

Ensuring Food Security of Developing Economy: Issues and Perspectives

A. Pyagay¹, K. Zhekeyeva², G. Aktailakova^{3*}, M. Iskakova¹, and Z. Tulegenova¹

ABSTRACT

The aim of this study was to define the ways of solving problems in food security at the expense of domestic production. The gross output of agricultural, forestry and fishery products was applied as the main cost indicator. Using data from the surveyed areas, the yield level per hectare across the entire crop area was determined. Balance model was divided into resource and distributive parts and involved data obtained in state statistical observations and reports from administrative sources. Thus, in the article, there are proposed measures to balance the related development of agricultural production and a rise in effective demand. There are recommended measures on public regulation of Agro-Industrial Complex (AIC) that have a systemic nature and include the maximum possible use of indirect instruments. Calculations have shown that these measures will increase the share of domestic food, namely, the overall volume of salable resources of the internal market. There is a need to improve the mechanisms of financial leasing of agricultural machinery and industrial equipment for the processing industry and support agriculture to the extent permitted by WTO terms with a focus on restoring the equivalent relationship between agriculture, industry, and trade.

Keywords: Agricultural economics, Consumption, Export potential, Republic of Kazakhstan.

INTRODUCTION

The international processes of globalization and integration influence the food security development and state policy formation in this sphere (Masih *et al.*, 2017; Minten and Reardon, 2008). Thus, providing the world with food against the backdrop of a sharp rise in food prices (2006-2011) was considered as a major challenge in the field of development and food security (FAO and OECD, 2015).

It is assumed that the world population will increase by 34% and reach 9.1 billion by 2050. The great share of population growth rates will be related to the developing countries. Urbanization will grow at an accelerated rate – about 70% of the world's population is expected to be urban (compared to current 49%). In order to provide food for a growing

population, mostly urban and potentially more prosperous, food production by 2050 has to be increased by 60% from the initial level, recorded in 2005-2007 (Alexandratos *et al.*, 2012). In developing countries, the average annual net investment in agriculture, necessary to ensure such production growth, is estimated at USD 83 billion (FAO and OECD, 2015).

At the same time, there are changes in the geography of poverty. Since the 1990s, accelerating economic growth in developing countries and a slowing one in developed countries has bonded the income between developing and rich countries. These development models change the pattern of income distribution in the world (Wood, 2015; Kang, 2015).

FAO has developed measures, including subsidies, to stimulate the agricultural

¹ Department of Economics and Innovation Business, University of Turan-Astana, Astana, Kazakhstan.

² Department of Finance and Accounting, K. Zhubanov Aktobe Regional State University, Aktobe, Kazakhstan.

³ Department of Economics and Tourism, S. Baishev Aktobe University, Aktobe, Kazakhstan.

*Corresponding author; e-mail: pyagay72@mail.ru



productivity in order to meet domestic food requirements. However, in achieving these goals, a food overproduction problem has arisen leading to additional unproductive costs. This has forced the states to refuse per unit subsidizing and to stimulate the rational land use (Josling and Tangermann, 2015). Currently, EU member countries have sufficient resources to provide the population with food. Thus, regional food security has to ensure the food affordability and safety (Garcia-German *et al.*, 2016; Achterbosch *et al.*, 2014). On a global scale, inadequate techniques of food production, storage, processing and distribution today create the most significant risks to food security and food safety (King *et al.*, 2017; Nag *et al.*, 2018).

The opportunities in investment and improving agricultural enterprise management, which arise in agricultural producers due to sale crop production, stimulate the innovative processes in agriculture and contribute to higher yields. Greater income from sale crops and improved technologies can also lead to increased food production in farm enterprises (Swinnen, 2015).

The Agro-Industrial Complex (AIC) of the Republic of Kazakhstan has good prospects for further development: export positions of the oilseed and meat sectors are increasing. In terms of grain and flour, Kazakhstan has become one of the largest exporting countries in the world. Kazakhstan's membership in the Eurasian Economic Union (EAEU) and the World Trade Organization (WTO) provides opportunities and, at the same time, imposes high requirements on competitiveness in both domestic and foreign markets (Sodano and Verneau, 2014). In this regard, state regulation of AIC is extremely important (State Program for the Development of the Agro Industrial Complex of the Republic of Kazakhstan).

MATERIALS AND METHODS

The average yield level per hectare is determined at the level of a district and region. The result of this survey involves a standing harvest with due account for the crops waste. The gross yield of grain crops is calculated by multiplying the size of acreage, chosen after analyzing the land use of farms with crop acreages. The Committee of Statistics, the Ministry of National Economy of the Republic of Kazakhstan (MNE RK), applies a system of interrelated natural, conditionally-natural, and cost indicators to illustrate the agricultural activity in general.

The central place in the system of indicators is occupied by natural and conditionally-natural indicators, which are used in agricultural statistics to characterize the production of specific products. However, they do not provide an opportunity to obtain consolidated data on agricultural producers, who are mainly mixed farmers. Therefore, multiple descriptions of agriculture, forestry and fishery activities will be possible only if we use value indicators, allowing us to obtain consolidated data on the industry, ensuring comparability of different products.

