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THEORETICAL AND METHODOLOGICAL PROBLEMS OF INNOVATION DEVELOPMENT OF THE RUSSIAN AGRICULTURAL AND FOOD PROCESSING COMPLEX

This paper focuses on the most important results of scientific research made by the Institution of the Russian Academy of Sciences Institute of Agrarian Problems of RAS. The feature of this research is to implement cross-sectoral and interdisciplinary approaches to the analysis and projection of agricultural and food industry development. The conceptual framework for strategic cross-sectoral management of the Russian agricultural and food processing sector was elaborated; it is aimed at strengthening food security. The priority of ensuring food security is to develop a new model of the Russian agricultural complex which has potential for sustainable dynamic growth and innovation receptivity that allows solving problems of raising living standards, efficiency and competitiveness.

Keywords: agricultural and food processing complex, food security

The need to develop and implement innovative agricultural and food policy in Russia is due to the worsening of global food security problems whose solution requires fundamental changes in the management of the agro-food complex. The main directions of the current study are changes and identification of conditions and factors of sustainable agri-food complex development, introduction of resource-saving technologies, increase of consumption of domestic basic food products, improvement of public support of commodity producers, development of agricultural insurance, taxation and credit improvement in the agro-food complex and other measures.

Establishment of the Russian Academy of Sciences, Institute of Agrarian Problems of RAS (IAgP RAS) is celebrating the 30th anniversary

of its foundation this year. The scientific team during the years of its operation has formed and developed the School of Social Research, whose foundations were laid by the first Director of IAgP RAS, Honoured worker of science, Professor V. B. Ostrovski and the School of Management and Interdisciplinary Interactions in the Agro-food Systems. The purpose of this paper is generalization of the collective creative efforts made by IAgP RAS to develop these directions, to strengthen the interdisciplinary nature of scientific research, to justify the innovative vector of the scientists' creative quests, to reflect new threats and challenges in a globalized economy. We hope that the publication of this paper will contribute to the consolidation of research teams that explore issues of global food security.

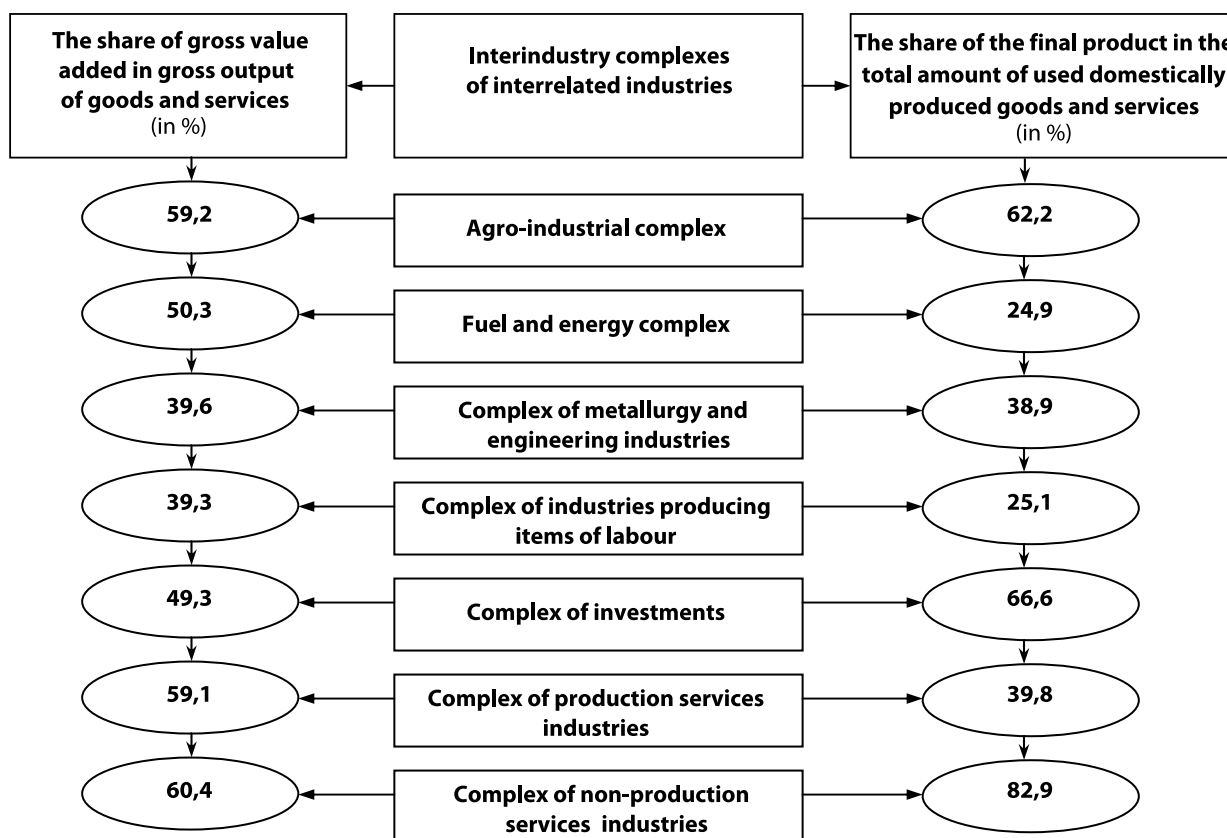


Fig.1. Agro-industrial complex in the system of inter-industry complexes of Russia's economy

