IJABR

International Journal of Advanced Biotechnology and Research (IJABR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-10, Issue-1, 2019, pp199-211
http://www.bipublication.com

Research Article

Major Trends of the Development of Grain Production

Inna V. Ryabova*, Sergey A. Suslov*,

Nikolai V. Mordovchenkov* and Kirill Yu. Kurilov**

*Nizhny Novgorod State Engineering and Economic University
**Togliatti State University

[Received: 15/12/2018; Accepted: 14/01/2019; Published: 15/01/2019]

ABSTRACT

Introduction. One has considered Russia a grain power since ancient times. The role of the grain farming in providing the population with food, economic and socio-political stability of the country is invaluable.

Methods. The historical aspects of the development of grain production in Russia indicate acute fluctuations in the gross collection of grain, an unstable yield level. Tendencies of decline and rise in gross collection of grain indicate the predominantly extensive management of the grain farming, its de-industrialization, and the increasing tendency of using imperfect grain farming technologies. This increases the dependence of the yield on weather conditions.

Results. The article reflects the importance of increasing the volume of grain production, the stability or increase in yield, and the efficiency of the use of available land resources, in particular, sown areas. According to the data on gross grain collection, one should judge that increasing its stabilization is an integral part of the grain sector of the Nizhny Novgorod region, the Volga Federal District, and Russia as a whole. There is a detailed analysis of the use of sown areas based on the data on the sown areas of grain crops in the Russian Federation and its member states. The results of the research revealed that there is a tendency of the transfer of agricultural lands from large agricultural producers to small and medium-sized ones.

Discussion. Analysis of the grain production per capita in Russia and its member states made it possible to reveal that gross collections of this crop do not guarantee stability in the provision of food. One can achieve it producing one tonne of grain per capita. Comparing the level of annual consumption of bread products per capita in Russia and countries of Europe and Asia, one should note that Russia has some advantage. Export-import flows of grain in the country indicate a significant excess of grain export over its import.

Conclusion. Providing the population with bread, its export and import, as well as the effective functioning of the country's agro-industrial complex as a whole, depends on the increase in grain production. The main thing is that our country has all the necessary resources and great opportunities for stabilizing and increasing grain production.

Key words.Gross collection, import, peasant farms and individual entrepreneurs, consumption rate, sown area, consumption per capita, grain production, agricultural organizations, the ratio of export and import, average grain production per capita, yield level, bread products, households, export.

INTRODUCTION

Grain production historically played a significant role in the provision of food to the Russian population. Stable provision of the population with bread products, economic and social stability in the country, its food security and world prestige as a whole, depend on the level of development of the country's grain farming.

Grain farming in Russia is traditionally a strategic branch of the economy. It stimulates or, on the contrary, restrains development of many other related industries, food and raw materials markets. The level of its development serves as a kind of indicator of the economic well-being and even geopolitical power of the country. The volume of gross and per capita production, the size of the carryover stocks, the availability of reserve funds, the state of the grain market, and the foreign trade in grain, indicate not only the efficiency of the functioning of the economy of the agro-industrial complex and its individual branches, but also the standard of living and nutrition of the population. In this regard, one should consider and evaluate the role of the grain farming in providing the country with food and developing its economy on the basis of its multi-purpose in economic, socio-political, environmental and international spheres [1, p. 3].

Therefore, one has always put an emphasis on the grain production in the Russian Federation and its member states. At present, about 70,000 enterprises and organizations are engaged in grain production in all agricultural regions in Russia. These include 25,000 large cooperative farms, joint-stock companies and partnerships, as well as more than 20,000 private farms [2, p. 116]. Our country has great opportunities to become one of the main producers of grain in the world. It has significant land, water, energy and labor resources. Russia has one of the world's largest agricultural potentials. With only 2.2% of the world population, the country has 8.9% of the world's arable land [3, p. 147].

The works of A. Altukhov [4, 5, 6, 7], A. Baurov [8], A. Gordeev [9], A. Kudel' [10], G. Chudilin [11] investigated trends in the development of grain production.

METHODS

As for the historical aspects of the development of the grain industry, one can note that the production of grain in the country is cyclical. Years of the First World War and the Civil War, the years of collectivization, as well as the Great Patriotic War, had a detrimental effect on the rates of production of all types of agricultural products, in particular, on grain production.

In 1913, grain and leguminous crops occupied over 90% of the total sown area (62,939 thousand ha), but the total grain yield was only 50.5 million tonnes. Low-yielding grain production and low grain yields (8.0 centners per hectare) are primarily due to the lack of mechanization and low level agrotechnology of that time (Table 1).

Table 1 – Grain production in the Russian Federation

Year	Sown area, thousand hectares			Gross yield, million tonnes	Yield level, centners per hectare
	Total	Of which grain crops	Ratio of grain crops in the sown area, %		
1913	69,798	62,939	90.2	50.5	8.0
1940	92,076	70,143	76.2	55.6	7.9
1950	88,953	64,948	73.0	46.8	7.2
1960	120,734	71,372	59.1	76.2	10.7
1970	121,912	72,689	59.6	107.4	15.6
1980	124,815	75,465	60.5	105.1	13.9
1990	117,705	63,068	53.6	116.7	19.0
2000	84,670	45,585	53.8	65.5	15.6
2010	75,188	43,194	57.4	61.0	18.3
2011	76,662	43,572	56.8	94.2	22.4
2012	76,325	44,439	58.2	70.9	18.3
2013	78,057	45,826	58.7	92.4	22.0
2014	78,525	46,220	58.9	105.3	24.1
2015	79,319	46,642	58.8	104.8	23.7
2016	79,993	47,110	58.9	120.7	26.2

As for the statistics, the main grain producers in 1913 were landowners' farms. Their grain production amounted to 12% of the gross yield, with 47% vendibility. Kulak farms produced 38% and 34% respectively, medium and poor farms produced 50% and 14.8%. The main reasons for low-yielding grain production and

low grain yields in 1913 were technical backwardness, shortage of land or lack of land for the bulk of the peasants, as well as landed estates with remnants of serfdom.

