Agriculture in Russia: Structure and Progress Trends

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The features of the regional differentiation of agricultural production in the Russian Federation are considered, given the existing climatic, financial and economic characteristics for 1990-2012. The natures of the variations of indicators of crop and livestock production are investigated, and an analysis of structural changes in the distribution of indicators of agricultural production by federal districts of Russia is conducted. The results of multidimensional classification are received in order to assess the level of development of the crop production in the regions of the country. The factors of crop production development are derived, and a regression model is built describing the influence of the derived factors on gross yield of grain and leguminous crops.

Key words: Agriculture, crop production, livestock production, Regional differentiation, structural changes, variation.

Peculiarity of agricultural production in Russia is the presence of significant differentiation, both by type and volume of production. Agricultural utilization of territories naturally varies from north to south and has an impact on livestock and crop production. It is worth noting that while the northern areas of the country have historically specialized in livestock production, which is primarily due to the harsh climatic conditions and low soil fertility, the central and southern areas with more favorable conditions (black soil and mild climate) have specialized in crop production[1].

Crop production in tundra zone is impossible due to the harsh climate, but there are extensive pastures in the area covered with reindeer moss, which provides for the successful branch of livestock production – reindeer farming.

Isolated areas of crop and livestock production appear in the northern part of the forest zone, along the river valleys (because the soil is more fertile and better drained there), but their area is negligible. For example, in the Arkhangelsk region, the share of agricultural land in total land area is only 1.5%, of arable land – 0.5% of agricultural land, the rest is hayfields and pastures. In the Vologda region, the share of agricultural land increases to 10% (arable land – up to 6%), and in Yaroslavl region – 32% and 22%, respectively. Agricultural development here is not patchy (like in the north), but selective, resulting in a prevalence of livestock over the crop production. The same can be said of the forest zone, where the share of agricultural land increases to 50-60%, and arable land – up to 35-45% (Bryansk, Ryazan regions).

Maximum of the plowing falls on the steppe regions: Kurgan, Lipetsk, Saratov, Rostov and other regions with a share of agricultural land

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of more than 80% and arable land of more than 60%. These areas are characterized by high volumes of crop production and a high level of agricultural development in general.

The share of arable land is reduced in the southern parts of the country: in some cases, because of the arid climate (for example, in Kalmykia, arable land in the zone of dry steppes and semi-deserts accounts for only 13% of the area, and pastures – for 73%), while in others it is because of the mountainous terrain (for example, arable land in Dagestan accounts for only 10% of the territory), thereby maintaining crop is almost impossible – however, the level of livestock production development is quite high, with its distinctive feature being the presence of sheep farming[2].

The above factors undoubtedly have an impact on the process of agricultural production and its regional differentiation. However, the possibility of using the natural potential of the territory depends on the level of development of the productive forces, which stipulates the technical equipment of agricultural industry, and on the nature of industrial relations associated with types of production, many social and economic and other aspects of the organization of production. As noted above, in addition to climatic factors, we can single out social and economic factors of territorial differentiation of agriculture as well[3].

Strengthening of the urban population growth rates contributes to the constant change in the territorial organization of agriculture within a particular area. Further growth of cities with a population of over 250 thous. people and, especially, over 500 thous. inhabitants is an important economic factor in the territorial organization of agriculture.

Another factor is different distance of agricultural production sites from the places of consumption and processing, i.e. transport and geographical location of agricultural enterprises, especially those manufacturing not transportable products.

Spatial localization of human resources associated with attributes of settlement in different types of rural areas has undeniable influence on territorial differentiation. Quantitative assessment of human resources stems from differences in complexity of different types of agricultural production at a certain level of mechanization of production processes. With the development of scientific and technological progress and integrated automation of agriculture, there is an increase in labor productivity in all its industries, although differences remain in the cost of living labor between the individual areas of crop and livestock production.

Thus, a combination of natural and economic factors stipulates the specialization of agricultural production that leads to the territorial differentiation.

Let's consider the features of the distribution of agricultural production by individual federal districts of the Russian Federation. Differences in terms of production and their changes determine the variation in livestock production in different regions of the country.

The peculiarity of investigating the patterns of change in volumes of livestock production is that the study of dynamics and territorial variation is focused on mainly consolidated and average regional indicators that already reflect certain trends and negate intraregional variability due to random and secondary causes. In this connection, the analysis of variation indicators for a number of years helps identify the presence or absence of trends in these parameters.