The scientists of the Institute developed a concept of food security and food sovereignty of the country, focused on the full use of the resource potential, which will consistently provide the main types of quality food of domestic production to the population [9]. The criteria and thresholds of food security in accordance with the scenario of multi-directional development of the Russian countryside are defined. The main provisions of rural society living space modernization in the paradigm of sociocultural factors changes dominance, approaches to improving the renewable resources of social and cultural development of the settler communities, the criteria for an effective social policy for rural society and differentiation of well-being levels are substantiated.

In terms of financial and economic instability, expansion of the list of risks and deepening the contradictions in the world economy, a cross-sectoral approach in determining the structure of the agri-food complex, interdisciplinary nature of the exchange, the formation of income factors and effective demand, the investment process in the real economy is becoming popular (Fig. 1). The method of the economic processes studies is based on the input-output analysis and mechanism of anima-

tion which allows us to estimate the total benefits of public investments. The scientists of the Institute developed the theoretical basis for modernization of agricultural and food policy in the transition to the innovational type of development. The novelty of the theoretical and methodological basis of the innovative agri-food policy concept in Russia is going to cross-sectoral management of the agro-food complex and critical subcomplexes in its structure for coordinating the economic interests of all stakeholders in food production, the growth of final products and value added in the agri-food sector plus the stabilization of prices in the domestic food market of the country [1, 5, 18].

Investigation of compliance with requirements of the agri-food complex innovational development to the systems of its regulation contains a methodological justification of determining the potential for import substitution, which involves the calculation of sensitivity of demand for products to be imported and rational relation to export and import orientation of the dynamics of imports. The new situation evolving in the food market in Russia urgently requires increased attention to the problems associated with the implementation of the «State agricultural development Programme and the regulation

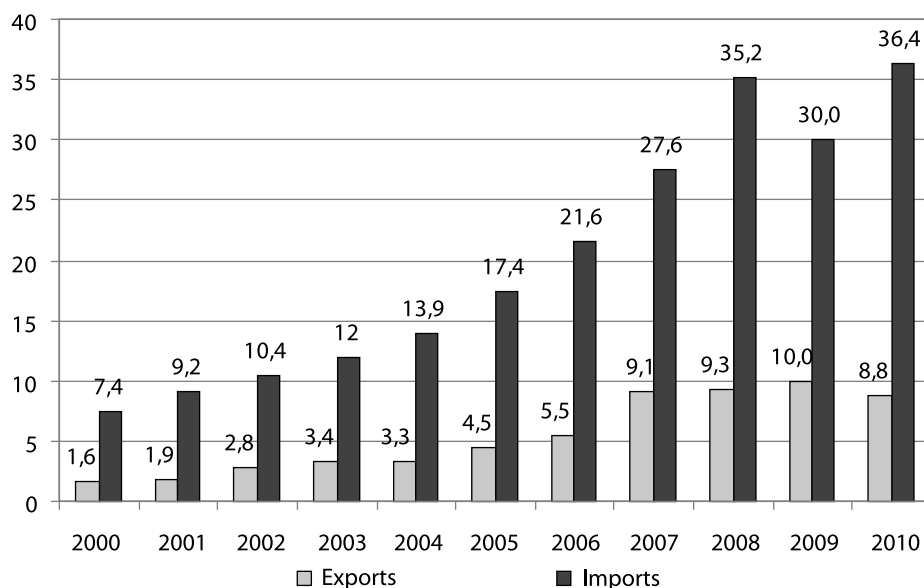


Fig. 2. Exports and Imports of food and agricultural raw materials in the Russian Federation (billions of USD)

of agricultural products, raw materials and food for 2008–2012» in order to reduce Russia's dependence on food imports, which exceeds the threshold of food security. The current stage of development of the agri-food industry of Russia is characterized by limited internal resources for food production and increasing imports of food. In 2009 the amount of imported food and agricultural raw materials was by 30.6 billion dollars, while in 2000 four times less (Fig. 2).

The share of imports relative to manufactured agricultural production in Russia in 2009 amounted to about 30%. In accordance with thresholds, the industry loses innovation and investment attractiveness, if the share of imports exceeds 20% of the volume of gross output in the sector. Between 2000 and 2008 food imports increased by 4.8 times and exceeded the volume of the exports nearly by 5 times. During these years, food and raw materials for its production were imported for over 154.5 billion USD, far exceeding the amount of state support under the «State Programme for the Development of Agriculture» and indicates the threat of loss of food independence of the country. In some regions of Russia, sustainable food supply for the population is maintained at the expense of production in private farms of the citizens.

