

Current State and Development Trends in Agricultural Land Use in the Central Chernozem Region

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Abstract — The paper considers the situation with the use of lands in the Central Chernozem Region (CChR) developed over the years of reforms. The data is provided on the availability of agricultural lands in the CChR, as well as the place and role of the CChR in the production of agricultural products in Russia. The soils in the region are represented by typical, ordinary, leached, and other subtypes of chernozem that occupy 84.3 % of the arable land area. However, at present chernozem soils of the CChR are undergoing degradation processes. It is established that the share of lands used for agricultural purposes in the total land fund of the CChR has reached 79.6 %, which is significantly higher than the levels in the Russian Federation and the Central Federal District (12.3 and 51.6 %, respectively). Given the emerging trend of increasing the area of agricultural lands, there is a decrease in the area of farmlands. In recent years the CChR, like all other regions of Russia, has been characterized by a trend towards redistributing the land owned by private persons to the ownership of legal entities and to state and municipal property. But in contrast to other regions of Russia, no substantial withdrawal of agricultural lands from economic turnover is observed in the CChR. There has been a significant increase in the concentration of land resources in all categories of farming units both in the Russian Federation as a whole, and in the Central Federal District and the Central Chernozem Region.

Keywords — *agricultural lands; farmlands; chernozem soils; plough disturbance of farmlands; land degradation; concentration of lands.*

I. INTRODUCTION

The analysis of current state of functioning of land relations in the agrarian sector of the economy in the Russian Federation indicates that in recent years they have undergone radical changes due to the difficult socio-economic situation in the country caused by the weakening of the ruble, the imposition of anti-Russian sanctions by foreign countries and Russian retaliation, internal and external risks and threats to

the development of agriculture. This has led to changes in the forms and types of land ownership, transformation of the land market and its main segments, changes in the size and structure of land ownership and land use, underdevelopment of cadastral registration and legal support for land relations, incompleteness and inadequate development of lease relations regarding the use of land shares and, as a result, a decrease in the fertility of lands used for agricultural purposes.

The economic reforms being implemented in Russia and focused on land privatization have led to the transformation of the entire system of land relations and have given rise to a number of problems causing a decrease in the efficiency of use of agricultural lands, a decrease in their fertility, violation of scientifically based farming systems, emergence of vacant lands, etc.

In the conditions of the undeveloped mechanism of state regulation of use of land resources in Russia and the difficult financial circumstances of most agricultural producers preventing them from land resources reproduction, there has been an increase in the processes of withdrawal of productive land from economic turnover and degradation of lands used for agricultural purposes. As a result, the efficiency of agricultural production and its competitiveness are constantly decreasing.

The theoretical and methodological issues of agricultural land use are the main topic of works of many Russian and foreign scientists. In the course of research, the authors have studied the classical and modern scientific concepts of economic science, the development works of scientists on the theory of land relations, management mechanism, and legal support for the use of land resources in the agrarian sector.

The theoretical foundations of the mechanism for using agricultural lands in the system of development of land

relations were laid by such economists as S.N. Volkov, E.F. Zavorotin, I.B. Zagaytov, A.Ya. Kibirov, O.B. Leppke, S.A. Lipsky, V.V. Miloserdov, D.V. Novikov, A.S. Tarasov, I.G. Ushachev, V.N. Khlystun, A.S. Cheshev, N.I. Shagayda et al.

The works of G.N. Barsukova, O.Yu. Voronkova, T.A. Emelyanova, N.V. Komov, N.I. Kresnikova, V.I. Nechaev, G.N. Nikonova, Yu.M. Rogatnev, A.E. Sagaydak, A.V. Ulez'ko, S.A. Sharipov and others are devoted to studying the problems of land management in the agrarian sphere.

Information and empirical basis of the research was formed on the basis of legislative and normative acts of the Russian Federation, the statistical data of the Federal State Statistics Service of the Russian Federation and its territorial authority of Voronezh Oblast, Ministry of Agriculture of the Russian Federation, the Department of Agrarian Policy of Voronezh Oblast Administration, published annual reports of agricultural enterprises, periodicals, Internet resources, and the authors' research results on the problems of regulating the use of agricultural land resources [1–3].

