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The Need to Diversify the Economy and Agriculture in the Transition to a New Technological Structure

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Abstract: Objective. An analysis of the current state of the agricultural industry of the Siberian Federal District Methodology. The following methods were used: statistical, monographic, graphic. Results. The authors revealed that the main producers of agricultural products are agricultural organizations, followed by households (ranking second) and peasant farms (ranking third). Use in practice. The authors examined the dynamics of production of major crops and livestock, which subsequently can be included into the development programs for state support of agriculture. Originality. The paper emphasizes that an increase in agricultural production is possible through the use of intensive factors of production.

Keywords: Agriculture, Regions, Animal Husbandry, Crop Production, Agricultural Producer.

I. INTRODUCTION

Siberia is one of those regions that play a crucial role in the formation of food supplies for the entire state. This plays a significant role in planning potential opportunities in the implementation of the Food Security Doctrine. However, it is worth noting that the period of long economic reforms significantly affected agricultural production, which was reflected in a decrease in agricultural production and weakening the economic potential of agricultural producers located in the Siberian Federal District (Sycheva et al., 2019).The main reason for the decline in agricultural production is the lack of efficient use of available resources, as well as problems with further sales of finished products of the agricultural sector.

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The growing of agricultural production and the further sale of finished products is one of the main tasks of the agro-industrial sector of the Siberian Federal District in the context of import substitution (Kuznetsova et al., 2019a; Bozhkova et al., 2019; Voronkova et al., 2019a,b; Frolova et al, 2019; Kuznetsov and Suprun, 2018; Mandal and Sanyal, 2019; Prakash and Garg, 2019; Kuznetsov et al., 2017).

II. LITERATURE REVIEW

The problem of agricultural development is the most important research topic of leading economic researchers and schools. A great contribution to the conceptual and practical issues of agricultural development was made by Altukhov, Ushachev, Paptsov, Chernyaeva, Pershukevich, Pankov, Sandu and many others.Among foreign economists, the problems of sustainable agricultural development are covered by Smith, Ricardo, Simon, Marshall, Pareto and others.

III. METHODS

As the main objective of the study, the authors put consideration and analysis of the main trends in the development of the agro-industrial sector of the Siberian Federal District.
In accordance with the objective, the object of study is the agriculture of the Siberian Federal District. The object of observations is agricultural producers and consumers of agricultural products.The subject of the study is the distribution of agricultural industries depending on climatic factors.The methodological and theoretical basis was the works by foreign and domestic scholars on the problem of agricultural development, regulations of the Russian Federation, decrees and reference materials.During the study, methods of statistical analysis, analogy and comparison, causal, graphic and monographic methods were used (Fedulova et al., 2019 a,b; Kilinc et al., 2018; Garafieva et al., 2019; Korableva et al., 2019; Gendler et al., 2019; Chernysheva et al., 2019).

IV. RESULTS

The Siberian Federal District is one of the largest agricultural districts located in the Russian Federation. The territory of the district occupies 30% of the land area of the Russian Federation, which in absolute terms amounts to 5,145 thousand square kilometers,

in terms of the size of the territory the district is second only to the Far Eastern Federal District being 6,169.3 thousand square kilometers, the share of which is 36%.

In terms of the number of people living in its area, the district ranks 3rd, which in absolute terms is 19,324.0 thousand people, inferior to the Central federal district (39,104.3 thousand people) and the Volga federal district (29,673.6 thousand people). The population density of the district is 3.8 people per 1 sq. km (Table 1).