Scientific substantiation for the effectiveness of government support measures of customs liberalization, tariff policy and protectionism is implemented by using the criteria of evaluation of these measures. Most of the agriculture sectors in Russia, first of all animal farming, are not competitive in the global food market. With the weakening of customs

policy and rejection of assignment of quotas (which includes the requirements of the WTO), an unfavorable balance of trade will increase. It is therefore important to do calculations and justification of aggregate measures of support of agricultural producers, such as a moratorium on bankruptcy, tax holidays, deferral of payments on the debt to the budget etc., which could weaken the finance load during the recession. The objectives of the agri-food complex regulation should be based on macro-economic concept of regulated and socially oriented market economy, which implies a state of active structural, industrial and strong social policy, its use of indicative macroeconomic planning and forms of strategic partnerships with large corporate business.

In the study of forms and methods of support for agricultural producers in Russia, we studied customs tariff protection formed in the EU, where the support level is at 36 eurocents per 1 euro of produced output. To support their agricultural producers only from the central EU budget, around 45 billion euros is spent per year. In addition, individual states have their own budgets of support. Therefore, producers may focus not on the liberal external tariffs but on tariffs applicable to the European Union.

The theoretical justification of projection changes in the formation of multi-integrated structures of agri-food industry of Russia in the context of globalization includes the development of principles, priorities and coordination of economic institutions in the interests of producers of food chains, agro-food complex on the basis of innovation and priorities of state regulation of the process of integration in the agrifood sector, ensuring sustainable

Assessment of the multiplier effect of agricultural growth and food industry

Industry branch	Correlation of total and direct costs coefficients							
	1996	1997	1998	1999	2000	2001	2002	2003
Agriculture	2,19	2,18	1,99	2,11	1,95	2,02	1,99	1,99
Food industry	2,05	2,01	2,16	2,05	2,06	2,14	2,11	2,14

development of enterprises. Analysis of the compliance system of taxation, financial and credit institutions, bankruptcy and mergers needs innovative development of food corporations as a basis for theoretical and methodological study of development prospects of industrial and social facilities in rural areas, development of a hierarchy of matrix models of agri-food corporations to assess the inter-industry balanced by different versions of the institutional environment modernization. Designing socio-economic development of the agri-food complex in accordance with intersectoral approach involves a left-justification of the target vector outcomes, assessment of resources and direction of modernization of the institutional environment of the complex, ensuring the achievement of settled goals.

We put intersectoral approach as the basis of the long-term strategy for the development of agri-food industry of Russia, the development of predictive methodologies for studying the structure of the food market, the theoretical basis of innovation and technological development of the agri-food complex in the context of globalization.

Interdisciplinary study of symmetrical patterns by modifications of the «input — output» tables is aimed at assessing the degree of dependence of the complex branches of the factors which are most important in the projection period, namely the level of state support for agricultural production, inflation, dynamics of lending rates, investment into fixed assets, changes in the exchange course, conditions of world food trade, share of transaction costs in total costs. Based on the identified relationships and meaningful analysis, multivariate projections of changes are developed by the gross value added agri-food complex of basic industries.

The usage of inter-branch balance elaborated on the complexes of connected branches on the basis of the information from symmetric «input-output» tables, allows us to estimate the intensity of inter-complex interactions and unique information about the direct, indirect and total costs of resources. One of the important advantages of this approach to the study of inter-branch interactions is to assess the reliability of the information arising from the ben-

efits of the balance sheet method of processing. Input-output tools allow to objectively evaluate the original data by their mutual control, to obtain information on the impact of the test set on the global economy, which is extremely important to the threat of food insecurity in the world. Of particular importance for the structural analysis is the study of the formation of the total cost per unit of output, the scientific rationale for their dynamics among the key issues of designing an innovative development of the socio-economic complex. It should be noted that the growth of the agro-food complex leads to a significant multiplier effect in the economy as a whole (Table 1). For example, on the basis of coefficients of direct and total costs of the system tables «input — output» of Russia in 2003, we can conclude that the growth of agricultural output for 1 000 rubles will cause an increase in chemical and petrochemical industries to 15.02 rubles and taking into account the indirect costs — to 39.43 rubles; in machinery and equipment, respectively, to 28.24 and 65.92 rubles. The average growth in agricultural production will require increased production and delivery of services in other sectors in the ratio of 1:2. Under these circumstances, the agri-food complex of Russia may become one of the growth points of Russia's national economy.

Intersectoral approach allows us to identify and evaluate the stable structural characteristics necessary to build a modified balance sheet combining the matrix of production and distribution of products with the matrices of income and expenditure of the population, to match the dynamics of effective demand, the volume and structure of the final product of the complex [15].