II. RESULTS AND DISCUSSION

Monitoring of the current state and trends in the use of land resources in agriculture was performed on the example of the Central Chernozem Region (CChR), which is one of the largest producers of agricultural products in Russia. It occupies 6 % of agricultural lands and 8.7 % of arable land of the country and hosts 6.5 % of the rural population.

The Central Chernozem Region produces 16.0 % of grain, 50.1 % of sugar beet, 27.1 % of sunflower, 12.5 % of potatoes, 7.1 % of vegetables, 22.4 % of meat (carcass weight equivalent), 6.9 % of milk, and 7.6 % of eggs in the total volume of production in the country (on average for the period of 2011–2017). At the same time, the role of the Central Chernozem Region in the country's agricultural production tends to increase [4].

Taking into account the role of the agro-food complex of the Central Chernozem Region in the Russian Federation, it should be noted that in recent years it has been characterized by an increase in both private and government investments in the agro-food complex. This is due to the fact that the return on investment in the Agro-Industrial Complex of the regions of the CChR is much higher than in most other regions of the country. The average level of return on investment in the Agro-Industrial Complex of the CChR exceeds that in the Central Federal District by 1.4 times.

The level of development of the Agro-Industrial Complex in the studied region is largely determined by farming conditions. Among them, first of all, it is necessary to point out a favorable and relatively homogeneous agroclimatic potential and the potential of land resources. In the regions included in the CChR there are relatively favorable conditions for the cultivation of all agricultural crops commonly grown in the European part of the country.

Lands used for agricultural purposes in the Central Chernozem Region are characterized by a high potential. The soils in the region are represented by typical, ordinary, leached, and other subtypes of chernozem that occupy 84.3 % of the arable land area. It should be noted that the share of chernozem soils varies significantly by the Oblasts, e.g. from 96.2 % in Tambov Oblast to 68.2 % in Kursk Oblast, which has a significant proportion (30.5 %) of dark gray, soddy soils and podzolized chernozem. The humus content in chernozem soils of the region is 1.5–2.3 times higher than in the types and subtypes of gray forest soils prevailing in the agricultural lands of the other Oblasts of the Central Federal District of Russia.

Cadastral valuation performed according to a unified methodology in the constituent entities of the Russian Federation also indicates a high level of return on farmlands. For instance, the monetary assessment of productivity of farmlands in the CChR amounted to 1,935 rubles per 1 hectare, or 17.0 c feed units per 1 hectare in conditional units, or 19,020 rubles per 1 hectare in cadastral value, which is, respectively, 1.5, 1.6, and 1.7 times higher than the productivity of farmlands in the Russian Federation, and 1.3, 1.4, and 1.6 times higher than that in the Central Federal District (excluding Moscow Oblast and the Oblasts of the CChR) [2, 3]. Therein, the highest cadastral value is observed in the farmlands of Voronezh Oblast (21,650 rubles), while in Lipetsk Oblast their cadastral value is the lowest (16,010 rubles).

Climatic conditions have direct and indirect impacts on biological components of natural landscapes and soil forming processes. Intensive cultivation leads to removal of large quantities of nutrients from the soil which results to in loss of soil fertility. The complex forms of the fertilizer's chemicals are also responsible for denaturing essential soil minerals, giving rise to nutrient losses from the soil. Therefore, the misuse or excessive use of fertilizers increases the rate of soil degradation by destroying the soil biological activity through incorrect fertilizer use.

Some other factors as deforestation, extensive cultivation on marginal land, improper cultivation practices like monocropping, poor manuring, misuse of fertilizers or excess use of fertilizers, excessive irrigation, over-grazing, etc. may accelerate the process of soil degradation. In addition to these causes, intensive cultivation using high-yielding short-duration and fertilizer-responsive cultivars of crops has further accelerated the loss of plant nutrients which is much greater than what is supplemented through fertilizers.

