

Mechanism of Subsidies as an Element of State Support of Livestock Sector's Development in Ukraine

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Abstract. The article presents results of the analysis of the cattle breeding industry's development in Ukraine, the main trend of which was the decrease in the number of cattle, including the number of cows. A way to support livestock in the industry using the subsidy mechanism is suggested. This approach is aimed at increasing profitability of the cattle breeding industry output per 1 ha of fodder crops in the farm to profitability of barley production from 1 hectare in the area. The results of the proposed approach show that increasing milk profitability from 1 hectare of fodder crops to barley profitability from 1 hectare can be the basis for maintaining the livestock sector. The use of the livestock productivity factor (cow milk yield) in the proposed methodology makes farms more interested in increasing livestock productivity, which in turn increases the number of subsidies in the industry. In addition, an increase in fodder crops area in the farm has an ecological effect.

Key words: support, subsidies, cattle breeding, profit.

Introduction

The issues of state regulation in various spheres of activity in the countries of the world are among topical ones. Their consideration is devoted to the work of theorists and practitioners. There are a lot of scientific papers, considering both basic and applied questions of state regulation.

A fundamental work in the sphere of economic development regulation is the work of the Austrian scientist Joseph Schumpeter's "Theory of Economic Development". It is devoted to the study of entrepreneurial profit, capital, credit, interest and the cycle of conjuncture (Schumpeter, 1982). Great attention in the work is paid to formation of bases of subsequent economic development, using the state support, a role of innovations in this process.

The work of Ludwig von Mises "Human Action" concerning regulation of economic relations development is also interesting (Mises, 2005). In one of the sections of this work L. von Mises gives his interpretation of the concepts of state and market, analyzes the degree of state intervention in the economy through taxation, interference in the price structure, production constraints. There are other works in which issues of state economic

policy formation, state regulation, state support are considered at the international, national levels at the level of industry, enterprises.

A special sphere in the formation of state economic policy is state support for the development of the agrarian sector of economy. According to OECD data, total agricultural support (TSE), provided in OECD countries on average in 2015-2017, amounted to 317 billion USD (285 billion euros) per year, of which 72% or 227 billion USD (205 billion euros) were provided as support to farms (Producer and Consumer Support Estimates database (2018)).

Experience of countries with developed market economies also indicates a significant support from the state in this area. And this is understandable because the action of natural, market and other factors is almost uncontrollable in relation to the agricultural sector. These and other reasons stipulate the need to support the agricultural sector in each country.

In modern literature, the term state support is considered as an element of state regulation. As a rule, support of agricultural sector includes a wide range of tools that affect competitiveness of agricultural producers (Ji, Lim, 2018). State support is entrusted with creation of equal economic conditions

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for business entities in accordance with the state (regional) development programs.

The purpose of our research is to identify tools the use of which would stop the decline in the number of livestock in the livestock sector of Ukraine. Subsidies at the state and regional levels can be such an instrument. Their use will stimulate preservation of the number of cattle, create conditions for its increment and solve a number of social and environmental issues in the countryside.

Materials and Methods

The following methods were used as the basis for our research: a monographic method – when studying the existing approaches in the practice of the countries of the world regarding state support for the development of the agrarian sector of the economy, the livestock sector including; the analytical method - when analyzing development of the cattle breeding industry in Ukraine in recent years; the calculation method - with the approbation of the author's methodology for supporting the livestock sector in the zones of Ukraine.

The study was carried out using statistical data on agricultural enterprises of Ukraine, including the Steppe, Forest-Steppe and Polessye zones, which produced milk in 2016. In general, in 2016 in Ukraine there were 1,386 enterprises, including 285 enterprises in the Steppe zone, 752 enterprises in the Forest-Steppe zone, and 349 enterprises in the Polessye zone. In the analyzed set of enterprises milk profitability is low, the number of cows is decreasing. A technique is proposed to support and increase livestock population in Ukraine and its zones. The basis of the proposed method is to subsidize the area of fodder crops.

The main idea of the presented methodology is to bring the level of milk production profitability in Ukrainian agricultural enterprises to the average barley profitability level in the zone as a fodder crop. The profitability level of the cattle breeding industry products was determined per 1 ha of fodder crops. Then, the profitability of 1 hectare of barley in the middle of the zone and 1 the profitability of milk per 1 ha of fodder crops was compared. The difference must be reimbursed to the milk producing enterprise. Maintaining profitability of milk production at barley level allows to keep the number of cattle, including cows, and in some cases, to even increase the number of livestock.