A study of trends in the development areas of food consumption at the present stage is aimed at overcoming the food poverty line. Consumption of the most prosperous part of the population has reached or exceeds the level of rational consumption norms. The consumption of the least wealthy part of the population for a number of positions is below the level of the minimum of physiological norm that is characterized by food poverty. With the growth of per capita consumption of staple foods,

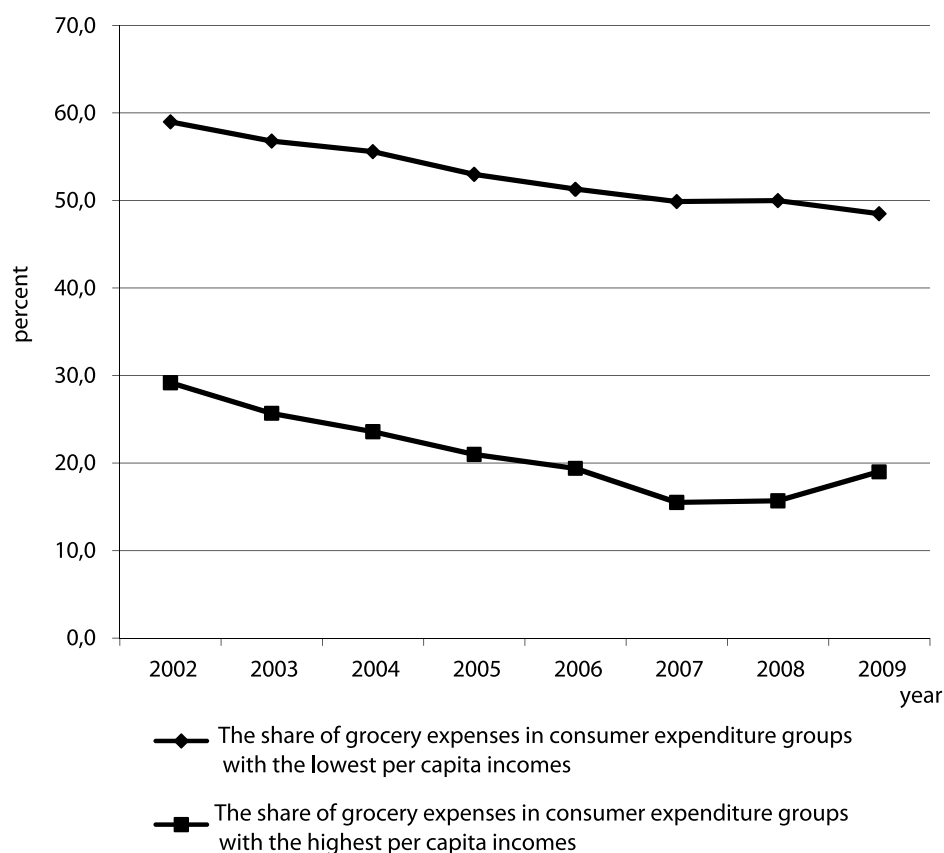


Fig. 3. Dynamics of food expenditure share in total consumer expenditure (%)

there is a decrease in food consumption level of differentiation due to the limited physiological needs for food. In economically developed countries, where spending on food constitutes 8–12% of total household expenditure, almost all members of society have the opportunity to meet their nutritional needs, so the differentiation of food consumption is low. It is due to some differences in the assortment diets of rich and poor, the acquisition of the latest gourmet products that have a much higher price. As incomes of the poor, the demand for food, it exceeds supply and thus gives extra energy to the movement of the inflationary spiral. Because the needs of the population in the major food currently are not fully satisfied, then the demand for them will grow and most of the population will send the bulk of growth in cash income to purchase food for a long time (Fig. 3) [16].

Justification of projection parameters of agri-food complex in accordance with the concept of an interdisciplinary approach is run by us with the use of econometric models constructed according to the data of symmetric «input-output» tables, a system of national accounts and the subsequent approval of the results obtained in different models of combined inter-branch balances of agri-food complex, were

developed in the Institute of Agrarian problems, RAS. The introduction of such balances into practice is assumed by us for an in-depth study of progressive structural changes in the agri-food sector, agriculture and food processing industry through this transformation, policy documents, which allows us to study the structure of inter-industry programs, to provide the final results of the agri-food sector development and final sectoral development indicators.

Currently IAgP RAS performs various estimation projects of socio-economic development of the agri-food industry of Russia and to ensure food security on the instructions of the Presidium of the Academy of Sciences and the Division of Social Sciences of the Academy of Sciences.

Long-term conceptual foresight of development of the agri-food complex is based on the definition of science-based vector of the population's needs for food, evaluating opportunities and deadlines for achieving them. This takes into account that the agri-food complex interacts with the natural systems that define the features of its conceptual foresight [19]. Long-term conceptual foresight is considered by us as the basis for the prolongation of the parameters of the state program of agricultural

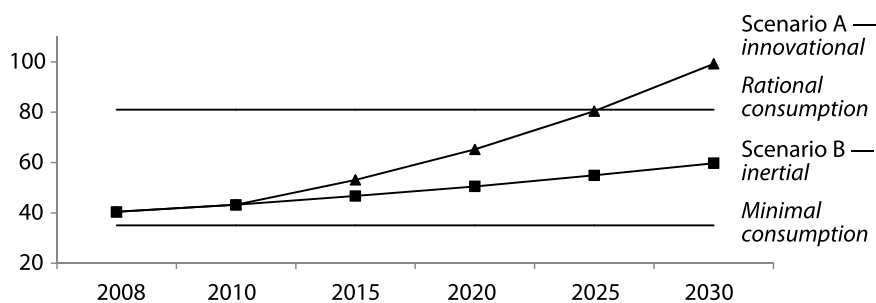


Fig. 4. Projection of meat production per capita in 2010–2030 for the basic dynamics of Russia's population dynamics under different scenarios of production (in carcass weight, kg per year)

