Agricultural insurance as a modern tool for protecting agricultural production on personal subsidiary farms

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Abstract. Personal subsidiary plots are one of the main categories of producers in the Russian food security system. An analysis of food independence is presented in the article. The article assesses the contribution of private farms to ensuring food security in Russia. This category of producers faces agricultural risk events. Farms are experiencing a shortage of financial resources to compensate for damage. Risks can be neutralized using agricultural insurance mechanisms with government support. The mechanism for assessing regions for the introduction of agricultural insurance with state assistance is discussed in the article. It is based on ranking the regions of operation of private farms. Ranking is carried out according to the degree of priority of ensuring food security and supporting producers in risky farming areas in the regions. The use of this mechanism will allow directing state support for private farms to the most significant and strategically important regions.

1 Introduction

The peculiarity of agricultural production is a close connection with natural conditions. Climatic conditions determine the risk of losses in years that have unfavorable weather conditions. Agricultural producers suffer losses that significantly undermine their activities [1]. Accordingly, mitigating the consequences of the adverse effects of natural and climatic conditions is a factor in the sustainable development of the agro-industrial complex [2].

Agricultural producers cannot mitigate the effects of agricultural risk events on their own. The shortage of financial resources causes this. The solution to this problem lies in the functioning of agricultural insurance mechanisms. Agricultural risk insurance is the most difficult type of insurance to implement in practice. This is determined by organizational and economic reasons. Two forms of agricultural insurance exist now - agricultural insurance with government support and commercial [3]. The state gives preference in assistance to agricultural producers who make tax payments. Budgetary efficiency is a priority in this matter. Agricultural organizations and farms have the opportunity to be under insurance protection. However, personal subsidiary farms are a full-fledged form of agricultural producers. This form of producers needs agricultural insurance as well [4].

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The history of personal subsidiary plots in the diverse economy of Russia demonstrates a high level of resistance to crisis phenomena. This fact is explained from the position of adaptability of this form of management to dynamically changing conditions of the external environment. The small size of the farm also helped in this regard. However, the operating conditions at the initial stage were significantly different from modern ones. Integration ties with the public sector of the economy, the provision of equipment and planting material were noted at the initial stage of the formation of a market economy. Cooperative forms of interaction developed. This mobilized personal subsidiary plots. These factors were a legacy of the planned economy. Personal subsidiary plots have become the main producers of open-ground vegetables and potatoes, as well as certain types of livestock products. The situation has changed dramatically over time. The results of the All-Russian Agricultural Census showed the scale of the functioning of personal subsidiary plots. 23496.9 thousand people are involved today in this type of activity. However, personal subsidiary plots perform a large number of functions—preserving the rural way of life and traditional culture, ensuring employment and income for the rural population, forming a middle class in the countryside, rural education mission, social control over the territory. Small farms allow the development of entrepreneurial initiative. Food supply is one of the main functions in the conditions of import substitution. This issue is strategically important. This determines the need for comprehensive support from the state. The main instruments are financial and credit. Agricultural insurance is one of the most important of them.

2 Materials and methods

The study is based on official data from the Ministry of Agriculture and the Federal State Statistics Service of the Russian Federation. Methods of complex economic analysis were used in the work. The object of scientific research was the criteria and indicators for ensuring food independence in Russia. The purpose of choosing the object of study is determined by the need to substantiate the importance of private plots in food independence. The subject of the study is a system for ranking regions of agricultural insurance implementation using government support measures. The methodological basis of the study is based on assessing the level of food independence. This methodology is determined by the provisions of the Food Security Doctrine of the Russian Federation.