Findings

Study of regional differentiation of livestock production

To analyze the variation of certain types of livestock production, the sector's production indicators by federal districts of the Russian Federation in 1990 – 2012 serve as an information base (Table 1). [4,5]

It should be noted that gross milk production varies within each federal district, but this variation is different. There are districts in which the variability of production is negligible, and we can talk about a relatively stable level of production from year to year (variation coefficients[6] range from 12.0% to 29.7%). However, the variability of milk production at the Far Eastern Federal District from year to year is quite large and amounts to 37.8%.

Analysis of the livestock and poultry production in live weight by individual subjects of the Federation showed that the figure is not stable over time within individual subjects and ranges

from 20.0% to 48.5%. There are two groups of regions by the degree of variation in the volume of livestock and poultry production in live weight: the first includes the Volga, Siberian, Urals, Central and Southern Federal Districts and is characterized by slight changes in output, and the second, with a sufficiently strong variation, includes North Western and Far Eastern districts.

Indicators of variation[7,8] of egg production slightly vary within individual federal districts – the greatest variability in production falls for the Far Eastern Federal District (33.4%).

Analysis of the regional differences in crop production

Analyzing the regional differentiation in crop production in Russia, we should note that more than 50% of total yield of grain crops are provided by Southern and Siberian Federal Districts. The first place in grain production is taken by the Krasnodar region, where gross grain yield in 2012 amounted to 16.3% of total gross yield across the country, which is 12 times the average level of production in Russia in general. Stavropol, Altai, Rostov and Novosibirsk regions also stand out.

The largest volume of sugar beet is produced in the Central Federal District – 50% of the total yield in Russia; 35% of the yield of sugar beet is harvested in the Southern Federal District.

Krasnodar region takes the first place for the production of sunflower in 2012 (1,028.8 thous. tons), followed by Rostov (901.1 thous. tons), Saratov (435.2 thous. tons) and Voronezh (421.5 thous. tons) regions.

Potatoes are produced in almost all regions of the Russian Federation, primarily in the Siberian and Central Federal Districts. The largest volume of potatoes by regions is harvested in Krasnoyarsk (1,253.8 thous. tons) and Altai regions (838.8 thous. tons), Omsk (763.7 thous. tons) and Bryansk (701.8 thous. tons) regions. The calculated coefficients of variation indicate an uneven distribution of the gross harvest of potatoes by the subjects of the Russian Federation (31.1% to 39.6%), demonstrating the constancy of variation indicators over time and indicating a stable nature of variation.

The most favorable conditions for the production of vegetables are in Southern, Volga and Central Federal Districts; the maximum yield of vegetables is harvested in the Republic of Dagestan – 950 thous. tons, and more than 650 thous. tons in Krasnodar, Volgograd and Astrakhan regions. Krasnodar region is in the first place for the production of fruit, berries and cucurbits crops (213.3 thousand. T), followed by Moscow (140 thous. tons), Volgograd (131.7 thous. tons) regions and the Republic of Dagestan (109.5 thous. tons). Analyzing the indicators of variations in the gross harvest of vegetables, it can be noted that the annual decline in the values of the indicators was traced from 1991 to 2000, but there has been significant growth of variations and the greatest value of variation indicators in 2009.

Analyzing the variation of the gross grain harvest by the subjects of the Russian Federation for 1990 – 2012, the presence of a downward trend for the variation until 1998 can be noted. In general, it can be noted that the grain production in Russia is subject to greater differentiation by federal districts than the gross yield of vegetables and potatoes (Table 2).

In general, all subjects of the Russian Federation can be divided into three groups according to the level of crop production development – the cluster analysis method[9,10]. The first cluster brings together regions with high rates of gross yield of the main crop products (grain, potatoes, vegetables); the second – with the average level; the third – with low levels of crop production (Table 3).

The first cluster is made up from Krasnodar, Stavropol, Altai and Rostov regions, which are leaders in the production of main crop products: grain – 6,918.5 thous. tons, potatoes – 483.8 thous. tons, vegetables – 408.1 thous. tons.

The second cluster includes 26 subjects of the federation located in the central part of the Russian Federation, representing mainly the black earth zone, Urals and southern Siberia regions, i.e. regions with favorable climatic conditions. This group is characterized by the following average values of gross yield: grain – 1,041.1 thous. tons, potatoes – 452.47 thous. tons, vegetables – 209.4 thous. tons.