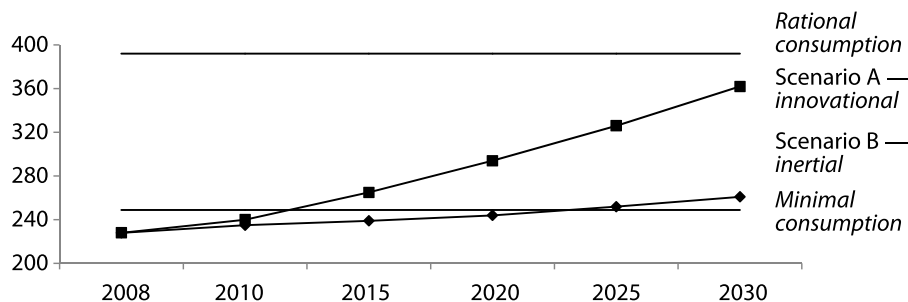


Fig. 5. Projection of milk production per capita in 2010–2030 for the basic dynamics of Russia's population dynamics under different scenarios of production (kg per year)

and food industry of Russia for the next five years. We also study global trends in the development of agri-food systems and rural areas, estimate changes in the world food demand. Long-term prognosis for the agri-food sector of Russia assumes its achievement of the balanced development in a changing conjuncture of the world food market and new challenges related to the deterioration of soil fertility, climate change, bioenergy and more. Projections reflect global trends, such as high population growth and decline of per capita food production in world, degradation of natural resources, increasing the number of poor countries in need of food aid, rising world prices for food and others.

In order to justify long-term projections, we have developed alternative scenarios for the agri-food complex development using various methods of interdisciplinary agrarian economy [8]. Scenarios to justify the needs of the Russian population in the long run in meat and milk consumption by rational parameters allowed us to determine the timeframe for achieving this level of consumption in various forms of import substitution (Fig. 4, 5). The basis of these predictive calculations is the data of change in the Russian population size and structure in the long run [14]. Further development of research conducted by IAgP RAS in this direction is to establish threshold values that characterize the level of food security, its status in the prediction of short and long term priorities and

rationale for achieving food independence of the country [7].

Short-term projection of the agri-food complex development is based on an assessment of food supply, prices for basic food and income dynamics in the short term. Analysis of price changes was carried out by us using a variety of indicators characterizing the stability of the trends and shifts, as well as measuring the velocity of directional price movement. Using the method of calculating the Elliott wave patterns, projections of consumer prices for some types of food in the domestic market of Russia were determined. The effectiveness of this approach to estimating the price was confirmed by a high level of reliability of short-term projections. The results of the work suggest that the offered method is a safe tool for the prediction of financial reliability, consumer demand, food supply and level of prices in the Russian food market.

The implementation of each scenario is determined by internal and external factors and depends on the choice of national priorities. Accelerated development of Russian agricultural sector will, as shown by the scenario calculations, ensure food sovereignty of the country in the foreseeable future if a more effective control of the complex based on the formation of a unified agricultural and food policy is provided.

One major area of conducted researches is the prediction of grain-growing and grocery subcom-