In the years of the First World War (1914-1918), Russian grain industry suffered a huge damage. There was a tendency to reduce the sown area of grain crops. This leads to a reduction in the gross yield of these crops. Only after the heaviest drought in 1921 and the end of the Civil War, the restoration of the country's agro-industrial complex, including its grain sector, began.

In 1940, they managed to collect 55.6 million tonnes of grain, while the level of vendibility reached 43% in those years. The agriculture of our country, including grain crops, suffered a great damage during the Great Patriotic War. In 1942, the gross yield of grain amounted to 24 million tones. In 1943, it was 19.8 million tonnes. The Soviet government determined the accelerated recovery of grain production as the priority area of the agricultural development. It was executed by means of the development of virgin and fallow lands and allowed to increase the share of economic regions in grain yields [12]. One should note that in the following years, there was a steady rise in the national economy of the country. Naturally, this affected the growth rate of agricultural products.

In the years 1956-1960, on average, they produced 66.3 million tonnes of grain annually. In 1961-1965, they produced 76.6 million tonnes. In 1970, with a yield of 15.6 centners per hectare, they achieved the highest gross grain yield in history - 107.4 million tonnes. During the period of 1970-1990, there was a stable dynamics of volumes of grain production in Russia.

One should note that from 1913 until the year 1980, there was a steady trend of the sown area growth, but the grain yield in 1980 was quite low - 13.9 centners per hectare. Since 1980, the sown area of grain crops began to decline steadily, amounting to 45.6 thousand hectares by 2000. Reduction of the sown area by more than 60% in this period caused a reduction in the gross yield of grain crops by almost 40%.

Market transformations brought profound qualitative and quantitative changes to the country's grain farming. Grain production began to decline, grain quality began to deteriorate, the level of intensity and efficiency of grain farming began to decrease. During the years of market transformations, the sown area occupied by grain crops decreased significantly. While the average for 1986-1990 was 65.5 million hectares, in 2006-2010, it was 44.9 million hectares or 68% of the average level of the previous years. Accordingly, the production of grain decreased, despite the increase in the yield of grain crops. Thus, the average grain yield reached 104.3 million tonnes in 1986-1990, with a yield level of 16.5 centners per hectare. In 2006-2010, it was only 85.2 million tonnes, although the yield level was 18.9 centners per hectare. The share of Russia in the world grain production decreased from 5.7% in 1986-1990 to 3.6% in 2006-2010 [6, p. 3].

In 2008, gross yields and yield levels of grain crops were the highest for the last 17 years. Only in 1990 the yield of grain and leguminous crops (116.7 million tonnes) was higher than the gross grain yield in 2008. Among grain crops, the grain production of wheat, barley, corn increased significantly (as compared to 2007, by 29.0%, 48.5% and 76.3%, respectively). However, the production of buckwheat reduced significantly (by 7.9%). In 2008, compared to 2007, the following major changes occurred. A high yield of grain and leguminous crops was farmed and collected - 108.1 million tonnes in weight after processing (132.6% of the gross grain yield in 2007) [2, p. 117]. In the yielding for Russia 2008, the production of grain per capita was 762 kg, while in the United States it was 1,380 kg, and in Canada it was 1,606 kg [13, p. 25].

The sharpest drop in the gross output of crop production was in the anomalously hot 2010.

It is noteworthy that changes in grain production depending on the "whims" of the weather within (+/-) 20% are not uncommon for Russia. But the crop failure of that season was really extraordinary: gross yield declined by almost 40%. Across Russia, crops in the area of about

10 million hectares perished from a drought in 2010, or in 22.7% of those areas where they planned to collect yield in the beginning of summer. The Volga region suffered from the drought the most. The crops perished in almost half of this area - 48.5%. The Southern and North-Caucasian Federal Districts suffered less than the other regions.

The sharp declines and rises in grain production testify predominantly extensive management of the grain farming, its de-industrialization and the growing tendency of using imperfect technologies for growing grain. This, in turn, increases the dependence of the yield on weather conditions. So, there have been sharp fluctuations of the gross grain collection during the Russian history (Figure 1).

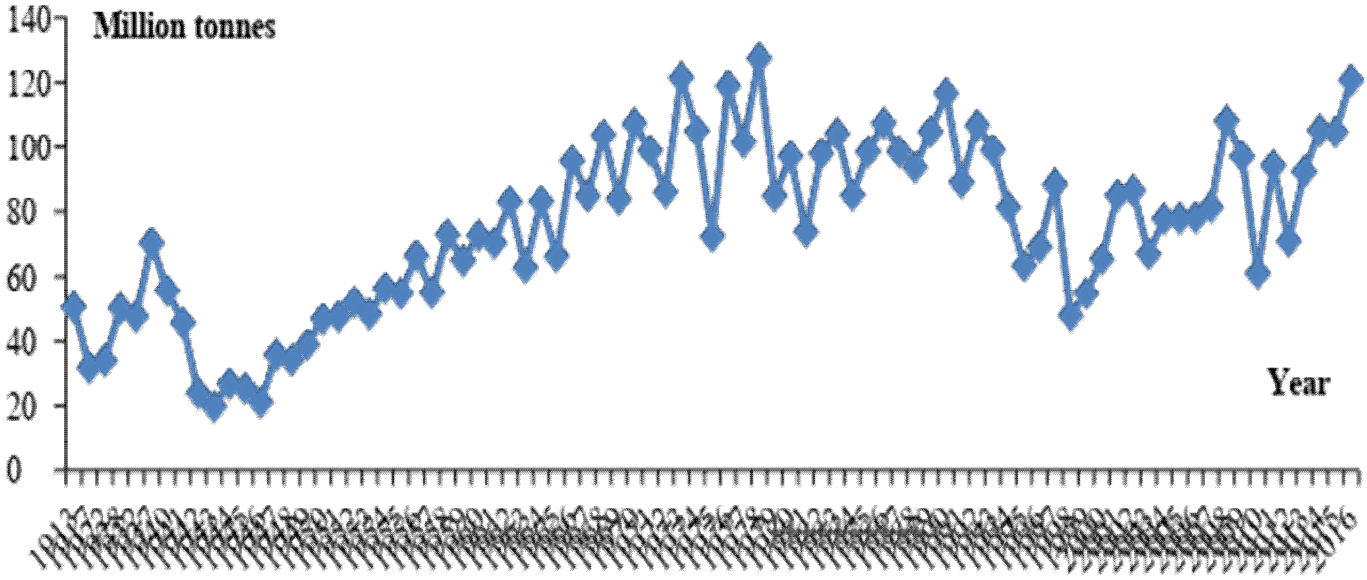

Figure 1 – Dynamics of the gross grain collection in Russia during the period from 1913 to 2016, million tonnes

