

Досліджено питання управління соціально-економічним розвитком сільських територій. Обґрунтовано, що державна політика повинна бути орієнтована на мобілізацію трудових, фінансових, матеріальних та організаційних ресурсів, посилення соціального захисту сільського населення, відновлення соціальної інфраструктури, розвиток підприємництва, збереження екологічної стабільності. Доведено, що в рамках комплексного управління розвитком сільських територій особливої уваги потребує розвиток системи місцевого самоврядування в сільських територіальних громадах.

Досліджено фактори, що призвели до безпрецедентної соціально-економічної та екологічної кризи у сільськогосподарському землекористуванні. На основі вирішення оптимізаційної задачі зазначені негативні тенденції в динаміці найважливіших показників сільськогосподарського виробництва, що виявляються особливо чітко за результатами кореляційного аналізу даних. Отримана математична модель динаміки дозволяє передбачати наслідки нераціонального управління розвитком та навіть прогнозувати сумний фінал, якщо не взяти визначених пріоритетних факторів управління. Прогноз на основі такої математичної моделі динаміки може бути зроблений за будь-якими показниками сільськогосподарського виробництва.

Відзначено, що сучасний період розвитку земельних відносин на селі здатний буде задовольнити інтереси селян лише за умови гармонійного поєднання економіки різних сфер діяльності на селі, які підсилюються одна одною. Обґрунтовано інноваційний підхід забезпечення бездефіцитного балансу ґумусу в ґрунті як умову збалансованого розвитку сільськогосподарського землекористування. Визначено, що в основі політики, орієнтованої на екологічну стабілізацію землекористування, є розвиток організаційно-правових форм господарювання кооперативного типу на засадах спільної часткової власності на земельні ділянки власників земельних паїв

Ключові слова: управління розвитком, динаміка показників сільськогосподарського виробництва, ринок землі, земельні ділянки, землекористування, земельна реформа

DEFINING THE MEASURES TO RATIONALLY MANAGE THE SUSTAINABLE DEVELOPMENT OF AGRICULTURAL LAND USE

V. Gorlachuk

Doctor of Economic Sciences, Professor, Head of Department, Honored Worker of Science and Technology of Ukraine*

E-mail: Gorlachuk_V@ukr.net

O. Lazarieva

Doctor of Economic Sciences, Associate Professor*

E-mail: lazareva95@ukr.net

S. Belinska

PhD, Associate Professor
Department of Accounting and Audit**

E-mail: melek2405@bigmir.net

Y. Potapsky

PhD***

E-mail: yurapotap@ukr.net

O. Petryshche

PhD***

E-mail: petrictche@ukr.net

*Department of Land Management**

**Petro Mohyla Black Sea National University

68 Desantnykiv str., 10, Mykolaiv, Ukraine, 54003

***Department of Geodesy and Land Management

State Agrarian and Engineering University in Podilya

Shevchenka str., 13, Kamianets-Podilskyi,

Ukraine, 32300

1. Introduction

Socio-economic development of the village is defined as a process of change aimed at increasing the level of development of the economic and social spheres of rural regions with minimal losses for natural environment and the highest level of satisfaction of the needs of rural population and the interests of the state. Rural development requires a comprehensive approach to solving all the problems of rural regions – economic, social, ecological, demographic – and needs scientific research.

Currently, the problems of designing optimum management of development of rural regions are one of the most

important directions of agro-economic research. While under conditions of the planned economy, imbalances in development of rural administrative districts were successfully eliminated by directive techniques, under today's economic conditions at the regional level of management, it is necessary to use a differentiated approach, which allows taking into account individual features of functioning of rural areas and villages. At the same time, the imperfection of national methodology of strategic planning and prediction of the development of rural areas at the sub-regional (municipal) level, the lack of a systems approach to the selection of priorities of the development of rural areas creates the need for constant search for methodical approaches to solution of this urgent problem.

