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DANYLENKO A., academician of NAAS
SOKOLSKA T., PhD. in Economics
Bila Tserkva national agrarian university

CONCEPTUAL BASES OF AGRICULTURE PRODUCTION RATIONALIZATION

Дослідженнями виявлено стійку тенденцію до зміни структури сільськогосподарського виробництва, яка відбувається на тлі впевненого нарощування загального обсягу виробництва. Між галузями тваринництва і рослинництва порушена пропорційність як в кількісному, так і якісному відношенні (рослинницька галузь становить майже 71 %). Через порушене екологічно допустиме співвідношення площ ріллі, природних кормових угідь, багаторічних насаджень, що негативно впливає на стійкість природних ландшафтів та техногенного навантаження, нинішнє використання земельних ресурсів не відповідає вимогам раціонального природокористування.

З метою забезпечення збалансованого економічного зростання в сільському господарстві, запропоновано комплексний підхід до раціоналізації виробничої структури, яка має здійснюватися за такими напрямами: структурна оптимізація, агротехнологічна оптимізація; торговельна оптимізація.

Ключові слова: раціоналізація, сільськогосподарське виробництво, структура виробництва, економічне зростання, оптимізація структурна, агротехнологічна, торговельна.

Problem statement. Crop and livestock products distribution channels develop haphazardly, they are unbalanced and uncontrollable in the current economic climate in Ukrainian agricultural sector due to economic freedom of the producers to independently determine the production direction, structure and volumes as well as the resources suppliers. These changes in some parameters in crop and livestock production affect the entire field production structure, and, therefore, economic efficiency environment and society oriented management of agricultural production enhancement is impossible without working out an efficient production structure, which is affected significantly by natural, environmental, demographic, technological and infrastructural factors.

Analysis of recent research and publications showed that the issues of optimizing the structure and size of the agricultural production were considered by numerous Ukrainian scientists V.H. Andriychuk, V.V. Vitlinskiy, P.I. Haidutskiy, A.O. Hutorov, P.T. Sabluk, M.O. Shpychak and others. However, the development of the optimal variants of industrial units formation through applying rationalization methods taking into account environment and society oriented farming methods as well as modern ways of doing society oriented and modern aspects of improving the agricultural sector production structure has not been studied profoundly so far. In addition, the challenge is the effective combination of private farms large-scale production.

Therefore, the **aim** of our study conceptual basis and justification rationalizing the structure of agricultural production.

Results and discussion. Summing up the existing theories concerning rationalization and optimization of agriculture production structure reveals that a sturucture can be considered rational if its branches operate effectively as well as complement each other and demonstrate their potential under certain quantitative and qualitative values of structural elements within them.

While interacting in the production process the branches are to ensure environmental sustainability of the environment, particularly by keeping non-deficit balance of humus in the soil, minimal environmental burden, the possibility of of organic products production and so on.

The rational combination of the fields is also to provide: sufficient agricultural production volumes to meet the population essential needs in foodstuffs as well as in the foods quality and variety. Thus, the proper level of profitability should also be achieved to ensure expanded reproduction and industry wages increase. In general, developing a rational structure of agricultural production should be directed at eliminating structural imbalances that will provide agricultural production efficiency.

The analysis of macro indices in Ukrainian agricultural sector showed a strong tendency to change significantly the structure of agricultural production that takes place against a background of total production steady increase. For example, if 25 years ago the gross agricultural output was made of crop and livestock products in nearly equal shares, nowadays the crop sector is the dominant (almost 71%). The total yield of grain and oil seeds has increased by 2.9 times and reached a total figure of

over
80 million tonnes (based on 2014) [1].

In 2015, Ukraine entered the top three of world cereal (sunflower, corn, barley, wheat, soy and chicken)exporters following the US and the EU, and made the highest amount in grain exports since its independence – almost 35 million tonnes [2].

The annual volume of agricultural exports in monetary terms increased almost 5 times in the last decade, having reached $ 16.7 billion in 2014 (almost 31% of total exports from Ukraine), confirming the national economy agriculture driver status, while the added gross value as a percentage of the total amounted to only 11.8% [3].

It is obvious that the growth of grain exports is extremely important for our country at this stage of development as it provides foreign currency earnings in Ukraine, but we also believe that insufficient development of livestock and low purchasing ability of the population contributr to the to lack of adequate domestic demand for grains.

