

# Feed Base for Animal Husbandry in the Regions as a Factor of Increasing Food Security and Sustainable Development Ensuring in the Russian Federation

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**Abstract:** The article shows the great importance of ensuring the food security of the country. Its state in the Russian Federation (RF) is considered. The assessment of the level of food supply in the country is given. There is the attention to the greater efficiency when feeding animals with compound feeds is paid in the article. An inequality is proposed to determine the economic feasibility of the production and use of compound feed. It is indicated that it is advisable to produce mixed feeds, in some cases, using their own grain and protein-vitamin-mineral concentrates. The state of production of the main ingredients in the Russian Federation that are part of compound feeds is shown.

## 1 INTRODUCTION

Animal husbandry is one of the most important sectors of agriculture, which has a significant impact on it. Animal husbandry produces the most important food products - milk and meat, which are the main source of protein of animal origin; it produces raw materials for various sectors of the processing industry, supplying them with milk, meat, wool, sheep, leather, etc. The relevance of this topic is that in development animal husbandry is inextricably connected with crop production, since the efficiency of the industry is largely determined by the state of the feed base.

The main trends in the market for livestock products today are as follows:

- Growing need for animal protein, rising incomes and continued urbanization;
- Increase in the number of livestock in Argentina, Paraguay, Uruguay and other countries in the region, which increases supply from these countries and may affect potential price reductions in the market, possible dumping;

- Geographically, the main growth of meat demand will be in China against the background of the development of the food industry in the country;
- The increase in the population of Muslim countries will be a factor in the increase in demand for halal beef.

At the same time, harsh climatic conditions complicate the task of providing livestock with quality feed in winter in Russia. Russia is still dependent on the import of livestock products (18-20% of consumption). The cost of livestock production in Russia is much higher than in other developed countries (Karabanova, Sharapova., Magomedov, 2020). But at the same time, the industry needs support and development in Russia, as it plays one of the most important tasks in ensuring the country's food security.

Ensuring the country's food security is of great social, economic and political importance (Altukhov, 2019). In the early 1990s, when there was a serious food problem in the USSR, radical economic and political changes began. Both subjective and objective factors had a negative impact on this problem. Subjective include deliberate restrictions on

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the supply of food to the trading network, as well as the irresponsible attitude of individual citizens involved in this problem. And objective are the low technical level of agricultural, food and transport enterprises, which had a great influence on a significant increase in losses in the production and transportation of food products. In modern conditions, after the use of advanced technologies in these enterprises, losses and efficiency were significantly reduced. According to the results of the studies, economists of our country set the necessary lower threshold for ensuring food security. It is 85%.

## 2 RESEARCH METHODOLOGY

The methodological and informational base of the study is the works of researchers in the field of agricultural, economy, regionalistics. The theoretical and methodological basis for studies of regional socio-economic systems is laid down in the works of W. Eisard, A. Weber, A. G. Granberg, N.N. Kolosovsky, etc. The agricultural sector as a subsystem of the regional economy was investigated in the works of A.I. Altukhov, V.M. Bautin, T.A. Dozorova, M.N. Dudin, and others. The problem of state regulation of the regional economy was raised in numerous publications by L.I. Abalkin, E.Yu. Alekseitcheva, A.S. Bashkirtsev. The study is based on data from statistical agencies for different periods of time (OECD, Rosstat),

Analysis, synthesis, modeling, analogy, formalisation, generalization are chosen as research methods.

## 3 RESULTS OF THE STUDY

The food security situation has improved much in recent years. The figure 1 shows that the share of imported food in the Russian market has a downward trend over the past 15 years. This indicator is one of the components of the methodology for assessing economic security in the Russian Federation.

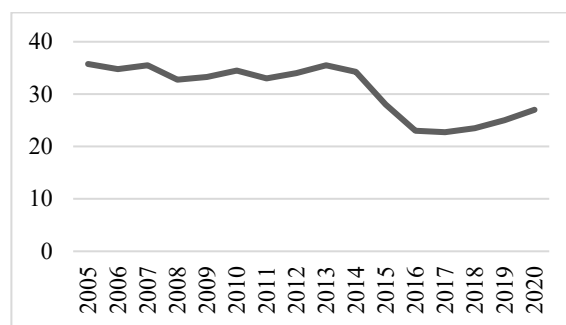


Figure 1: Share of food imports in food retail commodities Russian Federation % (Federal State Statistics Service, 2021).