2. Literature review and problem statement

Land management, specifically the theoretical development of land market relations, has received considerable attention [1]. Thus, land management is considered through the prism of relevant regulations, land leases and taxation, and resolving land disputes [2]. In this context, land management must be based on policies, processes and institutions that control the land, real estate and natural resources [3]. It is a reasonable opinion [4] that land management should be viewed through the prism of the established boundaries of land plots, information about the right to land areas, the process of land transactions, evaluation of land, and land use planning. In this case, the importance of governmental support of land practice as a tool for land management is emphasized [5]. This idea was later developed in paper [6]. The issues of the development of rural areas are tackled in the context of the policy of the European Union [7]. To solve the problems of the development of rural areas in the context of innovative provision, the need for the formation of structural development funds is emphasized [8]. It is noted that the development of rural areas largely depends on the development of agriculture [9]. The basis for the economic increasing in the growing productivity of the land is public investment in innovative projects in the sphere of agricultural land use [10]. Over the past years, there has been made a significant contribution to the research into these problems, which focus on the fact that the land reform is one of the most important areas of socio-economic policy of the state [11]. This reform deals with the issues of land ownership, that is, possession, use and disposal of land resources [12]. It is believed that within the period of land reform, the level of the use of land resource potential of agriculture has dropped by more than 30 % [13]. There is an opinion that it is actually possible to include land in the market circulation under condition of the effective state regulation of this process [14].

But the constructive interpretation of the problem allows us to conclude that the results of scientific research did not have a significant influence on the course of processes of the land reform in Ukraine, the course of processes of effective agricultural land use. This is due to the fact that the results of research of foreign scientists need the systemic correcting adaptation to the realities of the Ukrainian land use in the practice of the activity of agricultural enterprises. It is particularly important to disclose the entire depth of the implementation of predicted future of the relations between economic entities on the land and executive bodies and the local self-government bodies. The studies by Ukrainian scientists mainly lack a correct methodology of researching the mentioned processes, underestimate the institutional basis for ensuring economic sustainability of the agricultural land use. According to this, problems in its future functioning accumulated exponentially. This led to the crisis of the economic system of the agrarian sector of the economy, including in the agricultural land use, which actively deepens. In many cases, the results of scientific research bear preventive character, pleasing the ideologists of the land reform. As a result, the course of the processes of land reform has led to an «erosion» of land relations, loss of control over social and economic value of land in agricultural production.

It was the solution of the underlying socio-economic problems in the agricultural land use that put on the agenda the development of the newest model of the organization of the state policy in the sphere of land relations and appro-

priate management of the processes of agricultural land use development.

3. The aim and objectives of the study

The aim of this research is to identify and substantiate the problems that hinder the balanced development of agricultural land use in order to define management processes in the context of overcoming the crisis phenomena, aimed at raising the standards of quality of life.

To accomplish the set aim, the following tasks were to be solved:

- to identify causal relationships in the management of the development of rural areas;
- to explore the tendencies of using the soil energy resource and to search for the ways that form its accumulation at the base of the innovative approach;
- to develop a mathematical model of the dynamics of indicators of agricultural production;
- to determine the systemic regulation of land relations and management of land resources.

4. Results of research into the effectiveness of existing processes of management of agricultural land use development

4.1. Identification of causal relationships in the management of the rural areas development based on a retrospective analysis

A retrospective analysis of the rural area development indicates that the cause of the crisis phenomena in the country was the former command-administrative system, with its rough methods of intervention in the economy. The conditions that determined the level of economic security of the country, which include labor, production, financial, innovative, information and other elements of the economic potential of agricultural enterprises, were underestimated. But even under those constantly changing conditions of functioning of collective farms and state farms, the latter demonstrated an impeccable organization of agricultural production and labor, the importance of which cannot be underestimated in the context of the economic security of the state. Socio-economic problems in the country, as well as the problems of comprehensive development of agricultural production for meeting demands of domestic and external markets were actively solved by the participants. Each villager was involved in the production process, based on their physical capabilities and abilities, cattle-breeding complexes, schools, clubs, kindergartens were built and other infrastructure in the country was developed.

