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GLOBAL FOOD PROBLEM AND ITS DISPLAYS IN THE CONTEXT OF THE ASYMMETRIC WORLD DEVELOPMENT**Stezhko N., Dr.of Econ.Sc.***Kirovohrad National Technical University*

The article substantiates on the basis of the research conducted that at the current stage the food problem is of asymmetric nature. It has been found out that the asymmetry of the global food problem is the disproportionality in food production and consumption in the countries of the world, the disparity between the scope of food demand and supply capabilities. The asymmetry of global food support is preconditioned by the inconsistency of provision of the countries of the world with natural resources for the development of the agro-industrial complex; uneven economic development of the countries of the world; different focus and efficiency of the social, economic and agrarian policy in different countries. The purpose of the article is to define distinctive features of asymmetry of the global food problem displays in the present-day context. The integrated approach which includes certain distribution of research functions for the single research object, deliverables systematisation that enables determining specifics of asymmetry of the global food problem displays has been used in the research. Facts and connections have been generalised by means of interpretation of dialectic and structural as well as historical and logical methods. The research conducted enabled determining the following present-day asymmetry displays of the global food problem: asymmetry between the global food production and global food demand; asymmetry in application of innovation methods of the agrarian sector development; territorial asymmetry of food production and consumption in the world; asymmetry in application of intensive and extensive agricultural methods which precondition food production scope and industry performance; asymmetry in the scope of the effective demand of the population for food products; asymmetry in provision for calorific value and qualitative contents of the food ration of the world populations; asymmetry in the scope of consumption of the main food products by the country groups of the world.

Keywords: global food problem, asymmetry of the global food problem, food security, food hazard, food crisis.

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ГЛОБАЛЬНА ПРОДОВОЛЬЧА ПРОБЛЕМА ТА ФОРМИ ЇЇ ПРОЯВУ В УМОВАХ АСИМЕТРИЧНОСТІ СВІТОВОГО РОЗВИТКУ**Сежко Н.В., д.е.н.***Кіровоградський національний технічний університет*

На підставі проведеного дослідження у статті доведено, що на сучасному етапі продовольча проблема має асиметричний характер. Визначено, що асиметрія

глобальної продовольчої проблеми – це диспропорційність у виробництві та споживанні продуктів харчування у країнах світу, неспіврозмірність між обсягами потреб у продовольстві та можливостями їх забезпечення. Асиметрія глобального продовольчого забезпечення обумовлена: нерівномірністю забезпечення країн світу природними ресурсами для розвитку АПК; нерівномірністю економічного розвитку країн світу; різною спрямованістю та ефективністю соціально-економічної та аграрної політики в різних країнах. Мета статті - визначити характерні ознаки асиметрії форм прояву глобальної продовольчої проблеми в сучасних умовах. В процесі дослідження було використано комплексний підхід, який передбачає при єдиному об'єкті дослідження певний розподіл функцій по його вивченню, систематизацію результатів, що дозволяє розкрити особливості асиметрії форм прояву глобальної продовольчої проблеми. Узагальнення фактів і зв'язків здійснювалося за допомогою інтерпретації методів - діалектичного та структурного, а також історико – логічного. Проведене дослідження дало змогу визначити такі сучасні форми прояву асиметрії глобальної продовольчої проблеми: асиметрія між глобальними обсягами виробництва продовольчих товарів і глобальним попитом на них; асиметрія у застосуванні інноваційних методів розвитку аграрного сектору; територіальна асиметрія виробництва і споживання продуктів харчування в світі; асиметрія в застосуванні інтенсивних та екстенсивних методів ведення сільського господарства, які обумовлюють обсяги виробництва продовольства та ефективність галузі; асиметрія у обсягах платоспроможного попиту населення на продукти харчування; асиметрія в забезпеченні калорійності та якісного складу раціона харчування населення країн світу; асиметрія в обсягах споживання основних продуктів харчування за групами країн світу.

Ключові слова: глобальна продовольча проблема, асиметричність глобальної продовольчої проблеми, продовольча забезпеченість, продовольча небезпека, продовольча криза.

Relevance of the problem and its connection with important scientific and practical tasks. The matter point of the food problem is uneven distribution of food resources among the countries of the world and insufficient nutrition level of a large number of the planet population. For instance, according to the Food and Agriculture Organisation (FAO) of the UN, the number of malnourished people in 2014 was 805 m people [1]. Moreover, experts of this organisation refer seventy-seven countries to the category with the low income level and food shortages [2].