The yield of grain crops exceeded 100-million mark in 1970 (107.4 million tonnes), 1974 (105.1 million tonnes), 1977 (101.6 million tonnes), 1983 (104.3 million tonnes), 1986 (107.5 million tonnes), 1989 (104.6 million tonnes), 1992 (106.9 million tonnes), 2008 (108.2 million tonnes), 2014 (105.3 million tonnes), 2015 (104.8 million tonnes). In 1973, 1976, 1978, 1990 and 2016, the gross grain collection was even bigger - 121.8 million tonnes, 119 million tonnes, 127.4 million tonnes, 116.7 million tonnes and 120.7 million tonnes, respectively. Thus, over the past 46 years, the grain collection exceeded the 100-million milestone 15 times. This indicates the possibility to obtain an average of 120-125 million tonnes of grain under certain conditions annually. However, to achieve this goal, it will be necessary to implement a number of measures of an economic and organizational nature on the part of state and economic management bodies, as well as tense innovative work of economic entities, serious investments, creative human resources [13, 14].

RESULTS

The Russian Federation has generally favorable natural and climatic conditions for the production of most grain crops. Their high quality characteristics are comparable to the Canadian provinces. Grain crops occupy about 60% of the total sown area and provide more than 50% of the value of the gross agricultural product. Grain farming provides about 10 million jobs. It accounts for one-fourth of the basic production assets and the number of workers employed in the agro-industrial complex.

There is an important problem for the grain industry, both in the regions and the country. It is to achieve an increase and stabilization of grain production. The production output is one of the main indicators characterizing the activities of organizations and the whole region. Its magnitude influences not only the volume of

sales of products of grain production, but also of some livestock sectors, as well as their cost level, the amount of profit, the rate of profitability, the financial position of the research object, its solvency and other economic indicators [14, p. 52].

Gross grain collection in the Russian Federation in 2016 amounted to 120.7 million tones. It is 15.2% or 15.9 million tonnes more than in 2015. One should note that during the period of 2006 – 2016, gross grain collection in the territory of the Russian Federation increased by half or by 54.3%. The increase in yield by 7.3 centners per 1 hectare was the main factor that affected the existing dynamics (Table 2).

Table 2 – Dynamics of the sown area, yield level and gross grain collection in the member states of the Russian Federation

Year	Sown area, thousand hectares			Gross yield, million tonnes	Yield level, centners per hectare
	Total	Of which grain crops	Ratio of grain crops in the sown area, %		
Nizhny Novgorod Region					
2006	1,196.4	573.8	47.9	1.17	20.5
2007	1,204.8	581.9	48.3	1.04	20.3
2008	1,237.9	597.3	48.3	1.30	22.0
2009	1,199.2	592.5	49.4	1.43	24.4
2010	1,165.1	562.5	48.3	0.54	13.6
2011	1,185.5	612.5	51.7	1.30	21.4
2012	1,182.3	536.1	45.3	0.93	17.7
2013	1,184.2	544.8	46.0	0.92	18.7
2014	1,139.7	529.0	46.4	1.13	21.6
2015	1,125.0	561.8	49.9	1.15	20.9
2016	1,137.9	583.0	51.2	1.13	19.7
Volga Federal District					
2006	23,389.4	13,359.5	57.1	20.9	16.3
2007	22,807.0	13,296.4	58.3	22.3	17.8
2008	23,588.8	14,004.7	59.4	27.2	19.7
2009	23,837.0	14,291.5	60.0	21.7	19.5
2010	23,171.7	12,946.9	55.9	6.6	10.0
2011	23,314.1	12,159.6	52.2	21.2	18.4
2012	23,014.2	12,700.5	55.2	14.5	14.0
2013	23,811.6	13,158.6	55.3	17.0	15.7
2014	23,485.6	12,917.3	55.0	20.9	17.1
2015	23,712.2	12,921.2	54.5	18.9	16.5
The Russian Federation					
2006	75,277.0	43,174.1	57.4	78.2	18.9
2007	74,758.5	44,264.8	59.2	81.5	19.8
2008	76,923.5	46,742.0	60.8	108.2	23.8
2009	77,805.4	47,533.2	61.1	97.1	22.7
2010	75,187.9	43,194.2	57.4	61.0	18.3
2011	76,661.7	43,572.4	56.8	94.2	22.4
2012	76,325.4	44,439.3	58.2	70.9	18.3
2013	78,057.1	45,826.5	58.7	92.4	22.0
2014	78,525.0	46,220.4	58.9	105.3	24.1
2015	79,319.0	46,642.5	58.8	104.8	23.7
2016	79,993.0	47,110.0	58.9	120.7	26.2

Grain production in the Nizhny Novgorod region is an integral part of the entire grain sector, both in the Volga Federal District and in Russia as a whole. The share of the region in the Volga Federal District and Russia as a whole is almost 6.0% and 1.0% of the gross grain yield.

Dynamically, there is a tendency to reduce the gross grain collection, both in the Volga Federal District and in the Nizhny Novgorod region, by 3.4% and 9.6%, respectively. The reduction in gross grain collection in the region is largely due to a decrease in yield level by 1.2 centners per hectare in 2016 compared to 2015. One should note that the sown area of grain crops in the

Nizhny Novgorod region, on the contrary, increased by 21.2 thousand hectares during the period of 2015-2016. In terms of gross grain collection, the Nizhny Novgorod Region ranked 27th in the Russian Federation in 2015.

