The Influence of Price Factors on the Strategic Development of the Agricultural Sector in Various Natural and Economic Conditions

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Abstract. The purpose of the study is to substantiate the directions for improving state support for the strategic development of the agricultural sector. The information and analytical resources of the study were the spatial database compiled by the authors in the context of the subjects of the Russian Federation by indicators on average for 2017-2019. The influence of price factors on the formation of physical and economic accessibility of products has been studied. It was revealed that in the process of formation the price interests of sellers and buyers have different polarity. In order to create a balanced formation of physical and economic accessibility of products, it is necessary to increase prices to create conditions for expanded reproduction of producers' resources, on the one hand, and reduce prices to increase the purchasing power of the population in food products, on the other hand. Moreover, the influence of natural and economic factors simultaneously on the conditions of reproduction and purchasing power is observed. It is proposed to supplement the provisions on the classification of state support for the agricultural sector with measures to subsidize the sphere of production and the sphere of consumption of products, the level of which is advisable to differentiate on a territorial basis.

1 Introduction

Today, the priority task of agricultural policy is to ensure such a level of strategic development of the agricultural industry, at which the physical and economic availability of products cover rational consumption rates. In fact, this conceptual provision strengthens the food function of agriculture and the sphere of processing. At the same time, there is a need to raise the status of state support as a tool for achieving the goals of strategic planning of the agricultural sector.

The fundamental complexity of the task is related to ensuring the balance of supply and demand in the domestic agri-food market at a new point (Figure 1), characterizing the

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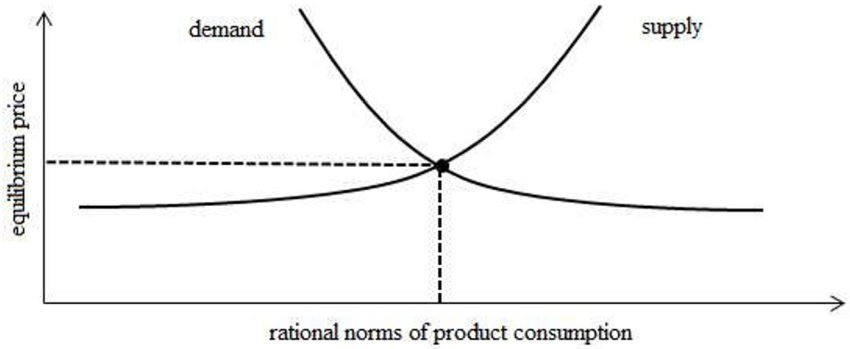
rational consumption rates for each type of product specified in the Order of the Ministry of Health of the Russian Federation.

Obviously, there will be disagreements among sellers (manufacturers) regarding the equilibrium price of products. It is known from economic theory that the size of the increase in output is limited by the supply price, and the size of consumption is limited by the demand price. In the process of increasing the level of production and the level of consumption of products, the price interests of sellers and buyers will have a different polarity. In the interests of producers – the maximum price for products, in the interests of the population – the minimum price. The convergence of interests on price determines the equilibrium point. To date, in order to establish an equilibrium of supply and demand, there has been an increase in production volumes to consumption volumes for some types of products and, conversely, a decrease in consumption volumes to production volumes for other types. Thus, the task of self-sufficiency of the threshold values of domestic demand was partially solved, only by reducing the level of consumption and the level of production per capita. This happened for potatoes, vegetables, milk and eggs. Over the period 2014-2021, the growth of self-sufficiency in these nomenclature groups was not accompanied by an increase in consumption.



Source: compiled by the authors

Fig. 1. The balance of supply and demand in the domestic agro-food market of the Russian Federation at the point of rational norms.

However, unlike the previous task, the new one cannot be solved by reducing consumption. Contrary to the current trend in the agri-food market, supply and demand should simultaneously strive for the level of rational consumption norms on a balanced basis. The main difficulties are related to ensuring the proportionality of the rates of formation of physical and economic accessibility [1]. Studies of scientists [7, 8, 9, 10] show that the growth of effective demand provokes an increase in imports of products to a greater extent than its production and, conversely, an increase in output without an increase in the purchasing power of the population leads to an increase in exports. In this regard, in order to form the physical and economic accessibility of products, there is a need for comprehensive state regulation and strengthening the purposefulness of agricultural support.

