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## **Development of the State Support for Agriculture in Krasnoyarsk Region**

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***Abstract:***

*The work reviews the status of state support for agriculture in Krasnoyarsk region on an example of dairy cattle breeding. The main shortcomings of the existing mechanism of state support for agricultural organizations are shown. The authors proposed a new definition of the state support for agriculture and derived comprehensive indicators of the assessment of the level of profitability of the resources used in agricultural production. On the basis of the developed economic and statistical model, the standards of dairy cattle breeding subsidies are defined in terms of levels of productivity and characteristics of reproduction.*

***Key Words:*** *Krasnoyarsk Region, Agriculture, Dairy Cattle Breeding, State Support, Subsidy Standards*

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***JEL Classification :*** *H53, O13, Q15*

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## **1. Introduction**

Krasnoyarsk region took the fourth place among the subjects of the Siberian Federal District by agricultural production in 2013. The share of the region's agricultural production is 13.6% in the Siberian Federal District and 1.8% in the Russian Federation. However, the development of agriculture in the region is inhibited by a number of problems, including those related to industry features. In these circumstances, the state support plays an increasing role, because internal sources of financing are not enough for the further development of agricultural producers.

Dairy cattle's breeding plays an important role both in the Russian Federation and in Krasnoyarsk region. At the same time, this industry differs from other livestock breeding industries due to its inherent features: dairy cows are involved in all production cycles and are the main means of production; deficiencies in feeding cows affect animal productivity; milk production sharply reduces in the face of protein shortage; loss of products is significant at violation of at least one link in the production cycle, it reduces the quality of the products (Makarets L.I. and Makarets M.N., 2002).

The region takes the 2nd place among the subjects of the Siberian Federal District by milk production. Milk accounts for almost 16% of the value of the gross output of the region. However, in Krasnoyarsk region, the provision of the population by own milk production is 62% of the medical standards developed by the Institute of Nutrition. Therefore, the active participation of the state in the form of financial support for agricultural producers becomes essential.

A significant contribution to the study of the current state and issues of state support for agriculture, particularly dairy cattle breeding, was made by such prominent scientists as Baryshnikov N.G., Bepakhotny G.V., Vernigor N.F., Gamidov G.G., Gataulin A.M., Dordzhieva O., Kuznetsova E., Miguel Yu.A., Mikhailyuk O.N., Nechayev V.I., Pavlova G.S., Stadnik A.T., Syomin A.N., Sidorenko V., Shelkovnikov S.A. Their works served as the scientific basis for the research (Baryshnikov N.G., 2008; Bepakhotny G.V., 2006; Vernigor N.F., 2014; Gamidov G.G., 2007; Gataulin A.M., 2006; Dordzhieva O., 2006; Kuznetsova E., 2009; Miguel Yu.A., 2011; Mikhailyuk O.N., 2009; Nechayev V.I., 2010; Pavlova G.S., 2014, Stadnik A.T., 2014 ; Syomin A.N., 2007; Sidorenko V., 2006; Shelkovnikov S.A., 2010).

## **2. Methodology**

The following research methods were used in the work: abstract logical, monographic, economic and statistical, computational and constructive. A review of existing approaches to assessing the level of state support and determination of its standards revealed their significant shortcomings; comprehensive indicators

assessing the level of profitability of the resources used in agriculture were derived using abstract logical method, with and without taking into account the state support. Dynamics of the main indicators characterizing the development of the dairy cattle breeding industry in Krasnoyarsk region was revealed using the statistical method of research.

Levels of profitability in order to achieve by milk producers simple (the level of profitability is 15%), extensive (40) and innovation (60 and over) reproduction was determined on the basis of the monographic method of the research. Application of computational and constructive method allowed determining the standards of subsidies in the context of efficiency of cows according to the level of reproduction using the developed economic and statistical model.

### **3. Outcomes**

The concept of state support for agriculture was suggested, which, in contrast to the existing definitions, is understood as a set of forms, methods and mechanisms of state influence aimed to ensure a more complete and efficient use of resources of agricultural organizations to achieve extensive reproduction and satisfaction of the population with quality agricultural products of their own production. A comprehensive measure of profitability of the resources used was suggested as the ratio of profit to gross annual payroll of workers employed in agriculture, value of working capital and basic production assets and the cadastral value of agricultural land.