The proposed method has the following expression:

$$S = Sf \cdot (Pb - Pm) \cdot I$$

If the difference between the profit from barley and milk sale is negative, the subsidy is not calculated.

Sf – the actual area of fodder crops in the farm, ha;
Pb - profit value from the sale of barley per 1 ha of the harvested area, dollars by zone;
Pm – profit value from milk sale per 1 ha of fodder crops in the enterprise, USD;
I – ratio of cows productivity level at a particular enterprise to its average level by the zone (for the last 3 years).

Results and Discussion

In economic literature, one can find a large number of approaches to justification of mechanisms supporting development of industries. They all can be conditionally represented in the form of calculated indicators, showing the level of industry development, its support; analysis of certain dependencies on the basis of which it is possible to determine the degree of state support's influence on financial and other indices of the industry development; development of models showing an overall picture of changes in the industry in the formation of a specific program of its support, etc.

When developing programs to support agricultural sector of the economy, we often refer to the World Trade Organization requirements where support is provided in accordance with three baskets (green, yellow, blue). The content of the set of support activities in each basket is regulated by the "Agreement on Sanitary and Phytosanitary Measures" (Agreement on Sanitary and Phytosanitary Measures, 1994).

The long-term task of the "Agreement on Agriculture" is a gradual decrease in support and protection of agriculture. It is implemented through agricultural support activities that have the greatest protectionist and stimulating influence on agricultural production, aimed at protecting domestic agro-food market. The agreement addresses issues of market access, support of the domestic producer, export competition and achievement of agreements on sanitary and phytosanitary measures.

"Green box" activities include support through government programs financed by public rather than consumer funds, and are not aimed at supporting production volumes and producer prices. Government programs provide services related to research, including environmental protection; pest and disease control; education, including training of specialists; services for disseminating information for consulting services, including communicating research results to producers and consumers; services for inspection, including identification of compliance with health, safety, quality and standards; marketing and promotion services; infrastructure services, and others.

As a member of the WTO, a state can support activities of the "green box" without restrictions, depending on its budget.

Table 1

Support of agrarian sector, all countries, mln. EUR

	1995-1997	2015-2017	2015	2016	2017
Total cost of produced agricultural products	924,273	2,628,696	2,633,305	2,600,236	2,652,546
Producers' support (PSE)	214,159	434,176	442,740	450,925	408,863
Ratio of producers' support to the total value of agricultural products, %	23.2	16.5	16.8	17.3	15.4
Ratio of producers' support to the total support, %	76.4	78.0	77.5	78.8	77.8
Shared Services Support (GSSE)	45,365	77,527	83,456	76,196	72,928
Ratio of general services support to the total value of agricultural products, %	4.9	2.9	3.2	2.9	2.7
Ratio of general services support to the total value of support, %	16.2	13.9	14.6	13.3	13.9
Customers' support (CSE)	-138,663	-230,034	-233,724	-244,301	-212,077
Total support value (TSE)	280,428	556,430	571,556	572,085	525 ,0

Calculated by the author, using data (Producer and Consumer Support Estimates database, 2018).

The "blue basket" activities are aimed at limiting overproduction of products by assisting structural reorganization in accordance with state programs, including those designed to free workers engaged in commodity production, removing land and other resources, including livestock from commodity production for at least three years, compensation for livestock elimination.

These payments are not related to the alternative use of land or other resources connected with production of marketable agricultural products. They should not concern the type or volume of production, the price of products, that is the result of production when using natural resources withdrawn from circulation (paragraph 9.10 «Agreements on agriculture»).

The amount of payments on this basket is limited by the amount required to compensate for the corresponding structural deficiencies.

«Yellow basket» activities that affect the volume of production and trade in agricultural products are questionable in the list of support activities. These include: subsidies for crop and livestock products, subsidies for mixed fodders, compensation for part of mineral fertilizers cost and animal protection means, electricity costs, price support, preferential loans to agricultural producers at the expense of the budget, leasing fund costs, etc.

The total value of support is determined to implement the «yellow basket» support activities,

defined as the annual amount of all types of state support that are subject to reduction obligations.