The hypothesis is connected with the scientific assumption that in order to ensure a balance of physical and economic accessibility at the level of rational norms, it is advisable to apply measures of state support for the reproduction of the resources of producers of products and measures of state support for the purchasing power of the population in food.

2 Materials and Methods

In this study, we adhere to the point of view of Academician E.N. Krylatykh and co-authors [5] with regard to the concept of the agro-food sector. By it we mean the sphere of production and the sphere of product sales, in which, in fact, the levels of physical and economic accessibility are formed. By the level of physical accessibility, the authors of the article understand the volume of food resources (stocks, production, imports), covering the rational consumption rates for each citizen of the country for the main types of products; under the level of economic accessibility is the volume of domestic consumption, covering the rational nutrition standards for each citizen of the country for the main types of products.

Considering that food independence can be guaranteed only at the expense of domestic production, the concept of physical accessibility is based on the provision of self-sufficiency of rational consumption norms. This is a guarantee of economic accessibility, which cannot be provided without the availability of products at the proper level.

To assess the level of formation of physical accessibility for each type of product, an indicator is used that characterizes the ratio of the level of production per capita with rational norms, and to assess economic accessibility – the ratio of the level of consumption per capita with the same norms. The achievement of rational norms in production and consumption is evidenced by the value of the indicator equal to or exceeding one (Figure 2).

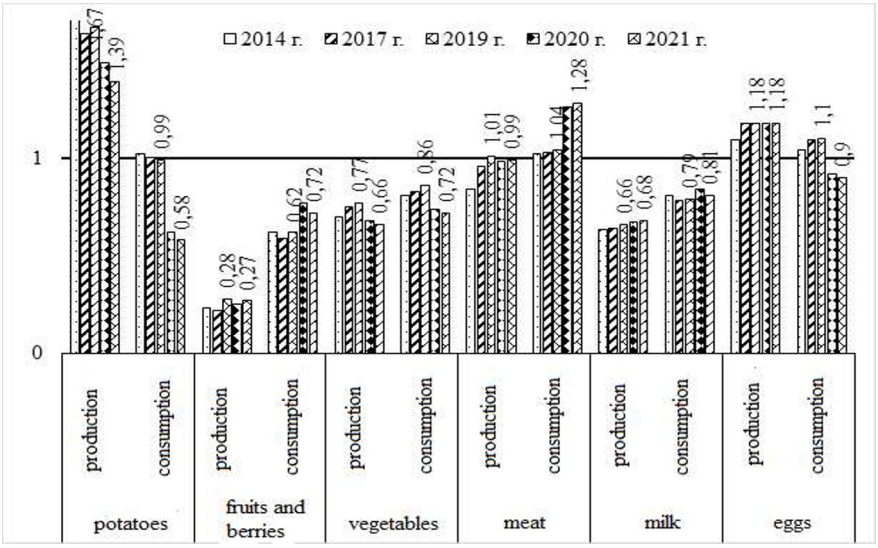


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Fig. 2. Assessment of the achievement of the level of rational norms in production and consumption per capita for the main types of products

At the end of the analyzed period (2021), the point of equilibrium of production and consumption was not established at the level of rational norms for any nomenclature group of products. For some types (potatoes, eggs), the "desired" values in consumption have not been achieved, for others (meat and meat products) – in production, for the third (fruits, vegetables and milk) – simultaneously in production and consumption.

In connection with the new tasks of the Food Security Doctrine, it is proposed to develop and supplement the scientific provisions of the classification of state support for the agri-food sector (Figure 3).

The proposed provisions of the classification of state support are based on the fact that in order to maintain the achieved (increase) level of physical accessibility for each type of product, it is necessary to create conditions for ensuring a continuous process of simple (expanded) reproduction of resources. In order to maintain the achieved (increase) level of economic accessibility, it is important to stabilize (increase) the purchasing power of the population. Logically, it is true to ensure simple reproduction of resources for those types of products where the level of physical accessibility per capita corresponds to rational consumption standards, and to ensure expanded reproduction for those types where its level does not reach such standards.