Despite the increase in the grain sown area in the Volga Federal District, the reduction in the gross production of this crop is also due to a decrease in its yield by 0.6 centners per hectare in 2016 compared to 2015. A slight increase in the sown area indicates that the decrease in the yield of grain crops exerted a greater influence on the formation of gross grain yield.

The institutional changes in the agrarian sector of the region that took place in the last twenty years contributed to the reform of ownership, the redistribution of land, the creation of a multistructure economy that involves the existence of large and small forms of management. The agricultural organizations of various forms of ownership take part in the grain production in the Nizhny Novgorod region.

Since land is indispensable for agricultural production, priority is to put the previously abandoned agricultural land into circulation. One should note that in the Nizhny Novgorod region, on the contrary, there is a reduction in the sown area of grain crops in agricultural organizations dynamically. The current situation is primarily due to the annual ruin of agricultural organizations. Their average rate of decrease is 5.9% [15, p. 64].

The share of grain crops in farms of all categories in the total sown area of the Nizhny Novgorod region for the entire period of the study is about 50%. This indicates the importance of these crops in the economy of the region. Agricultural organizations occupy the largest share in the sown area of grain crops among farms of all categories - 84.3% or 491.7 thousand hectares. This is 9.4% less than in 2006 (Table 3).

Table 3 – Dynamics of the sown areas of grain crops in various categories of farms of The Nizhny Novgorod Region

Year	Sown area of grain crops in farms of all categories, thousand hectares	Including					
		Agricultural organizations		Peasant farms and individual entrepreneurs		Households	
		Thousand hectares	% of total sown area of grain crops in farms of all categories	Thousand hectares	% of total sown area of grain crops in farms of all categories	Thousand hectares	% of total sown area of grain crops in farms of all categories
2006	573.8	543.0	94.6	28.8	5.0	2.0	0.4
2007	581.9	548.0	94.2	32.8	5.6	1.1	0.2
2008	597.3	553.5	92.7	42.6	7.1	1.2	0.2
2009	592.5	544.8	91.9	46.5	7.8	1.2	0.2
2010	562.5	515.0	91.5	46.3	8.2	1.1	0.2
2011	612.5	555.8	90.7	55.1	9.0	1.6	0.3
2012	536.1	474.6	88.5	59.3	11.1	2.2	0.4
2013	544.8	475.7	87.3	66.9	12.3	2.1	0.4
2014	529.0	458.9	86.7	68.1	12.9	2.0	0.4
2015	561.8	469.0	83.5	91.0	16.2	1.9	0.4
2016	583.0	491.7	84.3	89.3	15.3	2.0	0.3
2016 to 2015, %	103.8	104.8	-	98.1	-	105.3	-
2016 to 2006, %	101.6	90.6	-	310.1	-	100.0	-

One should note that the share of peasant farms and individual entrepreneurs in the sown area of grain crops, dynamically, increases annually and rapidly. In 2016, it amounted to 15.3%. The sown area of grain in this category of farms is 89.3 thousand hectares. It is 60.5 thousand hectares or 3.1 times more than in 2006.

During the analyzed period, the sown area of grain crops in the households remained unchanged - 2 thousand hectares. It is 0.3% of the sown area of grain crops in the farms of all categories in the Nizhny Novgorod region.

One should note that in the region, there is a tendency of the transfer of agricultural lands from large agricultural producers to small and medium-sized ones. This is not right, since small businesses have no chance in the competitive struggle between the domestic agro-industrial complex and global multinational companies. In turn, large agricultural organizations are able to compete with import.

Agricultural organizations, unlike peasant farms and households, have much better means of production and, consequently, can perform the required agricultural work in a more qualitative and timely manner [16, p. 195].

However, the main grain producers in the region are still agricultural organizations. They produce 956.2 thousand tonnes of grain (Table 4). It is 84.8% of the gross yield in farms of all categories in the Nizhny Novgorod region in 2016.

Table 4 – Dynamics of gross grain collection and yield level in various categories of farms in the Nizhny Novgorod region

Year	Gross yield in farms of all categories, thousand tonnes		Including					
			Agricultural organizations		Peasant farms and individual entrepreneurs		Households	
	Thousand tonnes	Centners per hectare	Thousand tonnes	Centners per hectare	Thousand tonnes	Centners per hectare	Thousand tonnes	Centners per hectare
2006	1,165.9	20.5	1,105.6	20.6	55.9	19.4	4.4	22.0
2007	1,042.5	20.3	986.9	20.5	53.9	16.4	1.8	16.4
2008	1,299.3	22.0	1,214.6	22.2	82.2	19.3	2.5	20.8
2009	1,432.4	24.4	1,319.3	24.5	110.4	23.8	2.6	23.0
2010	541.5	13.6	499.9	13.7	39.2	12.4	2.4	20.6
2011	1,301.8	21.4	1,179.1	21.3	118.2	21.8	4.5	28.8
2012	933.3	17.7	822.5	17.7	106.1	17.9	4.7	21.9
2013	918.6	18.7	801.0	18.8	114.4	18.5	3.2	15.8
2014	1,133.4	21.6	990.7	21.7	139.6	20.5	3.1	15.7
2015	1,150.1	20.9	969.0	21.1	178.2	19.6	2.9	15.3
2016	1,127.5	19.7	956.2	19.9	168.4	18.9	2.9	14.5
2016 to 2015, %	98.0	94.3	98.7	94.3	94.5	96.4	100.0	94.8
2016 to 2006, %	97.2	96.1	86.5	96.6	301.3	97.4	65.9	65.9

Dynamic development of peasant farms and individual entrepreneurs allowed them to produce 168.4 thousand tonnes of grain in 2016. This is 14.9% of the regional yield with a yield level of 18.9 centners per hectare. Despite the invariable sown area of grain crops in the households, the dynamic trend is the reduction of the gross grain yield by 34.1% or by 1.5 thousand tonnes. A decrease in the yield of this crop from 22.0 centners per hectare in 2006 to 14.5 centners per hectare in 2016 caused this situation. For the entire analyzed period, the households have the lowest yield levels in the reporting year.