During last decade the nutrients deficiency has been considered as the main cause of poor productivity and crop failure. A study of the current trends in agronomic practices has suggested that the nutrients deficiency is further aggravated by continued use of high yielding crop varieties, intensive cropping pattern and relatively poor fertilizers.

Soil degradation is a global phenomenon. Of the world's total land area of 13.5 billion hectares, only 3.03 billion

hectares (22 %) is actually cultivable and about 2 billion hectares is degraded.

The increasing degradation of land resources is registered in many parts of Russia, manifested in numerous forms such as desertification, soil erosion, secondary salinization, waterlogging, and overgrazing. The soils of the CChR are not the exception.

At present, chernozem soils of the CChR are significantly affected by degradation processes. According to I.A. Trofimov et al. [5], about 36 % of agricultural lands in the CChR correspond to the category of erosion threatening, and 17 % of agricultural lands are considered deflation threatening. Of these lands, 22 % are already classified as eroded and wind eroded, 4 % are waterlogged, 3 % are marshy, and 53 % are acidic. The proportion of eroded farmlands in the Oblasts of the CChR remains significant (see Table I).

TABLE I. THE LEVEL OF ERODED AGRICULTURAL LANDS IN THE CENTRAL CHERNOZEM REGION, % OF THE SURVEYED AREA

Subjects of the Russian Federation	The category of erosion threatening lands			of which deflation threatening lands		
	tilled fields	hay lands	pasture fields	tilled fields	hay lands	pasture fields
For the Central Chernozem Region as a whole	34	13	51	18	3	15
Belgorod Oblast	39	26	54	28	7	34
Voronezh Oblast	39	6	53	38	3	17
Kursk Oblast	41	27	60	9	5	15
Lipetsk Oblast	47	18	47	3	1	3
Tambov Oblast	12	9	39	2	2	4

^a. Source: Authoring, calculations based on the data from [5]

Among the Oblasts of the CChR Voronezh Oblast stands out with the highest proportion of deflation threatening arable land and the share of the total erosion threatening arable land that significantly exceed the average regional level. Therefore, according to the concept of “designing” the ecological frameworks of specific agricultural landscapes and rural territories in order to ensure the ecological and economic balance of land use, the following long-term tasks of strategic management of agricultural landscapes should be immediately addressed:

- firstly, adaptive intensification of agricultural production should be promoted;
- secondly, the principle of rational use of nature and land should be ensured;
- thirdly, individual agricultural landscapes should be optimized with the account of their landscape-ecological, soil-ecological, and biological features.

The performed analysis of the structure of land fund shows that the proportion of lands used for agricultural purposes in the total land fund of the CChR has reached 79.6 %, which is significantly higher than in the Russian Federation and the Central Federal District (12.3 % and 51.6 %, respectively). At

the same time, both Russia as a whole and the CChR are characterized by a trend towards reducing the area of farmlands, which is associated with their withdrawal from agricultural turnover for the purpose of building and expanding industrial enterprises and settlements, afforestation, and organization of protected environmental zones.

The data from the analysis of the size and structure of agricultural lands in the Oblasts of the CChR indicate that the level of agricultural development of territories varies insignificantly (see Table II). Abbreviation LUFAP in Table II means lands used for agricultural purposes.

TABLE II. SIZE OF LANDS USED FOR AGRICULTURAL PURPOSES AND THEIR SHARE IN THE TOTAL LAND AREA OF THE CENTRAL CHERNOZEM REGION, THOUSAND HECTARES