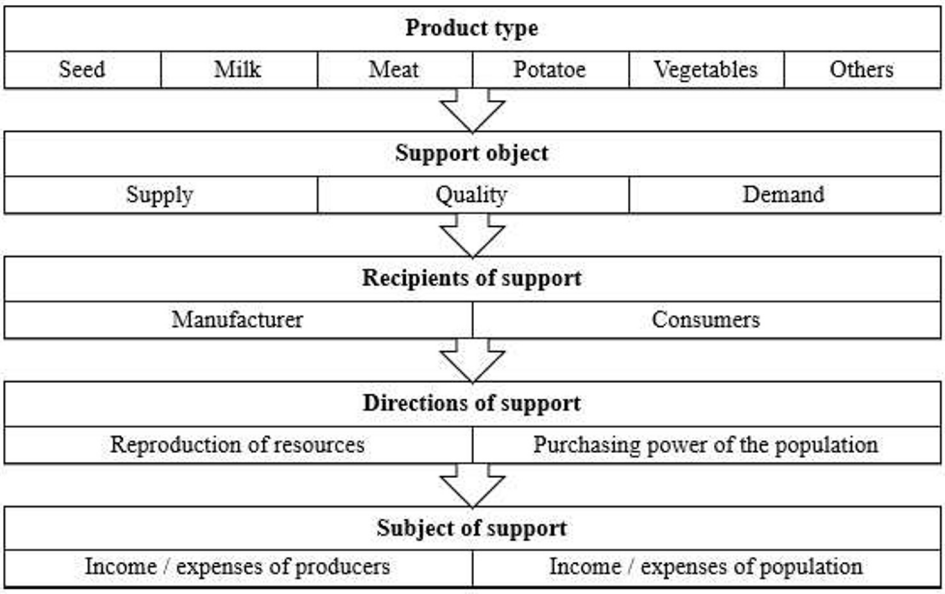

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Fig. 3. Classification features and types of state support in order to ensure the physical and economic accessibility of products

According to the economic accessibility of products, it is true that in order to achieve it, it is necessary to create conditions for increasing the purchasing power of the population in food.

It is important to note that the interest of farms and expanded reproduction is an increase in prices for manufactured products, and at the same time, the interest of consumers and purchasing power is a decrease in prices. The different orientation of the conditions for the implementation of a single process of forming physical and economic accessibility at the level of rational norms determines the expediency of supporting both production and consumption.

The proposed scientific provisions follow from the experience of the leading economies of the world, in which the regulation of the physical availability and quality of products is implemented through measures to support the income of producers, the regulation of economic access – through measures to support the solvency of citizens [2, 3, 4].

When setting strategic objectives for the formation of physical and economic accessibility of products, it is important to take into account the natural and economic conditions in which the reproduction of resources is carried out and, to a certain extent, the purchasing power of the population in food is formed. Today, the differences in costs and output per unit of land area between the subjects of the Russian Federation reach 10 or

more times [6]. Territorial differences in the purchase prices of products and incomes of citizens are also significant.

In order to verify the proposed scientific provisions on the development of the purposefulness of state support for the agri-food sector, the functional dependencies of the level of physical and level of economic accessibility on the main factors are constructed in the work. As already noted, in order to increase the supply from producers, it is important both the availability of demand and the return on investment sufficient to conduct the process of simple or extended reproduction of resources. The level of production per capita is used as supply, and the level of consumption per capita is used as demand. Cost recovery is characterized by the ratio of revenue and cost of sales. To increase demand, the favourable purchasing power of the population in food is important. Therefore, prices, incomes and the share of food expenses are used as factors describing the level of consumption per capita.

The information and analytical resources of the study were the spatial database compiled by the authors in the context of the subjects of the Russian Federation by indicators on average for 2017-2019. A specialized package of econometric analysis Gretl 2020d was used as a software tool for processing an array of data.