Land in agriculture was used exclusively based of land management projects. In order to meet the needs of families in food, each peasant household kept cattle, pigs, poultry, etc. But scientific and technical backwardness of the agrarian sector of the economy, in particular in the sphere of technologies of agricultural production, did not allow the effective use of land resources of the country. It follows from the mentioned above that it was necessary to reform not collective agricultural enterprises, but the institutions of state power along its whole vertical. All this led to the fact that the reform created complex socio-economic problems for the village and the entire economy.

4. 2. Determining the tendencies in the use of soil energy resource

During the period of the land reform in Ukraine, the heads of livestock under conditions of a deep systemic crisis dropped an average by 8–10 times. Dynamics of development of farm animal breeding within 1990–2016 is shown in Fig. 1.

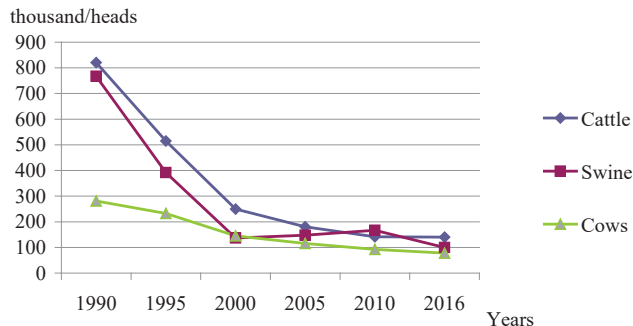


Fig. 1. Dynamics of development of farm animal breeding within the period of 1990–2016

Fig. 1 shows that within the studied period, the heads of cattle have dropped almost by 6 times, and of cows – by 3.6 times. The number of swine has dropped by 8 times. While before the reforms, there were 60–70 or more heads of cattle per 100 hectares of agricultural land, after more than 25 years of reform, there were 5–6 heads.

Accordingly, getting of organic fertilizers (manure) in the soil, which is the key to the successful development of the agrarian sector of the economy, improvement of an agronomically valuable properties of the soil, decreases.

Thus, while 5.8 t/ha of organic fertilizers were added to the soils of Mykolayiv oblast in 1996, the figure was 0.8 t/ha in 2000, and in all subsequent years – by 0.1 t/ha, and only in 2016, it was 0.5 t/ha.

Let us emphasize that such troubles are based on the deficient balance of humus, which is not directly consumed by plants, but serves as a substrate for nutrition of micro-organisms and soil fungi (Fig. 2).

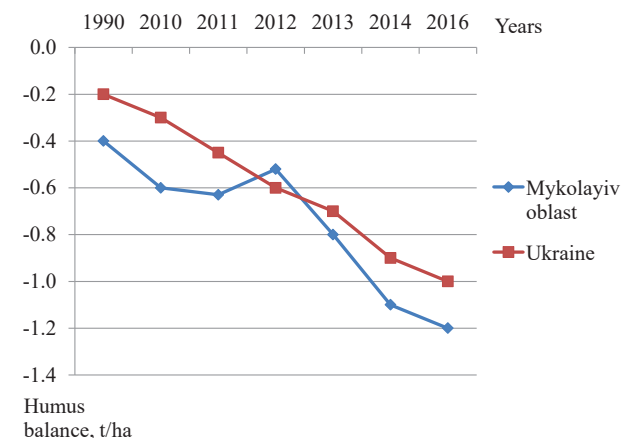


Fig. 2. Dynamics of humus balance in soils

Fig. 2 shows that humus deficit in soil increased on average by 5 times, for a 25-year period reaching the mark of one ton per hectare, which is equivalent to putting into the soil of compensating amount of organic fertilizers at the level of 20 t/ha.

In the framework of the Mykolaiv oblast, humus deficit increased from minus 0.4 t/ha in 1990 to minus 1.2 t/ha in the year 2016. This tendency is mainly caused by the greatly increasing specific weight, first of all, of sunflower in the structure of sowing areas from 10 % up to 30–35 %.