Ukrainian scientists have been debating on the impact of these trends on the economy the national economy for many years, in particular, on grain exports correlation with its domestic consumption, the share of which decreased from 98.1% (1990) to 45% in 2015 (Figure 1).

We agree with the opinion of the leading experts who believe that increasing export capacity will result in decreased domestic needs in grain and adverse changes in both the grain sector and in the agricultural sector as a whole.

We share the opinion of our leading scientists that grain export, which could be used as raw material for animal fodder production we import is unreasonable since we lose the value added and jobs.

We export significant volumes and import animal products, while meat and dairy products consumption milk is below the rational norms by 34.81 and 41.36%, respectively.

Akdemician A.M. Shpychak believes that using 100 thousand. tons of grain for livestock feeding can yield in 260 thousand tons of milk, and in UAH 132.8 million of value added if we concider the proportion of concentrated feed rationswhich is 5.4 times higher as compared with the cost of grain exports. High level of mechanization in specialized dairy complexes can create 930 additional jobs.

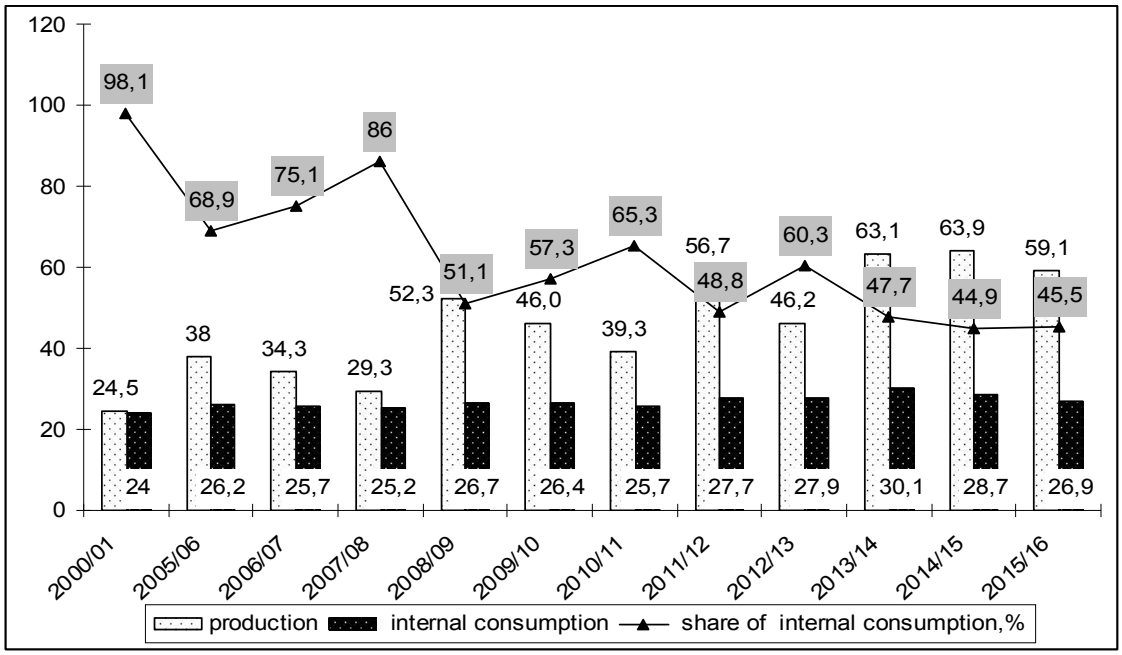

Fig. 1. **Dynamics of grain crops production and consumption of in Ukraine,** mln t
Source: compiled from the data [1].

Besides, it has been proven that the number of employees in private farms livestock farming increased by several times. According to calculations, [4] meat and milk processing within the country

can provide value added growth increase by 9.4 times for milk and 8.8 times more than that of grain exports.

So, today it is essential to expand the ways to uses the grain produced in Ukraine, as the leading countries (USA, Canada, France, etc.) do. These countries export not only crops but also dairy and meat products, as well as bioethanol, production of which involves using processed grains, but cover domestic needs in grain and livestock products.

