



УДК 338.439

INFORMATION SUPPORT FOR IDENTIFYING THE BIOENERGY POTENTIAL OF THE AGRICULTURAL SECTOR AND FOOD SECURITY OF THE STATE

Vasylyna O.R. / Васи́лина О.Р.

s.e.s., as.prof. / к.е.н., доц.

ORCID: 0000-0003-2124-3792

Berezivskyi Z.P. / Березівський З.П.

s.e.s., as.prof. / к.е.н., доц.

ORCID: 0000-0001-57311377

Kolach S.M. / Ко́лач С.М.

s.e.s., as.prof. / к.е.н., доц.

ORCID: 0000-0001-8650-4696

Lviv National Environmental University, 1,

V.Velykoho str., Dubliany-Lviv, 80381, Ukraine

Львівський національний університет природокористування,

Дубляни-Львів, Володимира Великого, 80381, Україна

Abstract. *In the article we analysed world philosophical-view and economic aspects of scientific inheritance of representatives of Ukrainian science. Actuality of studies of physiocrats consists in the decision of food problem of the state. Ukrainian school of physical economy develops scientific thought which provides the output of Ukraine and world on the way of progress. The purpose of our study is to show the mission of Ukraine in view of the development of physiocratic economic and philosophical thought. The Ukrainian school of physical economics offered an original solution to the food problem, which was based on the energy of the Sun and cosmic forces reaching the planet Earth. Rationally structured human work in agriculture, technically and technologically strengthened, should contribute to the growth of this energy. The purpose of our study is to show the mission of Ukraine in view of the development of physiocratic economic and philosophical thought.*

The Ukrainian school of physical economics offered an original solution to the food problem, which was based on the energy of the Sun and cosmic forces reaching the planet Earth. Rationally structured human work in agriculture, technically and technologically strengthened, should contribute to the growth of this energy. The latest physical economics investigates economic phenomena and processes in close relationship with energy-matter and bio-information flows coming from space. This makes it possible to find a cognitive basis for spatial modeling of the preservation of biomass of living matter in the process of economic activity. Information support for identifying the bioenergy potential of the agricultural sector.

Key words: *food safety, physical economy, physiocrats, food, welfare.*

Introduction. In recent decades, despite breakthroughs in technology and increased productivity in food production, the fact remains that food – the primary source of all human needs – is beyond the reach of about a billion people around the world. Maintaining Ukraine's food security is a problem that is gaining more and more relevance every year. Disparities in the production of agricultural products, low profitability, a critically low level of technical support for agriculture, as well as the growth of the world population and adverse climatic changes indicate the need to support the development of agriculture. Achieving food security in the 21st century is a titanic task. The problem is complicated by the fact that 9 billion people will need to be fed by 2050. Only knowledge of natural laws reveals the true essence of market



economy. After all, physical economy makes it possible to see its deep essence, generated by an excess of grain, which causes the flourishing of civilizations. Without a physico-economic understanding of the essence of this excess, discussions around the market are not only unproductive, but also harmful.

They recognize the earth and plants as the primary link in the accumulation of such energy. Everything else (industry, technology, various benefits of civilization) are derived from them. Human activity can contribute to the growth of the potential of this energy or, on the contrary, accelerate its dissipation. Due to the correct use and distribution of energy by mankind, the planet Earth is capable of feeding more than one billion people. Agriculture organized on a scientific basis is the most convincing example of useful human labor, that is, the kind that contributes to the accumulation of solar energy. It is progress, as well as agriculture in general, that will be its reliable basis for the development of the country. Thanks to human labor, the productivity of the earth increases significantly compared to its pristine, untouched state.

Ensuring the food security of the state on the base of the production of physiocratic economic and philosophical thought

The deterioration of the financial condition of agro-industrial enterprises, the lack of financial resources, the impossibility of using modern technologies and equipment, the low profitability of activities indicate the presence of problems that pose a threat to food security and food independence of Ukraine [9]. Today, our state manages to balance on the edge of providing the population with food products, despite inefficient agricultural production and the lack of actual state support for it. But this will not last all the time, and therefore decisive actions on the part of state authorities are needed. The concept of sustainable economic development is recognized by the world community as the dominant ideology of the development of human civilization in the 21st century, as a strategic direction for ensuring the material, social and spiritual progress of society. In general, M. Rudenko also tried to achieve sustainable socio-economic development of Ukraine and any other state, which involves: meeting the growing material and spiritual needs of the population under the condition of rational and ecologically safe management and highly efficient use of natural resources ; maintenance of natural and ecological conditions of life favorable for human health, preservation, reproduction and multiplication of the quality of the environment and the natural resource potential of social production.