In 2012, the average volume of grain production in the third cluster, which includes 48 regions, amounted to 129.6 thous. tons, potatoes – 154,9 thous. tons, vegetables – 105.2 thous. tons (most of the subjects of the northern part of the

Russian Federation and the Far East, i.e. the regions located on the territory with the adverse climatic conditions).

A strong differentiation of subjects of the Russian Federation by the production of grain, potatoes and vegetables was observed in 2011-2012: more than 61% of the subjects had low levels of gross harvest and only 5% of the regions can be called the leaders in production. Average values of grain production indicators in this group are 6 times the average cluster values. 14% of the subjects could be included in the leading group in 1990, and the average value in 56% of the regions was almost 4 times the value of 2011 for this group. These data clearly reflect the widening gap between the subjects of the Russian Federation by the production of the main crops products and the reduction of regions with high indicators, and demonstrate the specialization of regions in production of certain products. State measures are focused on the development of certain types of crop production in a specific region, which under the given climatic conditions shows good results at the lowest cost.

The state budget allocated 600 mln. rubles to the support of the subjects of the Russian Federation in the area of crop development in 2012, of which: 6.8 mln. rubles – to the development of vegetable production in the Republic of Dagestan in 2012-2020; 134 mln. rubles to the restoration and development of horticulture in the Chechen Republic in 2009-2012; 303.4 mln. rubles – to the development of beet-sugar refining complex in the Chechen Republic in 2011-2014.

Analysis of the concentration of livestock production

The analysis of the structure of production[11] is of particular importance in the study of the dynamics of certain types of livestock production, where the most interesting (from the point of view of economic aspects) is the distribution of production by the subjects of the federation.

Distribution of milk production by federal districts of the Russian Federation and the changes in the structure over 22 years (in 1990 and 2012) is shown in Figure 1. [12]

More than half of all milk production in 1990 fell for Central and Volga Federal Districts (26.1% and 26.0% of the total volume); the third

largest milk production was in the Siberian Federal District – 17.0%.

By 2012, there is some differentiation in the structure of milk production by the subjects of the Russian Federation: a little less than one third of the volume of milk is currently produced in the Volga Federal District; the second place with a considerable gap is taken by the Central Federal District (18.2%) and the third – by the Siberian (16.9%). The lowest volumes (less than 2%) of production remain in the Far Eastern Federal District.

Analyzing the dynamics of the distribution of milk production by federal districts, we can definitely say that the formation of groups of leaders and outsiders is predominantly influenced by the climatic factors.

Analyzing the changes in the share of gross milk production by federal districts, it should be noted that there was a trend to an increase in the share of output in the Volga, North Caucasus, Southern and Siberian districts (Table 4). The largest increase occurred in the North Caucasus Federal District, where the average annual increase was 1.9 percentage points. Between 1990 and 2012, the majority of federal districts saw changes in gross volumes, indicating the presence of structural changes [13,14] in the distribution of milk production.

In 1990, a group of leaders in the production of eggs included the Central and Volga Federal Districts (47.9% of total production), while the share of each was 26.3% and 21.6%, respectively. The group of outsiders in 1990 consisted of the North Caucasus, Far East and Urals Federal Districts – the share of each of them had less than a tenth of egg production (Figure 2).

By 2012, the distribution of egg production by federal districts remained virtually unchanged – the Volga and the Central Federal Districts remained the leaders in the production.

It should be noted that the division of federal districts by the leaders and outsiders is based on the distance from the consumer. Poultry farming is less likely dependent from climatic factors, but the production is focused on the consumer, so the group of leaders includes the most densely populated regions.

Analysis of the distribution of egg production by federal districts in the analyzed

period from 1990 to 2012 showed that there was a slight redistribution of shares without changing the parity output. Therefore, we can say there is a sufficiently stable distribution without significant structural changes.

The analysis showed that the distribution of certain types of livestock production by federal districts is quite stable and is subject to minor changes, which are formed under the influence of natural climatic and geographical factors.

Concentration indicators were used for the statistical evaluation of the uniformity of distribution of production structure of milk, meat and eggs by federal districts (Table 5)[15].

Concentration coefficients for the distribution of milk production by federal districts indicate that the studied structure is characterized

by fairly uniform distribution of the volumes of milk and egg production.