In Ukraine, there is an active process of adaptation to the conditions of using state support for the three baskets, an increase in "green box" activities in the volume of state support to agriculture, which in the opinion of scientists, will contribute to the development of depressed regions, environmental protection, development of market infrastructure for farms and will limit activities of the «yellow basket».

According to the OECD approach, agricultural support is defined as the annual monetary value of gross agricultural income in accordance with government policies in the area, increasing incomes or reducing farmers' expenses regardless of the goal or impact of this policy. This indicator includes the total volume of support (TSE), measured as a percentage of GDP. It is formed under the influence of producer support (PSE), consumer support (CSE) and support of general services (GSSE).

In accordance with the methodology proposed by the OECD, total support (TSE) is the support of producers, consumers of agricultural products and general services. These values during 1995-2017, as well as their ratio to the value of produced agricultural products and the total amount of support are given in Table 1.

Table 1 shows an increase in support of the agricultural sector in countries in the world from EUR 924,273 million in 1997-1997 up to EUR 2,628,696

million in 2015-2017 or by 1,704,423 million euros. General services support in the agrarian sphere was increasing most rapidly. In 2017, it increased almost twice compared to the average in 1995-1997, and amounted to 72,928 million EUR.

At the same time, according to the results of the OECD research, the main trends in supporting development of the agrarian sector of the economy in the countries in the world are:

- a slow downward trend in the producer support level, which is measured by specific weight of the PSE in the total value of support. It is more visible in the countries with low levels of support;

- stability in support of general services (GSSE), their specific weight in the total value of support (TSE);

- reduced support of market prices, which remains the main source of support of commodity producers and accounts for about 75% of total support (Legg, 2003).

Support of the agrarian sector has its own characteristics in each of the countries in the world. For countries whose economic policy in the agrarian sphere is being formed, topical issues are those of international cooperation in the agricultural sector with the World Bank, the EU and other countries of the world (Blizkovsky, Grega, & Verter, 2018). As a rule, in this case we consider influence of such support on development of agrarian products markets (Kotevska, Dimitrievski, & Erjavec, 2013).

Among the most widely used support instruments in the world there is price support of agriculture. It is calculated as a ratio of the internal product price to the world price (nominal protection factor NPC (Nominal Protection Coefficient), or as the price difference divided by the world price expressed as a percentage (NPR Nominal Protection Rate). If NPC equals 1, it characterizes a neutral state policy, if $NPC > 1$, agriculture is supported by the state (subsidized), if $NPC < 1$ - agriculture is taxed. The greater the NPC is from 1, the greater is influence of state agrarian policy on a particular type of product.

Influence of the state on agricultural products market can be traced, using an effective protection factor (EPC). It is defined as the ratio of value added at domestic prices to added value at world prices.

Each country in the world has programs to support the development of the agricultural sector of the economy. As a rule, they are aimed at developing agricultural business, maintaining sustainable agriculture, supporting innovation, managing risks, developing the agricultural market, etc. In Canada, for example, implementation of the AgriStability program allows to ensure a stable yield of agricultural production in case of unpredictable weather

conditions, harvest, disease of animals, market volatility and low prices on agricultural products. The AgrilInsurance program provides disaster insurance services to reduce financial or other losses (Agriculture and Agri-Food Canada, 2018).

The "Community Pasture Program" is interesting from the point of view of our studies. Implementation of this program is related to the work of the Land Management Service. It is aimed at restoring the land cover, improving the ecological value of lands, increasing their productivity. Damaged land is used mainly for cattle grazing and breeding. The grazing program is aimed at supporting a healthy, diverse landscape, preserving natural ecosystems.

Accordingly, a model of effective trade liberalization of the agrarian sphere in developing countries is presented in some recent publications (Erokhin, Ivolga, & Heijman, 2014). The model allows to assess agricultural market's sensitivity to import tariffs, subsidies. The authors of the article come to the conclusion that developing countries have limited opportunities to create sufficient support of the domestic commodity producer. Integration into international trade forces them to open domestic markets for foreign agricultural machinery, agricultural and food products, which leads to a reduction in domestic production.

There are a number of publications in economic literature on the development strategy of agriculture and its branches (Svitovyi, 2016), financial instruments and their impact on its stable development, level of its profitability, competitiveness (Stehnei, Irtysheva, & Korol, 2017; Hutnik, 1996).