Actually, in order to form the harvest of 25 centner/ha, sunflower mineralizes 3 t/ha of humus, which is equivalent to putting 60 t/ha of manure into the soil, although the actual putting it in the soil does not exceed, as already noted, 0.1–0.5 t/ha. Under these circumstances, there is a danger of degradation of arable lands, including dehumification and pollution with by-products of mineral fertilizers. It will result into the loss of the natural soil fertility, quality parameters for plant production will worsen. The soil is running the risk to be transformed into the ballast mass, which will not have soil living organisms and soil fungi. There will be no soil without living organisms.

Considering the problem of the negative balance of humus in the soil, it is worth noting that the main reason for this is violation of the state of the ecological balance in the agricultural sector of the economy. In this regard, it is advisable to consider the question of the balance of organic matter not only as an environmental, but rather as an economic category. We will particularly focus on functions that this category performs.

One of the fundamental functions performed by an economic category is the formation of a system of crop rotation, the structure of sowing areas, since the latter are a tool for maintaining the appropriate level of humus balance in the soil. This conclusion has a real proof.

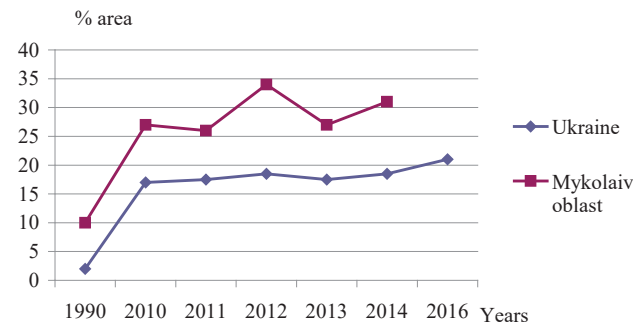


Fig. 3. Dynamics of the structure of sunflower crops, %

Thus, it is known that corn for grain at the yield of 80 kg/ha, under conditions of sawing accompanying products has a negative balance of humus at the level of minus 1.9 t/ha. Perennial grasses, on the contrary provide a positive balance of humus at the level of plus 2.2 t/ha. Grain group of crops occupies an intermediate position in the chain of particular crops between piling and loss of humus. According to this, crop rotation should include such set of cultures that balance the process of accumulation of humus and its removal by the harvest of agricultural crops.

The structure of arable land, oriented by the deficit-free balance of humus, should be controlled by means of the audit, although the latter in so far does not meet the requirements of the time in the institutional and professional aspects.

4. 3. Development of a mathematical model for the dynamics of indicators of agricultural production

The specified negative tendencies in the dynamics of the major agricultural production indicators are identified particularly clearly by the results of the data correlation

analysis. Let us reduce the data on the results of agricultural production for the past 25 years in Table 1. The simplest statistical processing of these data allows drawing some conclusions.

Table 1

Sets of value of the indicators

No.	Indicators	Years					
		1990	1995	2000	2005	2010	2015
X ₁	Heads (thousand) of cattle	820	515	260	185	145	135
X ₂	Heads (thousand) of swine	770	290	200	165	168	100
X ₃	Humus deficit (t/ha)	-0.2	-0.23	-0.27	-0.32	-0.56	-0.8
X ₄	Specific weight of sunflower in the sowing acreage (%)	3	7	11	13	16	22

We will use the obtained data to evaluate the level of statistical relationship between the indicators. For an arbitrary pair of indicators $x_i, x_j, i = 1, 2, 3, 4, j = 1, 2, 3, 4$, we will explore the sets of their values $\{x_{ik}\}$ and $\{x_{jk}\}$ at time moments $\{T_k\}, k = 1, 2, 3, 4, 5, 6$. Using the sets $\{x_{ik}\}, \{x_{jk}\}$, we will calculate the values of mathematical expectations and dispersions of the selected indicators x_i, x_j :

$$m_{x_i} = \frac{1}{6} \sum_{k=1}^6 x_{ik}, \quad m_{x_j} = \frac{1}{6} \sum_{k=1}^6 x_{jk};$$

$$D_{x_i} = \frac{1}{6} \sum_{k=1}^6 (x_{ik} - m_{x_i})^2; \quad D_{x_j} = \frac{1}{6} \sum_{k=1}^6 (x_{jk} - m_{x_j})^2. \quad (1)$$