Analysis of the structure of crop production

Let's analyze the structure of crop production by certain products (Table 6).

The highest absolute structural changes were observed for gross grain and sugar beet yield; the proportion of grains and legumes annually decreased by 0.62 percentage points in average, while the production of beet annually increased by 0.33 percentage points in average, while the largest relative structural changes have taken place in the production of sunflower, the average annual growth rate of the share of gross yield of which amounted to 104.9%.

The linear coefficient of absolute structural changes is used for a summary

Table 1. The grouping of regions of the Russian Federation by the values of the coefficients of variation of certain types of livestock production by economic areas for 1990 – 2012

Groups of regions	Federal districts		
by the value of the coefficient of variation, %	Gross milk production, mln. tons	Production of livestock and poultry in live weight, mln. tons	Egg production, bln. pieces.
up to 33	Volga	Volga	Volga
	North Western	North Caucasus	North Western
	North Caucasus	Southern	North Caucasus
	Southern	Siberian	Southern
	Siberian	Urals	Siberian
	Urals	Central	Urals
	Central	North Western	Central
33 and more	Far Eastern	Far Eastern	Far Eastern

Table 2. The grouping of federal districts of the Russian Federation by the values of the coefficients of variation of certain types of crop production for 1990 – 2012

Groups of regions by the	Federal districts of the Russian Federation		
value of the coefficient of variation of certain types of crop production, %	Gross grain production, mln. tons	Gross potatoes production, mln. tons	Gross vegetable production, mln. tons
up to 33	Central	Central	Central
	Southern	North Caucasus	North Western
	North Caucasus	Volga	Southern
	Volga	Urals	Volga
	Urals	Siberian	Urals
	Siberian	Southern	Siberian
		Far Eastern	Far Eastern
33 and more	North Western	North Western	North Caucasus

assessment of structural changes for each year (Table 7).

The linear coefficient of absolute structural changes was the highest in 1995 and 1998, which is associated with the transition of agricultural producers to the market relations, while there was a trend increase in the share of expensive crops by reducing the share of cheaper and less profitable ones. The smallest value of the linear coefficient of absolute structural changes was observed in 2005 and was due to the ensuing economic stabilization and end of the formation of economic relations.

So far, three types of farmers have been formed during market reforms in Russia in 1992: agricultural organizations, peasant farms and population farms[16].

Analysis of the shares of the gross grain yield of individual producers showed that agricultural organizations held the leading position for the production of grain in 1990, since they accounted for the entire volume of production. In the next 15 years, there was a redistribution of production volumes between these types of manufacturers due to reduction in the share of agricultural organizations and a systematic annual

Table 3. Average values of the gross yield of major crop products by clusters for 1990, 1999 and 2012, thous. tons

Indicators	Cluster 1			Cluster 2			Cluster 3		
	1990	1999	2012	1990	1999	2012	1990	1999	2012
Grain	5,399.8	3,130.1	6,918.5	2,080.5	991.04	1,041.1	497.9	124.7	129.6
Potatoes	593.2	549.1	483.8	545.1	579.4	452.7	337.6	306.5	154.9
Vegetables	307.6	261.8	408.1	136.2	213.0	209.4	103.4	111.8	105.2
Number of subjects in clusters	11	8	4	17	25	26	44	40	48

Table 4. Average values of structural changes in livestock production by federal districts of the Russian Federation for 1990-2012, %

Federal district	Gross milk production		Egg production	
	Average "absolute" increase of the share, %	Average growth rate of the share, %	Average "absolute" increase of the share, %	Average growth rate of the share, %
Far Eastern	-0.05	98.0	-0.08	97.6
Volga	0.25	100.8	0.20	100.9
North Western	-0.08	98.7	0.04	100.4
North Caucasus	0.13	101.9	-0.02	99.5
Southern	0.11	101.1	0.02	100.2
Siberian	0.03	100.1	0.02	100.1
Urals	-0.02	99.7	0.06	100.7
Central	-0.36	98.4	-0.24	99.0

Table 5. Concentration coefficients for livestock production

Indicator	Gini index		Herfindahl-Hirschman index		Rosenbluth index	
	1990	2012	1990	2012	1990	2012
Gross milk production	0.04	0.08	0.11	0.12	0.06	0.06
Egg production	0.04	0.05	0.12	0.11	0.06	0.06

increase in the share of peasant farms: they accounted for 22% of the harvest of grain by 2011-2012, i.e. their share increased by 3.6 times in comparison to 1997. Agricultural organizations still remained the leaders in the production of grain and leguminous crops, as they accounted for over 75% of grain yield. The share of population farms increased to a certain extent as well, as they accounted for 1.1% of the gross grain yield in 2012. The share of agricultural enterprises decreased by 0.8% per year on average, while the share of peasant farms and individual entrepreneurs increased by 1.5%.