Indicators	2005	2010	2015	2016	2017
For the Central Chernozem Region as a whole					
Total area of lands	16,785.6	16,785.6	16,785.6	16,785.6	16,785.6
of which LUFAP	13,254.0	13,267.4	13,273.3	13,268.2	13,259.1
The share of LUFAP	79.0	79.1	79.1	79.0	79.0
Belgorod Oblast					
Total area of lands	2,713.4	2,713.4	2,713.4	2,713.4	2,713.4
of which LUFAP	2,013.9	2,015.4	2,094.8	2,093.0	2,091.5
The share of LUFAP	74.2	77.3	77.2	77.1	77.1
Voronezh Oblast					
Total area of lands	5,221.6	5,221.6	5,221.6	5,221.6	5,221.6
of which LUFAP	4,222.7	4,213.7	4,188.2	4,186.9	4,182.2
The share of LUFAP	80.9	80.7	80.2	80.2	80.1
Kursk Oblast					
Total area of lands	2,999.7	2,999.7	2,999.7	2,999.7	2,999.7
of which LUFAP	2,278.6	2,275.9	2,279.0	2,279.6	2,279.4
The share of LUFAP	76.0	75.9	76.0	76.0	76.0
Lipetsk Oblast					
Total area of lands	2,404.7	2,404.7	2,404.7	2,404.7	2,404.7
of which LUFAP	1,953.0	1,941.0	1,927.4	1,925.2	1,922.5
The share of LUFAP	81.2	80.7	80.2	80.1	79.9
Tambov Oblast					
Total area of lands	3,446.2	3,446.2	3,446.2	3,446.2	3,446.2
of which LUFAP	2,785.8	2,821.4	2,783.9	2,783.5	2,783.5
The share of LUFAP	80.8	81.9	80.8	80.8	80.8

^b. Source: Authoring, calculations based on the data from [1, 2]

From 2005 to 2016 the area of lands used for agricultural purposes in the Central Chernozem Region as a whole increased by 5.1 thousand hectares, or by 0.4 %. An increase in the area of lands used for agricultural purposes is observed in Belgorod and Tambov Oblasts, while in Voronezh, Kursk, and Lipetsk Oblasts, on the contrary, there is a trend towards their reduction.

In the course of research, it was established that despite the emerging trend of increasing the area of agricultural lands, there was a decrease in the area of farmlands, e.g. their area in

the Oblasts of the CChR decreased by 31.9 thousand hectares over the analyzed period.

Plough disturbance of farmlands in the Central Chernozem Region is significantly higher than in the Russian Federation and the Central Federal District. The average share of arable land in the area of farmlands in 2017 was 80.0 % for the Oblasts of the CChR, while in Russia and the Central Federal District it was 58.9 % and 74.6 %, respectively. The highest plough disturbance of farmlands was observed in Kursk (85.9 %) and Lipetsk (81.7 %) Oblasts, while in Voronezh Oblast it was the lowest (76.2 %). From 2005 to 2017 the area of arable land in the CChR increased by 36.6 thousand hectares, or 0.4 %, due to the plowing of fallow lands.

In recent years the Central Chernozem Region, like all other regions of Russia, has been characterized by a trend towards redistributing the land owned by private persons to the ownership of legal entities and to state and municipal property. For instance, from 2005 to 2016 the area of land owned by private persons decreased by 1,365.4 thousand hectares, or by 27.1 %, while the area of land owned by legal entities and in state and municipal ownership increased by 2,189.9 and 441.5 thousand hectares, respectively.

It is necessary to note the increasing role of the state in tightening control over the use of land. This is evidenced, first of all, by the reduction in the area of unallocated land plots. From 2005 to 2017 in the Oblasts of the CChR the area of land plots, the ownership of which was non-delineated, decreased by 2,369.1 thousand hectares and the share of such lands owned by the state and municipalities decreased from 91.7 to 52.4 %.

The proportion of unallocated land remains high in Kursk (70.7 %) and Lipetsk (64.1 %) Oblasts, and in Belgorod Oblast it is the lowest (34.7 %). Therefore, active organizational and legal activities of Federal and regional authorities with the use of various regulatory instruments contribute to improving the efficiency of use of land resources and to organization of their reproduction.

The performed analysis of land classification by forms and types of property in the Oblasts of the Central Chernozem Region shows that about two thirds of privately owned land plots are registered in Kursk (64.1 %), Lipetsk (62.6 %), and Tambov (62.9 %) Oblasts, while in Belgorod Oblast there are only 44.1 % with the average level across the CChR being 58.0 % (here it should also be noted that Belgorod Oblast has the highest proportion of regionally owned land, which is 43.7 %). All this indicates that in the current conditions of economic instability the management of Belgorod Oblast refutes the axiom about the advantages of private ownership of land and allegedly higher efficiency of its use.