Table 1 – Area and number of federal districts of the Russian Federation, 2018

Regions	Territory		Population size		Population density, people per 1 square. km
	Thousand sq. km	% To total	Thousand people	% To total	
The Russian Federation	17125,2	100,0	146544,7	100,0	8,6
By federal districts: Central	650,2	3,8	39104,3	26,7	60,1
North West	1687,0	9,8	13853,7	9,5	8,2
South	420,9	2,5	14044,6	9,6	33,4
North Caucasian	170,4	1,0	9718,0	6,6	57,0
Volga	1037,0	6,1	29673,6	20,2	28,6
Ural	1818,5	10,6	12308,1	8,4	6,8
Siberian	5145,0	30,0	19324,0	13,2	3,8
Far Eastern	6169,3	36,0	6195,0	4,2	1,0
Crimean	27,0	0,2	2323,4	1,6	86,1

The territory of the district has a favorable economic location, connecting the European and Eastern parts of the state. The Siberian Federal District includes 12 constituent entities of the Russian Federation. The geographical location of the district was of great importance in the formation of economic potential and the national division of labor. It is worth noting that the district occupies a significant territory and is located in several climatic zones, significantly different from each other, both in temperature conditions and in the development of natural systems (Kuznetsova et al., 2019b; Polyakova et al., 2018a,b; Dunets et al., 2019a,b; Ivanova et al., 2019; Pavlyshyn et al., 2019; Yamova et al., 2018; Garafiev et al., 2019; Glushkov et al., 2019; Paptsov and Nechaev, 2019).

At the end of the year, the district ranked 4th in the country's agricultural production. The share of agricultural products produced in Central district is 25%, Volga – 23%, Ural –19%, Siberian – 12.5% (Figure 1).

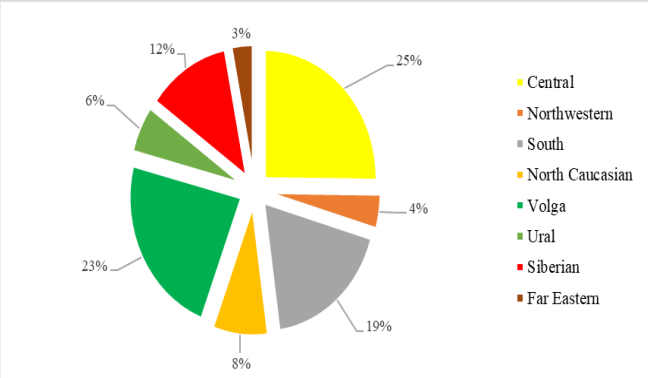

Figure 1 – Agricultural products, 2018, %

The Siberian Federal District specializes in dairy and beef cattle breeding, pig breeding, and poultry farming. In 2013 – 2018, steady dynamics of an increase in agricultural production by 53% is observed. The main crops are grain, potatoes and vegetables. Over the past 5 years, the grain harvest increased by 3%, potatoes and vegetables decreased by 8 and 5.5%, respectively.

The basis of animal husbandry is cattle breeding and pig farming. The number of cattle over 5 years decreased by 6%. As for milk production, despite the use of modern technologies in dairy cattle breeding, milk production decreased by 443.6 thousand tons. Positive changes have taken place in the poultry industry, primarily due to technological updating of the industry and an increase in consumer demand for finished products (Prodanova et al., 2019a,b,c; Akhmadeev et al., 2016; Banerjee and Mistri, 2019; Plaskova,et al., 2019; Nagimov et al., 2018). Egg production increased by 572 million pcs. or 9.6%.

Table 2 – Main indicators of agriculture in the Siberian Federal District

Indicators	Years					
	2013	2014	2015	2016	2017	2018
Agricultural products, million rubles	441028	428089	502653	543890	628955	672930
Gross harvest of major crops, thousand tons:						
Grain	14602,0	8996,5	15325,1	13018,3	13803,6	15059,7
Potatoes	5845,0	4478,9	5334,1	5330,4	5324,1	5346,9
Vegetables	1694,5	1600,1	1597,6	1530,1	1555,0	1602,9
Livestock (end of year), thousand heads						
Cattle	4319,0	4279,0	4171,2	4149,2	4119,1	4054,1
Pigs	3064,4	3226,9	3158,9	3139,8	3205,2	3029,6
Production of basic livestock products:						
Cattle and poultry for slaughter (in slaughter weight), thousand tons	1090,6	1145,1	1158,4	1162,1	1159,8	1174,1
Milk, thousand tons	5725,8	5582,8	5299,2	5389,3	5386,5	5285,2
Eggs, million pieces	5942,8	6178,4	6253,2	6332,9	6528,6	6515,6