We will find the correlation coefficient between x_i and x_j , which determines the measure of the statistical relationship between them, from formula:

$$M[x_i, x_j] = \frac{1}{6D_{x_i}^{0.5}D_{x_j}^{0.5}} \sum_{k=1}^6 (x_{ik} - m_{x_i})(x_{jk} - m_{x_j}). \quad (2)$$

A set of correlation coefficients for all pairs of indicators forms the correlation matrix:

	x_1	x_2	x_3	x_4
x_1	1	0.948	0.673	-0.888
x_2	0.948	1	0.560	-0.801
x_3	0.673	0.560	1	-0.931
x_4	-0.888	-0.801	-0.931	1

An analysis of this matrix allows making the following conclusions:

1. High positive values of coefficients k_{12}, k_{13} give convincing evidence about a simultaneous increase in livestock of cattle and pigs over past 25 years, which was accompanied by an increase in humus deficit in soil.
2. Negative values of coefficients k_{14}, k_{24}, k_{34} prove a negative influence of an increase in specific weight of sunflower, based on the indicators of farm animal breeding.

Next, based on the data, shown in Table 1, we will obtain the analytic relationship, which describes dynamics of any indicator, for example, the level of a decrease in the cattle livestock. We will do it by analyzing a decrease in the livestock of cattle.

Let us introduce the following designations:

- y_1 is the value of livestock at the initial moment;

- y_i is the value of livestock at moment i ;

- l is the parameter that determines the level of an increase in the livestock for five years.

In this case, the model of dynamics will take the form:

$$y_2 = ly_1, \quad y_3 = ly_2 = l^2y_1, \dots, \quad y_i = ly_{i-1} = l^{i-1}y_1,$$

$$i = 1, 2, \dots, m. \quad (3)$$

Parameter l must be determined so that the model values (y_1, y_2, \dots, y_m) should be maximally close to observed value $(\dot{y}_1, \dot{y}_2, \dots, \dot{y}_m)$. In this case, objective function of the problem takes the form:

$$J = \sum_{i=2}^m (\dot{y}_i - y_i)^2 \Rightarrow \min, \quad \dot{y}_1 = y_1. \quad (4)$$

Taking into account (3), we will bring the ratio to the following:

$$J = \sum_{i=2}^m (\dot{y}_i - l^{i-1}y_1)^2 \Rightarrow \min. \quad (5)$$

The optimization problem obtained by l is essentially simplified, if model values (y_1, y_2, \dots, y_m) and observed values $(\dot{y}_1, \dot{y}_2, \dots, \dot{y}_m)$ are substituted by their logarithms. Taking logarithms is a monotonous transformation, which is why value l , minimizing (4), will not change. According to this we will introduce:

$$\ln y_i = \ln(l^{i-1}y_1) = (i-1)\ln l + \ln y_1 = (i-1)\ln l + \ln \dot{y}_1.$$

Then (4) will take the form:

$$J = \sum_{i=2}^m (\ln \dot{y}_i - \ln y_i)^2 = \sum_{i=2}^m (\ln \dot{y}_i - (i-1)\ln l - \ln \dot{y}_1)^2. \quad (6)$$

We will replace variables:

$$z_i = \ln \dot{y}_i, \quad i = 1, 2, \dots, m, \quad v = \ln l.$$

According to this:

$$J = \sum_{i=2}^m (z_i - z_1 - (i-1)v)^2. \quad (7)$$

We will find v , by differentiating (7) by v . We have:

$$\frac{dJ}{dv} = 2 \sum_{i=2}^m (z_i - z_1 - (i-1)v)(i-1) = 0.$$

Hence:

$$\sum_{i=2}^m (z_i - z_1)(i-1) = v \sum_{i=2}^m (i-1)^2.$$

Then:

$$v = \frac{\sum_{i=2}^m (z_i - z_1)(i-1)}{\sum_{i=2}^m (i-1)^2} = \frac{6 \sum_{i=2}^m (z_i - z_1)(i-1)}{(m-1)m(2m-1)}. \tag{8}$$

Using the actual data from Table 1, we will make the necessary calculations and reduce them in Table 2.