3 Results and discussion

Sustainable development of agricultural production is a strategically important task of the state. This problem is solved through comprehensive measures, including the use of government support. Production volume in value terms has shown steady growth over the past 13 years. The growth of agricultural production in 2023 compared to 2010 was 61.7%. This trend is ensured by increasing production in the public sector and farms. Agricultural organizations increased production by 2.2 times, peasant farms—by 1.23 times. The opposite trend is typical for private plots. Agricultural production during this period decreased by 7.8%. The identified problem is very serious. The bulk of production was traditionally produced by private farms. The situation changed dramatically in 2011 (Table 1). Changes in economic conditions led to a change in their positions. Agricultural organizations and farms began to actively use government support measures and transform production. This led to an increase in the scale of their activities.

Table 1. The share of producers in production of agriculture in the Russian Federation in 2010–2023, %.
Agricultural products - agricultural organizations 44.8 54.0 58.5 60.1 60.0
- personal subsidiary farms 48.0 34.5 26.6 24.1 25.1
- peasant farms 7.2 11.5 14.9 15.8 14.9

Crop products - agricultural organizations 42.0 50.8 56.0 57.2 55.7
- personal subsidiary farms 46.5 31.4 22.1 19.8 21.7
- peasant farms 11.5 17.8 21.9 23.0 22.6

Livestock products - agricultural organizations 47.0 57.4 61.8 64.1 65.1
- personal subsidiary farms 49.2 37.9 32.2 30.0 29.1
- peasant farms 3.8 4.7 6.0 5.9 5.8

Share of agricultural production in personal subsidiary farms was determined by the following formula:

\[ S_{psf} = \left( \frac{Q_{psf}}{Q_t} \right) \times 100\% \]  

where \( S_{psf} \) - share of personal subsidiary farms in total agricultural production; \( Q_{psf} \) - volume of agricultural production in personal subsidiary farms; \( Q_t \) - volume of agricultural production in farms of all categories.

The national approach to assessing food security is focused on ensuring food independence. This indicator is defined as the level of satisfaction of the population's food needs through domestic production of main types of agricultural products. An analysis of Russia's food independence showed that in dependence has now been achieved in meat production (Table 2). The production of potatoes, vegetables and milk does not meet the standard value. Personal subsidiary farms are the main producers of potatoes and a significant share of vegetables traditionally. Their contribution is significant to ensuring food independence for these products. These producers make a significant contribution to the provision of milk to the population. This fact confirms the need to take urgent measures to support and protect private farms.

Table 2. Food independence of Russia by main products in 2018-2022

<table>
<thead>
<tr>
<th>Food product</th>
<th>Standard</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato</td>
<td>&gt; 95</td>
<td>79</td>
<td>78</td>
<td>78.3</td>
<td>78.8</td>
<td>78.8</td>
</tr>
<tr>
<td>Vegetables</td>
<td>&gt; 90</td>
<td>87</td>
<td>87.2</td>
<td>86.3</td>
<td>86.2</td>
<td>88.3</td>
</tr>
<tr>
<td>Meat</td>
<td>&gt; 85</td>
<td>95.7</td>
<td>97.4</td>
<td>100</td>
<td>99.7</td>
<td>99.7</td>
</tr>
<tr>
<td>Milk</td>
<td>&gt; 90</td>
<td>83.9</td>
<td>83.9</td>
<td>84.0</td>
<td>84.3</td>
<td>84.3</td>
</tr>
</tbody>
</table>
Indicator of food independence in Russia is calculated by the following formula:

\[ \text{Ifi} = \left( \frac{Q_{psf}}{Q_{t}} \right) \times 100\% \] (2)

where \( \text{Ifi} \) - level of food independence; \( Q_{psf} \) - volume of agricultural production in farms of all categories; \( Q_{t} \) - volume of agricultural production in farms of all categories.

Indicator of food independence in Russia provided by personal subsidiary farms is calculated using the formula:

\[ \text{Ifi} = \left( \frac{Q_{psf}}{Q_{dc}} \right) \times 100\% \] (3)

where \( \text{Ifi} \) - level of food independence; \( Q_{psf} \) - volume of agricultural production in personal subsidiary farms; \( Q_{dc} \) - volume of domestic consumption of agricultural products.