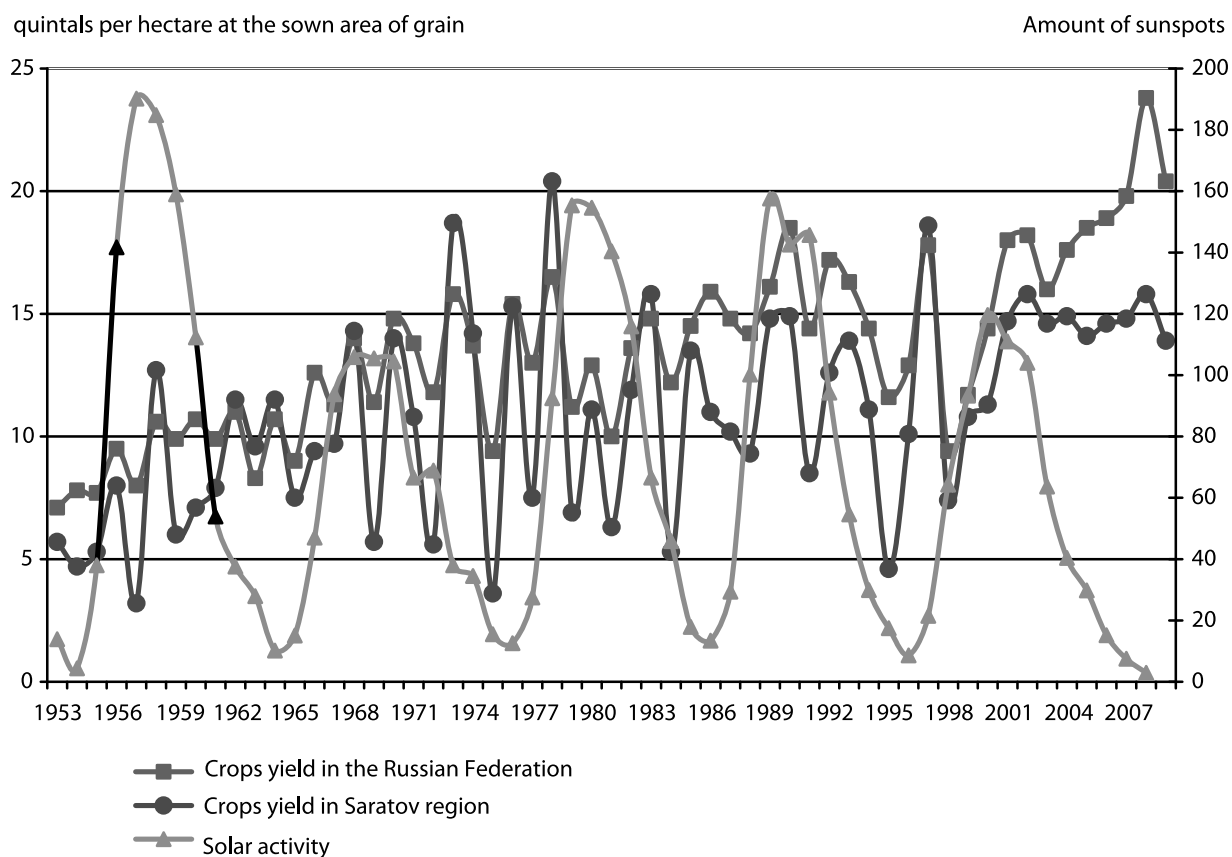


Fig. 6. Cyclic dynamics of grain crops production for 50 years and cycles of solar activity for 56 years

plex of Russia, the rationale for alternative scenarios for the formation and use of the resource potential of the agricultural sector to which extent Russia provides land, labour, material and technical resources management in relation to the potential of animal farming production, as well as the establishment of effective external linkages. The scenarios reflect slow, optimistic and export-oriented versions of grain-growing and grain production in relation to the volume of animal farming production and resource capabilities of self-sufficiency.

The revealed patterns of cyclic dynamics of the actual values of the crop yield can predict the trends of climatic extremes affecting the level of grain yield and provide scientific basis of long-term management strategies of the agri-food complex resource potential (Fig. 6) [13, 17].

Consolidated Russian agri-food policy, the core of which is cross-sectoral management system, involves modernization of shaping its institutions for sustainable agri-food sector development and functioning of the successful implementation of predictive calculations. We propose that the concept of a common agricultural and food policy consists in transformation of existing and construction of new institutions that will increase the effectiveness of

public support for the agri-food sector, income and security of rural producers. A comparative analysis of institutions in Russia and the EU suggests the possible relevance of the latter in the formation of Russian agricultural and food policy. Consolidated Russian agri-food policy creates conditions for working in the face of new challenges, such as the food crisis, climate changes, water deficit and others. It includes a support system that improves the competitiveness of agricultural producers, promotes the efficient use of agricultural land and environmental protection, increases the availability of credits and the successful development of the lease. An effective system of cross-sectoral management of the agro-food complex in the food chain includes a system of mutual control of food quality on all their links [2].

Systemic modernization of the state support institute for final products of agri-food manufacturers in the complex should be linked to the performance of producers. An introduction of a system of state orders for the main final product of the complex in necessary, as well as the state guarantees for the stability of income for processing manufacturers and agricultural producers. An Announcement made by the Russian Ministry of Agriculture of the interven-

tional prices for some agricultural products is an important innovation but it does not guarantee stable conditions for agricultural organizations to sell their products, because these prices are subject to change due to changes in internal and external factors. A more reliable tool to ensure the stability of incomes of agricultural producers is guaranteed by the state to maintain a certain level of profitability of the production of basic agricultural commodities and food.

The system of state support to producers is linked in the concept of a consolidated agricultural and food policy programs with new technologies that reduce production costs, offer greater use of leasing etc. This approach, combined with the introduction of the nationwide register of state-supported agricultural producers, is an important lever to enhance its effectiveness. It is extremely important to address support to agricultural producers involving a turnover of agricultural lands. A type of such support may be a special prize per hectare for the development of new agricultural lands. Improving the competitiveness of domestic producers in the world food market and enabling them to sustainably develop within any changes of conditions involves development of institutions that promote the growth of exports of goods with high value added.

Of particular importance to the agri-food complex is the risk management system. Ministry of Agriculture of Russia suggested improvements to the insurance regulations that increase the reliability of the insurance companies. At present, agricultural producers carry insurance only to farmland. In 2008, only 25% of the total sown area of the country was insured. Consolidated Russian agri-food policy means further development of the insurance system in the direction of the targeted risk management. Thus, the EU used the scheme of insurance against natural disasters; funds are to overcome the effects of diseases of animals and plants. In terms of the financial crisis, it is especially important to carry out the management of economic risks arising due to instability of market prices. Therefore, Russia needs formation of new insurance schemes that provide compensation for damages of this kind by means of direct compensation for the losses. The study of strategic risks in the agri-food complex was made in the IAgP RAS and All-Russian Institute of Agrarian Problems and Informatics, Russian Academy of Agricultural Sciences in accordance with the Program of Presidium of RAS «Prediction of socio-economic development of Russia up to 2030» [6].