One should note a sharp decline in the gross grain collection in farms of all categories in the lean and anomalously hot 2010. Then, agricultural organizations collected only 37.8% of the grain compared to 2009, with a yield level of 13.6 centners per hectare. Peasant farms and individual entrepreneurs collected 37.9%, and the households collected 92.3%. In households, despite the weather anomalies, the yield level of grain crops was quite high - 20.6 centners per hectare. This is much higher than in agricultural organizations, and peasant farms and individual entrepreneurs. This situation is due to the fact that it is much easier to water the plants in small areas, since the construction of large irrigation systems is beyond the means of most large commodity producers.

There is a tendency to reduce the gross grain collection in farms of all categories in the Nizhny Novgorod region almost for all types of grain crops (Figure 2).

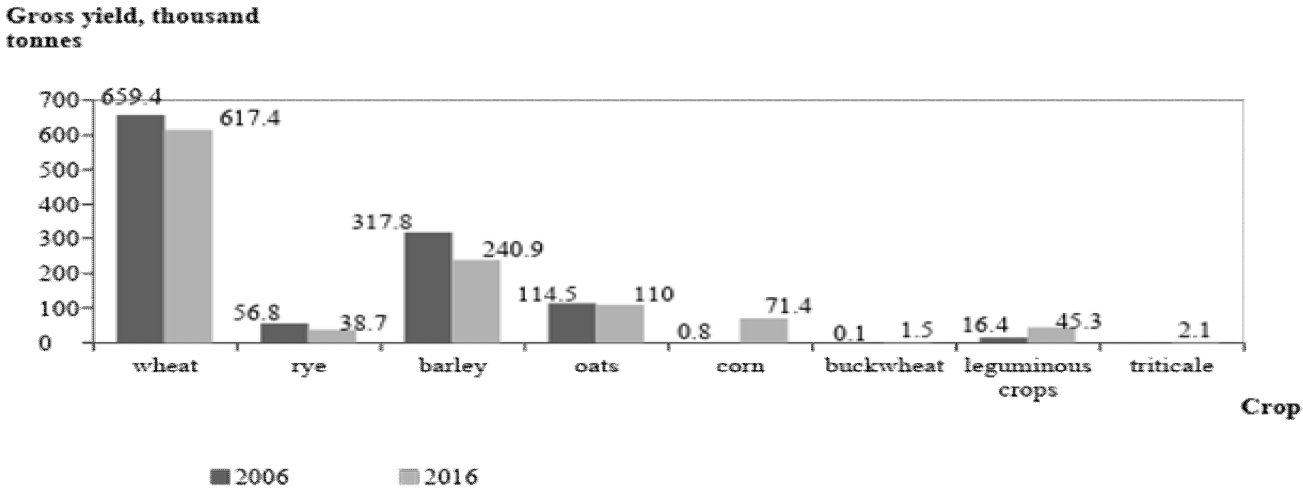

Figure 2 – Structure of grain production by types of crops in farms of all categories in the Nizhny Novgorod region in 2006 and 2016

Relative to the level of 2006, in 2016, gross wheat yield amounted to 93.6%, barley - 75.8%, oats - 96.1%. One should note that there is a certain positive trend in the gross yield of rye, corn, buckwheat and leguminous crops. They are the main source of fodder protein in modern conditions and an effective improver of soil fertility. This is especially important due to a sharp decline in the use of fertilizers and widespread decrease in soil fertility.

DISCUSSION

Grain production is of great importance in providing the population with bread and bread products, as well as products produced using grain processing products. Grain crops remain the main source of protein in the diet of Russian citizens. Their consumption provides up to 37% of the daily diet [17, p. 27].

It is not for nothing that the Chairman of the Government of the Russian Federation, D. Medvedev, said: "In Russia, people have considered that bread is the staff of life since ancient times. And this folk proverb reflected all the importance of such spheres as agriculture and the production of grain for people... Food is the most important resource of life. And the level of food security is the first measure to assess its quality" [18].

The production of food per capita is an important indicator of the population's food security. Table 5 allows to judge its level. Reliable provision of food for the population is one of the main conditions for the stable development of the economy of the country and its regions.

Table 5 – Production of grain per capita in Russia and its member states, kg

Rate	2006	2010	2011	2012	2013	2014	2015	2016
Nizhny Novgorod Region	344.8	163.7	394.9	283.7	279.9	346.6	352.8	347.2
Volga Federal District	690.0	219.2	712.5	488.0	572.9	703.3	636.9	-
The Russian Federation	547.4	427.1	657.8	495.8	644.8	732.8	716.3	823.9

The data in Table 5 show an increase in the production of grain per capita in the Russian Federation, but not its member states. The decline in grain production in the region by 22.6 thousand tonnes in 2016 compared to 2015 led to a decrease in grain production per capita by 5.6 kg, or 1.6%. The explanation is the reduction in the yield levels of grain crops from 20.5 to 19.7 centners per hectare, or by 3.9%. As of reporting date, the region produces around 350 kg of grain per capita. And for stable food supply, according to the World Health Organization (WHO), it is necessary to produce at least 700 kg per capita [19, p. 95].

Some researchers believe that a fall in average grain production per capita below 600 kg per

year is an unfavorable indicator for ensuring the country's food security [20, p. 13]. However, the Nizhny Novgorod region is far from this level.

In the Russian Federation, average grain production per capita in 2016 was 823.9 kg. This is 107.6 kg or 15% more than in 2015 (Figure 3). This situation is primarily due to an increase in gross grain yield in the reporting period and a slight increase in the population of the country.

However, as they believe, stability in the provision of foodstuffs for any country comes with the annual production of one tonne of grain per capita. Then, modern Russia needs to produce at least 140-150 million tonnes of grain annually Meanwhile, average grain production in Russia was 85-95 million tonnes in recent years [21, p. 15].