Table 2

Reduced calculations

No. of entry	\dot{y}_i	$\ln \dot{y}_i = z_i$	$z_i - z_1$	$(z_i - z_1)(i-1)$
1	820	6.709	0	0
2	515	6.244	-0.465	-0.465
3	260	5.561	-1.148	-2.269
4	185	5.220	-1.489	-4.467
5	145	4.977	-1.732	-6.928
6	135	4.905	-1.804	-9.02

According to (8), we will calculate:

$$\sum_{i=2}^m (z_i - z_1)(i-1) = -23,149, \quad (m-1)m(2m-1) = 55.$$

Then:

$$v = -0.42 \quad \text{and} \quad l = e^{-0.42} = 0.66.$$

The adequacy of model (3) was checked by the Fisher criterion for the calculated values of variances of reproduction of s_0^2 and adequacy of s_{ad}^2 , derived from formulas:

$$\bar{y} = \frac{1}{n} \sum_{i=1}^n \dot{y}_i = 343.3,$$

$$s_0^2 = \frac{1}{m} \sum_{i=1}^m (\dot{y}_i - \bar{y})^2 = 62681.83,$$

$$s_{ad}^2 = \frac{1}{m} \sum_{i=1}^m (y_i - \dot{y}_i)^2 = 2295.6.$$

The obtained values are used for the comparison of relationships $F_p = s_{ad}^2/s_0^2$ with the critical value F_{kp} , selected from the Fisher distribution table for the assigned number of degrees of freedom and level of significance $\alpha = 0.05$. In the explored situation $F_p = 0.0366$, $F_{kp} = 4.39$. Thus the model is adequate.

Therefore, the heads of cattle decreased approximately by one third within every year of a five-year period. The model allows us to predict a quick sad ending, if nothing changes. A similar prediction can be made by other indicators of agricultural production.

4. 4. Determining the systemic regulation of land relations and land management

The presented results indicate that at the current stage of socio-economic development, there is a question of creating

appropriate conditions that would meet the needs of the society, preventing environmental problems in the agricultural land use. But the land reform gave fruitless hopes to farmers regarding a raise in the level and quality of life, working conditions, an increase in the productivity of arable land and protection from destructive processes. No land reform will give good results, moreover, will not activates the economic growth, passing land plots of the owners to lease, or even worse – for sale. That is why today Ukraine faces a choice – which way to move, once and for all to remove the specified contradictions that have emerged in the land practices, or to expect imminent default of the country. There is a growing understanding that under the conditions of deformation of the economic development, the land reform should bear a gradual, but focused character, aimed at the prosperity of local communities, positive dynamics of agricultural land use. Such a policy must be based on the reasonable, organized, flexible and targeted institutional transformation, focused on the use of high-tech production. First of all, it is about the creation of organizational-legal forms of the cooperative type, capable of taking on the role of the steam locomotive of the agrarian economy. This will make a significant impact on ensuring competitiveness of the agricultural land use and the agricultural sector of the economy in general.

The implementation of this priority finds its embodiment in life through the combining of land shares and creation of agricultural cooperatives based on the common land ownership with the inherent to them organizational structure, legal and financial component. Research into modern tendencies of development of agricultural cooperatives testifies that now the interest in them in Ukraine is increasing, although the idea of the methodology of organization of their creation remains superficial, inaccurate or even simply controversial.

The effectiveness and reliability of agricultural cooperatives is determined by the degree of activation of the process of creation. Here it comes about the fact that the more actively such cooperatives will be created, the sooner the agricultural sector of the economy will be implemented in the global economic environment, satisfying the needs of the consumer for high quality competitive products.

This modernization of land relationships should be part of a strategy of long-term development of the agrarian sector of the economy, ensuring macroeconomic stability. Of course, this kind of economic policy in the countryside will allow an owner of land shares to receive not UAH 1–1.5 thousand for the rent of one hectare of a land share at the end of the marketing year, but UAH 8–10 thousand, and more, monthly, taking the mandatory participation in the work of the cooperative. But what is important is that the land will remain the property of a share owner forever, providing high social standards of quality of life and labor.