In agricultural statistics, the main cost indicator is the gross output of agricultural, forestry, and fishery products (services). It is calculated separately for each region and for the country (Hammond and World Resources Institute, 1995). Gross output of agricultural, forestry, and fishery products (services) is calculated according to the General Classification of Economic Activities (GCEA). Section A, "Agriculture, Forestry, and Fisheries", which consists of three paragraphs: crop production and livestock, hunting, and services in these areas (paragraph 01). The gross output of crop and livestock production is calculated on a monthly basis under the paragraph 01 during the report year. The calculation is made discretely for the month; the indicator for the period is defined as the sum of indicators for the months of the period. Based on the year results, the final gross output (for whole Section A) is calculated on the basis of annual statistical observations.

Gross Output of Crop and Animal Husbandry Products (Services)

The value of produced crop and livestock products is calculated on the basis of data on agricultural production (in kind) for each category of farms and data on the average annual sale prices, as well as the sale prices average for the report period, for each type of product (Alston *et al.*, 2010).

$$S_{crop/livestock} = \sum (k_i \times p_i) \quad (1)$$

Where: $S_{crop/livestock}$: Crop/livestock Sale price; k_i : Amount of certain product in kind produced in a year; p_i : Average annual (average for the report period) sale price for a certain type of product.

In crop production, change in the Work-In-Progress (WIP) cost is defined as difference between its cost for the report and previous years. This indicator can be positive or negative.

The cost of agricultural services rendered for the year is determined by the total annual survey of legal entities providing agricultural services.

Thus, gross output of crop and livestock products (services) can be calculated by the formula:

$$V_{crop/livestock} = S_{livestock} + S_{crop} + N_{crop} + S_{service} \quad (2)$$

Where, $V_{crop/livestock}$: Gross output of crop and livestock products; $S_{livestock}$: Livestock value; S_{crop} : Crop value; N_{crop} : Change in WIP cost in crop production (+/-); $S_{service}$: Agricultural Service cost.

In calculating the gross output of crop and livestock products (services) for a month, the following points should be taken into account. In monthly observations, there are only the basic livestock products produced i.e. cow's milk, chicken eggs, sheep's wool, as well as cattle, sheep/goat, pig, horse, camel, maral, and poultry meat. Therefore, the first step is to determine the value of these basic species by the Equation (1). Then, we have to use data on the value of other livestock products that include the other types of products. In calculations, we used the average share of these products in the total volume of livestock gross

production over the past three years. The calculation is made by the following formula:

$$S_{other_livestock} = \frac{d_{other_livestock} \times S_{basic_livestock}}{100\% - d_{other_livestock}} \quad (3)$$

Where, $S_{other_livestock}$: Value of other livestock products for the report period; $d_{other_livestock}$: Average share of other livestock products in the total volume of livestock gross production over the past three years (in %); $S_{basic_livestock}$: Basic livestock volume in value terms for the report period.

The amount of produced crops during the year is determined on a calculated basis. The quantity of field crop products should be calculated when the first crops begin to ripe (Hülsbergen *et al.*, 2011). Calculations are based on the information about the crop acreage prepared for the current year and on the information about the average yield of these crops over the past three years:

$$k_i = ubp_i \times ur_i \quad (4)$$

Where, k_i : Amount of particular crops produced in a year; ubp_i : Particular crop acreage harvested in a report year; ur_i : Average yield level over the past three years.

In recording the harvested acreage in each reported month, one has to use the administrative sources (reports on the harvesting process provided by the Ministry of Agriculture of the Republic of Kazakhstan and its territorial subdivisions). In terms of crops not provided in the reports, one has to take into account the periods of their ripening, regional climate, weather conditions, and other factors that go with harvesting. In terms of crops grown under cover the year-round, the amount of crops grown after each reported month is considered as the 1/12 share of the gross harvest grown under cover according to the latest annual report.

Allocating Field Sites for Sampling



Agricultural enterprises usually have large fields, whose average size is about 5,000 hectares and larger due to available machinery and a big number of workers.

In peasant farm enterprises, the average field size is 200-300 hectares due to heterogeneous household composition and small financial possibilities.

In the farm that is in the sample, one determines a field with a development table. Based on the survey procedure and the principle of randomness, there are several 1 m² sections on the field. One has to take separate samples from each section (Petersen, 1994). Based on data from the surveyed areas, we determined the yield level per hectare across the entire crop area.

Measuring the Yielding Capacity

In each sample, there are a number of spikelets to be counted. Samples are threshed and delivered to district laboratories in paper bags to determine the moisture content and weight of collected grain. Samples for moisture are stored in a cool place; the moisture content is determined no later than 3-5 hours after the selection. The laboratory test results are recorded in the appropriate forms.

Formulas for Yielding Capacity Measurement

According to this technique, survey provides self-sufficient data, i.e. data that does not need to be redistributed.