Analysis of the Figure 3 revealed that the rate of production per capita in the Russian Federation was largely restored after military disruption in 1950. After that, it began to grow.

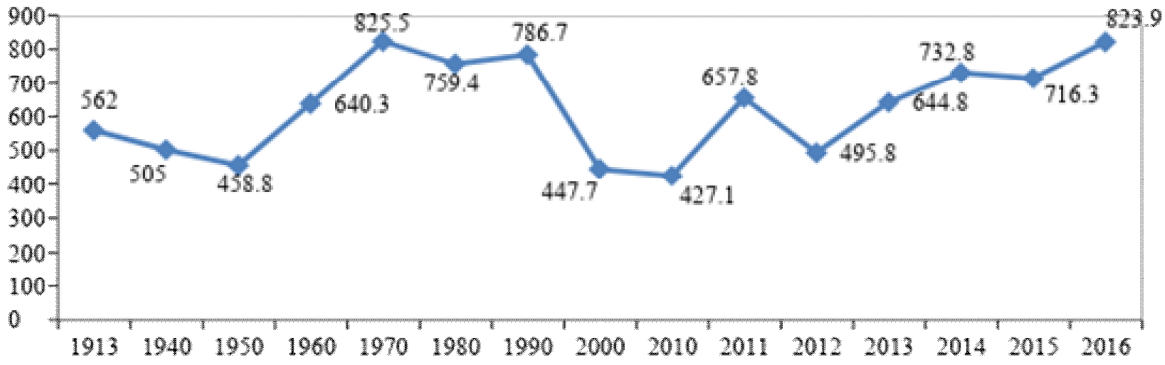

Figure 3 – Production of grain per capita in Russia from 1913 to 2016, kg

According to the information collected by the priest Slovtsov, and later processed and described by E. Borisenkov and V. Pasetsky, and according to many sources, Russia survived 350 hungry years during the X-XIX centuries. In the twentieth century, there were 20 lean years in Russia and the Soviet Union. Most hungry people were in 1921 and 1946, when 265 kg and 240 kg of grain per capita were produced [21, p. 14].

In 1990, grain production per capita was 40% higher than in 1913, and 55.6% higher than in the pre-war 1940. In the yielding for Russia 2008, the production of grain per capita was 762 kg, while in the United States it was 1,380 kg, and in Canada it was 1,606 kg [7, p. 25].

One should note the anomalously hot summer of 2010, when only 61 million tonnes of grain were collected. In 2016, grain production per capita was 1.9 times higher than in the unfavorable 2010.

The production of a particular product in a particular area primarily affects its consumption per capita. Consumption of grain products per capita in Russia and its member states is presented in Table 6.

Table 6 – Annual consumption of bread products per capita in Russia and its member states, kg

Rate	2006	2010	2011	2012	2013	2014	2015	2016
Nizhny Novgorod Region	105	96	97	102	100	109	107	108
Volga Federal District	120	115	115	115	114	116	115	115
The Russian Federation	121	120	119	119	118	118	118	117

The annual consumption of bread products in 2016 in the Nizhny Novgorod region amounted to 108 kg per capita, which is 7 kg less than in the Volga Federal District and 9 kg less than in the Russian Federation. Despite this, the annual consumption of bread products meets the recommended norms of consumption 2010 (95 - 105 kg per person).

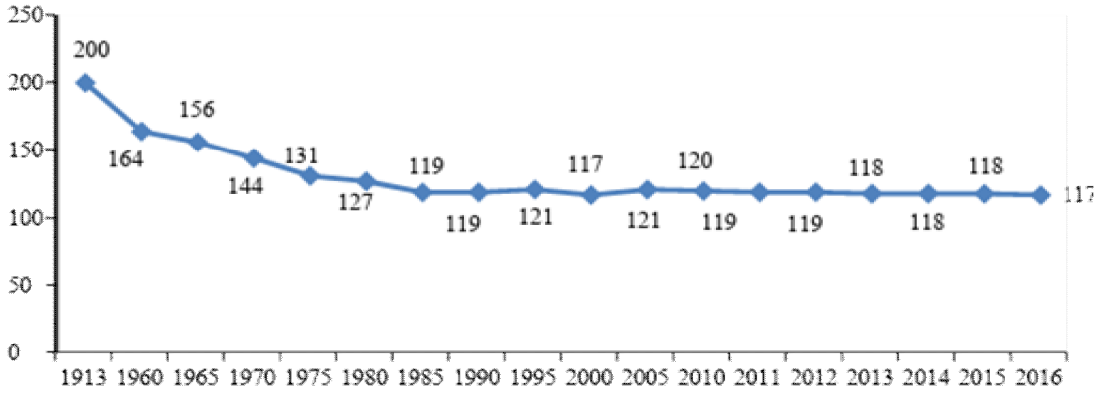

Figure 4 – Annual consumption of bread products per capita in Russia from 1913 to 2016, kg

The annual consumption of bread products per capita in Russia was 117 kg in 2016. This is higher than the recommended consumption rate of 17 kg. Table 7 presents a comparative analysis of the annual consumption of bread products per capita in Russia and countries of Europe and Asia.

Table 7 – Annual consumption of bread products per capita in Russia and countries of Europe and Asia, kg

Year Country	Russia	Poland	Armenia	Germany	USA	Japan
2000	117	120	117	81	94	98
2005	121	119	121	87	90	94
2010	120	108	186	101	88	92
2014	118	106	190	103	89	89

Comparing the rate of annual consumption of grain products per capita with other countries, one should note that Russia has some advantage over the developed countries. The greatest consumption of bread products falls on the people of Armenia. This is due to their low price. It is important that consumption of one of the consumer basket products above the norm cannot compensate for the consumption of other products.

Due to the insufficient volume of grain production both in the Russian Federation and in the Nizhny Novgorod region (taking into account one tonne per capita), the country and region have to import this type of agricultural products to cover the needs of the population. Dynamics of export-import grain flows in the country and region is presented in Table 8.