From the point of view of economic aspects, the distribution of crop production by economic entities was the most interesting. Analyzing the distribution of gross grain yield by the subjects of the Russian Federation in 1990, we can note the following: 28.9% of the total yield was in the Volga, 22.3% – in the South, and 20.3% in the Central Federal Districts. The lowest rates of production of grain crops were in the North

Western, Far Eastern and Urals Federal Districts. By 2012, a new "leader" in the production of grains and legumes appeared. The greatest volume of grain is currently produced in the Southern Federal District (30.9%); the second place in terms of production is taken by the Siberian Federal District (21.9%); the third place – by the Central Federal District (15.9%). We can definitely say that the formation of groups of leaders have been greatly influenced by climatic factors.

Analyzing the changes in the share of the gross grain yield by federal districts, it should be noted that there was a trend to an increase in the share of production in the Southern, the North Caucasus and the Siberian Federal Districts. A positive trend has also been observed in the Volga Federal District until 1997, while there has been a trend towards a decrease in the share of the gross grain yield from 1997 to 2012. The largest increase occurred in the North Caucasus region, where the average annual growth was 3.1 percentage points. Dynamics of the share of the gross grain yield in

Table 6. Average characteristics of changes in product structure of crop production in the Russian Federation for 1990-2012

Crop products	Average absolute increase of the share, percentage points	Average growth rate of the share, %
Grain	-0.62	98.8
Sugar beet	0.33	101.7
Sunflower	0.15	104.9
Potatoes	0.02	100.1
Vegetables	0.10	101.5
Berries	-0.02	99.6

Table 7. Linear coefficients of absolute structural changes in the structure of total yield of crop production in 1990-2012

Year	1990	1995	1998	1999	2000	2005	2007	2008	2009	2010	2011	2012
Value of the coefficient	0.0	3.8	3.9	1.3	2.1	0.4	1.7	0.9	1.9	1.2	2.2	2.0

Table 8. Results of Bartlett's test on sphericity and the Kaiser-Meyer-Olkin test

Criterion		Value
Kaiser-Meyer-Olkin's measure of sampling adequacy		0.766
Bartlett's sphericity criterion	value of	1 314.427
	number of degrees of freedom	153
	significance level (p-value)	0.000

the North Caucasus Federal District is characterized by instability: for example, a decrease in the share by more than 20% was observed in 1992 and 1996, and there was an increase by more than 50 percentage points in 1998 and 2010. The most significant decrease in the share of the total grain yield – 5 percentage points – was observed in the Volga Federal District.

Overall, the changes in the shares occurred in most federal districts of the Russian Federation between 1990 and 2012, indicating the presence of structural changes in the distribution of grain and leguminous crops by economic regions of the country.

The analysis showed that the distribution of certain types of crop production by federal districts is quite stable and has been subject to minor changes between 1990 and 2009. In the past two years, there were considerable structural changes that occurred under the influence of natural climatic and geographical factors. Changes

in the structure of crop production by type of crops were minor, and the grain crops make up the largest share. Redistribution of the production by producer groups, on the other hand, is subject to strong structural changes due to institutional changes in the economy of the country.

This dependence is clearly seen in the main indicators of crops for 2010, which reflect the effects of abnormal drought that summer in the Russian Federation, when domestic agriculture lost almost 10% in volumes compared to the 2009. Grain harvest fell by more than a third – down to 60.8 mln. tons.

82% of farms affected by the drought are located in these regions, which is almost the entire central and eastern part of Russia, while the share of the Central and Volga Federal Districts in the total area of lost crops was 82%, and in the direct damage – 87%.