As a result of land reforms aimed at creating a new system of land relations a significant volume of agricultural lands has been withdrawn from economic turnover and the efficiency of land use in the Russian Federation as a whole has decreased (see Table III).

However, it should be noted that in the CChR the withdrawal of agricultural lands from economic turnover has not led to radical changes.

According to the results of 2006 All-Russia Agricultural Census [6], 16.7 % of farmlands in the Oblasts of the Central Chernozem Region remained unused in farming units of all categories, including:

- 17.4 % in agricultural organizations;
- 11.8 % in peasant farm enterprises and individual entrepreneurs;
- 17.9 % in food-producing households.

According to the results of 2016 All-Russia Agricultural Census [7], the share of farmlands not involved in the economic turnover in the Oblasts of the Central Chernozem Region decreased to 5.3 % in total by all categories of farms, including:

- 5.1 % in agricultural organizations;
- 2.7 % in peasant farm enterprises and individual entrepreneurs;
- 18.4 % in food-producing households (see Table III).

TABLE III. THE SHARE OF FARMLANDS NOT INVOLVED IN THE ECONOMIC TURNOVER IN THE OBLASTS OF THE CENTRAL CHERNOZEM REGION ACCORDING TO 2006 AND 2016 ALL-RUSSIA AGRICULTURAL CENSUSES, %

Subjects of the Russian Federation	All categories of farming units		Agricultural organizations		Peasant farm enterprises and individual entrepreneurs		Food-producing households	
	2006	2016	2006	2016	2006	2016	2006	2016
Belgorod Oblast	10.4	4.2	10.8	3.8	6.8	5.2	10.4	7.1
Voronezh Oblast	14.1	4.6	14.3	4.4	11.2	2.8	21.1	16.5
Kursk Oblast	21.8	5.7	24.0	5.2	8.9	1.9	14.9	23.3
Lipetsk Oblast	13.0	5.5	11.9	5.2	18.0	1.8	20.4	21.0
Tambov Oblast	23.5	6.6	25.8	7.0	13.7	2.5	22.1	26.1
For the CChR as a whole	16.7	5.3	17.4	5.1	11.8	2.7	17.9	18.4

^c Source: Authoring, calculations based on the data from [6, 7]

The activities of Federal and regional authorities to improve the agrarian policy and implement Federal and regional programs for the development of agriculture have ensured a reduction in the area of unused farmlands and also significantly increased the efficiency of agricultural production.

As it follows from the data presented in Table III, there are significant fluctuations in the proportion of unused farmlands in various categories of farming units in the Oblasts of the Central Chernozem Region. For instance, in 2016 the highest proportion of unused farmlands was registered in agricultural organizations in Tambov Oblast (7.0 %), and the lowest was

in Belgorod Oblast (3.8 %). In peasant farm enterprises this proportion was the highest in Belgorod Oblast (5.2 %) and the lowest in Lipetsk Oblast (1.8 %). In food-producing households Tambov Oblast had the highest proportion of unused farmlands (26.1 %), while Belgorod Oblast had the lowest (7.1 %).

From 2006 to 2016 the area of unused farmlands in the CChR decreased by 1,403.1 thousand hectares. However, in general it remains quite high (594.33 thousand hectares in 2016). The largest areas of unused land are located in Voronezh Oblast (161.3 thousand hectares), and the smallest are registered in Belgorod Oblast (73.5 thousand hectares). This is comparable to the withdrawal from agricultural turnover of farmlands of an area that is approximately equal to the area of one municipal district.

The presented data indicates the need to strengthen the state regulation of use of farmlands and improve the ways of redistributing them in favor of effective users.

It is important to note that within the analyzed period there was a significant increase in the concentration of land resources in all categories of farms both in the Russian Federation as a whole and in the Central Federal District and the Central Chernozem Region. This trend is most clearly observed in agricultural organizations. This is confirmed by the grouping of agricultural organizations in the Russian

Federation and the CChR based on the results of 2006 and 2016 All-Russia Agricultural Censuses (see Table IV).