It is important to warn the authors of the National Sustainable Development Program not to emphasize only the modernization of industry. Ukraine has unique resources - agricultural land. First of all, they should be protected, taken care of, and the quality of agriculture should be improved. The financial potential of our arable land is many times greater than the potential of all plants and factories combined. The secret is quite simple and it is revealed in M. Rudenko's article "Globalization and Ukraine".

In general, the economic indicators of agricultural production in Ukraine over the last decade show that this type of economic activity has not yet acquired such important and effective incentives for growth. So, we note that the index of the volume of agricultural production in Ukraine in January 2022 compared to January 2021 was 100,9% (Table 1).



**Table 1. Indices of agricultural products by categories of manufacturers
(in % to the corresponding period of the previous year)**

	January 2022	For reference:	
		2021 (preliminary data)	January 2021
Farms of all categories	100,9	114,4	94,3
including:			
<i>enterprises</i>	107,3	119,2	93,3
<i>economy of the population</i>	92,3	105,5	95,7

In January of the current year, the index of the volume of agricultural production compared to the corresponding period of 2021 was 107,3% in agricultural enterprises, 92,3% in households. The greatest test for the Ukrainian agricultural sector was the destruction of production and export capacities. There are also risks associated with proximity to the front line. There are many other problems, including the lack of human resources. And since these crops are the main ones in terms of providing food to the population, then, accordingly, a decrease in their production leads to a deterioration of the food security of Ukraine.

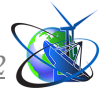
Since Ukraine is one of the five leading global exporters of grains and legumes and for quite a long time has been positioned as a "guarantor of food security in many countries of the world thanks to traditionally powerful food exports" [2; 3]. So, with the beginning of a full-scale armed invasion of Russian troops on the territory of Ukraine, its consequences began to be associated with the onset of a global food crisis.

The indicators of livestock production in Ukraine also remain negative. In particular, the number of cattle, including cows, is decreasing. At the same time, some positive dynamics are observed in increasing the production of poultry products.

The prominent Ukrainian scientist S. Podolynsky later, developing the meaning of these ideas, defined the production of food products and, in particular, grain as the best human activity that accumulates energy on earth [4, p. 308].

The embodiment of these ideas by academician V. Vernadskyi in his teachings on the biosphere, and later on the noosphere, made it possible to assert the separation of living, non-living and intelligent in social life and management. The scientist was convinced that agricultural production should be considered the leading form of both the management of nations and civilizations, as well as their development of the biosphere. Summarizing the scientific ideology of the Physiocrats, V. Vernadsky noted that quite clear evidence, opinions and facts about the energy difference between the living and the dead were not understood and appreciated at the time [1, p. 36-39].

In recent history, the mentioned ideas were developed by the Hero of Ukraine M. Rudenko. According to his estimates, our state should produce up to 100 million commercial grains annually. The thinker saw the ability of the Ukrainian peasantry to store more than 100 million grains in their granaries as a priority task of the national economic strategy.



The goal of agrarian reforms should be seen in increasing the surplus of grain as the most important of absolute goods. The same criterion should be used to measure the results of the reforms, considering their effectiveness as an increase in the volume of this surplus with a simultaneous increase in the fertility of the land [6, p. 20].

The Russian invasion of Ukraine strengthened Ukraine's role in ensuring global food security. Blocked exports and the threatened current sowing campaign have led to a sharp rise in prices on the world market, creating not only the risks of undermining the country's agri-food sector and the national economy as a whole, but also the prerequisites for the starvation of hundreds of millions of people around the world.

Ukraine is playing an increasingly important role in the world agricultural market. Just two decades ago, Ukrainian grain exports were capable of feeding 40 million people, and today it is more than 400 million. In 2019-2021, Ukraine accounted for almost 10% of world wheat exports, 15% of corn exports, 15% of barley exports, and almost 50% of sunflower oil exports.

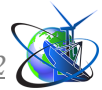
An insider's view: agriculture accounts for about 20% of Ukraine's GDP (including related industries located on the value-added chain) and more than 40% of total export revenues. In addition to the fact that agriculture is an important sector from the point of view of GDP and employment (about 15% of the total population of Ukraine), agricultural producers provide the local population with almost 100% of the consumption of the main agricultural crops, vegetables and at least 80% of the meat consumption. Despite the huge potential of Ukraine's agricultural production, the war seriously affects not only global, but also domestic food security.