The current study of the dynamics of agricultural production reveals broken proportionality between the livestock and crop sectors in Ukraine both in quantitative and qualitative terms. In particular, the decrease in cattle results in a loss of organic fertilizers, and to achieve the balance of humus in the soil, one needs to make 8 -13 tons of manure per 1 ha of arable land [5].

The current imbalance in the production structure is one of the main reasons for the low efficiency of the agricultural sector, and agriculture becomes a one-sided development structure- with a focus on sunflower, soybean, canola, wheat crop production (Table. 1). In 2014, the share of cereals and legumes in the total volume amounted to 54.3%; technical crops – to30.9%; potatoes, vegetables, melons – to 6.9%; forage crops – to 7.7% [1].

Table 1 – **Structure of sown area under main agricultural crops,** per cent

	1990	1995	2000	2005	2010	2012	2013	2014
All sown area	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Grain and legumi-nous crops	45,0	45,7	50,2	57,6	56,0	55,6	57,2	54,3
Industrial crops	11,6	12,1	15,4	20,2	27,1	28,2	27,8	31,0
Potatoes, vegetables and cucurbi-taceae crops	6,4	7,0	8,4	7,8	7,3	7,3	6,9	7,0
Fodder crops	37,0	35,2	26,0	14,4	9,6	8,9	8,1	7,7

Source: compiled from the data [1].

There is a tendency to decline in growing niche crops, the combined share of which in the total yields reaches only 3%. This segment also comprises basic cereal crops that currently make the basis of the Ukrainians diet. Increasing the share of high profit energy-intensive and crops in the seeded area structure, results in higher efficiency, though livestock feed cost increases, slowing down the pace of its development. Above all, scientifically grounded crop rotation is broken, which causes decrease in soil fertility, pests and diseases spread.

Perennial grasses can used to illustrate the situation since they are more than 17 times lower in the North-steppe region than the lowest limit, in the pre-Carpathian region the figure makes 9 and in the Polissyan region – more than 5 times lower than the norm [5].

Current land use does not comply with environmental management due to the broken environmentally acceptable ratio of arable land, natural grasslands, perennial plantings which afffects the stability of the natural landscape and man-made load. According to [6], modern rational structure of land use is largely determined by the volume of natural areas under forage crops. The proportion of grasslands, pastures and forest plantations for ecologically sustainable land use should be 30-50%. The average share of natural pastures in the structure of agricultural land In the EU is 39.3%. In particular, for France it is 36.6%, Germany – 30.4%, Great Britain – 63.1%

The research has found out that the lack of real incentives for rationalization of land use and production structure in general resulted in an extremely low efficiency of natural resources use in agriculture. We believe that the area of arable land in Ukraine should be reduced by 5.10 million hectares and its degraded and unproductive part should be used as natural forage and forest land. The worst of the lands, as well as those located on steep slopes should be excluded from the cultivation structure and reserved for legumes that can produce up to 500-700 kg of humus per 1 ha and accumulate 150-200 kg of nitrogen, which is equivalent to adding 20-30 tons of manure and 150 kg of nitrogen per 1 ha.

Since agriculture is a combination of agriculture and industry, the rationalization of agricultural production must be accompanied by defining the most appropriate areas of processing certain

agricultural raw materials, specified range of the final product and the most efficient use of industrial recylcling wastes [7].

Having summarized the statements of the leading scientists, we believe that the main criteria of agricultural production structure rationality are economic, environmental and social ones.

The economic criteria of structure optimality criteria involve considering agriculture production profitability, focus on production costs minimizing, resource efficiency etc.

Social criteria involve compliance of with production activity results with basic social needs of farmers (providing employment, wage growth in agriculture, i.e. inclusive growth and development of rural infrastructure etc.

Environmental criteria involve the relationship between the change in production structure and trends in natural resource reproduction processes. Agriculture greenization implies creation of favorable conditions for crops growing and productive livestock breeding. Hereby, the positive and negative aspects of introducing new crop rotations, tillage systems, crops fertilization, determine the effectiveness of land as the basic agricultural resource .

In our study, these criteria make a single unity. Here, the environment and society oriented model of agriculture economy maintains soil fertility, veterinary welfare, high quality agricultural products while ensuring employment of rural population through activating the natural production mechanisms due to using high-tech innovative production means. The system is balanced in the environmental, economic and social terms, it does not overload the environment, it is independent of external labor costs and contributes to the preservation and development of rural areas and agriculture as a social and cultural category.