The implementation of measures aimed at systemic and consistent formation of agricultural cooperatives has the feature that land rent will not be concentrated in the hands of land renters, but within the framework of agricultural cooperatives. At its core, the creation of agricultural cooperatives should aim to implement strong and unified standards in the sphere of land relations and to avoid the shadow land market, which now amounts to almost 50 %.

High efficiency of agriculture business of such cooperatives is achieved by integrating the areas of crop and animal production, agricultural products processing, and trading activity. Without the development of these industries in the countryside, the positive dynamics of indicators of develop-

ment and structural transformations of the economy, meeting the needs of rural population is impossible.

The characteristic feature of creating an integrated network of production, service and consumer cooperatives is that their combination allows an increase in the volume of sold products and services at smaller investments. The competitive advantages of local communities due to the scope of the spheres of economic activity on the territory are much higher than in cases of their absence. This opens up additional possibilities to enter the international markets and carry out scientific research and project works, etc.

The multiplicative effect of diversified activities is a key prerequisite and a powerful source of economic stabilization, the improvement of standards of quality of life of people in the countryside, creating an additional number of jobs, the harmony between the man and the nature. Understanding the above is a great prospect of formation of effective land relations in the village, an increase in effectiveness of the rural economy. This can be summarized in the form of the diagram (Fig. 4).

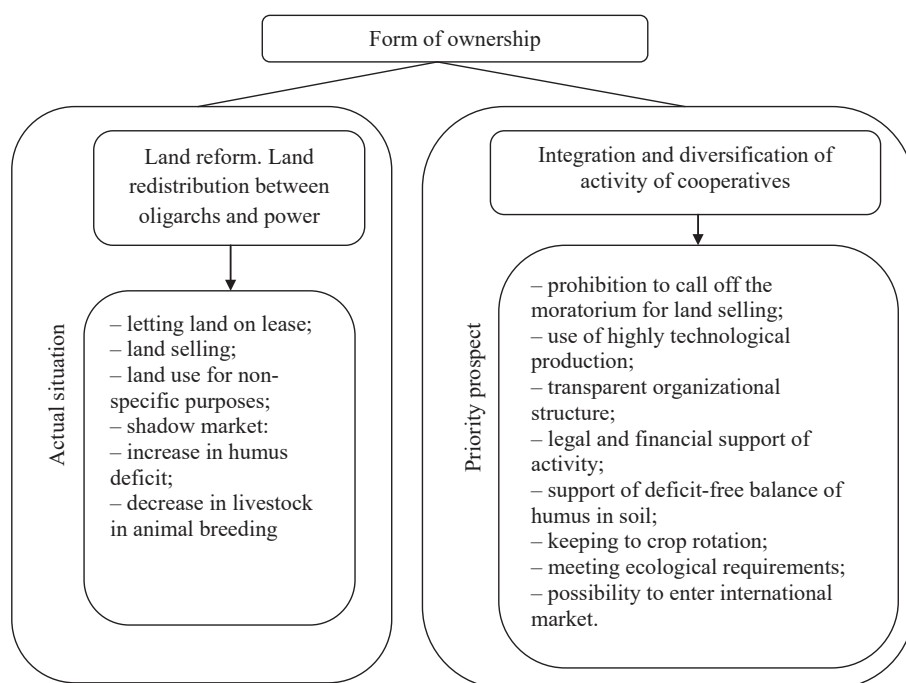


Fig. 4. Diagram of the system of regulation of land relations and management of land resources

Fig. 4 shows that the form of land ownership does not determine the effectiveness of land use. A priority component of the successful development of agricultural land use and, therefore, of rural areas is the organizational-legal form of economy on the land.

5. Discussion of results of modeling and determining the measures for overcoming crisis phenomena

The above analysis reveals that the violation of the state of ecological balance in the agricultural sector of the economy leads to the problem of negative balance of humus in soil. That is why this issue gives rise to the need for the examination of not only an environmental, but also an eco-

nomical category. And in this sense, in terms of forming viable administrative decisions, the priority is the formation of a system of crop rotation, the structure of sowing areas, since the latter are a tool for maintaining the appropriate level of balance of humus in the soil.