More than 14 thous. farms suffered from the drought in the Volga region, acreage of which
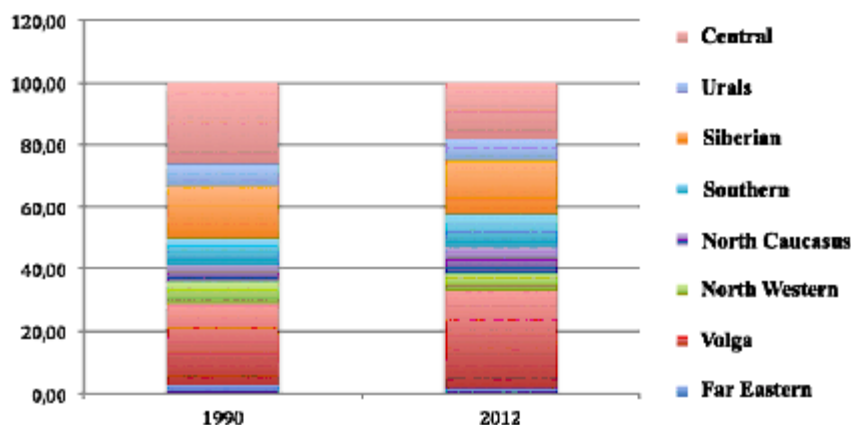

Fig. 1. Structure of milk production by federal districts of the Russian Federation in 1990 and 2012
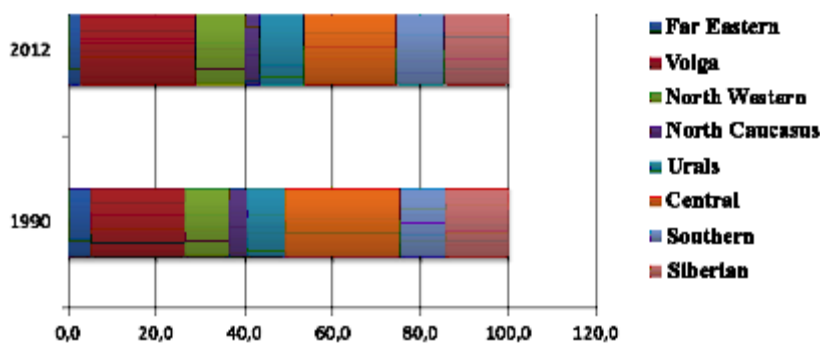

Fig. 2. Structure of egg production by federal districts of the Russian Federation in 1990 and 2012

amounted to 9 mln. ha, resulting in financial losses of more than 25 bln. rubles, i.e. 62% of the total damage. The Central District accounted for 25% of the suffered farms with damage volume of over 10 bln. rubles.

Analysis of the factors of crop production

As the history of agriculture shows, the drought results in the inevitable price increases for almost all food products. In addition to the climatic conditions, a large number of factors affect the volume and structure of crop production: the material and technical base, quality of the seed stock, the size and structure of sown areas, the availability and use of a protected ground, fertilization, timely application of agro-technical measures, qualitative harvesting, etc.

To study the influence of these factors on the gross yield of grains and legumes, let's consider the indicators, data for which are presented for 1990-2012 in general across the Russian Federation:

X_1 - number of tractors per 1,000 hectares;
X_2 - number of plows per 1,000 hectares;
X_3 - number of tillers per 1,000 hectares;
X_4 - number of seeders per 1,000 hectares;
X_5 - number of combine harvesters per 1,000 hectares;
X_6 - number of mowers per 1,000 hectares;
X_7 - number of balers per 1,000 hectares;
X_8 - number of windrowers per 1,000 hectares;
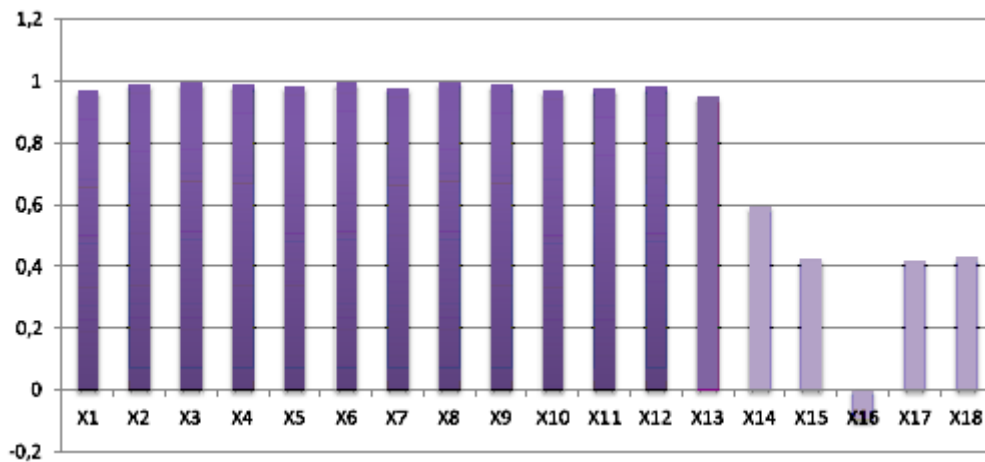X_9 - number of sprinklers and irrigation machines per 1,000 hectares;