The standards of the budget support for milk production by agricultural organizations of Krasnoyarsk region are defined at different levels of efficiency of cows to achieve simple, extensive and innovation reproduction on the basis of the developed economic and statistical model for calculating production costs required to produce a given volume of milk in the future. It was calculated that the groups of agricultural organizations with milk yield of 4,000-5,000 and 5,000-6,000 kg per head with the state support in the amount of 12.8 to 54.1 thous. rub./head see the highest annual growth of productivity – 200 and 150 kg/head respectively.

### **4. Discussion**

Under present conditions, the role of the state support for agriculture in Russia increases. This is primarily due to the specific features of agricultural production. According to the authors, state support for agriculture is a combination of the forms of state influence aimed to ensure sustainable development and a more complete and efficient use of all resources of agricultural organizations that produce quality products to meet the needs of the population.

The state support for agricultural producers of Krasnoyarsk region is carried out mainly at the expense of the regional budget (Table 1). Thus, the share of funds

from the regional budget in 2010 amounted to 81.3% – this is the highest share over the study period. In the reporting year, the total amount of state support was recorded in the amount of 3,775.8 mln. rub., which is only 0.2% higher than the amount of budgetary infusions in 2009. At the same time, funding levels were lower for the 2010-2012 period. In addition, the share of consolidated budget expenditures on agriculture in the region remains low – 2.5% of the expenditure part of the regional budget (2014).

**Table 1. Financing of Agricultural Production at the Expense of Regional and Federal Budgets**

Year	Total amount of state support, mln. rub.	Regional budget funds in the total amount of state support, %	Federal budget funds in the total amount of state support, %
2009	3,768.3	70.3	29.7
2010	3,164.8	81.3	28.7
2011	3,066.3	73.0	27.0
2012	3,262.4	76.7	23.3
2013	3,775.8	64.7	35.3
2013 to 2009, %	100.2	92.0	118.9

In accordance with the law of Krasnoyarsk region "About state support for agricultural development in Krasnoyarsk region", the state support for agriculture in the region is carried out in the following areas today:

- support for agricultural crop and livestock production, production of meat, dairy, fish, flour and cereals, animal feed, baking and food industry;
- renewal of fixed assets of subjects of agribusiness;
- carrying out measures aimed at improving land management and land use, land planning, increase fertility of farmland, land reclamation, comprehensive agrochemical survey of farmland;
- carrying out measures in the field of livestock breeding;
- lending and insurance;
- scientific and information support for agribusiness, including the scientific and technical works, creation and development of information and advisory service of the regional agribusiness, publication of literature, coverage in the media, providing advisory services to subjects of the regional agribusiness;

- conducting regional, inter-regional (zonal) and all-Russia competitions, exhibitions, conferences and events in agribusiness and participation of the subjects of the regional agribusiness;
- human resourcing in the regional agribusiness;
- carrying out activities in the area of marketing the products produced by the subjects of the regional agribusiness;
- housing improvements of citizens living in rural areas, young families and young professionals living or wishing to live in the countryside, working or wishing to work in the agribusiness organizations or social sphere in rural areas;
- development of small businesses in rural areas (agricultural consumer cooperatives, peasant (farming) businesses, citizens running private farms, individual entrepreneurs who are agricultural producers, consumer associations);
- sustainable development of rural areas; and
- other areas provided by individual regional and federal legislative acts (2014).

To evaluate the effectiveness of state support, its impact on the functioning of agricultural organizations, their use of existing resources, we have proposed new comprehensive indicators to measure the profitability level of the resources used by the agricultural organization without state support ( $PLres.$ ), and with state support ( $PLres_{.ss}$ ).

$PLres.$  is calculated using the following formula:

$$PLres. = \frac{Rv}{\sum Res.}, \quad (1)$$

where  $Rv$  – revenue, mln. rub.;

$\sum Res.$  – totality of resources used in agricultural production, mln. rub.

This indicator shows the effectiveness of using the combined resources by agricultural organizations, which are included in the annual wage fund of workers employed in agriculture, value of working capital and fixed assets and cadastral value of agricultural land.

To assess the impact of state support on these processes, the authors propose the following indicator:

$$PLres_{.ss} = \frac{Rv + SS}{\sum Res.}, \quad (2)$$

where *SS* – state support, mln. rub.

The values of some existing (Kovalenko, 2008) indicators and those proposed by the authors are presented in Table 2. Despite the increase in state support per 1 worker employed in the agricultural production, the employment in rural areas has declined over the study period. The share of state support in the value of the gross output is negligible; it decreased by 14.3% over 2009-2013. However, these figures are not enough to assess the level of budget funding.