The yielding capacity of a certain sample is measured according to the following formula:

$$G_i = \frac{W_i}{N} \times \frac{1 - m_i / 100}{0.86} \left(\frac{g}{m^2} \right) \quad \text{or} \quad G_i = \frac{W_i}{N} \times \frac{1 - m_i / 100}{0.86} \left(\frac{g}{m^2} \right) \times 0.1 dt / ha \quad (5)$$

Where, W_i : Total Weight of collected samples in a particular sampling, in grams; N : Studied area size, in square meters; m_i :

Moisture level of grain in a particular sampling, in %; 0.86: Standard moisture level across the Republic of Kazakhstan in the report year, in %.

The average yield level across the district is measured by the following formula:

$$\bar{G} = \frac{1}{N_G} \times \sum G_i \quad (6)$$

Where, G_i : Yield level of a particular sampling; N_G : Number of samplings across the district.

The average yield level with the crop waste is measured by Equation (7):

$$\bar{L} = \frac{1}{N_L} \times \sum L_i \quad (7)$$

Where, L_i : Average yield level with the crop waste in a particular sampling; N_L : Number of samplings across the district.

The net biological yield level is measured by Equation (8):

$$Y = \bar{G} - \bar{L} \quad (8)$$

The degree of precision is measured for the most important variables (in our case, for the yield variable) and analyzed by the "sampling error" and the Coefficient of Variation (CV) (Fischer *et al.*, 2014).

The inventory balance is important for indicators formation, characterizing the country's food security. The resource balance and the use of basic agricultural products are included in the list of such indicators.

Resource Balance and Use Model

The information base for balance model involves data obtained in state statistical observations and information from administrative sources.

Balance models are made for all main food products and agricultural raw materials, including grain and grain processing products, meat and meat products, milk and dairy products, eggs and egg products, potatoes, vegetables and melons, fruits, berries, grapes, sugar beet, sunflower seeds, sugar, vegetable oil, fish and fish products.

Balance models are made under a single example designed for all analyzed products. Balance models have two parts – resource and distributive. The resource part reflects the main sources of income: the distributive part and the main consumption areas.

In general, the balance model is as follows:

I. Resources:

Inventory at the beginning of the year;

Manufacturing;

Import;

Total resources (1+2+3);

II. Usage:

- Industrial use:

- fodder and poultry feed;
- feed production for farm animals;
- sowing/ incubation;
- Processing for food;
- Other industrial uses;
- Wasting;
- Exporting;
- Family consumption;
- Inventory at the end of the year;

Balance models are made by statistical bodies for one calendar year (Committee of Statistics MNE RK, 2016).

RESULTS AND DISCUSSION

Assessment of AIC's potential has shown that Kazakhstan is a self-sufficient country in terms of all types of resources needed for agricultural activities. Currently, the agricultural sector of the Republic of Kazakhstan is growing noticeably. The volume of gross agricultural output has grown more than 1.5 times over the past five years. At the same time, prices have increased almost 1.3 times during this period. In 2016, the gross grain yield was 20,634 million tons, and the export potential – about 5-6 million tons (including flour) (Committee of Statistics MNE RK, 2016).

This has allowed meeting domestic requirements of the country. Now, Kazakhstan is the largest grain exporter and occupies one of the first places in the world as a flour exporter. In the context of current diversification, oilseed, potato, vegetable, and fruit production have been expanded, and the area of wheat planting has been reduced.

At the same time, there are still not enough fodder-grain, cereal, and feed crops in the crop acreage structure (although the area has grown by 9% over the last five years) (Committee of Statistics MNE RK, 2016).

The number of livestock and poultry is growing by 1-1.5% per year. In this case, livestock structure is also changing, as there is a decrease in the number of cattle (by 2%) and a sharp drop in the number of pigs (by 34%). This has slowed down the growth of cattle production and reduced the amount of pig farm products (Figure 1).

There is an increase in the food processing industry's output. The value of food produced by processing enterprises has increased 1.5 times, while the prices have increased by 38% over the past five years and have been integral to this trend.

Therefore, despite all the prerequisites, the current potential of the agricultural sector is not fully employed to ensure the country's food security. This causes a shortage of many types of food, and their deficit level is even below the scientifically based modern consumption standard.

There is an imbalance between the volume of food produced and the demand for it. As a result, wheat overproduction comes with deficiency of meat, sugar, and other products (Figure 2).

As the industrial output shows, domestic production is not a base for food resources. Hence, this situation is a threat to the food security of the Republic of Kazakhstan.