Usage of a system of institutions to support sustainable development of agri-food complex in the disadvantaged regions is particularly necessary for Russia, which shows a great regional diversity. In our country there was a system of allocation of state support amounts to rural producers from the federal and regional budgets on an equal footing. It is necessary to form a targeted budget for regional development of the agri-food complex for use in terms of crisis.

Development of methodology and predictive performance evaluation studies of interbranch relations in the prices of agri-food complex of Russia in terms of innovative development of the country are carried out to estimate the price disparity in the system. For 1991-2008, prices for agricultural products have grown in the country at 8 thousand times, while prices for industrial products and services consumed in agriculture — at 46 thousand times. The instability of the socio-economic situation in the agro-food complex makes a new perspective on the process of cost and revenue at all stages of food chain. Important factors of changing the cost structure are technological features of material resources, structural factors, the level of intensification of production, structure of production, commodity prices and price dynamics in the agri-food industry complex. The peculiarity of the agri-food complex is a high level of trade and intermediary margins, especially in the food industry. High level of trade and intermediary margins set in this sphere leads to the impossibility of establishing the proportions of commodity exchange therein, providing a normal reproduction process in the industries. Particularly acute it is evident in the grain market. The study showed that the established trends of the proportion of the circulation in the structure of the retail price of premium wheat flour will increase from 32% in 2000 to 60% in 2012, when the proportion of intermediary managers will increase from 12.1% in 2000 to 28%. In the face of rising food prices, mechanisms to regulate the use of fixed prices for socially important food products and limit trade margins in the retail trade are required. The mechanism of state support should target producers on the search for production reserves, reduction of costs and improvement of performance.

Sustainable development of the agri-food sector and rural areas in general depends on the demographic and labour market conditions. Researchers at the IAgP RAS substantiated demographic development of rural society basing on the construction

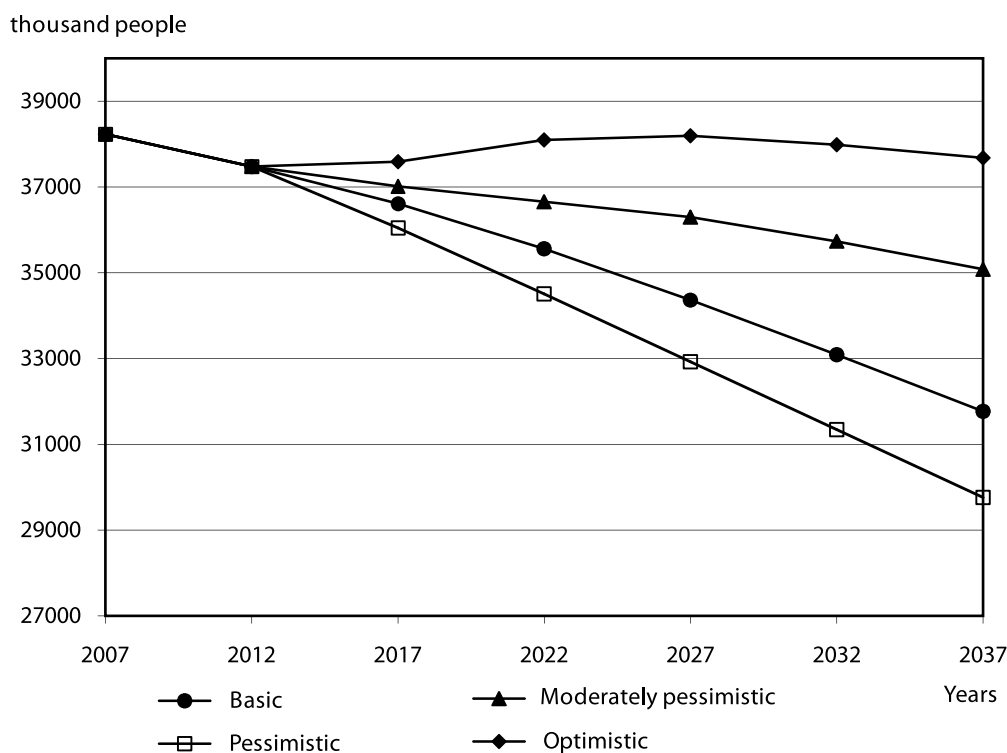


Fig. 7. Projected dynamics of the rural population of Russia

of alternative projection scenarios of rural population size and structure, multi-model analysis of rural development, spatial characteristics of the demographic development in rural areas and assessment of the impact of the measures regarding active population policy (Fig. 7, 8). Demographic projection and scientific substantiation of alternative scenarios of demographic development of the Russian village are elaborated in the short, medium and long term perspectives for the period 2011-2020 and up to 2037. Matrix of scenarios is built according to the internal laws of the demographic development, as well as economic and demographic policies. A comparative analysis of the demographic development strategies of Russian regions was made. The technique of the medium-term projection of population and demographic structure of the population of Russia and its regions with incomplete socio-demographic statistics was elaborated. An interdisciplinary study of social and economic modernization of the village, the priorities of the active social and demographic policy and the basic values of the rural population using results from surveys was made. Projections of employment in agriculture, taking into account the dynamics of working-age population, and measures to stabilize the rural labour market were justified [3, 4].