However, despite positive trends in food security, many problems remain: high competition in the world market, industry difficulties caused by pandemic restrictions, high costs of livestock products, and others.

The main food products necessary for human life include grain and its processed products; meat of all kinds; milk and milk products; fish and fish products, as well as eggs. (Altukhov, 2020) Among them, livestock products occupy a large proportion.

When studying the problems of animal husbandry in Russia, it is necessary to concentrate on providing the feed base as the main component of the cost of livestock products.

At the same time, climate features put first the problem of providing livestock feed in winter. Currently, grain directed for foraging purposes is not always used effectively (Magomedov., Alekseicheva, Kulomzina, 2015). So, for example, according to Rosstat data in 2019, cattle and poultry were fed grain at its finest - 12.7 million tons, which is not desirable.

The main products of the livestock industry include meat, milk, eggs.

The shortage of meat and meat products to meet the needs of the country's population, taking into account their exports, is 0.4 million tons (according to Rosstat data for 2019). This volume is small. However, given the economic feasibility of increasing the export of meat and meat products, it is necessary to significantly increase their production in the country.

Milk and milk products occupy a large part in human nutrition. Their production volumes in the country in the last ten years have not changed much and until today Russia is forced to import products to meet needs. Import exceeds 20% of the volume produced in the country.

To solve this problem, the Government of the Russian Federation should pay more attention to

increase the production of milk and dairy products, although entrepreneurs engaged in this type of business receive some support. A positive factor affecting the development of the industry is the increase in milk production from one cow. At the same time, there was a decrease in the number of cows. That is, on the one hand, there was an increase in milk production on average from one cow, and on the other, a decrease in the number of cows, and as a result, the total milk production remained at about the same level. It is necessary to increase the number of highly productive cows and create the required feed base for them to improve the situation.

Table 1: Feed consumption in livestock industry of the Russian Federation (in farms of all categories) for 2000-2019.

	2000	2010	2017	2018	2019
All feed in terms of feed units, mln tons	106,9	96,9	107,0	105,6	105,9
including: concentrated feed	37,1	43,6	54,1	54,9	55,9
coarse, juicy and other feeds	69,8	53,3	52,9	50,7	50,0
Feed consumption per head of conditional cattle, centner	28,5	28,9	29,2	29,0	29,1

\*According to Rosstat data (Federal State Statistics Service, 2020).

Eggs are an important food item for humans that meet the protein needs to some extent. In recent years, there have been great positive changes in the poultry industry of the Russian Federation, but despite of it, egg imports remain very high. So, according to 2019, 6728 million units were imported. To eliminate this problem, the interest of entrepreneurs engaged in this type of business should be increased and a good feed base should be created.

Of the above-mentioned livestock products, only milk and dairy products do not provide food security. That is, they produce less than 85% of the required level. To solve this problem, first of all, it is necessary to create a good feed base.

The table 1 presents data on the consumption of all types of feed in the livestock industry of the Russian Federation for 2000-2019.

As table 1 shows, the total feed consumption for the period under review remained at approximately

the same level. At the same time, the consumption of concentrated feed increases every year. That is, if in 2000 they were used 37.1 million tons, and in 2019 use was increased to 55.9 million tons (growth amounted to 50.7%). However, for other types of feed (hay, green feed, silage and senage), the opposite trend is observed. In 2000, their volume amounted to 69.8 million tons, and in 2019, 50 million tons (production decreased by 28.4%). This situation adversely affects the amount of milk produced (Panova, 2020). Cows should receive concentrated and other fodder in strict accordance with zootechnical standards. Otherwise, it will not be possible to avoid a decrease in milk yields. An analysis of the work of advanced agricultural enterprises showed that the collection and drying of coarse and juicy feed is carried out using advanced technology and technology, therefore the labor intensity and labor losses during their harvesting have significantly decreased, which positively affected the growth of livestock production efficiency. Table 1 shows that feed consumption per head of conditional cattle remained at almost the same level.

Dry forage (hay), green feed, silage and senage occupy an important place in the diet of farm animals (Tranchenko, 2014). The volumes of their production are significantly influenced by the natural and climatic conditions in the regions of the country, the level of use of advanced technology and technology, the state of organization of labor and etc. (Panova, 2020). If there are real conditions for increasing the volume of harvests of these types of feed in a particular region, it is necessary to interest entrepreneurs engaged in this type of business.

Table 2 Hay, green feed, silage and senage production in the Russian Federation for 2011- 2018, mln tons.