After half a year of war, due to rising consumer prices and unemployment, the availability of food products in Ukraine decreased by 15-43%. We present an overview of the Food Availability Index (FIA) since the beginning of the full-scale military invasion of the Russian Federation. FIA is calculated as the ratio of the average wage to the price of a food basket 1. Data on changes in wages are limited, while data on commodity prices are available and regular. That is why in this issue we look at FIA from the point of view of income variability and report on possible minimum and maximum changes in the index.

Today, increasing grain production is a primary prerequisite for the implementation of planned agrarian reforms. Since August 1, 2023, since the Russian blockade on food exports through the Black Sea was lifted, Ukraine has sent more than 11 million tons of agricultural products to 38 countries around the world. At the same time, some of the poorest countries were forced out of the market by high grain prices. The essence of the new "Grain from Ukraine" program is to purchase it from Ukrainian producers - the priority is small and medium-sized enterprises - and transfer it to countries that are on the verge of starvation.

Only a third of the planet's population is provided with food products in the required quantity. According to the Food and Agriculture Organization of the United Nations (FAO), almost 1 billion people are chronically hungry today, and more than 2 billion are malnourished. First of all, these are the underdeveloped countries of Africa and Asia.

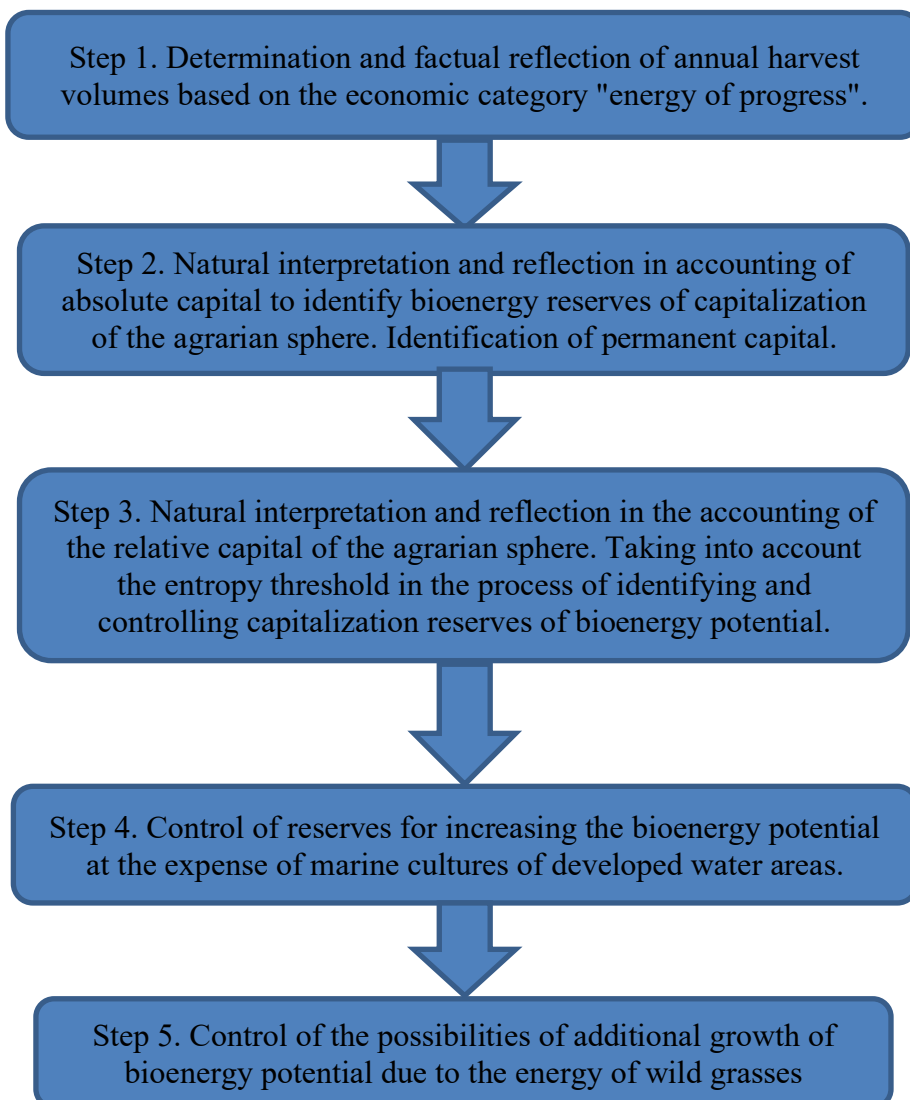
In this regard, Ukraine is considered as a significant reserve for increasing the



volume of production and export of agricultural products. Today, it is difficult for agricultural companies to compete in the market. This situation is caused by a high level of instability due to imperfection of the economic mechanism, underdevelopment of market infrastructure, lack of necessary information about market state and practical experience in a dynamic competitive environment. The driving force in resolving of the most of these issues may become the formation of a marketing mechanism for agricultural enterprise development based on the elements of integration and innovation, which will allow to use the opportunities in order to prevent the crisis processes impact on their effectiveness (10).