In Figure 7: baseline scenario — natality and mortality rates stabilize at the level of 2007; pes-

simistic scenario — simulates the social impact of the global financial crisis; moderately optimistic scenario — target landmarks that are inherent in the Concept of long-term socio-economic development of the Russian Federation until 2020; optimistic scenario — the impact of measures of active demographic policy with reaching the European level of natality and mortality rates.

In accordance with the «Russian peasantry in terms of economic instability» in the IAgP RAS in 2011, theoretical and applied sociological studies of the current state of rural society are continued to assess the readiness of different population groups to innovative changes, studying the reaction of producers on those or other government support measures and projecting financial crisis on the socio-demographic behavior in rural areas. The purpose of the survey, which involved the entire research team of the IAgP RAS, is the justification of anti-crisis measures on the most vulnerable social groups, assessment of the readiness of various strata of rural population to innovational activities, identification of value orientations of rural society. The results of the survey will be used for scientific justification of the training program of a new type, capable of introducing innovative energy saving technologies and enhancing business activities in the agri-food sector. An indispensable condition for solving this problem is to improve the employability of graduates of ag-

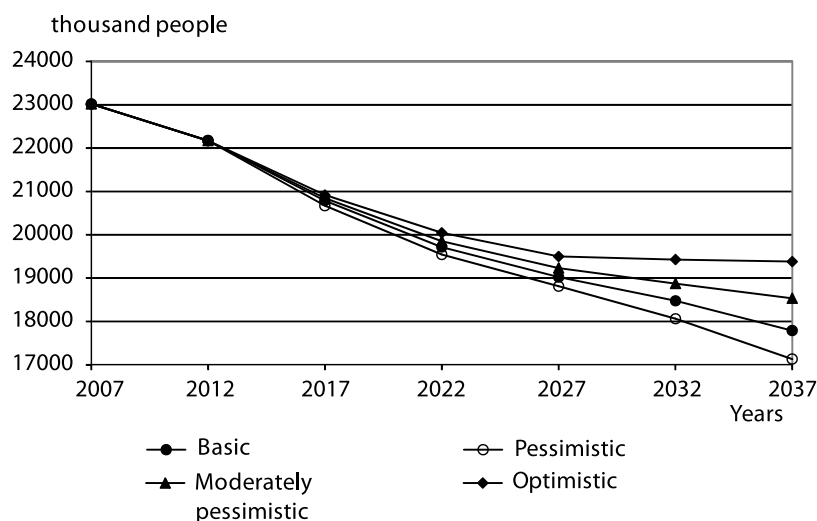


Fig. 8. Projected dynamics of the able-bodied rural population of Russia

ricultural colleges and securing young people in agricultural sphere.

A significant place in the research conducted by the scientists of the Institute is given to the theoretical analysis of land ownership and land relations, determination of trends in the implementation of forms of land ownership, changes in the structure of objects and forms of land ownership. A conceptual correction program of land reform in agriculture is formulated. Proposals for improving the system of land disposal of shares, reducing the process of crushing the objects of land relations (land fields, land, part of land), consolidation of land fields and improval of their structure, denial of bankruptcy of agricultural enterprises on the basis of an insufficient level of land use, simplification of procedures for allocation of land and inheritance of land and other legal mechanisms of land legislation are suggested [11, 12].

Ways of improving the economic mechanism of land management and protection of land, as well as economic and environmental criteria for determining a rational structure for environmental programs and sufficient volumes of their financing are developed.

As authorized by the Vice-President of the Russian Academy of Sciences A. D. Nekipelov at the request of the Accounting Chamber of Russian Federation, the IAgP RAS prepared proposals for

the implementation of the Doctrine of food security in Russia, including specifications and additional indicators of the criteria and thresholds for food security and the analysis of their dynamics over the past twenty years.

Scientific results are reflected in the annual editions of «Regional agro-ecosystems: Economics and Sociology», as well as materials of Annual scientific conference of School of young scientists. The study of technical and economic aspects of agri-food complex informatization as a factor in adaptation of agricultural producers to market reforms is related to one of the key areas of modernization of informational support of scientific researches and supported with a grant for young scientists from the President of the Russian Federation 10.

The implementation of a consolidated agricultural and food policy requires further enhancement of interaction between researchers and practitioners, an assessment of usability of the results of scientific research for giving adequate answers to new challenges in the development of agri-food sector. While solving these problems, it is difficult to overestimate the role of the funds for supporting national science and promoting the development of interdisciplinary researches, an inflow of talented young scientists into the research institutes and strengthening creative links between Russian and international research fellows.

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