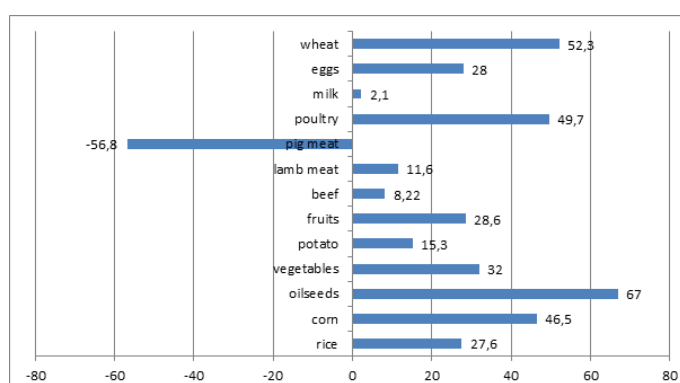


Figure 1. Percentage of agricultural output increment for 2016 in comparison with 2011.

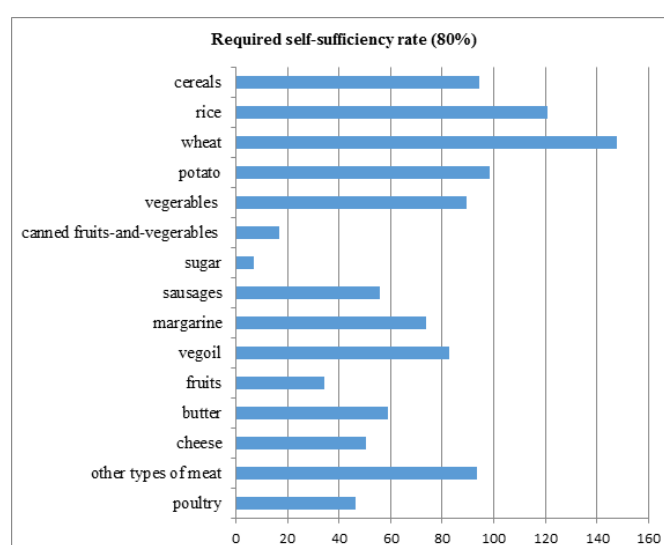


Figure 2. Self-sufficiency of the national food market in domestic products (2016).

It is true that the Republic cannot fulfill the public demand for all the products and there are natural and economic restrictions. Therefore, raw sugar, individual varieties of vegetable oil, tropical fruits will always be imported. However, public demand for butter and vegetable oil, canned vegetables, sausages, margarine should be the goal of state policy in the field of agro-industrial production.

In 2016, based on the real development trends in agricultural production, the social situation, and consumer's affordability, the state of food consumption in the republic was far from the standard level. Thus, we

can conclude about the existing problems in ensuring food sovereignty (Figure 3).

According to preliminary data provided by Ranking.kz (project on monitoring the economy of the Republic of Kazakhstan in a ranking format) in 2016, the average Kazakstani individual has eaten more bread and bakery products than in the previous year – by 1%. The amount of consumed milk and dairy products has increased by 1.2% in one year; the number of consumed eggs by 0.7%; and potatoes by 0.5%. In the past year, consumers sharply increased the use of oil and fat in the households of the country by 1.9%.

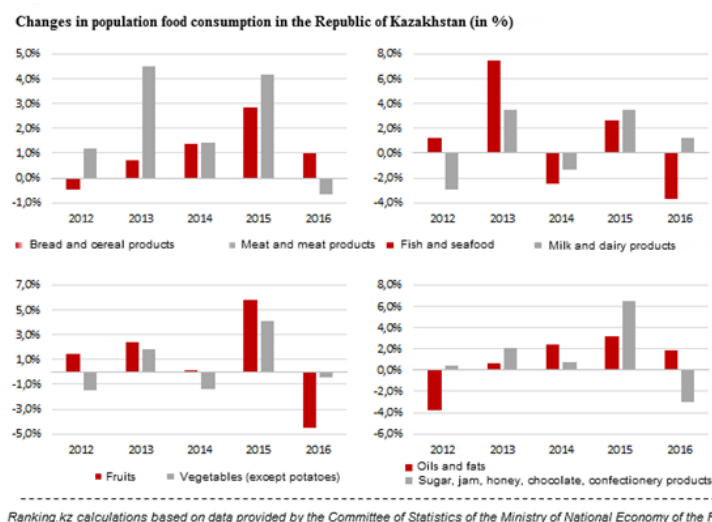


Figure 3. Changes in population food consumption in the Republic of Kazakhstan (in %, for the period 2012 to 2016).

At the same time, the diet of Kazakhstani people included less number of "healthy" products. In one year, the amount of consumed meat and meat products decreased by 0.6%; the amount of consumed vegetables (except potatoes) by 0.5%.

The prices have grown so much that Kazakhstani consumers have had to refuse consuming fruits (-4.5%), fish and seafood (-3.7% per year), as well as sugar-based products (-3%) (Kazakhstan's population consumption of food products for 2016). Consequently, their nutrition does not correspond to the diet required for population.

Thus, governmental authority has to take measures both to increase the demand and to ensure it through domestic production in order to achieve food sovereignty of the country.

As there is a need for improving the nutrition of people living in the Republic, as well as its structure at the level of scientifically ensured standards, the deficit of food produced in the country may increase (Table 1).