Indicators	2011	2013	2014	2015	2016	2017	2018
Natural hayfields:							
hay	11734,0	10257,9	10119,4	9637,3	9751,2	9481,4	9152,5
green feed, silage and senage	888,8	638,2	664,6	566,7	673,2	631,0	569,1
Cultural hayfields and improved pastures:							
hay	197,2	110,8	103,7	116,6	50,5	50,6	47,9
green feed, silage and senage	973,8	511,4	520,8	450,5	302,4	262,5	237,8
Total hay	11931,2	10369,7	10223,1	9753,9	9801,7	9532,0	9200,4
Total green feed, silage, senage	1862,6	1149,6	1185,4	1017,2	975,6	893,5	806,9

\* According to Rosstat data (Federal State Statistics Service, 2020).

Table 2 shows that the amount of hay produced in the Russian Federation is constantly declining except in 2016, when there was a slight increase compared to 2015. About the same situation has developed in green feed, silage and senage, with the exception of 2014, when their number was slightly more than 2013.

#### 4 DISCUSSION OF RESULTS

In animal feeding, concentrated feed occupies an important place. They include different types of grain available in each region and, if economically feasible, imported from other regions, regions and republics; Waste from food enterprises and feedstuffs brought to a suitable condition. Of all the listed species of concentrated feed, feedstuffs are more effective. Scientists involved in the study of the problems of the agro-industrial complex have found that compound feed gives a large return on pure grain by 34%. The composition of feedstuffs includes many components of different nutritional value. Some of them exist in the region where the feed mill operates, and the rest is imported from other regions. Practice shows that it is not always profitable to bring the missing ingredients for the production of feed from other regions of the country. This is primarily due to the high transport costs and therefore it is necessary to assess the economic feasibility of acquiring them. Based on the results of the studies, we recommend using the following inequalities to assess the profitability of feed production:

$$ZhP1 \times C - Zk \geq ZhP2 \times C - Zz \quad (1)$$

Where:

ZhP1 - the volume of livestock products obtained by feeding one head of conditional cattle with compound feed, kg.;

C - price of one kg of livestock products produced, rub. (Magomedov, Kulomzina, Chaikina, 2012).

Zk - costs of production and sale of livestock products obtained by feeding one head of conditional cattle with compound feed, rub.;

ZhP2- volume of livestock products obtained by feeding one head of conditional cattle with clean grain, kg;

Zz - costs of production and sale of livestock products obtained by feeding one head of conditional cattle with clean grain, rub.

The results of practical testing of this inequality confirmed its validity.

A large variety of ingredients are used for the production of feedstuffs as mentioned above. They are not always available in the region where the feed mill is located, and some of them are produced only in a single region. Therefore, the production of scarce types of ingredients should be increased where possible. Table 3 presents the data on the structure of production of feedstuffs and its main ingredients for the federal districts of the Russian Federation (Alexeichev, Edelev and Magomedov, 2011) for 2019.

Table 3 - Structure of combined feed production and its main ingredients by federal districts of the Russian Federation for 2019, % .

Federal Districts	Combined Feed and Ingredients						
	Combined Feed	premises	protein vitamin-mineral complex	fodder protein	fish flour	meat flour	seed cake
Central	42,4	64,0	64,4	47,3	2,2	46,0	27,4
South	7,2	12,9	14,6	6,9	2,8	4,0	22,0
Northwest	8,9	4,9	2,6	3,4	14,5	3,0	23,7
Far Eastern	0,7	0,1	0,1	3,9	80,4	0,0	0,1
Siberian	8,5	5,8	1,7	0,0	0,2	7,0	5,8
Ural	8,8	2,9	5,3	0,0	0,0	7,0	0,5
Volga	20,4	9,4	10,0	38,5	0,0	28,0	19,5
North Caucasus	3,1	0,0	1,3	0,0	0,0	5,0	1,0
	100	100	100	100	100	100	100

\*According to Rosstat data (Federal State Statistics Service, 2020).

The table 3 shows that the Central Federal has the largest share in the total production of feedstuffs - 42.4% and the lowest is in the Far Eastern - 0.7%. Such dramatic fluctuations in the volume of feed produced in federal districts show that they do not everywhere pay the necessary attention to the development of livestock. If we take into account that livestock products are used in nutrition by citizens of our country everywhere, then to meet the needs for them, they should be imported from other federal districts. And if still, in such federal districts they produce livestock products, then pure grain is used as concentrated feed. This form of animal feeding is ineffective.