To assess the impact of natural and economic factors on the conditions for the formation of physical and economic accessibility of products, the named database is divided into five equal groups as the cadastral value of 1 hectare of farmland increases as an indicator that best characterizes the bioclimatic and economic potential of the territories of the subjects of the Russian Federation.

3 Results and Discussion

Models describing the physical and economic accessibility of products allow us to determine strategic directions of influence on the main factors in order to balance production and consumption at the level of rational norms and above [10].

As expected, the output of products depends on its consumption and the level of cost recovery that characterize the reproduction of resources. Also, the consumption of products is described by the level of income and prices. Moreover, in the vast majority of cases, the relationship with the first factor is directly proportional, with the second – inversely proportional (Table 1).

The best description of the behavior of supply and demand from the selected key factors is given by production-type equations. This confirms the earlier conclusions of scientists [11] that most important economic relations and patterns are nonlinear

Evaluation of the elasticity of models describing the level of physical accessibility shows that it is important to achieve rational norms in the process of production of the main types of products, along with demand, the payback of the costs invested in production and sales. As expected, the impact of demand on output is quite moderate. An increase in the level of consumption by 1% leads to an increase in the level of grain production by 1.2%, potatoes – by 1.3%, vegetables – by 0.9%. At the same time, cost recovery has a strong motivational effect on the level of production. Payback growth by 1% increases grain production by almost 7.1%, vegetables by 2.1%, cattle meat by 3.0%, milk by 1.7%. The results of the description of models of the level of production per capita show that commodity producers are able to form the physical availability of products at the level of rational norms, provided that there is a sufficient level of reproduction of resources and, of course, there is a corresponding demand for products. Therefore, as scientists point out [13], in the conditions of changing food market conditions under the influence of the embargo, it is especially important to take into account the dependence of supply on demand for food.

Table 1. Models for describing the physical and economic accessibility of the main types of products per head

Production	Model	Coefficient of determination
manufacture		
Seed	$LC^{1,20} * p^{7,06}$	96,82
Potatoe	$LC^{1,26}$	98,71
Vegetables	$LC^{0,89} * p^{2,09}$	99,03
Cattle meat	$LC^{0,41} * p^{2,97}$	92,05
Pig meat	$LC^{0,5921}$	88,91
Milk and dairy products	$LC^{0,91} * p^{1,72}$	98,52
Eggs	$LC^{1,09} * p^{2,90}$	98,14
consumption		
Potatoe	$S^{0,40} * C^{-0,49} * Sh^{0,48}$	99,87
Milk and dairy products	$S^{0,56} * C^{-0,51} * Sh^{0,53}$	99,97
Meat and meat products	$S^{0,30} * Sh^{0,40}$	99,94
Vegetables	$S^{0,59} * C^{-0,67} * Sh^{0,43}$	99,96
Sugar and confectionery	$S^{0,41} * C^{-0,33} * Sh^{0,26}$	99,94
Bread and bread products	$S^{0,62} * C^{-0,73} * Sh^{0,46}$	99,97
Eggs	$S^{0,42} * C^{-0,31} * Sh^{0,50}$	99,87
*LC – level of consumprion of products per head, kg/year; P – payback of production costs, rub/rub.; S – salary, rub./month; C – cost of the relevant products, руб.; Sh – share of food expenses, %		

Source: compiled by the authors

An assessment of the elasticity of models describing the level of economic accessibility shows that both prices and incomes are important for achieving rational per capita consumption rates. It is expected that the elasticity of demand for income is less than one, which indicates that there is no proportionality of the growth of household spending on products with an increase in income. In addition, for a number of nomenclature groups, price elasticity is higher than income, which, with an equal amount of their increase, will lead to a decrease in the level of consumption. For example, for vegetables, an increase in income by 1% will lead to an increase in the average per capita consumption level by 0.6%, and an increase in vegetable prices, on the contrary, will reduce such consumption by 0.7%.

The results obtained are to a certain extent consistent with the conclusions of foreign scientists [12] that food prices are becoming a key factor in food insecurity.