Issues of state support are considered in the ecological and economic aspect. As a rule, such developments concern the solution to both economic and environmental problems. An example can be the project "Economic-Ecological Optimization Model of Land and Resource Use at Farm-Aggregated Level", developed by Sommer R., Djanibecov N., Muller M, Salaev O. (Sommer, *et al.*, 2012). Its implementation is aimed at ensuring environmental and economic optimization of land distribution at the level of farms and associations in Uzbekistan.

The work of Schulz T., Lauber S., Herzoq F. «Summer Farms in Switzerland: Profitability and Public Financial Support» is interesting in this aspect. The article summarizes results of a study of the Swiss research program AlpFUTUR regarding profitability and state support of summer camps. Thus, the conclusion is made that the profitability of livestock production depends on the size of summer camps, their ability to create additional value (cheese industry, direct sales of products). At the same time, state support is an essential element in support of agro-

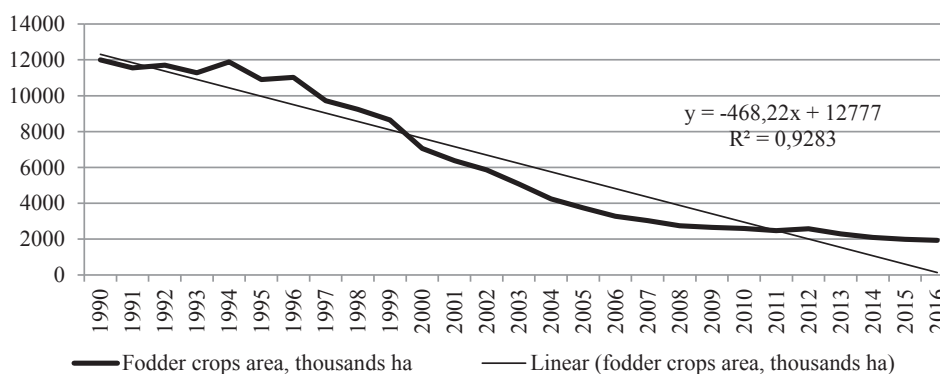


Figure 1. Dynamics of fodder crops on cultivated areas in Ukraine in 1990-2016.

ecological subsystems (Schulz, Lauber, & Herzoq, 2018). Whichever approach is adopted in the state regulation of agriculture development, including the sector of cattle breeding, it is necessary to formulate clear principles and the mechanism for its operation.

A widespread view in modern scientific literature is that the state support of agriculture should be aimed at: creating conditions for profitable production, which is possible due to its expanded reproduction; solving social problems in the countryside (including improvement of their families' welfare); forming conditions for the integrated development of rural areas; satisfaction of the population's needs for a sufficient number of high-quality food products.

According to the theme of our research – the development of measures to curb reduction of cattle number in the enterprises of Ukraine - it would be expedient to put the task of meeting the population's needs in high-quality food in sufficient quantity. The basis for this provision implementation would be support of the industry's profitable production, solution to social problems, problems of rural territories development.

Thereby, state support in the countries of the world is one of the key elements in supporting development of agricultural production. Each of the countries approaches to the solution of the problem from different points of view. Determining position in the formation of such support is definition of the object of support - what it aims at, definition of the expected result. In our study the object of state support is the area of fodder crops in milk producing enterprises.

According to statistical data of State Statistical Committee of Ukraine the size of fodder land in Ukraine in 1990-2016 had a clear tendency to decrease (Figure 1). So, during the analyzed period, the area under fodder crops decreased by 84% and in 2016 was 1932 thousand ha.

At the same time, the specific weight of fodder crops relative to the area of cereals and leguminous crops and sunflower significantly reduced (Table 2). In 1990, the specific weight of fodder crops in the area

of the cereals and leguminous crops, specific area of fodder crops decreased from 82.3% in 1990 to 13.4% in 2016, or by 69.9%.

Regarding the area of sunflower, it can be noted that in 1990 the area of fodder crops exceeded the sunflower area by 7.334 times, and in 2016 it was only 31.8% of its value that year. That is, in recent years there have been significant changes in the structure of crop areas.

The situation that has developed is due to various reasons. One of them is purely economic - a higher level of profitability in the production of cereals and legumes and the possibility to obtain super-profits in production and sale of sunflower (Table 3).

Table 3 data confirm the thesis that sunflower seeds are highly profitable. During the analyzed period (1990-2016), sunflower profitability reached 541.6% (1992). In 2015, sunflower profitability was 78.4% and 61.9% in 2016.