The standard aggregate demand (AD) level (including productive consumption and losses) is provided only by general grain production. The above data show that the amount of produced potatoes and vegetables

can fulfill the public demand at the standard level. However, high self-sufficiency in potatoes and vegetables is more likely based on inadequate accounting of their production by farms that provide 61 and 46% of total production, respectively (Nikitina, 2016).

The level of vegetable oil provision is quite high, but the current demand for it is above the standard by more than 1.4 times. This necessitates the import of these products.

The increase in demand for other types of food to the standard level may lead to a significant deficit of domestic fruits, sugar, animal and fish products (Gandhi and Zhou, 2014). The latter will only increase if the population and wage rate are greater. Calculations show that sugar and fruit production have to be increased 4-5 times and livestock production 2 times to satisfy the public demand.

This is a significant challenge, since Kazakhstani agriculture urgently requires the upgraded plants, hi-tech technologies and more efficient and targeted state support, without which its dynamic development will become at risk of failure. The problems that have arisen will become even more acute in the context of WTO. The latter involves a reduction in tariff protection of the national deficit market, changes in the

**Table 1.** Assessment of Kazakhstan's food sovereignty regarding the standard level of per capita consumption (in kg, statistics for 2016).^a

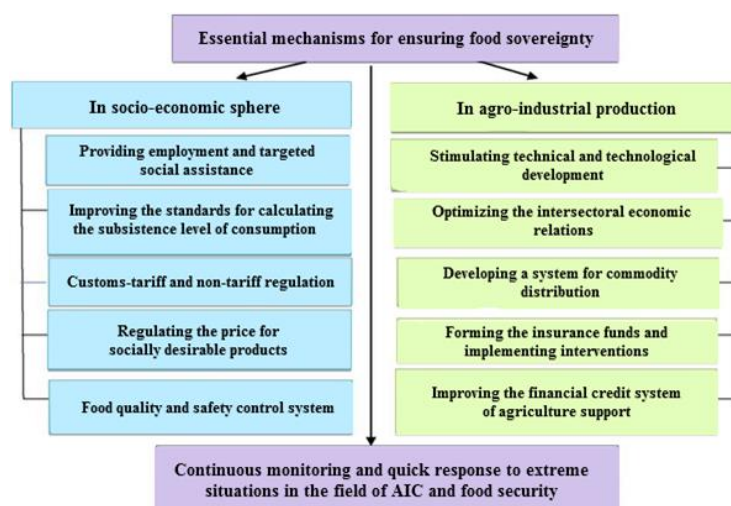
Product	Standard level		Actual output level (2016)	Actual-to-standard output ratio (%)
	Consumption	Production		
Bakery products (Corn)	110	737.0	1162.3	157.7
Potatoes	80	130.2	199.7	153.4
Vegetables	110	169.8	235.0	138.4
Melons	36	39.0	116.7	299.2
Fruits	60	70.0	14.5	20.7
Sugar	36	39.1	25.8	66.0
Oil	13	16.0	15.0	93.8
Meat	82	90.2	50.7	56.2
Milk	380	570.0	298.5	52.4
Egg	292	394.2	268.2	68.0
Fish	17	18.7	2.3	12.3

^a Note: Our calculations are based on data provided by the Committee of Statistics of the Ministry of National Economy of the Republic of Kazakhstan, 2016.

state support of agriculture, transition to international quality standards, etc.

The state objective of ensuring the food sovereignty of the Republic of Kazakhstan is not only to accelerate the agri-food development. It has a socio-economic character that involves the process of solving the existing problems (Figure 4).

In order to create impulses of domestic production growth and ensure food sovereignty, governmental authority has to record an outrun income-to-price ratio. This will form the basis for expanding demand and will provide food affordability, since the current purchasing power of the population has reached its limit. Besides, we have this

**Figure 4.** Essential elements of the state mechanism for ensuring food sovereignty over the past 16 years.

situation in the context of crisis and outrun price growth over incomes. As a result, the level of actual revenues in the Republic of Kazakhstan has decreased by 4.5% in 2016 (Committee of Statistics MNE RK, 2016). This is the most significant drop in the standard of living over the past 16 years.

However, there is a regularly high share of gross trading income in the structure of retail price for basic food products. For example, wages in distributive trading sector are 2.1 times higher than in agriculture. At the same time, in agricultural formations, prices do not allow achieving a sufficient income level for extended reproduction. For example, sunflower seed producers have an opportunity to reproduce on an extended scale, whose Level of Production Profitability (LPP) reaches 36% in recent years. A similar upward trend covers the level of cow's milk profitability (LPP varies between 34-38%) and the level of wheat grain profitability (44%). Poultry producers are in a more difficult situation: their *LPP* does not exceed 20%; as well as the rice producers, who receive only 12% of net income and can reproduce only on a simple scale (Committee of Statistics MNE RK, 2016) (see Figure 5).

There is price skewness for agricultural products. On the one hand, it reflects the competitive capability of domestic products. On the other hand, it hinders the possibility of intensive production and market saturation with high-quality goods.

