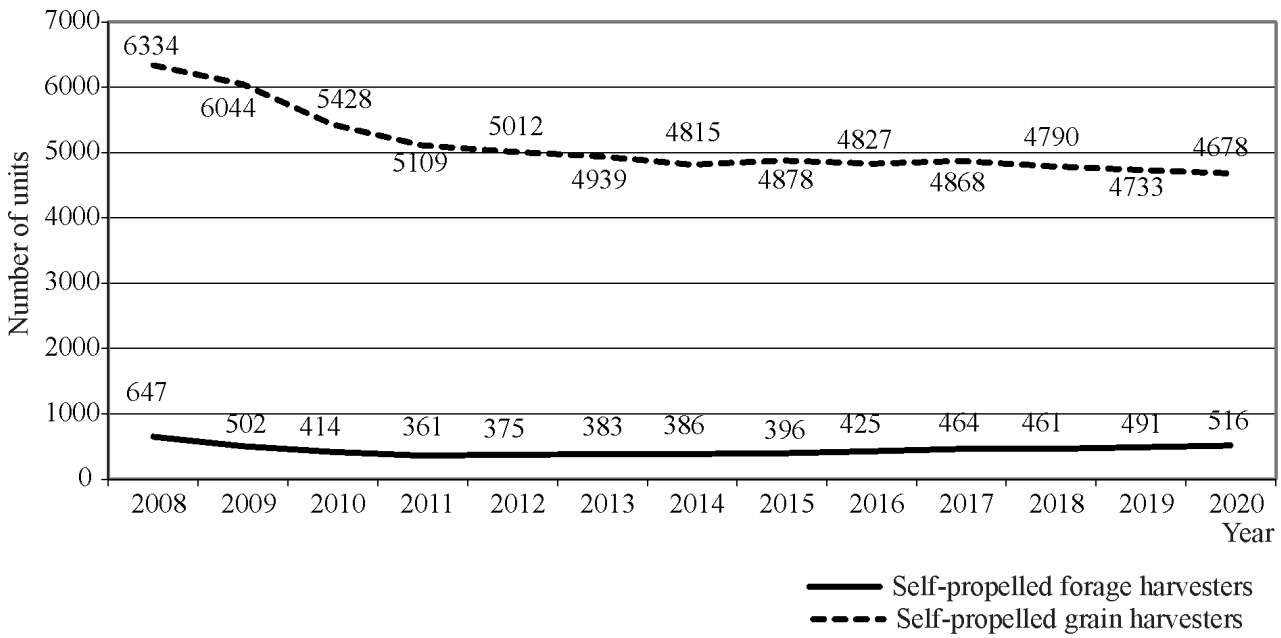

Рис. 4. Динамика изменения количества самоходных комбайнов

Fig. 4. Dynamics of changes in the number of self-propelled combines

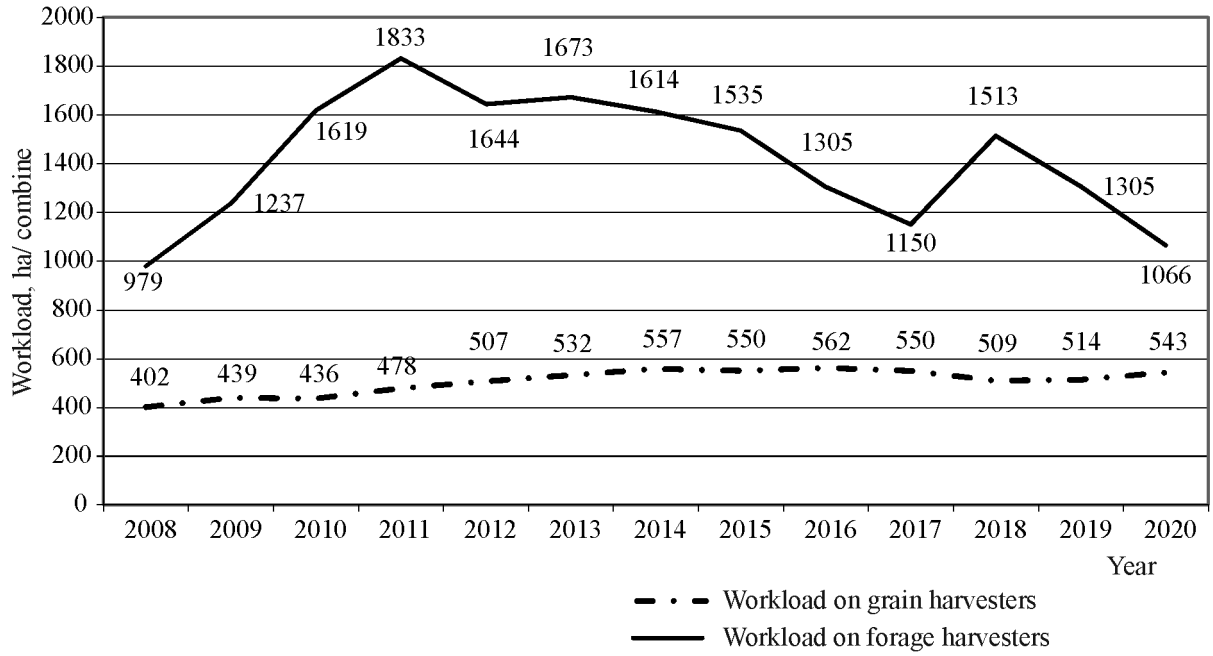

Рис. 5. Изменение средней нагрузки на самоходный комбайн

Fig. 5. Change in the average load on a self-propelled combine

On the whole, the quantity and quality of agricultural products produced, the costs of the corresponding resources and, ultimately, the economic well-being of the economy directly depend on the efficiency of using machine-tractor units. High technical equipment of the farm is the most important condition for minimizing costs, which ensures a high level of farming culture and accurate performance of technological operations in optimal terms.

CONCLUSION

There was a tendency to reduce the machine and tractor fleet in the Omsk region for 2008–2020 with a slight change in the volume of sown areas and their structure. The number of tractors used in agriculture in 2020 was 7751 units, grain harvesters - 4678 units, forage harvesters - 516 units. The reduction in the number of tractors and combines during the period under study led to an increase in the average annual load on a tractor by 99 hectares, or 36%, on a combine harvester - by 141 hectares, or 35%. This affects the timing of the main agrotechnical operations, the quantity and quality of the final product. The determination of the optimal composition of the tractor and combine harvester fleet should be carried out for each specific farm, taking into account local conditions and the structure of economic activity.

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