Cereals and legumes profitability was somewhat lower compared to the level of profitability of sunflower. Meanwhile, during the analyzed period cereals and legumes were profitable. The least value of cereals and leguminous crops profitability was in 1998, amounting to 1.9%, the largest - 361.1% in 1993.

The situation is more complicated regarding profitability (loss) of livestock production. Profitability (unprofitability) of milk production during 1990-2016 was of fluctuating character. In some of the years, unprofitability level reached 53.7% (1997), and the profitability level was 39.6% (in 1992). In 2016, the level of profitability of milk production was 18.6%. In some periods growth of cattle production, however, was unprofitable, with loss exceeding 50%. Production of crops is actually cost-effective, sunflower is highly profitable, unlike production of the cattle-breeding industry (increase in cattle, milk).

Direction of agrarian enterprises of Ukraine to production of highly profitable crops at this stage and in the future raises issues of land quality, possibility of its restoration.

Table 2

Cultivated area of the main agricultural crops in Ukraine in 1990-2016

Cereal legumes	Cultivated area of the main agricultural crops, thousands ha			Ratio of fodder crops area to		
	Fodder crops	Sunflower	area of cereal and leguminous crops, %	sunflower area, %		
1	2	3	4	$5 = 3/2 \cdot 100$	$6 = 3 / 4 \cdot 100$	
1990	14,583	11,999	1,636	82.3	733.4	
1991	14,671	11,555	1,601	78.8	721.7	
1992	13,903	11,707	1,641	84.2	713.4	
1993	14,305	11,287	1,637	78.9	689.5	
1994	13,527	11,881	1,784	87.8	666.0	
1995	14,152	10,898	2,020	77.0	539.5	
1996	13,248	11,026	2,107	83.2	523.3	
1997	15,051	9,720	2,065	64.6	470.7	
1998	13,718	9,236	2,531	67.3	364.9	
1999	13,154	8,653	2,889	65.8	299.5	
2000	13,646	7,063	2,943	51.8	240.0	
2001	15,586	6,375	2,502	40.9	254.8	
2002	15,448	5,858	2,834	37.9	206.7	
2003	12,495	5,074	4,001	40.6	126.8	
2004	15,434	4,243	3,521	27.5	120.5	
2005	15,005	3,738	3,743	24.9	99.9	
2006	14,515	3,277	3,964	22.6	82.7	
2007	15,115	3,028	3,604	20.0	84.0	
2008	15,636	2,752	4,306	17.6	63.9	
2009	15,837	2,658	4,232	16.8	62.8	
2010	15,090	2,599	4,572	17.2	56.8	
2011	15,724	2,477	4,739	15.8	52.3	
2012	15,449	2,475	5,194	16.0	47.7	
2013	16,210	2,289	5,051	14.1	45.3	
2014	14,801	2,101	5,257	14.2	40.0	
2015	14,739	1,990	5,105	13.5	39.0	
2016 ¹	14,401	1,932	6,073	13.4	31.8	
2016 to 2010	+,-	-182.0	-10,067	4,437	-68.9 p.p.	-701.6 p.p.
	%	98.8	16.1	371.2	-	-

1) Without accounting for the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the zone of antiterrorist operation

Plant crops use different combinations of soils during the growing season. In conditions of intensive farming the value of the law of returning elements to the soil significantly increases. The essence of the law is that the elements used by plants in the process of growth must return to the soil with fertilizers. Violation of this law can decline fertility. (Theory of mineral nutrition: a short course of lectures

for graduate students in the direction of education 36.01.2006 «Agriculture» (2004). Therefore, agrarian enterprises face a problem: not only to return nutrients to the soil, but also to ensure such their ratio that would increase crop yields.

If we consider the data on nutrients removal by agricultural crops, we can see that there is a significant difference in their values (Table 4).