The state priorities of the agrarian policy, including its main aspects, i.e. food, agricultural, agro-industrial and foreign trade, as well as indicators characterizing the

innovative development, whose ultimate goal is to increase the production efficiency and competitiveness, are oriented towards the same goal ("Agrobusiness – 2020" Program, 2013). This involves the process of mastering new techniques and product types that should promote the reorientation of the strategic goal in production development.

At the same time, Republic's integration into the World Trade Organization necessitates implementing more effective mechanisms to increase the competitiveness and sustainability of agricultural products. Depreciation charges of commodity producers should become one of the main financing sources of investment. The experience of developed countries shows that depreciation is considered as the main source of internal capital assets of the company. The mechanism of financial support for agricultural enterprises can be improved by the EU experience – Agenda 2000 "Modulation", used as a base in developing measures presented in Figure 5.

As a result, there will be a possibility of replacing a significant part of imports, although it will not be possible to reach the 80% of scientifically based standard for all products. Calculations show the growing share of domestic agricultural products and food in the overall volume of national salable resources:

Group 1 – Over 100%: Grain, flour, rice – cereals, macaroni, vegetables, potatoes;

Group 2 – 80-100%: Meat (except for poultry), unpasteurized milk and milk products, sunflower oil;

Group 3 – 50-80%: Cheese, butter, poultry, sausages, canned meat;

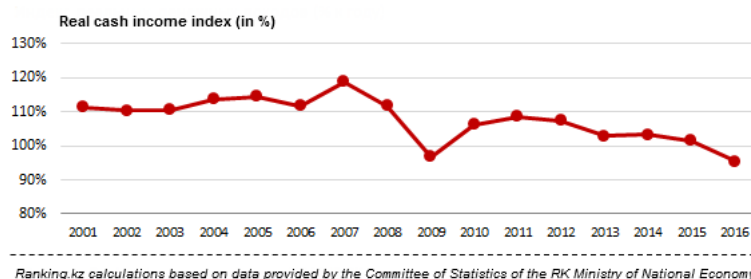


Figure 5. Real cash income index (statistics for the period 2001 to 2016).



Group 4 – Under 50%: White sugar, fruits, canned fruits and vegetables.

In other words, total imports of the main groups of food products will not exceed 20% of the volume of their domestic consumption. Food products of the first and second groups provide 90% of the nutrition energy value and are the most important and indispensable in terms of the quantitative and qualitative balance of essential nutrients.

CONCLUSIONS

Successful resolution of food security issues requires an integrated approach that combines quick returns and long-term measures in agriculture (Godfray *et al.*, 2010). Firstly, it is related to the specific nature of agricultural production. The latter is dependent on weather conditions. Rising food prices always lead to the upturn in inflation and to social strain, as the population cannot reduce own consumption. Secondly, each country seeks to maintain food security and to provide citizens with basic foodstuffs on its own (Drimie and Ruysenaar, 2010). Thirdly, there are important environmental and social functions assigned to agrarian policy. State support for agriculture is seen as a factor of resource and cultural-historical heritage conservation (Chen *et al.*, 2011).

The issue of producing raw materials for biofuels production can be regarded as an actual and high-potential direction in resolving the food security problem (Sausheva *et al.*, 2016). Such raw materials may include oilseed rape, and rapeseed oil is a substitute for diesel fuel, used for agricultural tractors and harvesting machines. Rape as a raw material for biofuels production has a number of advantages. Fuel from its seeds has no harmful effect on the environment, it is non-toxic, fire-safe, and relatively cheap. Besides, growing rape significantly reduces the nitrogen content in the soil. This helps to reduce the groundwater and surface water pollution. Rapeseed oil as a fuel is actively

used in Germany, gradually replacing the traditional sources of energy (Demirbaş, 2001).

The limited ability to produce food in the country gives a bitter experience of dependence on emergency assistance and a clear understanding that resources must be mobilized to cultivate own agricultural products. Therefore, the state has to give an opportunity to the people to release own creative energy in order to contribute to their personality development and well-being (Wharton, 2017).

Recently, many stakeholders, including the World Bank, recognize that this mechanism works more reliably in an opposite way: good nutrition stimulates the economic growth (The World Bank, 2006). The measures without a component of good nutrition-education had no significant impact on resolving the problem of good nutrition (Ruel, 2001). Similarly, agricultural measures with investments in several types of capital (for example, human, physical, financial, natural, and social) provided significant results in the field of nutrition (Berti *et al.*, 2004).

Based on these studies, we can conclude that improved quality of agricultural products is not enough to ensure the good nutrition. This process should also involve measures addressing other determinants of nutrition: education, health promotion, improved water supply and sanitation, gender, and social equity.

To sum up, it is necessary to monitor the state of food security: national output-to-demand ratio both in general and for certain products, allocating the specific areas of state support for production. In the context of the WTO and the Eurasian Economic Union, requirements for competitive abilities and directly related issues of labor productivity, economic efficiency of producer's agricultural activity, product quality, and marketing are brought to the forefront because of the actively developing international trade, transportation, and communication, raising product standards and changing consumers' preferences.