According to the theory of physical economy, grain not only can, but must be a measure of wealth, or, in other words, its equivalent.

The natural approach to the recapitalization of the energy of progress should now be transformed into a strategic direction for the current and future increase of absolute surplus value. The defining directions of the national economic strategy in the wartime and postwar period should be the mobilization of existing opportunities and missed benefits in order to multiply the bioenergy potential of the agrarian sphere.





Thus, the information obtained thanks to the fundamental basis of accounting allows us to propose a step-by-step model for identifying reserves for multiplying the bioenergy potential, namely. The ultimate goal of introducing the proposed model is to control compliance with food safety in the agricultural sector.

At the same time, the natural vision of information support for accounting opens up further areas of food security control, primarily through the identification of missed benefits, the prevention of which can contribute to the growth of the bioenergy potential of the agricultural sector (Table 2).(11)

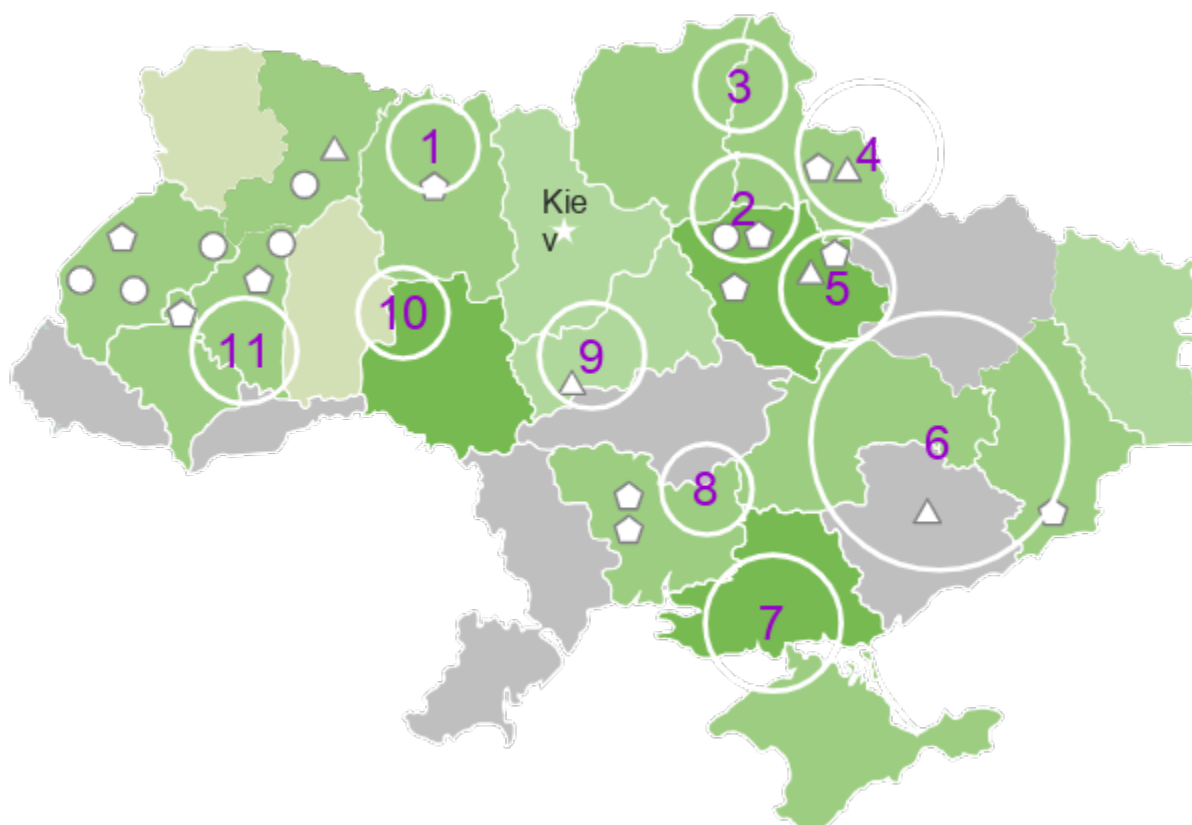
Table 2. Control of lost profits, the prevention of which ensures compliance with food security