During the period under review, there have been some changes in the structure of agriculture. A study of agriculture shows that agriculture is experiencing significant difficulties, despite some positive developments over the past few years (Kolmakov and Polyakova, 2019; Tarman, 2018; Ohlin, 2019; Saenko et al., 2019; Polyakova et al., 2018; Kashirskaya et al., 2019; Kolmakov et al., 2019). Existing problems in the agricultural sector do not allow agricultural producers to reach a new qualitative level of development. The Siberian Federal District ranks 2nd among the regions with the largest number of cattle after the Volga Federal District. However, over the years of economic reform, the reduction in the number of cattle was more than 2.5 times.

In the rating of other federal districts, the Siberian Federal District takes one of the leading places in the production of agricultural products, ranks second in the livestock quantity, and third in the pigs' population, milk and egg production, as well as the cultivation of grain and potatoes, among other federal districts.

Table 3 – Rating of Siberian Federal District among other regions in agricultural production, 2018

Regions	Picking vegetables	Agricultural products	Corn	Cattle stock	Pig population	Milk	Eggs	Potatoes
Siberian Federal District	5	4	4	2	3	3	3	3
Altai Republic	76	69	69	25	73	66	76	76
The Republic of Buryatia	61	66	65	17	45	50	65	58
Tyva Republic	79	77	71	45	72	71	81	75
The Republic of Khakassia	59	67	56	39	56	53	61	63
Altai region	16	8	4	4	9	3	16	6
Transbaikal region	67	62	62	11	49	35	68	57
Krasnoyarsk region	20	19	17	13	7	10	24	4
Irkutsk region	37	31	33	21	32	27	18	17
Kemerovo region	19	34	32	35	15	31	12	12
Novosibirsk region	25	22	18	10	19	14	11	25
Omsk region	18	21	12	15	11	15	22	16
Tomsk region	50	55	47	60	50	61	58	47

Agriculture is an industry on a coordinated operation of which the quality of life and health of the people depend. In the period preceding the reforms in the industry, large agricultural producers functioned safely, today the situation is such that in this sector of the economy, along with corporate bodies, there is a significant number of peasant farms. The structure shows that in the district there is a tendency towards a decrease in the number of agricultural organizations, due to an increase in peasant farms. The largest number of peasant farms is located in Omsk – 48%, Irkutsk – 46%, Kemerovo Regions – 44.2%.

In the current conditions, personal subsidiary plots occupy an important place in providing the population with food. To the greatest extent among the regions of the district, personal subsidiary plots were developed in the Republic of Tuva – 17.1%. Although a number of difficulties arise when maintaining personal subsidiary plots, households fully provide themselves with the necessary food products (Glotko et al., 2019; Kosenchuk et al., 2019; Aleshko et al., 2019; Goryushkina et al., 2019c,d; Lomova et al., 2019; Kolupaev et al., 2019; Safiullin and Akhmetshin, 2019). The share of private household plots in the overall structure of agricultural production is negligible, which is associated with low purchase prices and underdeveloped procurement points.

Table 4 – Structure of the supply of agricultural products of the Siberian Federal District, %