Therefore, increasing financial support has to be combined with tightening the control over the compliance with sanitary requirements, both to imported and domestic food; ensuring the development and budget support of all forms of ownership and all forms of business, paying special attention to small-scale farms that provide the market with 81% of milk, 64% of meat, more than half of vegetables and potatoes. Moreover, there is a need to improve the mechanisms of financial leasing of agricultural machinery and industrial equipment for the processing industry and support agriculture to the extent permitted by WTO terms with a focus on restoring the equivalent relationship between agriculture, industry, and trade. The developed recommendations can also be useful for other developing countries.

REFERENCES

1. Achterbosch, T. J., van Berkum, S., Meijerink, G. W., Asbreuk, H. and Oudendag, D. A. 2014. *Cash Crops and Food Security: Contributions to Income, Livelihood Risk and Agricultural Innovation (No. 2014-15)*. LEI Wageningen UR. Pp. 32-47.
2. Alexandratos, N. and Bruinsma, J. 2012. *World Agriculture towards 2030/2050: The 2012 Revision (No. 12-03)*. ESA Working Paper, FAO, Rome, 4 PP.
3. Alston, J. M., Babcock, B. A. and Pardey, P. G. 2010. *The Shifting Patterns of Agricultural Production and Productivity Worldwide*. Midwest Agribusiness Trade Research and Information Center. PP. 234-236.
4. Berti, P. R., Krusevec, J. and FitzGerald, S. 2004. A Review of the Effectiveness of Agriculture Interventions in Improving Nutrition Outcomes. *Public Health Nutr*, **7(5)**: 599-609.
5. Chen, X. P., Cui, Z. L., Vitousek, P. M., Cassman, K. G., Matson, P. A., Bai, J. S. and Zhang, F. S. 2011. Integrated Soil-Crop System Management for Food Security. *Proceed. of Nat. Acad. Sci.*, **108(16)**: 6399-6404.
6. Committee of Statistics of the Ministry of National Economy of the Republic of Kazakhstan. Available at: <http://www.stat.gov.kz>.
7. Demirbaş, A. 2001. Biomass Resource Facilities and Biomass Conversion Processing for Fuels and Chemicals. *Ener. Convers Manage.*, **42(11)**: 1357-1378.
8. Drimie, S. and Ruysenaar, S. 2010. The Integrated Food Security Strategy of South Africa: An Institutional Analysis. *Agrekon.*, **49(3)**: 316-337.
9. FAO and OECD. 2015. *OECD-FAO Agricultural Outlook 2015-2024*. OECD Publishing, Paris.
10. Fischer, R. A., Byerlee, D. and Edmeades, G. 2014. *Crop Yields and Global Food Security*. ACIAR, Canberra, ACT.
11. Gandhi, V. P. and Zhou, Z. 2014. Food Demand and the Food Security Challenge with Rapid Economic Growth in the Emerging Economies of India and China. *Food Res. Int.*, **63**: 108-124.
12. García-Germán, S., Bardají, I. and Garrido, A. 2016. Evaluating Price transmission between Global Agricultural Markets and Consumer Food Price Indices in the European Union. *Agr. Econ.*, **47(1)**: 59-70.
13. Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F. and Toulmin, C. 2010. Food Security: The Challenge of Feeding 9 Billion People. *Sci.*, **327(5967)**: 812-818.
14. Hammond, A., 1995. *Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development (No. 333.7/H225)*. World Resources Institute, Washington DC.
15. Hülsbergen, K. J., Feil, B., Biermann, S., Rathke, G. W., Kalk, W. D. and Diepenbrock, W. 2001. A Method of Energy Balancing in Crop Production and Its Application in a Long-Term Fertilizer Trial. *Agric. Ecos. Environ.*, **86(3)**: 303-321.
16. Josling, T. and Tangermann, S. 2015. *Production and Export Subsidies in Agriculture: Lessons from GATT and WTO Disputes Involving the US and the EC*. World Scientific Publishing Co. Pte. Ltd. PP. 180-208.
17. Kang, H. 2015. A Study on the Relationship between International Trade and Food Security: Evidence from Less Developed