Table 3

Dynamics of profitability (loss) of certain types of agricultural products, %

Year	Cereals and legumes	Sunflower	Milk	Meat cattle	Year	Cereals and legumes	Sunflower	Milk	Meat cattle
1990	275.1	236.5	32.2	20.6	2004	20.1	45.2	-0.4	-33.8
1991	166.2	307.6	21.7	43.9	2005	3.1	24.3	12.2	-25.0
1992	346.0	541.6	39.6	131.2	2006	7.4	20.7	-3.7	-38.4
1993	361.1	505.6	42.0	88.0	2007	28.7	75.9	13.8	-41.0
1994	214.1	224.1	-5.2	29.8	2008	16.4	18.4	4.1	-24.1
1995	85.6	170.9	-23.2	-19.8	2009	7.3	41.4	1.4	-32.9
1996	64.6	53.0	-44.0	-43.1	2010	13.9	64.7	17.9	-35.9
1997	37.5	19.4	-53.7	-61.5	2011	26.1	57.0	18.5	-24.8
1998	1.9	22.0	-46.7	-59.3	2012	15.8	44.9	1.8	-28.3
1999	12.0	54.5	-36.6	-57.9	2013	2.4	28.2	13.1	-41.3
2000	64.8	52.2	-6.0	-42.3	2014	25.7	36.7	11.1	-34.5
2001	43.3	68.7	-0.8	-21.4	2015	42.6	78.4	12.7	-16.9
2002	19.3	77.9	-13.8	-40.5	2016	37.8	61.9	18.6	-23.2
2003	45.8	64.3	9.9	-44.3	-	-	-	-	-

The data presented in Table 4 indicate significant removal of nutrients from the soil by sunflower (60 kg of active nitrogen, 26 kg of phosphorus, 210 kg of potassium). The next crops are winter crops, including winter wheat, whose nutrient removal

is also large (nitrogen 37 kg, phosphorus - 13 kg, potassium - 26 kg). Forage crops and pastures have low values for the size of fodder removal.

This information is interesting from the point of view of our research, as the problem of returning

Table 4

Nutrients removal by some agricultural crops

Crop	Per 10 centners of the main products with corresponding quantity collateral 1, kg		
	N	P ₂ O ₅	K ₂ O
Winter wheat	37	13	26
Winter rye	31	14	26
Barley	29	13	25
Oats	28	13	29
Millet	30	14	35
Sunflower	60	26	210
Fodder beets	6.5	1.5	8.5
Corn for silage	4.0	1.5	5.0
Vetch-oat mixture for green fodder and silage	2.0	1.0	4.0
Annual herbs for green fodder and silage	11.4	1.6	4.8
Annual grasses for silage	21.0	4.5	19.0
Perennial herbs on silage	3.7	1.5	3.9
Natural hayfields	1.5	0.5	2.0

Source: Theory of mineral nutrition: a short course of lectures for graduate students in the direction of education 36.01.2006 «Agriculture», 2014.

nutrients, used in the process of growing these crops, is urgent for production of cereals and sunflower. At the same time, from the ecological point of view, production of fodder crops, including annual and perennial ones for green fodder and silage, makes it expedient for practitioners to pay attention to them.

That is, an increase in the area of fodder crops for agricultural enterprises can be considered as one of the elements of a set of measures aimed at preserving and improving soil fertility.

Starting from this thesis, let us present our vision of the motivation of agricultural enterprises to increase the area under fodder crops.

Production profitability of certain crops determines the direction of the agricultural enterprise development. Table 5 shows profitability (loss) of the products analyzed in this study.

Due to a significant difference in profit per hectare of cereals and legumes, sunflower and livestock products per 1 ha of fodder crops, equalization of profits in the livestock sector and in the production of grain and leguminous crops can create conditions for maintaining the livestock sector. Such equalization of profitability is possible with support subsidies.

When calculating the amount of support subsidy between the profit per 1 hectare of cereals and legumes and milk per 1 ha of fodder crops, a significant amount of such support is obtained. It exceeds the existing capabilities of the state budget of Ukraine in the formation of such support (in 2018, 150.2 thousand USD).

To reduce its size and bring its values to a level that would be of interest to enterprises and could be paid by the budget as a subsidy, we turn to an analysis

Table 5

Profitability (loss) per 1 ha of corresponding types of agricultural products by zones in 2016, USD

	Cereals and legumes	Including barley	Sunflower	Per 1 ha of fodder crops		Profit difference per 1 ha		Milk yield (average for 3 years, kg)
				Cattle growth	milk	Cereals and legumes – milk	Barley – milk	
Ukraine	148.7	70.3	239.3	-59.0	51.2	97.5	19.0	5,694
Zone: Steppe	118.6	73.5	233.0	-91.6	20.7	97.9	52.8	5,183
Forest-steppe	184.5	67.7	255.7	-54.0	64.0	120.5	3.7	5,990
Polesyie	121.4	54.2	208.1	-48.4	45.0	76.4	9.2	5,174