Regions	Agricultural organizations			Households			Peasant (farmer) households		
	2012 r.	2015 r.	2018 r.	2012 r.	2015 r.	2018 r.	2012 r.	2015 r.	2018 r.
Siberian Federal District	72,2	64,8	63,9	0,6	0,6	0,6	27,2	34,6	35,5
Altai Republic	88,5	85,1	81,9	0,2	0	0	11,3	14,9	18,1
The Republic of Buryatia	86,2	72,8	65,9	0,3	1,8	1,9	13,6	25,4	32,3
Tyva Republic	62,8	29,7	49,2	19,8	59,4	17,1	17,4	10,9	33,8
The Republic of Khakassia	70,3	68,9	59,2	-	-	-	29,7	31,1	40,8
Altai region	69,5	62,4	61,4	0	-	-	30,5	37,6	38,6
Transbaikal region	86,0	86,9	80,2	0,1	1,3	0,7	13,9	11,8	19,1
Krasnoyarsk region	90,1	86,5	84,9	0,3	0,3	0,3	9,5	13,2	14,8
Irkutsk region	63,1	54,5	53,5	0,3	0,6	0,5	36,6	44,9	46,0
Kemerovo region	56,6	53,4	53,8	1,5	3,0	2,0	41,9	43,7	44,2
Novosibirsk region	79,8	72,6	72,0	0,5	0,2	0,2	19,7	27,2	27,2
Omsk region	56,2	51,5	50,4	1,9	1,2	1,5	41,9	47,3	48,0
Tomsk region	79,8	74,2	76,0	0,1	0,2	0,1	20,1	25,6	23,9

Small producers of agricultural products have a significant competitive advantage over large organizations, as they can respond more quickly to market needs of consumers. Over the past 20 years, agricultural products in actual prices have increased by more than 15 times, but this does not allow one to conclude on the stable development of the industry, since high inflation rates significantly reduce the income of agricultural producers. Thus, the financial situation of producers can be judged by the index of agricultural production in comparison with the previous year.

Table 5 – Indices of the physical volume of agricultural production, %

Regions	Livestock Production Volume Index			Crop production volume index			Agricultural Production Volume Index		
	2013	2015	2018	2013	2015	2018	2013	2015	2018
Siberian Federal District	98,7	100,1	99,3	130,7	104,0	109,5	130,7	104,0	109,4
Altai Republic	100,1	101,4	100,2	113,7	97,0	113,3	113,7	97,0	109,8
The Republic of Buryatia	106,8	95,4	100,9	94,8	81,2	113,5	94,8	81,2	114,2
Tyva Republic	101,6	100,8	100,2	97,5	88,2	115,1	97,5	88,2	114,0
The Republic of Khakassia	102,3	97,4	98,1	95,9	83,5	110,0	95,9	83,5	107,1
Altai region	98,4	99,4	97,7	148,9	115,6	125,2	148,9	115,6	125,4
Transbaikal region	102,8	100,0	96,2	92,5	79,8	104,3	92,5	79,8	103,2
Krasnoyarsk region	97,2	103,1	104,5	104,5	101,2	105,6	104,5	101,2	106,0
Irkutsk region	100,9	100,2	99,6	103,9	86,0	114,5	103,9	86,0	113,4
Kemerovo region	99,7	104,7	100,4	125,3	103,6	100,5	125,3	103,6	100,3
Novosibirsk region	95,0	99,4	101,3	140,9	112,6	100,8	140,9	112,6	100,6
Omsk region	97,1	96,7	96,5	170,2	104,4	99,4	170,2	104,4	99,3
Tomsk region	99,6	102,8	92,1	129,9	107,9	105,1	129,9	107,9	104,1

At the end of 2018, the agricultural production index in farms of all categories amounted to 109.4% compared to the previous year. The crop production index was 99.3%, livestock – 109.5%.

Negative changes in the decrease in agricultural production over the period under consideration affected Omsk Region – 99.3%, Kemerovo Region – 100.3% and Novosibirsk Region – 100.3%. First of all, this is due to a decrease in sown areas and a reduction in the livestock population.

Of particular importance for the development of agriculture in the Siberian Federal District is livestock. The climatic conditions of the district with a predominance of steppe and mountain-steppe terrain have a favorable effect on the development of the livestock industry. Its share is approximately 57%. A retrospective review indicates unsustainable agricultural development. Slower livestock production is caused by a wide range of problems the industry is facing (Plaskova et al., 2017; Goloshchapova et al., 2018; Goryushkina et al., 2019a,b; Kosov et al., 2016).