The simulation capabilities of the models make it possible to determine the level of indicative prices for the main types of agri-food products in the interests of its producers and consumers (Table 2).

Table 2. The vector of price changes in order to ensure the physical and economic accessibility of certain types of products

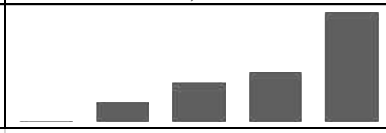
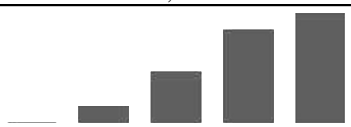
Products	For physical accessibility, %	Products	Products For economic accessibility, %
Milk	+17.44	Milk and dairy products	–24.55
Cattle meat	+49.76	Meat and meat products	–12.38
Pig meat	+25.68	Potatoes	–25.19
Vegetables	+67.11	Vegetables	–22.94
Eggs	+23.26	Eggs	–9.26

Source: compiled by the authors

Calculations show that in order to ensure physical accessibility at the level of rational consumption standards for the main diet-forming types of products, it is necessary to increase the price level of their sale as the main source of financing for the reproduction of resources. In order to ensure economic accessibility at the level of rational consumption rates for the same types of products, it is important to reduce the level of purchase prices as the main factor in the formation of purchasing power.

Depending on the natural and economic conditions, the elasticity of the average per capita level of production and the average per capita level of consumption from the main factors of the formation of physical and economic availability of products will vary. This is indicated by the results of grouping the regions of Russia according to the cadastral value of 1 hectare of agricultural land (Table 3).

Table 3. The level of cost recovery in production and the level of purchasing power of the population in groups of subjects of the Russian Federation according to the cadastral value of 1 ha of farmland

Groups of subjects of the Russian Federation	The level of cost recovery on average for the main types of products	The ratio of household income and purchase prices on average for the main types of products
1st group	1,08	1,17
2nd group	1,10	1,19
3rd group	1,12	1,23
4th group	1,13	1,28
5th group	1,19	1,30
Trend		

According to Table 3, it can be seen that both the cost recovery indicator, which characterizes the level of reproduction of commodity producers' resources, and the ratio of household income and product prices, which characterizes the level of purchasing power of the population, depend on the territorial feature. As the values of the natural and economic factor increase, there is an improvement in the conditions for the formation of physical and economic accessibility of products. For example, the ratio of the fifth and first groups of subjects of the Russian Federation is 110% in terms of payback, 111% in terms of purchasing power. This circumstance should be taken into account when setting tasks in the field of territorial development of the agro-food sector to ensure the physical and economic accessibility of products at the level of rational consumption standards.

4 Conclusion

So, in the field of ensuring food security, a strategically important task has been set to achieve rational consumption standards for every citizen of the country in the process of forming physical and economic accessibility for the main types of products. The fundamental complexity of the task is due to the need to balance supply and demand in the agri-food market at a new point. This means that changes are needed in the system of state support, since even the task of self-sufficiency of the needs of the domestic market was partially solved only by reducing the level of consumption to the level of production per capita.

In order to determine the strategic nature and directions of transformations in the system of state support for the agri-food sector, the dependence of the level of physical on demand and cost recovery and the dependence of the level of economic accessibility on product prices and

income of the population are constructed. The main conclusion based on the results of model calculations is that the formation of economic accessibility requires not only the indexation of income, but also a significant reduction in market prices for the main types of products, and for the formation of physical accessibility, on the contrary, their increase. There is a need for a compromise solution. Logically, it is true, in the practice of strategic planning of the agro-food sector, to develop measures of state support for the reproduction of commodity producers' resources and measures to support the purchasing power of the population. Such measures, as confirmed by the results of the study, it is advisable to differentiate according to the natural and economic conditions of the regions in order to neutralize the influence of territorial factors on the conditions for ensuring physical and economic accessibility of products.

Scientific developments can be useful to the authorities and management of the agro-industrial complex in the formation, implementation and adjustment of strategic planning documents (State programs on agriculture, the Concept of domestic food aid, the Development Strategy of the agro-industrial complex, etc.).

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