**Table 2. Assessment of State Support for Agricultural Organizations of Krasnoyarsk Region**

Year	State support			<i>PLres.</i> , %	<i>PLres.<sub>SS</sub></i> , %
	per 1 ha of agricultural land, rub.	per 1 worker employed in the agricultural production, rub.	in the value of gross output, %		
2009	818.7	111,739.4	6.3	2.06	3.81
2010	1,566.0	87,801.6	6.0	1.70	2.43
2011	1,517.1	91,270.3	6.1	1.92	2.71
2012	1,612.0	98,065.7	5.1	2.10	3.80
2013	1,855.1	121,907.1	5.4	2.59	4.52

To ensure objectivity of assessment, the authors present the calculation of the proposed indicators determining the profitability level of the resources without state support (*PLres.*), and with state support (*PLres.<sub>SS</sub>*) (Formulas 1, 2). On average, in 2013, 1 rub. of resources accounted for only 2.59 kopecks of profit, and with state support – 4.52 kopecks. This suggests that the state funds are not enough to take full advantage of the region's agricultural resources. Yet the state support in the present conditions remains an essential element contributing to the development of agricultural production in the region.

The main method of implementation of the state support in the region is direct subsidy of the costs for livestock production, with the largest share in the amount of allocations taken by support for the production and sale of milk in the form of compensation payments for reimbursement.

Overall, the region saw a reduction of the average annual population of cows by 2.7% from 2009 to 2013 (Table 3). Almost all categories of livestock farms saw decrease in livestock population: agricultural organizations – 6.2, households – 1%. Only in the farms, the population has grown by 2.2 times. The main reason for the reduction of livestock population is a significant increase in production costs, which leads to an increase in the number of unprofitable enterprises in the industry in the

face of a lower rate of price growth. At the optimum herd structure in dairy cattle breeding, the proportion of cows should be about 50%. Over the study period, the proportion of cows in a herd of cattle in the region's agricultural organizations has increased, but not significantly – by 2.1%. Perhaps, this is due to the fact that the rate of slaughter of dairy herd was higher than the corresponding rates of slaughter of other types of cattle. At the same time, only in the households, the proportion of cows in the total cattle population better corresponds to the standards.

**Table 3. Key Indicators of Development of Dairy Cattle Breeding by Agricultural Producers of Krasnoyarsk Region**

Indicator	Year					2013 to 2009, %
	2009	2010	2011	2012	2013	
Average annual population of cows in farms of all categories – total, thous. heads	173.2	173.3	174.6	172.7	168.5	97.3
Including:						
- at agricultural organizations	89.6	88.9	89.5	87.5	84.0	93.8
- at households	82.2	82.9	83.1	82.2	81.4	99.0
- at farms	1.4	1.5	2.0	2.7	3.1	Growth by 2.2 times
Proportion of the population of cows in the total population of the cattle – total, %	39.2	39.9	39.7	39.2	39.4	100.5
Including:						
- at agricultural organizations	37.0	37.8	37.5	36.6	37.0	100.0
- at households	41.9	42.4	42.3	42.1	42.2	100.7
- at farms	39.2	40.0	46.5	42.9	40.8	104.1
Milk production in farms of all categories – total, thous. tons	701.8	707.4	721.4	726.9	708.1	100.9
Including:						
- at agricultural organizations	343.2	345.8	362.7	369.1	355.9	103.7
- at households	352.3	355.6	355.3	351.4	345.4	98.0
- at farms	6.3	5.9	5.7	6.4	6.8	107.9

Over 2009-2013, dairy cattle breeding in the agricultural organizations of the region was developing steadily (Table 4). Annual milk yield per cow in agricultural

organizations increased by 10.6%. Despite the reduction of dairy herd population, milk production increased as productivity increased. According to statistics, the average milk yield in the breeding plants amounted to 5,997 kg/head in 2013. The highest productivity of cows was recorded at the following agricultural organizations: CJSC "Solgonskoye" (West area) – 7,557 kg/head, CJSC "Nazarovskoye" (West area) – 6,687 kg/head, CJSC "Plemzavod "Tayozhny" (Suburban area) – 6,830 kg/head, CJSC "Iskra" (West area) – 7,297 kg/head, CJSC "Kansk strain-testing station" (East area) – 6,130 kg/head.