Rational food consumption is also a key issue within the Doctrine of Food Security. The problem of discrepancy between actual and rational consumption is critical. Rational consumption standards must comply with modern scientific principles of optimal nutrition. Unfortunately, the meaning of rational norms is not given in the Doctrine. Using the recommendations of the Ministry of Health of the Russian Federation is appropriate in this matter. A food independence analysis was carried out based on these norms (Table 3). It shows an increasing gap between production volumes and standard values for potatoes, vegetables and milk. The reasons are a significant difference between recommended and actual consumption volumes, and failure to achieve the level of food independence in fact. This situation leads to a violation of indicators of the physical availability of domestic food. Citizens cannot purchase domestically produced food products in volumes and assortments no less than rational consumption standards. Problems will not arise with the availability of crop products such as vegetables and potatoes for citizens running private household plots. They produce them on their own plots. Another part of the population can achieve rational consumption standards only through imported food.

Table 3. Food independence of Russia for basic food products based on rational consumption standards recommended by the Ministry of Health of the Russian Federation in 2018-2022, %

<table>
<thead>
<tr>
<th>Food Product</th>
<th>Standard</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato, &gt; 95</td>
<td>78.3</td>
<td>77.7</td>
<td>76.7</td>
<td>73.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>including through production in personal subsidiary farms</td>
<td>58.4</td>
<td>59.1</td>
<td>57.0</td>
<td>48.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetables, &gt; 90</td>
<td>66.6</td>
<td>67.7</td>
<td>66.0</td>
<td>65.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>including through production in personal subsidiary farms</td>
<td>36.7</td>
<td>35.8</td>
<td>33.0</td>
<td>33.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat, &gt; 85</td>
<td>98.3</td>
<td>101.4</td>
<td>104.2</td>
<td>106.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>including through production in personal subsidiary farms</td>
<td>17.7</td>
<td>17.4</td>
<td>16.9</td>
<td>16.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, &gt; 90</td>
<td>59.1</td>
<td>60.4</td>
<td>62.0</td>
<td>62.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>including through production in personal subsidiary farms</td>
<td>2.8</td>
<td>2.6</td>
<td>2.1</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The level of food independence according to rational consumption standards in personal subsidiary farms is calculated using the formula:

\[ \text{Ifirc} = \left( \frac{Q_{psf}}{P \times \text{Crs}} \right) \times 100\% \]

where \( Q_{psf} \) is the volume of agricultural production in personal subsidiary farms; \( P \) is the population size; \( \text{Crs} \) are rational standards for consumption of agricultural products. Rational consumption standards are regulated by the Food Security Doctrine of the Russian Federation.

The presented analysis indicates the significant contribution of private farms to ensuring food security in Russia. However, these manufacturers face a long list of difficulties today:

- Strong dependence of work results on natural conditions;
- Seasonality of production;
- The predominance of crop farming over livestock farming;
- Weak integration ties with organizations and farmers;
- Low level of mechanization and chemicalization.

The activities of private farms are associated with a large number of risks. Most risks are related to natural conditions. These factors do not depend on the person.

The problem of financial security is also relevant. Financial support is at a low level for private farms. This does not allow the crisis and adverse events to be overcome in a timely manner. This could be fatal for the economy. Therefore, modern forms of financial protection are a necessity.

Agriculture is one of the most risky sectors of the economy. The development of agricultural risk insurance is a necessary condition for a modern and efficient management system.

The Russian agricultural insurance market includes two components—voluntary insurance and insurance with state support. Moreover, the latter accounts for more than 70% of insurance premiums. High prices are typical for voluntary agricultural insurance in the Russian Federation. This reduces the interest of agricultural producers in this species. The insurance option with government support is actively used because of this.