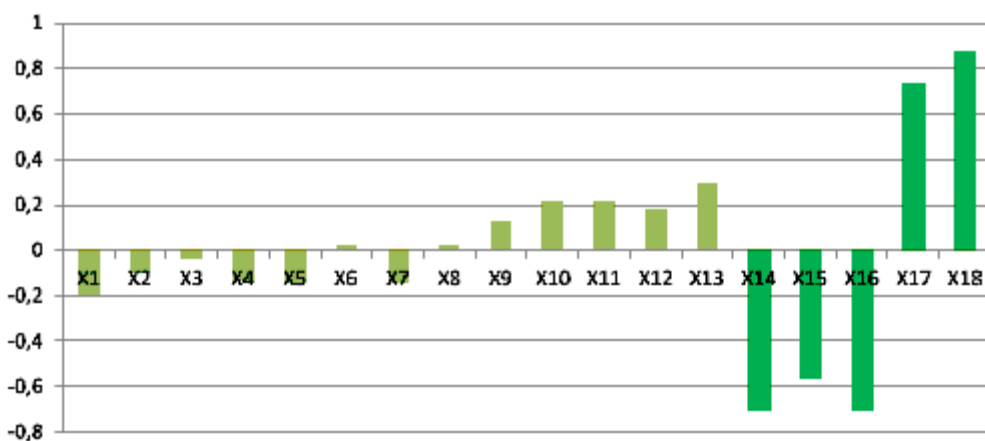**Fig. 3.** Factor loadings of the studied variables in the first factor

Fig. 4. Factor loadings of the studied variables in the second factor

X_{10} - number of spreaders of solid fertilizers per 1,000 hectares;

X_{11} - number of machines for application of soil solid organic fertilizers per 1,000 hectares;

X_{12} - number of machines for application of soil liquid organic fertilizers per 1,000 hectares;

X_{13} - number of tractor sprayers and dusters per 1,000 hectares;

X_{14} - limestone powder and other calcareous materials applied per hectare, t;

X_{15} - gypsum, phosphogypsum and other gypsum-containing agents applied per hectare, t;

X_{16} - phosphoriting of acidic soil made per hectare, t;

X_{17} - mineral fertilizers for crops applied per hectare, kg;

X_{18} - organic fertilizers for crops applied per hectare, t.

Bartlett's test on sphericity (Table 8) (1,314.43; p=0.000) showed that the correlation matrix of the variables selected for the analysis of the factors influencing the volume of production of grains and legumes differs significantly from the unit. The high value of measure of sampling adequacy KMO=0.766 showed that conducting a factor analysis is very promising[17].

The method of principal components was used to isolate a stable factor structure of the primary indicators of crop production, and the equimax method was used for the rotation of the obtained factors, as it gives the best result of the partition of the original variables into factors[18].

Based on the Kaiser criteria, two factors are singled out, the eigenvalues of which are greater than 1. In essence, this means that other factors do not emit dispersion equivalent to the dispersion of one variable, and they are omitted. The cumulative percentage is 90.8%, which indicates the correctness of the selected variables: 90.8% of the dispersion variation is explained by the influence of the included variable factors.

The chart of the factor loadings of the studied variables in the first factor is shown in Fig. 3. The first factor F1 is marked by high loadings on variables that characterize the technical equipment of the production, availability of the necessary equipment for production process: cars, tractors, combines, etc.

Thus, using the method of principal components, the initial factor variables that characterize the process of grain and leguminous crops production were combined into two factors. The first describes the provision of agricultural producers with necessary equipment for the production of grains and legumes, and the second includes variables that describe the activities aimed at improving the quality characteristics of the soil.