First of all, this is because of the complexity and energy intensity, as well as low prices for the final products and high costs associated with the procurement and storage of animal feed. For many agricultural organizations, animal husbandry has become unprofitable, due to difficulties with the further sale of products. Reduced production is observed in Tomsk, Omsk, Irkutsk Regions, as well as in Trans-Baikal and Altai Territories. The situation is the best in Novosibirsk Region, since there is a steady annual increase in the volume of output in the livestock industry (Kuznetsova et al., 2016; Frolova et al., 2019; Regaña et al., 2019; Boutelier, 2019; Masood et al., 2019).

It should be noted that during the economic reforms over the last few decades, the main damage was suffered by the enterprises engaged in crop production. In particular, this affected Republic of Buryatia, Trans-Baikal Territory, Novosibirsk and Kemerovo Regions. The largest sown areas are located in Altai Territory – 5,409.3, Omsk Region – 3,029.9 and Novosibirsk Regions – 2,353.3 thousand ha.

Table 6 – Sown area of crops (thousand ha)

ions	Sown area				Sown areas for grain			
	2000 г.	2015 г.	2016 г.	2018 г.	2000 г.	2015 г.	2016 г.	201
erian Federal trict	16738,8	15026,7	15072,6	15125,3	10178,6	9883,3	9887,6	988
ai Republic	106,2	108,3	103,7	102,1	19,4	6,5	5,8	4,9
Republic of yatia	361,6	154,0	146,6	143,2	252,9	85,5	83,9	82,4
/a Republic	44,2	27,2	35,4	34,3	29,4	6,1	5,9	5,8
Republic of akassia	280,9	240,4	242,1	241,3	140,3	92,7	91,8	92,1
ai region	5344,9	5394,3	5409,3	5407,6	3415,1	3632,1	3633,2	375
nsbaikal region	1926,4	208,2	199,4	200,0	1083,3	1043,4	1111,5	121
snoyarsk region	339,6	1538,1	1559,4	1596,9	243,3	139,7	139,8	135
tsk region	938,7	675,3	676,5	678,1	559,6	410,5	412,3	414
nerovo region	1141,6	971,7	961,2	963,3	643,5	605,8	607,6	609
vosibirsk region	2718,8	2339,2	2353,3	2358,7	1743,4	1517,6	1578,9	164
sk region	2964,8	3029,4	3029,9	3031,1	1778,8	2146,0	2148,3	220
nsk region	488,4	339,9	356,0	358,8	270,1	197,6	196,5	198

Significant volatility in crop production profitability indicates that agriculture is heavily influenced by the climatic conditions associated with the geographical location of the district. In addition, one of the reasons for the decrease in crop production is the decrease in the fertility of agricultural land due to the lack of replenishment of nutrients of mineral fertilizers, as well as the lack of measures to protect plants. The provision of the industry with agricultural machinery has significantly decreased over the years of reform, which leads to an increase in the load per unit of equipment by 2-2.5 times. This leads to an increase in harvesting time, resulting in the loss of a significant number of agricultural products.

As for livestock, the most profitable agricultural organizations are located in Tomsk region – 34%, Altai Territory – 36.2%, Krasnoyarsk Territory – 21.5% and Novosibirsk Region – 19.8%.

V. CONCLUSION

An assessment of the development of agriculture in the Siberian Federal District allows one to conclude that the further development of the industry may be carried out in several ways, by attracting additional production sources – extensive, and by changing the efficiency of existing economic production resources. In economic theory, this path is called intensive and involves the use of highly skilled workers, advanced digital technologies, as well as the use of available land resources with greater efficiency, due to the timely introduction of organic and mineral fertilizers. The implementation of further measures to introduce digital technologies requires significant budget funding, as it is associated with an increase in the efficiency of agricultural production (Kuznetsova et al., 2019c).

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