For instance, from 2006 to 2016 the average size of land area increased from 7,891 to 9,101 hectares (by 15.3 %) in agricultural organizations of the Russian Federation, and from 2,478 to 4,187 hectares (by 69.0 %) in agricultural organizations of the Central Chernozem Region.

However, the total size of land of agricultural organizations decreased both in the Russian Federation (by 28.3 %) and the CChR (by 17.5 %), which can be explained by the redistribution of land to other categories of farms, mainly to peasant farm enterprises. At the same time, the number of land-owning agricultural organizations decreased by almost 20 thousand (by 38.4 %) in the Russian Federation and by 2,185 (51.2 %) in the CChR.

A decrease in the number of agricultural organizations in the CChR is observed in all groups, with the exception of the group in which the area of land being used is more than 10 thousand hectares (the data presented in Table IV allows speaking about a trend towards an increase in the concentration of land resources, which is characteristic of all Oblasts of the CChR).

Thus, the presented data indicates the creation of large corporate structures in the Agro-Industrial Complex of the Central Chernozem Region.

TABLE IV. GROUPING OF AGRICULTURAL ORGANIZATIONS OF THE RUSSIAN FEDERATION AND THE CENTRAL CHERNOZEM REGION BY LAND AREA SIZE

Indicators	Land area size, hectares						Total
	1–1,500.1	1,500.1–3,000.0	3,000.1–4,000.0	4,000.1–6,000.0	6,000.1–10,000.0	above 10,000.0	
Russian Federation, 2006							
Number of farming units	27,505	6,806	3,508	4,943	4,495	4,732	51,989
Percent of total	52.9	13.1	6.7	9.5	8.6	9.1	100.0
Total area, thousand ha	9,574.9	15,077.4	12,237.3	24,293.2	34,345.0	314,735.8	410,263.6
Area per one farm unit, ha	348	2,215	3,488	4,915	7,641	66,512	7,891
Russian Federation, 2016							
Number of farming units	19,086	4,187	1,723	2,206	2,035	2,804	32,041
Percent of total	59.6	13.1	5.4	6.9	6.4	8.8	100.0
Total area, thousand ha	6,984.2	9,083.5	5,994.5	10,846.3	15,638.7	243,040.6	291,587.8
Area per one farm unit, ha	366	2,169	3,479	4,917	7,685	86,676	9,101
Central Chernozem Region, 2006							
Number of farming units	2,316	664	379	492	280	138	4,269
Percent of total	54.2	15.6	8.9	11.5	6.6	3.2	100.0
Total area, thousand ha	946.1	1,465.4	1,325.1	2,413.5	2,092.5	2,337.3	10,579.9
Area per one farm unit, ha	409	2,207	3,496	4,905	7,473	16,938	2,478
Central Chernozem Region, 2016							
Number of farming units	1,042	301	144	232	163	202	2,084
Percent of total	50.0	14.4	6.9	11.1	7.8	9.7	100.0
Total area, thousand ha	410.4	659.2	507.7	1,150.5	1,241.8	4,756.2	8,725.8
Area per one farm unit, ha	394	2,190	3,526	4,959	7,618	23,546	4,187

^d Source: Authoring, calculations based on the data from [6, 7]

III. CONCLUSION

The increase in concentration of land resources is due to the growing investment attractiveness of the agrarian sector and the need to strengthen the state regulation of the process of land concentration in the hands of the largest agro-industrial corporations and tighten control over the monopolization of land market and markets for agricultural products.

In modern conditions the Agro-Industrial Complex can function sustainably and efficiently only with the optimal combination of interests of territorial and sectoral development, as well as the subjects of large, medium and small agrarian entrepreneurship. This implies the maximum possible use of the agroclimatic potential and the potential of land resources.

Therefore, one of the priority tasks of state regulation is to create favorable conditions for the efficient use of agricultural

lands and a mechanism for redistributing the land in favor of effective owners, while respecting the legitimate interests of all subjects of land relations.

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