This model involves implementation of sectoral and intra-regional differentiation with creating combinations of interrelated and interdependent production activities.

Livestock industriy development is to be determined by manufacture products in quantity and variety, which ensures food sefeaty and meets the needs of the population needs in good nutrition at the lowest material and money cost of its production and creates new jobs.

Therefore, there arises the need to optimize the management forms in the countryside, since large-scale farming and its orientation to production and increasing its scope to some extent even bear threats and risks for sustainable development agrosphere. To overcome the decline of the village and streamlining the organizational structure of agriculture in line with European standards state should create favorable conditions for the development of family farms, which currently provide a variety of farming systems, landscapes, preserve culture and traditions and demonstrate a more responsible management of natural resources (soil, drinking water and wildlife), which provides significant environmental benefits to the society.

Outstanding Ukrainian scientists (O.V. Shubravska, A. Borodin, L.V. Moldovan, I.V. Prokopa) emphasized the inadmissibility of megalomania in agriculture, pointed to the limited effect of the scale and high risks of monoculturisation, lack of diversification of the agricultural business. They proved the volatility of food prices (which may not only grow, but the decline as well as observed for the last time) [8].

V.Ya. Mesel-Veselyak believes that if the size of the economy exceeds the rational dimensions, it results in a negative scale effect [9]. The author argues that the optimal size of farms is over 2.5 thousand ha dairy farms should have 600 cows. These will provide a significant reduction (25-30%) of production costs and increased productivity (2-2.5 times).

Despite these studies, vertically integrated structure still continue to increase their land banks in very large amounts, which limits agriculture capacities through breaking comprehensive growth of the agricultural sector. Thus, nearly lost essence of agriculture multifunctionality, which is based on the world agricultural policy and the achievements of economic growth are not profoundly while future risks and threats are not revealed. For example, private farms engaged in manufacturing labor-intensive agricultural products produce 85% of vegetables, 80% of milk, over 75% of beef, 60% of pork. It is impossible to achieve the required level of milk production in Ukraine without the farms in the nearest future. However, the intention of our country to join the European Union requires establishing market-oriented model of agricultural enterprises. In particular, introducing international experience into the national policy of stimulating measures in setting ur cooperatives through providing economic aid and social benefits is indisputable.

Using internal potential of rural areas, executive authorities, local authorities and local communities under limited budget and other financial resources is essential to ensure proportionality

and balanced agricultural productio through setting up the rural agrarian systems, industrial and social infrastructure, agricultural products processing enterprises, their own distribution network of agricultural enterprises, and so on. In addition to technical services for agriculture, food and processing industries, the state should promote the development of the most promising, according to international experience, areas of non-agricultural activities like agro-tourism, art and national-ethnic heritage, as well as embroidery and weaving, social services development, the implementation of remote trade and services using the Internet, fish farming, vegetables and flowers nursering, planting fruit trees and berry bushes, early greens cultivation in greenhouses, harvesting medicinal plants, woodcrafts and so on.

To ensure agriculture growth, the following areas should be rationalised:

- structural optimization – scientifically justified crops acreages placing which takes into account climate change, crop adaptation to these changes, which allows the most efficient use of natural resources under the new climatic conditions to achieve sustainable growth in the crops yield and quality, increase in raw materials, energy and human resources.

- agrotechnological optimization – resource-saving technologies further implementation and development that optimizes the resources use and improves the products quality in the course of reducing its cost.

- trade optimization – establishing the optimal balance between domestic demand and exports, which allows to develop the processing industry and to increase export revenue from the selling goods with value added, without losing positions in commodity markets. To illustrate this one can consider the planned increase of flour exports, which totaled 257.5 ton in 2014/15. These trends give a signal to foreign investors and manufacturers.

Therefore, in order to ensure sustainable agricultural production, each region should have its own model, built on the basis of existing resources, risks and threats due to climatic conditions.

The problem of crops proportion under market economy is decided by a tenant or landowner under any particular case, based on considering each crop adaptability for specific soil and climatic conditions, market demand, growing profitability, etc. However, considering specifically grounded scientific standards of crop rotation and crop mix as well as their practical implementation, producers can improve significantly the results of the management.