	<i>Reasons for lost benefits</i>	<i>Manifestations of the lost resilience</i>
A	Replacement of working livestock with machines and other agricultural machinery	Losses of organic fertilizers have not yet been compensated
B	Permanent reduction of livestock cattle and other livestock	Losses of organic fertilizers, meat, dairy and other products
B	Burning straw, tops, chaff, as well as stems, leaves, etc	The growth of absolute losses, in including permanent capital
Г	Payment in kind for facilitating the export of intermediary countries of Ukrainian grain	Reduction in the amount of absolute capital caused by a loss energy of progress

The results of the study of this problem indicate the need to recognize the energy of progress as the most present object of accounting, and also point to the urgency of its systematic coverage in accounting for the purpose of information support for the management of bioenergy potential. The control carried out according to the accounting data built on natural principles is intended to become a tool for identifying unused opportunities and missed benefits, aimed at mobilizing food security reserves in the agricultural sector. (11).

Why IT is an important part of the Group's business?

540,000 hectares of land in 22 regions, the development of crop production is the main business direction of the Group of Companies, 11 company clusters throughout Ukraine, 16 elevators with a total capacity of 2.6 million tons of simultaneous processing, the largest exporter of corn and one of the largest producers of wheat in the country



Nearly 100 million uah – annual economic effect of using it solutions/

These leading companies effectively operate in the market of information and technical support of economic effect in the food industry:

UkrLandFarming Bitrek Keep Control



Conclusions.

Increasing grain production is the basis for the realization of Ukraine's global mission. The government's policy of regarding grain surplus should not lead to a drop in domestic grain prices, but to the flourishing of the agrarian and food sector, financial and monetary stability, energy independence and world leadership. Actually, the representatives of the school of physical economy are developing that field of scientific thought, the observance of which ensures the exit of Ukraine and the world on the path of progress. The relevance of their works to the idea of progress is becoming relevant especially now, at the beginning of the third millennium, elevating them to the prospect of becoming a driving force of civilizational progress.

References

1. Zhuk V., 2011. Conceptual approaches to solving surface and deep problems of accounting for innovative activity. *Accounting and finance of agriculture*. 2011. No. 1. P. 36-39 LabVIEW Environment Basics, National Instruments (<https://www.ni.com/getting-started/labview-basics/environment>).



2. Nakonechnyi R., Kopytko A., Sas I., 2015. Implementation of the principles of physical economy in organic farming: theory and practice. Bulletin of the Dnipropetrovsk State Agrarian and Economic University. Vol. 4. - pp. 34-38. Access mode: http://nbuv.gov.ua/UJRN/vddau_2015_4_8 . [Accessed 20 May 2023]

3. Oliynyk T., 2008. Mykola Rudenko knew how to save humanity. Ukrainian newspaper plus. April 17-23. P. 12-20.

4. Podolinskyi S., 2000. Selected works. edited, preface and approx. L. Korniychuk. K.: KNEU, 328 p.

5. Rudenko M. Globalization and Ukraine. Mirror of the week. 2002. July 13.

6. Trehobchuk V., 2002. Concept of sustainable development of Ukraine. Bulletin of the National Academy of Sciences of Ukraine. No. 2. pp. 31-40.

7. Shevchuk V., 2010. Agrarian production as development of the biosphere: traditions and transformations. Organizational and economic transformations in agrarian production: coll. of materials of the Twelfth Annual Meeting of the All-Ukrainian Congress of Agrarian Economists, Kyiv, February 25-26, / editor.: P. Sabluk and others. K.: NSC: Institute of Agrarian Economy. 618 p.

8. Rudenko M., 2004. Energy of progress (Essays on physical economy) Ternopil: Jura. 359 p.

9. Sabluk P., 2001. A new economic paradigm for the formation of the national food security strategy of Ukraine in the 21st century. Economy of agro-industrial complex. Vol. 4. pp. 13-19. Migration and socio-political attitudes during the full-scale war of Russia against Ukraine - [https://gradus.app/documents/295/Gradus EU wave 9 UA.pdf](https://gradus.app/documents/295/Gradus_EU_wave_9_UA.pdf)

10. N. Zelisko, S. Kolach, R. Magijovych, Orisia Vasylyna. Influence of marketing instruments on the formation and use of marketing potential of agricultural enterprises. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 20, Issue 3, 2020. P. 663-668.

https://managementjournal.usamv.ro/pdf/vol.20_3/volume_20_3_2020.pdf.

11. Shevchuk V. O. Natural principles of accounting and information support of food safety control. Accounting and financial science and practice: development priorities and mission in wartime: materials of the XIII International. science and practice conf. (November 16, 2022, Kyiv) / Answer. for issue Yu.S. Heartless K.: NNC "IAE", 2022. p. 67-70.