State support for agricultural insurance affects only farms and enterprises. Two agricultural insurance programs are offered to farmers—multi-risk insurance and emergency insurance. Multi-risk insurance protects against natural hazards and harmful organisms:

- Atmosphere, soil drought, dry winds, natural fire;
- Frosts, damping-off, freezing, ice crust, early appearance or establishment of snow cover, freezing of the top layer of soil;
- Hail, large hail, heavy rain, heavy and (or) prolonged rain, waterlogging of the soil;
- Strong dust (sand) storm, strong and (or) hurricane wind;
- Landslide, earthquake, avalanche, mudflow;
- Flood, inundation, flood;
- Disruption of electricity, heat and water supply as a result of hazardous natural phenomena;
- Penetration or spread of harmful organisms of an epiphytotic (mass) nature.

Emergency insurance includes crop protection in case of complete loss in the event of any natural emergency of a federal, interregional or regional nature. The Ministry of Agriculture pays a significant portion of the cost of insurance. This is 50% for multi-risk insurance and up to 80% for insurance against natural emergencies. These government support measures led to a significant increase in insured farms and organizations (Figure 1). The number of organizations that received subsidies for agricultural insurance increased by 4.4 times, and peasant farms by 15 times in 2018-2022.
Fig. 1. The number of producers who received subsidies for agricultural insurance in Russia in 2018–2022. Personal subsidiary farms are not included in the list of producers who are offered government support measures for agricultural insurance. This situation can be explained from the perspective of budgetary inefficiency. Personal subsidiary farms are exempt from taxation when selling products. However, two key points must be placed at the center - the contribution to ensuring food independence, as well as support for farms in the risky farming zone. The state cannot provide support to all regions. Ranking of territories where personal subsidiary farms are located is an option for extending protection measures. It is advisable to rank insured regions in three categories:

- Group 1: regions in the zone of risky farming, where the share of personal subsidiary farms in the structure of agricultural production exceeds 60%;
- Group 2: regions where the share of personal subsidiary farms in the structure of agricultural production exceeds 60%;
- Group 3: regions in the zone of risky agriculture.

The results of the study showed the following ranking of regions based on the results of 2023:

- Group 1: Republic of Altai, Republic of Tyva, Khanty-Mansiysk Autonomous Okrug-Yugra, Yamalo-Nenets Autonomous Okrug, Republic of North Ossetia-Alania, Republic of Dagestan (6 regions);
- Group 2: Republic of Khakassia, Chechen Republic (2 regions);
- Group 3: Republic of Buryatia, Republic of Ingushetia, Republic of Kalmykia, Karachay-Cherkess Republic, Republic of Karelia, Republic of Komi, Republic of Sakha (Yakutia), Kamchatka Territory, Perm Territory, Primorsky Territory, Khabarovsk Territory, Arkhangelsk Region, Bryansk Region, Volgograd Region, Ivanovo Region, Kemerovo region, Magadan region, Sakhalin region, Tomsk region, Tyumen region (without autonomous okrugs), Jewish Autonomous Region, Nenets Autonomous Okrug, Chukotka Autonomous Okrug (23 regions).

The developed system for ranking regions will allow for the efficient distribution of limited government subsidies. This system will take into account important factors,
4 Conclusion

The priority of modern government policy is given to ensuring food independence. Sustainable agricultural production is the basis of this. However, not all categories of manufacturers have these characteristics. Personal subsidiary plots are significantly reducing the scale of their operation. At the same time, their contribution to food security remains significant.

Private farms face problems: unpredictable weather, outbreaks of infections, equipment breakdowns. Small farms have fewer resources to overcome the crisis. The strategic goal for the state is to create conditions for insurance protection of private farms. However, the state has limited financial capabilities to provide protection. State support measures for agricultural insurance of personal subsidiary farms can be aimed at priority regions. The ranking mechanism for regions was developed based on their contribution to ensuring food independence and location in the risky farming zone. The damage caused to agricultural production extremely reduces its sustainability and negatively affects the development of the industry.

The protection of agricultural production in private farms should become an integral part of national agricultural policy. This will allow us to solve key problems in the field of import substitution in Russia.

References

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