The regression model describing the influence of the obtained factors on the gross yield of grains and legumes is the following[19]:

$$Y_F 81,64677 \mid 4,251.47 \, F_2 \mid 9,98269 F_2$$
$$(0.000) \quad (0.028) \quad (0.006)$$
$$R^2 = 0.61; F = 8.532$$

Thus, we have proved the influence of technical factor and the factor that characterizes the measures aimed at improving the quality of the soil on the volume of gross yield of grains and legumes. It should be noted that 62% of the variation of total yield of grain and leguminous crops is due to variation of the factors included in the model. With an increase in the first and second indicator by one unit, the gross yield of grain and leguminous crops will be 4,251.5 thous. tons or 9,982.7 thous. tons, respectively.

Besides fertilizing crops, the gross yield of crop production is determined by the levels of mechanization. On the one hand, automation and mechanization lead to an increase in unemployment in rural areas, despite the fact that the gross yield and the average number of people employed in agriculture are not linked. Not very favorable relationship for the economy and development of crops is observed.

On the other hand, the share of agricultural mechanization has a strong direct impact on the volume of harvest (0.82). This dependence can be particularly traced under adverse climatic conditions.

Returning to the effects of abnormal drought in 2010, it can be argued that new trends to preserve the maximum yield under all weather conditions appeared in the Russian agricultural sector under its influence.

Of course, application of any measures to enhance the development of crop production and introduction of new technologies requires a significant investment. First of all, the state supports agricultural producers. Over the studied period between 1990 and 2012, annual spending

on agriculture increased 2.4 times, i.e. there is a general positive trend. The correlation coefficient between the gross yield and expenses allocated from the consolidated budget of the Russian Federation on agriculture is 0.72, which indicates the importance of the state support and the need to increase spending on it for agricultural producers.

Thanks to unprecedented state support measures, the consequences of the abnormal drought in 2010 were overcome. 45 bln. rubles was spent on support of crop production, most of which (29.7 bln. rubles) was intended to subsidize interest rates. Direct support to farmers was slightly less – 8.9 bln. rubles, including 5.5 bln. rubles on fertilizers, about 2 bln. rubles on elite seeds, 770 mln. rubles on the establishment of perennial plantings. Support for producers of rapeseed (for the purchase of means of chemical protection) was 252 mln. rubles, flax growers – 250 mln. rubles.

According to the Ministry of Agriculture[20], 97.8 mln. tons of grain in bunker weight was produced in 2011. Record harvests of sugar beet (45 mln. tons) were received, rape (1.1 mln. tons), soybeans (1.45 mln. tons), sunflower (8 mln. tons). Production of important forage crop – corn – was 6 mln. tons. The production of buckwheat and barley in the volumes required for internal needs was also restored. The Russian Federation has returned to the world grain market: this year the volume of exports is projected at 25 mln. tons, despite the fact that 17 mln. tons were shipped in 2012; 170 thous. tons of sunflower oil and 80 thous. tons of sugar were exported.

CONCLUSION

Thus, the most effective measure to improve the development of crop and livestock production in the Russian Federation is in the first place the increase in financial support to farmers, increase of investment in agriculture, introduction of new technologies, development of transport infrastructure, improving the quality of products.

One of the factors in the development of agriculture in Russia that should be studied in the future is the accessibility of agricultural production in terms of transportation. Russia is distinguished by unequal economic and geographical location of the countryside in relation to places of consumption and processing of agricultural products, i.e. transport and geographical location of agricultural enterprises, especially those manufacturing not transportable products. The degree of transportability of products changes as a result of the improvement of vehicles, creation of specialized forms of transport, including refrigerators and other units.

Spatial localization of human resources associated with the characteristic patterns of rural settlement in different types of rural areas has undeniable influence on territorial differentiation. Quantitative assessment of the labor force is due to different complexity of certain types of agricultural products. With the development of scientific and technological progress and comprehensive mechanization of agriculture, there is an increase in productivity, while preserving the differences in cost of living labor between more (poultry, bee-keeping) and less (pig breeding) labor-intensive activities. Therefore, during the study of regional differentiation of agricultural production in the Russian Federation, special attention should be paid to the analysis of the distribution of the labor force.

The present analysis of the structure and dynamics of the main indicators of agricultural production and the combined effects of the factors that determine its condition and efficiency provides a glimpse of the positive trends in the development of agriculture in Russia.

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