Data presented in Table 5 show a significant difference in the profitability of the analyzed types of products. In 2016, sunflower was a highly profitable crop in Ukraine and its zones. The profit margin per 1 ha of the collected area varied from 208.1 USD in the Polesyie zone to 255.7 USD in the zone of the Forest steppe. Profitability of cereals and legumes was lower. It was the lowest in the Steppe zone, amounting to 118.6 dollars, the highest - in the Forest-Steppe - 184.5 USD ha⁻¹.

Production of cattle increment per 1 ha of fodder crops brought big losses to the enterprises. The biggest loss was in the Steppe, amounting to 91.6 USD ha⁻¹ of fodder crops. In milk sale, the profit per 1 ha of fodder crops was the lowest in the steppe, amounting to 20.7 USD ha⁻¹ of fodder crops, the largest - in the Forest-steppe - 64.0 USD.

of profitability from 1 ha of barley as a forage crop and a comparison of this value with the profitability of milk calculated per 1 ha of fodder crops (Table 5).

Difference between profitability of barley and milk in Ukraine in 2016 was 19 USD. This is almost 5 times less than the difference between profit on cereals and legumes and milk.

Dependence on the level of profitability was similar in the zones. They differed only in profitability of milk sales per 1 ha of fodder crops and barley.

To calculate the subsidies for equalizing profitability of milk production from 1 hectare of fodder crops and profitability of barley, we propose to use the proposed procedure.

The results of the methodology approbation are presented in Table 6. Two enterprises of the Polesyia zone with different sizes of fodder lands and different

Table 6

Subsidies for 1 hectare of fodder crops in individual enterprises of the Polessye zone, USD

	Area of fodder crops, ha, fact	Milk yield per 1 cow fact, kg	Ratio of milk yield of cows in the enterprise to the average by area	Profit per 1 hectare of barley in the zone, USD	Profit per 1 ha of fodder crops from the sale of milk, USD.	Difference in profitability per 1 ha of corresponding lands between the sale of barley and milk, USD	Subsidies
Enterprise 1	1,674	4,423	0.855	54.2	31.4	22.8	32,633
Enterprise 2	3,400	8,903	1.720	54.2	49.7	4.5	26,316
Polessye	-	5,174	-	-	-	-	-

levels of productivity were taken for the approbation. Enterprise 1 has 1,674 ha of fodder crops, the productivity of cows is 4,423 kg, which is 85.5% of the average level of productivity in the Polessye zone. In Enterprise 2, the area of fodder crops is substantially larger than in Enterprise 1 and amounts to 3,400 ha. Cow productivity is 8,903 kg, which is 1.72 times more than the average in the Polessye zone.

Difference in barley profitability per 1 hectare of harvested area and profits from the sale of milk per 1 hectare of fodder crops in the enterprise 1 was 22.8 USD, but in Enterprise 2 – 4.5 USD. It is possible to equalize barley and milk production profitability for the analyzed enterprises by using the proposed method.

The sum of subsidies per 1 enterprise according to the proposed methodology for Enterprise 1 will be 32,633 USD, but for Enterprise 2 – 26,316 USD. The received sum of subsidies will be able to equalize profitability of barley and milk production, which can be considered as the basis for keeping livestock in the herd of cattle in these enterprises.

In general, the presented methodology, in our opinion, will create conditions for supporting the existing livestock in the livestock industry. In total, for Ukrainian enterprises the sum of subsidies is about 37,552 thousand USD, which is equal to the fourth part of the amount allocated by the Government for the development of the livestock industry in 2016.

Conclusions

The results of the research show that the issues of state support of the cattle-breeding industry in Ukraine are the urgent ones. Their relevance rises in the conditions of the industry development in

agricultural enterprises and the current tendency to decrease the number of livestock in the industry.

It is expedient to base the formation of a support system of the livestock sector on the non-livestock population, in accordance with which the existing regulatory and legal framework supporting the cattle-breeding industry is formed, but the area of fodder crops, which, in addition to the economic effect (increasing the profitability of livestock production) will also have an ecologically positive effect.

The use of the proposed methodology will keep the interest of agricultural producers in the production of livestock products.

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