The calculated rate of the young offspring output from 100 dams only in 2009 was slightly below its physiological features (95 calves). Milk production in 2013 compared to 2009 increased by 3.7%, while the volume of sales increased by 12.1%. The level of marketability increased by 8.1% due to the increasing demand for local products.

**Table 4. Level of Development of Dairy Cattle Breeding in the Agricultural Organizations of Krasnoyarsk Region**

Indicator	Year					2013 to 2009, %
	2009	2010	2011	2012	2013	
Number of agricultural organizations	414	407	386	385	366	88.4
Average population of cows	89.6	88.9	89.5	87.5	84.0	93.8
– total, thous. heads	216	218	232	227	230	106.5
– per one agricultural organization, heads	2.8	4.4	4.4	4.3	4.2	Growth by 1.5 times
– per 100 ha of farmland, heads						
Annual milk yield per cow, kg	4,034	4,195	4,312	4,538	4,63	110.6
Output of calves per 100 cows, heads	94	95	101	108.5	102.6	109.1
Deaths of cows in %	0.2	0.2	0.2	0.2	0.2	100
Milk production						
– total, thous. tons	343.2	345.8	362.7	369.1	355.9	103.7
– per one agricultural organization, tons	829	849.6	939.3	959	972	117.2
– per 100 ha of farmland, dt.	106.4	171.1	179.5	182.6	176.1	165.5



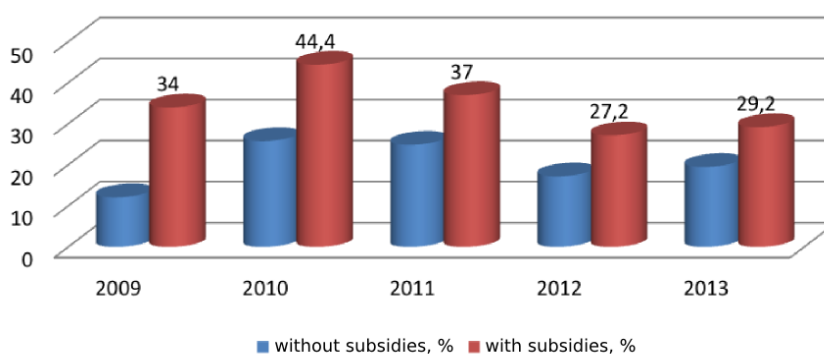
Volume of milk sales, thous. tons	288.3	311.5	329.5	335.7	323.3	112.1
Level of marketability, %	84.0	90.1	90.8	91.0	90.8	108.1

Over the study period, the terms of provision of the budget finds to milk producers have changed; thus, in accordance with the addendum to the law of Krasnoyarsk region "About the regional budget for 2013 and the planning period of 2014-2015", in 2013 the size of the provided subsidies depends on which group the farm organization belongs to:

- the first group – agricultural producers, except for citizens running private farms, located in the Taimyr, Dolgan-Nenets, Evenk municipal districts, Turukhansk district – 2,296 rub. per ton of milk;
- the second group – agricultural producers, except for citizens running private farms, located in the North-Yenisei, Yenisei, Boguchansk, Kezhemsk, Motynginsk, Birilyussk, Kazachinsk and Pirovsk districts – 1,722 rub. per ton of milk;
- the third group – agricultural producers, except for citizens running private farms, located in other areas of the region – 1,148 rub. per ton of milk (2012).

In 2013, the Procedure was also approved on subsidies from the federal budget for the partial reimbursement of the cost of agricultural producers for 1 liter (kilogram) of the market milk sold, including lists, forms, deadlines for submission and review of documents required for obtaining these subsidies. State support improves industry profitability (Figure 1).

**Figure 1. Dynamics of the Profitability Level of Milk Production and Sales in the Region**



The proportion of cost reimbursement in dairy cattle breeding of the region is insignificant. The agricultural producers were compensated on average 15% of production costs over the study period. Therefore, the amount of subsidies in livestock production must be determined based on changes in the cost of production by years.

The calculation of productivity of cows depending on production costs, cost of feed and population of cows was performed using the correlation and regression analysis by a representative sample of more than 100 agricultural enterprises of Krasnoyarsk region. The work analyzed the organizations with different specializations and production volumes. Therefore, the dairy livestock herd was calculated taking into account the area of agricultural land, and cost characteristics were calculated per cow. The equation of the parabola of the second order was chosen, which has the following form:

$$y=702.09871244+36.75411299x_1+0.64342287x_1^2-76.45752133x_2-3.96641297x_2^2+126.06422532x_3-8.98700123x_3^2, \quad (3)$$

where  $y$  – productivity of the dairy herd, kg/head;  $x_1$  – cost of keeping 1 head, thous. rub.;  $x_2$  – cost of feeding 1 head, thous. rub.,  $x_3$  – population of a dairy herd per 100 ha of agricultural land (Ovsyanko, 2012).