- Countries (LDCs). *Agr. Econ.-Czech*, **61(10)**: 475-483.
18. Kazakhstan's Population Consumption of Food Products for 2016. Available at: <http://www.ranking.kz/ru/a/reviews/potreblenie-produktov-pitaniya-naseleniem-rk-2016-god>
 19. King, T., Cole, M., Farber, J. M., Eisenbrand, G., Zabaras, D., Fox, E. M. and Hill, J. P. 2017. Food Safety for Food Security: Relationship between Global Megatrends and Developments in Food Safety. *Trend. Food Sci. Tech.*, **68**: 160-175.
 20. Masih, J., Sharma, A., Patel, L. and Gade, S. 2017. Indicators of Food Security in Various Economies of World. *J. Agr. Sci.*, **9(3)**: 254.
 21. Minten, B. and Reardon, T. 2008. Food Prices, Quality, and Quality's Pricing in Supermarkets *versus* Traditional Markets in Developing Countries. *Rev. Agr. Econ.*, **30(3)**: 480-490.
 22. Nag, A., Kumar Jha, S., Mohammad, A., Maiti, S., Gupta, J., Gosain, D. K. and Mohanty, T. K. 2018. Predictive Factors Affecting Indian Rural Farm Youths' Decisions to Stay in or Leave Agriculture Sector. *J. Agr. Sci. Tech.*, **20(2)**: 221-234.
 23. Nikitina, G. A. 2016. Problems and Ways of Ensuring Food Sovereignty of the Republic of Kazakhstan. "*Problemy Agrorynka*" *J. (Challenges of the Agriculture Market)*, pp. 15-22.
 24. Ogundari, K. 2008. Resource-Productivity, Allocative Efficiency and Determinants of Technical Efficiency of Rainfed Rice Farmers: A Guide for Food Security Policy in Nigeria. *ZEM EKON-PRAHA*, **54(5)**: 224.
 25. Petersen, R. G. 1994. *Agricultural Field Experiments: Design and Analysis*. CRC Press.
 26. Ruel, M. T. 2001. *Can Food-Based Strategies Help Reduce Vitamin A and Iron Deficiencies?* (No. 5). International Food Policy Research Institute (IFPRI),
 27. Sausheva, O. S., Gorin, V. A. and Zemskova, E. S. 2016. Resource-Saving Technologies in Agriculture as a Tool for Ensuring Food Security: The Experience of the European Union. *Fundamental Res.*, **6(1)**: 212-217.
 28. Sodano, V. and Verneau, F. 2014. Competition Policy and Food Sector in the European Union. *J. Int. Food Agribusiness Market.*, **26(3)**: 155-172.
 29. State Program for the Development of the Agro Industrial Complex of the Republic of Kazakhstan for 2017-2021. Available at: <http://pavlodar.gov.kz/en/information-of-the-implementation-of-the-state-program-of-agroindustrial-complex-development-of-the-republic-of-kazakhstan-for-2017-2021-2/>
 30. State Program for the Development of the Agro-Industrial Complex in the Republic of Kazakhstan for 2013-2020 "Agro-Business 2020", 2013. Resolution of the Government of the Republic of Kazakhstan.
 31. Swinnen, J. 2015. Supply Chains, Trade and Food Security: Linking Rich Consumers to Poor Producers through Value Chains. *In Presentation at FAO Workshop on Trade and Food Security*, March, Rome.
 32. The World Bank. 2006. *Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action*. Washington DC. Available at: <http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf>, (Accessed 18 January 2013).
 33. Wharton, J. 2017. *Subsistence Agriculture and Economic Development*. Routledge. New York, 494 pages.
 34. Wood, A. 2015. World Trade Report 2014–Trade and Development: Recent Trends and the Role of the WTO World Trade Organization, 2014. *World Trade Rev.*, **14(3)**: 546-548.

تضمین امنیت غذایی یک اقتصاد در حال رشد: موضوعات و جنبه ها

۱. پیماگی، ک. ژکیوا، گ. آکتایلاکوا، م. اسکاگوا، و ز. تولگنوا

چکیده

هدف این پژوهش تعیین راههایی برای حل مسایل مربوط به امنیت غذایی به هزینه تولید داخلی بود. به این منظور، برون داد یا خروجی ناخالص محصولات کشاورزی، جنگلداری و شیلات به عنوان شاخص-هزینه اصلی به کار رفت. با کاربرد داده های مکان های پیمایش شده، عملکرد در هکتار در سراسر سطح زیر کشت مشخص شد. مدل توازن به دو بخش منابع و توزیع تقسیم شد و شامل داده های به دست آمده از آمار مشاهداتی و گزارش های دولتی و منابع اداری بود. به این قرار، در این مقاله، پیشنهادها و معیار هایی برای متعادل ساختن توسعه تولیدات کشاورزی متناسب با افزایش تقاضای موثر ارایه شده است. همچنین، معیارهایی در باره مقررات عمومی مجتمع های کشت و صنعت (AIC) که طبیعتی گسترده دارد توصیه شده و شامل است بر استفاده حد اکثر از ابزار غیر مستقیم با حداقل اثرات مستقیم. محاسبات نشان داده است که این معیارها به افزایش سهم غذای داخلی یعنی حجم کلی منابع قابل فروش بازارهای داخلی منجر می شود. نیز لازم است که سازوکار لیزینگ مالی (financial leasing) ماشین آلات کشاورزی و وسایل صنعتی برای صنایع فرآوری و حمایت از کشاورزی در حدی که از نظر سازمان تجارت جهانی (WTO) مجاز است، با تاکید بر بازگرداندن رابطه برابر بین کشاورزی، صنعت و تجارت، بهبود یابد.