In respect that the feature of production structure model optimization is its multi- directionality of the objectives to be achieved, we took into account three options while developing a model for the Forest-steppe zone: traditional, animal husbandry development focused, and combination of traditional and organic management (Table. 2).

Table 2 – **Optimal structure parameters of acreage for farming in various types of the Forest steppe zone**

Crops, %	Traditional farming	Animal husbandry development
Cereals and legumes	55	51
Industrial crops	20	24
Potato, vegetables and melons	1	0,8
Fruits and berries	1	0,2
Forage crops	23	24

It has been proved that traditional farming can be conducted in two ways: by concentrating the most productive crops in the sown areas structure, or by a structure that provides livestock industry with the required feeding products.

If the farming is focused on livestock development, it is appropriate to expand the area under forage crops by reducing the structure of grain crops share to 51%.

Combining traditional type and organic types of management results in significant growth of most of arable land performance indicators.

Implementation of modern economic policy of environment and society oriented agricultural development must proceed from the idea that mitigating the conflicts between the need to further sustainable development of the agricultural sector and the ability to save the environment is only possible if two problems will be solved parallel and simultaneously: the first one is to change the approach for the purposes of agricultural production and, the second – its transformation into an environmentally safe and "clean" industry. The solution to this strategically important task depends largely on the formation and

efficiency of the policy of combining production and environmental practices in agriculture aimed at providing economic growth and preservation of the quality of agricultural and other ecosystems.

Thus, the rational structure of agricultural production implies a ratio of certain products manufacturing, their quantitative and qualitative parameters, location and relationship between the various subsectors (crops and livestock), accompanied by a structural balance of all types of resources, their adaptability to the environment challenges and meets the social focusing of the results.

We believe that the main task of agricultural production is not only to achieve the highest possible gross yield under certain soil and climatic conditions, but to process it intothe most marketable ready-to-eat products with the creation of closed cycles of non-waste production.

Conclusions. To use the resources of different climatic and economic zones efficiently with considering the challenges of the environment and risks of doing business proportional development of basic industries, i.e. crops and livestock should be ensured. This will allow to achieve the resource balance in agricultural production, and thus, to get a positive result from economic point of view (in the form of the maximum possible profit or the lowest possible cost), and from agroecological and social ones as well.

Elimination of interior imbalances in agriculture is equivalent to about 10–15% of production growth.

The rational combination of the industries implies: production of sufficient volumes of agricultural products to meet population demand for essential foodstuffs; diversification of products by type and quality, achieving adequate profitability to ensure expanded reproduction and wages growth.

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Концептуальные основы рационализации структуры сельскохозяйственного производства
А.С. Даниленко, Т.В. Сокольская

Исследованиями выявлено устойчивую тенденцию к изменению структуры сельскохозяйственного производства, происходящую на фоне уверенного наращивания общего объема производства. Между отраслями животноводства и растениеводства нарушена пропорциональность как в количественном, так и качественном отношении (растениеводческая отрасль составляет почти 71 %). Из-за нарушения экологически допустимого соотношения площадей пашни, естественных кормовых угодий, многолетних насаждений, нынешнее использование земельных ресурсов не соответствует требованиям рационального природопользования.

С целью обеспечения сбалансированного экономического роста в сельском хозяйстве предложен комплексный подход к рационализации структуры сельскохозяйственного производства, которая должна осуществляться по следующим направлениям: структурная оптимизация; агротехнологическая оптимизация; торговая оптимизация.

Ключевые слова: рационализация, сельскохозяйственное производство, структура производства, экономический рост, оптимизация структурная, агротехнологическая, торговая.

Conceptual bases of agriculture production rationalization

A. Danylenko, T. Sokolska

The paper considers conceptual foundations, current status and structure of agricultural production in Ukraine. A comprehensive approach to rationalizing the structure of agricultural production within environment and society oriented management to ensure sustainable growth in agriculture.

The rational combination of the industries implies : production of sufficient volumes of agricultural product s to meet population demand for essential foodstuffs; diversification of products by type and quality, achiev ing adequate profitability to ensure expanded reproduction and wages growth.

Key words: rationalization, agricultural production, production structure, economic growth, optimization, environment and society oriented management.

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