Premixes are added to them to produce mixed fodders with sufficient mineral substances and vitamins. After that, balanced feed is obtained and as a result, the efficiency of feeding animals increases. Given this importance in the Central Federal District, increased attention is paid to increasing the production of premixes. As a result, their largest share in the total volume in the country is concentrated in the Central Federal District. Following to the Central District is the Southern and in third place is Volga region. As the number of mixed feed produced in the country increases, the volume of premixes should also grow synchronously. This will make it possible to increase the efficiency in feeding animals with compound feed.

Protein-vitamin-mineral concentrates (PVMC) contain the required amount of minerals and vitamins. They can, in a certain ratio with grain produced locally, ensure the production of balanced feed for agricultural enterprises and livestock complexes. In such situations, the presence of grain at the location of feed consumers is very important. The disadvantage of such feedstuffs is the large proportion

of grain in them, which increases their cost. Despite this, in most cases, it is more profitable to feed animals with such feed than clean grain. Our country has huge territories and it is not economically feasible everywhere to produce feed from a large number of ingredients. Therefore, increasing the production of PVMC will make it possible to use coarse grain more effectively.

## 5 CONCLUSIONS

For animal life-sustaining activity, protein occupies an important place. Under such conditions, the production of fodder protein is of particular importance. The data in Table 3 show that most feed protein is produced in the Central Federal District. At the same time, in the Siberian, Ural and North Caucasus federal districts its production is completely absent. Table 3 also shows that the Far Eastern Federal District has a large share of fish flour production (80.4%). This is due to the presence of favorable conditions in this district for the production of fish flour. These possibilities need to be fully exploited, since it is a very valuable ingredient necessary for the production of feedstuffs. Meat-and-bone flour and cake are produced more in the Central Federal District. As far as possible, it is necessary to increase their volumes, since they have a positive impact on the quality of the produced feed.

In the future, from our point of view, it is necessary to significantly increase the production of these ingredients necessary for the production of feedstuffs, which will contribute to the increase in livestock production in the Russian Federation. This will make it possible to fully meet domestic needs for them and send a certain amount for export, which will



provide an opportunity to replenish the country's foreign currency resources and improve the financial condition of domestic agricultural enterprises.

At the same time, it is necessary to increase the competitiveness of the Russian feed base, reducing the cost, but at the same time maintaining the high quality of the feed due to the preservation of sugar, protein, and high nutriency during long-term storage; increase the productivity of livestock (including birds, milk production with a high protein content) and preserve its health; ensuring complete mechanization and automation of the process from mowing of herbs to distribution of feed to animals; reduction of fuel consumption up to 40%; reduction of first-class fodder harvesting time; increasing the degree of return on the use of land: with a feed conveyor and several slopes.

## REFERENCES

- Alexeicheva, E.Yu., Edelev, D.A. and Magomedov, M.D., (2011). *Economic geography and regionalistics. The book*. Moscow: The publishing company Dashkov and K.
- Altukhov, A.I. (2019). *The paradigm of food security. Russia*, Monograph. Fund "Kadrovyyi rezerv".
- Altukhov, A.I. (2020). Food security in the context of the implementation of the new version of its doctrine. *Bulletin of the Kursk State Agricultural Academy*, 9: 82-90.
- Federal State Statistics Service, 2021. Retrieved from <https://rosstat.gov.ru/>.
- Karabanova O.V., Sharapova S.A. and Magomedov M.D. (2020). Competitiveness of a Multicultural Region's Economy: Measuring and Provision. *Public Administration and Regional Management in Russia. Contributions to Economics*. Springer, Cham. [https://doi.org/10.1007/978-3-030-38497-5\\_19](https://doi.org/10.1007/978-3-030-38497-5_19)
- Magomedov, M.D., Alekseicheva, E.Yu. and Kulomzina, E.Yu. (2015). Increasing the economic efficiency of using forage grain. *Ekonomika i predprinimatel'stvo*, 10-1 (63): 580-582.
- Magomedov, M.D., Kulomzina, E.Yu. and Chaikina, I.I. (2012). *Pricing*. Moscow: The publishing company Dashkov and K.
- Panova, E.O. (2020). Factors and reserves of increasing food security of the Russian Federation. *Economy yesterday, today, tomorrow*, 7: 73-84.
- Panova, E.O. (2020). Increase in milk production as a direction to increase food security of the Russian Federation. *Economy yesterday, today, tomorrow*, 48: 448-455.
- Tranchenko, L.V. (2014). Modern state and trends in the development of the feed base. *Agricultural Journal*, 3(7): 437-441.