Negative trends in the dynamics of the most important indicators of the agricultural production can be detected based on formalization and construction of the appropriate mathematical model. Such a model, if it is adequate, makes it possible to state and to solve the optimization problem with least squares functional, which will provide minimization of sum of squares of deviations of model values of the selected indicator to the indicators observed in actual agricultural production. The latter can be obtained by the results of correlation analysis. In particular, it was shown that the use of such a model allows making predictions that can turn out to be negative. This was demonstrated, for example, for the level of reduction of heads of cattle with the current system of management of agricultural land use, which does not correspond to the rational option.

The obtained results testify to substantiation of socio-economic benefits of using arable lands based on common ownership of land plots in the form of agricultural cooperatives. This ensures the security of land owners from fraudulent land projects of leasers. First of all, the land rent will be shared between the land owners, and not by the leasers. Taking part in the economic activities of the cooperative, an owner of a land share will be able to receive monthly 300–370 c.u., which does not correspond to the maximum of 37–56 c.u./ha of rent a year, which the lesser receives today.

That is, the overall financial situation of a share owner is determined by the effectiveness of its activities in the cooperative.

It should also be added that agricultural cooperatives form an idea of the quality of soil condition, the development of animal breeding, the activity of business entity, competitiveness of an enterprise and its stability.

The developed proposals for the rational management of the balanced development of agricultural land use are reasonable and can be used in practical activity of agricultural producers. But it should be noted, however, that the chosen methodology regarding an increase in the humus content in soil based on the process of its fertility reproduction and preservation can be considered the limitation of this study.

It can be noted that the shortcomings of the research include excessively categorical conclusions concerning further dynamics of development of indicators of agricultural production under the condition of non-performance of the variables of the problem, on which the constructed diagnostic mathematical model rests. Obviously, other conditions, initial data for mathematical modeling should be considered. However, despite this drawback, the obtained predictable

data regarding dynamics should be considered useful. Given the fact that human behavior is considered in this study as economically rational, we believe it is appropriate to continue this research within the framework of united territorial communities. This will be the basis for the development of the competitive agricultural sector of the economy and the real development of rural areas.

6. Conclusions

1. The cause of the crisis phenomena in the countryside was the former command-administrative system, with its rough methods of intervention in the economy. This was caused by underestimation of the conditions that determined the level of economic security of the country: labor, production, financial, innovative, information and other elements of the economic potential of agricultural enterprises.

2. The main cause of humus disbalance is violation of the state of the ecological balance in the agricultural sector of the economy. Therefore, it is advisable to consider the issue of humus balance not only as an environmental, but also as an economic category. In particular, it was found that the structure of sowing areas, oriented to the deficit-free balance of humus, should be controlled by means of the audit, although the latter so far does not meet the requirements of time in institutional and professional aspects.

3. Based on the construction of the mathematical model that describes the dynamics of the major indicators of agricultural production and further solution of the optimization problem, negative tendencies in its development can be identified. To support this conclusion, we presented a certain solution for the example of the level of decreasing the number of livestock in the current system of agricultural land management. In particular, it was shown that the heads of cattle for every five-year period decreased by approximately one third. The resulting adequate mathematical model allows predicting the following: if nothing changes in the land use management, there will be a quick sad finale. A similar prediction can be made for other indicators of agricultural production.

4. The key condition and a powerful source of economic stabilization, the improvement of standards of quality of life of people in the village is the multiplicative effect of diversified activities. Understanding this is a great prospect for formation of the effective land relations in the rural area, an increase of effectiveness of the rural economy. The proposed systematization in the form of a diagram of the system of the land relations regulation and management of land resources allowed establishing that the land ownership form does not yet determine the efficiency of land use. A priority component of the successful development of agricultural land use and, therefore, rural areas, is the organizational-legal form of economy on the land as a basic element of the system of land use management.

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