Talking about the country's total independence in terms of grain, it is necessary to produce about 1 tonne per capita. Only an increase in grain production by 26.1 million tonnes will allow to reach the level of 146.8 million tonnes. As the gross grain production in the Russian Federation was 120.7 million tonnes in 2016 and the population of the country amounted to 146.8 million people at the end of 2016.

Table 8 – Dynamics of export-import grain flows

Rate	2006	2010	2011	2012	2013	2014	2015	2016
Nizhny Novgorod Region								
Import, thousand tonnes	179.6	163.5	148.3	178.9	210.9	163.1	182.6	624.4
Export, thousand tonnes	45.4	18.5	44.1	304.0	120.4	109.9	230.3	557.6
Cover ratio of food import	0.253	0.113	0.297	1.699	0.571	0.674	1.261	0.893
Import / Export Ratio	3.960	8.838	3.363	0.588	1.752	1.484	0.793	1.119
The Russian Federation								
Import, thousand tonnes	2.3	0.4	0.7	1.2	1.5	0.9	0.8	1.0
Export, thousand tonnes	11.1	13.9	18.3	22.5	19.0	30.1	30.7	33.9
Cover ratio of food import	4.826	34.750	26.143	18.750	12.667	33.444	38.375	33.900
Import / Export Ratio	0.207	0.029	0.038	0.053	0.079	0.030	0.026	0.029

During the analyzed period, the volume of export in the Russian Federation increased more than 3 times. It reached 33.9 million tonnes as of reporting date, while the volume of import decreased 0.4 times. It amounted to 1.0 million tonnes as of reporting date.

The volume of grain export in the Russian Federation varied from 11.1 million tonnes in 2006 to 33.9 million tonnes in 2016. And it increased by an average of 1.90 million tonnes annually during the period from 2006 to 2016. The fact that in 2009, grain export was 54.5 times bigger than import is worth noting. One should note the abnormally hot 2010, when the gross grain yield was low. During this period, 13.9 million tonnes of grain were exported. This amounted to 22.8% of the gross grain yield in Russia. In turn, grain import was the lowest for the entire analyzed period in 2010 - 0.4 million tonnes. As of reporting date, export exceeded import 34 times.

The main buyers of Russian grain are Egypt, India, Turkey, Jordan, Libya, Yemen, Tunisia, Bangladesh, Israel, Greece, Italy [22, p. 52-53].

The volume of grain import in Russia decreased by an average of 0.05 million tonnes annually during the period from 2006 to 2016. As of reporting date, it amounted to 1.0 million tonnes. In 2016, the volume of import was 2.9% of Russia's exported grain.

Analyzing the data of Table 8, one can see that in the Nizhny Novgorod region, both export and import of grain show a progressive and upward trend in indicators. This is due not only to the activation of export potential, but also to the increase in import. Export of goods does not exceed their import. Therefore, the cover ratio of food import was significantly less than one across the entire study period (with the exception of cover ratio in 2012 and 2015). These data characterize the steadily growing needs of the population for food and its deficit within the region.

Grain export in the Nizhny Novgorod region amounted to 557.6 thousand tonnes in the reporting year. This is 12.3 times more than in 2006. One should note that during the period of 2000-2016, grain export tended to grow and increased by an average of 20.1 thousand tonnes annually. The value of this indicator for the period of 2000-2016 fluctuates from 2.3 thousand tonnes in 2000 to 557.6 thousand tonnes in 2016. In the Nizhny Novgorod region, the cover ratio for food import is significantly lower than in the Russian Federation.

The grain import in the Nizhny Novgorod region was almost 12% higher than export in 2016. During the period of 2006-2016, the volume of import in the Nizhny Novgorod region increased 3.5 times. While in Russia it decreased 0.4 times. The reason for the excess of grain import over its export in the region is the fact that the region mainly exports fodder grains and imports food grain and elite seeds.

The volume of grain import in the Nizhny Novgorod region varies from 624.2 thousand tonnes in 2016 to 57.7 thousand tonnes in 2009. It decreased by an average of 4,4 thousand tonnes annually during the period of 2000-2016.. The largest volume of import for the entire analyzed period falls on the reporting year of 2016 - 624.2 thousand tonnes. One should note that in the lean 2010, grain import was almost 9 times higher than export.

CONCLUSION

Agro-industrial complex is the main producer of raw materials for the production of food products. Unfortunately, the dependence of the domestic food industry on the foreign supplies took form of a standard. Obviously, it is necessary to take real steps to meet the domestic needs independently, through the introduction of effective measures in the agricultural sector. While the recovery and radical transformation of the commodity structure will occur only with the change of priorities in the national economy. It should aim at creating competitive goods with high level of processing.

Providing the population with bread products, their export and import, as well as the effective functioning of the country's agro-industrial complex as a whole, depend on the increase in grain production. The main thing is that our country has all the necessary resources and great

opportunities for stabilizing and increasing grain production.