The suggested model allows calculation of operating costs required to produce a given volume of milk in the future (Table 5). The calculations used average regional values of the feed costs – 24 thousand rub./head and dairy herd population – 6 heads/100 ha of agricultural land.

Depending on the level of production development, the state compensates various proportions of costs of milk production by agricultural producers in the region to achieve simple (rate of return is 15%), extensive (40) and innovation (60 and over) reproduction.

**Table 5. Calculation of Standards of Budget Support for Milk Production in the Agricultural Organizations of Krasnoyarsk Region**

Milk yield, kg/head	Estimated costs per	Average annual	Rate of the need in subsidies per head, thousand. rub.
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	head, thous. rub.	growth of productivity kg/head	simple reproduction	extensive reproduction	innovation reproduction
up to 3,000	43.6	50	6.5	17.4	26.2
3,000 to 4,000	57.4	120	8.6	23.0	34.4
4,000 to 5,000	85.5	200	12.8	32.2	51.3
5,000 to 6,000	90.2	150	13.5	36.1	54.1
6,000 to 7,000	101.0	100	15.2	40.4	60.6
over 7,000	107.3	70	16.1	42.9	64.4

Rate of the need in subsidies granted for the development of milk production increases along with productivity growth. At that, the groups of agricultural organizations with milk yields of 4,000-5,000 and 5,000-6,000 kg/head have the highest annual productivity growth – 200 and 150 kg/head respectively. At organizations with the highest yields up to 7,000 kg/head and higher, it is important not to increase the productivity, because it reaches a maximum, but keep it at the reached level.

At milk yields from 4,000 to 6,000 kg/head, rate of the need for subsidies depending on the method of reproduction varies from 12.8 to 54.1 thousand rub/head. This is the productivity level the agricultural organizations should aim for, and state support for milk production should be focused on. Further, with an increase in productivity to more than 7,000 kg/head, the need for subsidies is significantly increased from 16.1 to 64.4 thousand rub / head with the reduction in growth. Thus, we have determined the optimal level of budgetary support for the growth of the dairy herd productivity.

## 5. Conclusion

In the present conditions, the state support is an essential element contributing to the development of agricultural production. The state support for agriculture should be a set of forms of state influence that form a system of methods of short-term and long-term measures aimed at ensuring a more comprehensive use of resources by agricultural organizations, improvement of its efficiency in order to provide the population with food of own production of appropriate quality and assortment.

To assess the effectiveness of the use of resources by agricultural organizations, the authors proposed new comprehensive indicators to determine the level of their profitability without ( $RLres.$ ) and with the state support ( $RLres_{ss}$ ). They reflect the amount of profit with and without the budget funds per 1 rub. of resources. On average, in 2009, 1 rub. of production resources accounted for only 2.59 kopecks of profit, and with state support – 4.52 kopecks. This suggests that the state support is not enough for the more efficient use of the region's agricultural resources.

The amount of budget financing of agricultural organizations in Krasnoyarsk region in comparison with 2009 has increased slightly and amounted to 3,775.8 million rub. in 2013. This had a positive impact on agricultural production: the proportion of profitable organizations increased by 3.6%. The predominant method of implementation of the state support in the region is a direct subsidy of the costs of production and sales. At the same time, one of the priority areas of the state support in the region is dairy cattle breeding. Despite the reduction in the population of cows by 6.2%, their productivity increased by 10.6%, and totaled to 4,463 kg from 1 head in 2013.

The standards of the budget support for milk production by agricultural organizations of Krasnoyarsk region, calculated by the authors using the developed economic and statistical model at different levels of dairy herds productivity from 3,000 to 7,000 kg/head and more, which allowed them to achieve simple (level of profitability is 15%), extensive (40) and innovation (60) reproduction, were 6.5 to 64.4 thousand rub. per head. Moreover, the state should support milk production both to ensure growth in productivity (milk yield in the range of 4,000-6,000 kg/head.) and to maintain the achieved level (7,000 kg/head and more).

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