REFERENCES

1. Altukhov, A. I. 2009. Grain Farming and Food Security in Russia [Zernovoye khozyaystvo i prodovol'stvennaya bezopasnost' Rossii]. *Agro-Industrial Complex: Economics, Management [APK: Ekonomika, upravleniye]* 1, p. 3–12.
2. Shishkin, A. F. 2009. Grain Market as a Factor of Economic Security of Russia [Rynok zerna kak faktor ekonomicheskoy bezopasnosti Rossii]. Shishkin, A. F. and Pozdnyakova, E. I. *Bulletin of Tambov University. Series: The Humanities [Vestnik Tambovskogo universiteta. Seriya: Gumanitarnyye nauki]* 12 (80), p. 116–118.
3. Lukomskaya, I. S. 2009. The Grain Market and Its Role in Ensuring the Country's Food Security [Zernovoy rynok i yego rol' v obespechenii prodovol'stvennoy bezopasnosti strany]. *Topical Issues of Economic Sciences [Aktual'nyye voprosy ekonomicheskikh nauk]* 7, p. 147–151.
4. Altukhov, A. I. 2009. Grain Farming and Food Security in Russia [Zernovoye khozyaystvo i prodovol'stvennaya bezopasnost' Rossii]. *Agro-Industrial Complex: Economics, Management [APK: Ekonomika, upravleniye]* 1, p. 3–12.
5. Altukhov, A. I. and Vasyutin, A. S. 2002. *Grain of Russia [Zerno Rossii]*. Moscow: EKONDS-K.
6. Altukhov, A. I. 2013. Risks in the Russian Grain Market and Ways to Overcome Them [Riski na zernovom rynke Rossii i puti ikh preodoleniya]. *Agro-Industrial Complex: Economics, Management [APK: Ekonomika, upravleniye]* 1, p. 3–12.
7. Altukhov, A. I. 2012. Grain Farming before Exportation [Zernovoye khozyaystvo pered vyvozom]. *The Economics of Agriculture in Russia [Ekonomika sel'skogo khozyaystva Rossii]* 1, p. 24–32.
8. Baurov, A. V. 2013. *The Substantiation of the Areas of Increase in Food Grain Production Efficiency Taking into Account Features of Natural Zones [Obosnovaniye napravleniy povysheniya effektivnosti proizvodstva prodovol'stvennogo zerna s uchetom osobennostey prirodnykh zon]*: Thesis of the Candidate of Economic Sciences. Saratov.
9. Gordeev, A. V. And Butkovsky, V. A. 2003. *Russia is a Grain Country [Rossiya – zernovaya derzhava]*. Moscow: Pishepromizdat.
10. Kudelya, A. D. 1997. *The Concept of the Grain Market Formation in Russia [Kontseptsiya stanovleniya rynka zerna v Rossii]*. Moscow: "Monolit" Humanitarian Center.
11. Chudilin, G. I. 2007. *Grain Subcomplex: Stability Conditions: Monograph [Zernovoy podkompleks: usloviya ustoychivosti : monografiya]*. Moscow: IITS "Statistika Rossii".
12. Mironin, S. Why Was There No Famine in the War Years? [Pochemu goloda ne bylo v gody voyny?]. *Warring figures and grain production [Voyuyushchiye tsifry i zernoproizvodstvo]*. http://www.economics.kiev.ua/index.php?id=1057&view=article.
13. Davoudi SMM, Fartash K, Venera G. Zakirova, Asiya M. Belyalova, Rashad A. Kurbanov, Anna V. Boiarchuk, Zhanna M. Sizova (2018). Testing the Mediating Role of Open Innovation on the Relationship between Intellectual Property Rights and Organizational Performance: A Case of Science and Technology Park, EURASIA Journal of Mathematics Science and Technology Education, 14(4), 1359-1369.
14. Fartash K., Davoudi, S.M.M., Tatiana A. Baklashova, Natalia V. Svechnikova 4, Yulia V. Nikolaeva, Svetlana A. Grimalskaya (2018). The Impact of Technology Acquisition & Exploitation on Organizational Innovation and Organizational Performance in Knowledge-Intensive Organizations, EURASIA Journal of Mathematics Science and Technology Education, 14(4), 1497-1507.

15. Igoshin, A. N. 2013. *Increase of Economic Efficiency of Grain Sector in Modern Conditions (Case Study of the Nizhniy Novgorod Region) [Povysheniye ekonomicheskoy effektivnosti zernovogo sektora v sovremennykh usloviyakh (na primere Nizhegorodskoy oblasti)]*. Thesis of the Candidate of Economic Sciences. Knyaginino.
16. Degtyaryova, T. D. 2010. Investigation of the Interrelationships between Different Types of Economic Activity of the Agrarian Sector of the Regional Economy [Issledovaniye vzaimosvyazey vidov ekonomicheskoy deyatel'nosti agrarnogo sektora ekonomiki regiona]. Degtyaryova, T. D. and Chulkova, E. A. *Economy of the Region [Ekonomika regiona]* 4, p. 194-198.
17. Yakovlev, T. A. 2010. Food Security of the Russian Federation in the Context of Global Trends [Prodovol'stvennaya bezopasnost' Rossiyskoy Federatsii v kontekste mirovykh tendentsiy]. *Vestnik of Peoples' friendship university of Russia (RUDN). Series: Economics [Vestnik Rossiyskogo Universiteta Druzhby Narodov]* 4, p. 22–29.
18. Medvedev, D. A. 2009. On the Development of the Grain Market [O razvitii zernovogo rynka]. *Ministry of Agriculture of the Russian Federation [Ministerstvo sel'skogo khozyaystva Rossiyskoy Federatsii]* 7. http: //www.agroxxi.ru/zrast/200907/200907.pdf
19. Kodyakova, T. E. 2009. The Problem of Food Provision of the Jewish Autonomous Region at the Present Stage [Problema prodovol'stvennogo obespecheniya Yevreyskoy avtonomnoy oblasti na sovremennom etape]. *Regional Problems [Regional'nyye problemy]* 12, p. 94–98.
20. Vavilova, E. V. 2013. The Economic Potential of Russia's Agro-Industrial Complex as a Factor in Ensuring Food Security[Ekonomicheskiy potentsial agropromyshlennogo kompleksa Rossii kak faktor obespecheniya prodovol'stvennoy bezopasnosti]. *International Trade and Trade Policy [Mezhdunarodnaya torgovlya i torgovaya politika]* 5, p. 12–19.
21. Denisova, N. I. 2012. Food Security in the System of Economic Security in Russia: Problems and Solutions [Prodovol'stvennaya bezopasnost' v sisteme ekonomicheskoy bezopasnosti Rossii: problemy i resheniya]. Denisova, N. I. and Polyansky, S. Ya. *Herald of Ryazan State Agrotechnological University Named after P.A. Kostychev [Vestnik Ryazanskogo gosudarstvennogo agrotekhnologicheskogo universiteta im. P. A. Kostycheva]* 3 (15), p. 14–18.
22. Zhidkov, S. 2011. Russian Grain Export Needs Improvement [Rossiyskiy eksport zerna trebuyet sovershenstvovaniya]. *Agro-Industrial Complex: Economics, Management [APK: Ekonomika, upravleniye]* 4, p. 52–56.