Topmost importance of the food problem is preconditioned by the fact that it is related to the fundamentals of human existence as a biological species. The level of provision of the population with food products has

impact in physiological, psychological and intellectual condition of people, preconditions the level of social peace or tension in the society. Food shortages result in inevitable people's deaths. According to the Ukrainian scientists, the global food problem has always existed in the human history and damaged the population greatly. The issue of providing population with the necessary food products has been studied since the economic science started to develop. This problem has been covered in the works of physiocrats, mercantilists, representatives of the classic political economy and contemporary economic theory.

At the current stage global food support and the food problem are getting more and more asymmetric. The asymmetry issue is researched by many scientists.

Analysis of the latest scientific researches. Most researchers see asymmetry as unevenness and disproportionality of development of any systems. Uneven world development is analysed by representatives of virtually all spheres of the economic science, from the classic political economy to contemporary economic concepts considering uneven capital accumulation, transnational corporations development, innovation and technological, social and economic development etc. Unevenness has been associated with asymmetry for the last decades.

Research into the issues related to asymmetry of the global economic development has been included into scientific works of national scientists. General approaches to asymmetry understanding are presented in the publications of N. Kravchuk who sees asymmetry as a category modal from «symmetry» and a source of development, evolution and creation of the new. In her opinion, this is the core of the methodological status of the asymmetry.

From her point of view, symmetry shall be treated as a balance whereas asymmetry is a system of cause-effect relationships, namely a source of imbalance resulting in instability, crisis phenomena and development in the world economy [3].

Most national researchers apply asymmetry to analysis of regional development irregularities. In their works I. Vakhovych and I. Storonianska have studied the theoretical and methodological framework of determination of the essence and approaches to understanding regional development asymmetry [4, 5].

When studying asymmetry in the system of social and economic relations, Z. Varnalii defines it as one of the main threats for regional development of Ukraine [6]. Regional development asymmetry is analysed in the light of economic security by the scientists of the National Institute for Strategic Studies [7]. The researches of M. Zhuk are focused on the methodological tools for identification of regional differences and asymmetry of social and economic development of regions, and on the basis thereof — development of the state regional adjustment policy [8]. O. Dudkina, P. Dudkin establish the conceptual fundamentals of research of social and economic asymmetry of regional development of Ukraine and a system of issues, hazards and factors of impact of regional asymmetry over transformation of regional development of Ukraine [9].

Global development asymmetry is presented in the most detailed and systematic manner in the monograph and thesis research of Ya. Stoliarchuk who substantiates definition of the global economic development asymmetry and analyses its key forms. Ya. Stoliarchuk understands it «... as established lack of structural balance of the global economic system which is displayed as disproportionality of development of world economy subsystems and elements due to objective contradictions between them» [10]. Key forms of display of the global economic development asymmetry include asynchrony and unevenness of development of certain global corporations and transnational state monopolistic industry-type associations, disproportionality in the levels of development of the world economy regions, unevenness in development of production clusters within the framework of the global reproduction process, multi-level countries' participation in technological globalisation processes, global financial imbalances, social polarisation etc. [10].

In this research asymmetry of the food problem displays is not examined, but some researches focus on this issue. Causes of the global food product supply and demand asymmetry are covered in the works of O. Cherebiak who states that supply asymmetry depends on performance of the agricultural sector of the economy which directly depends on the scope, quality and efficiency of land resources use, geopolitical location and climate conditions of the countries of the world. Demand asymmetry is displayed as low elasticity of food demand, that is due to their physiological limitation the country's population will not buy more food than they need to satisfy their needs at the low price and will buy a minimum set of food products even if prices go up [11].

The works of Yu. Makhanova present asymmetric obligations Ukraine has assumed under the WTO treaty as to export of agricultural products which considerably restrict the opportunities of national companies to export agricultural products to external markets. Asymmetry of the established non-tariff measures for agricultural market regulation includes cancellation and prohibition of future quantitative import restrictions introduction, application of antidumping duties, complicated application of compensation measures and non-application of special WTO protective tools with regard to the developed countries [12].

Therefore, asymmetry of the global food problem displays has not been presented in a systematic manner yet, although there are numerous demonstrations of asymmetry of the global food support. The analysis conducted enables determining the main types and characteristics thereof.

The purpose of the article is to determine characteristics of asymmetry of the global food problem displays in the present-day context.

Presentation of the principal research data. When analysing the global food problem, the following global food support asymmetry displays may be noted (Fig. 1.):

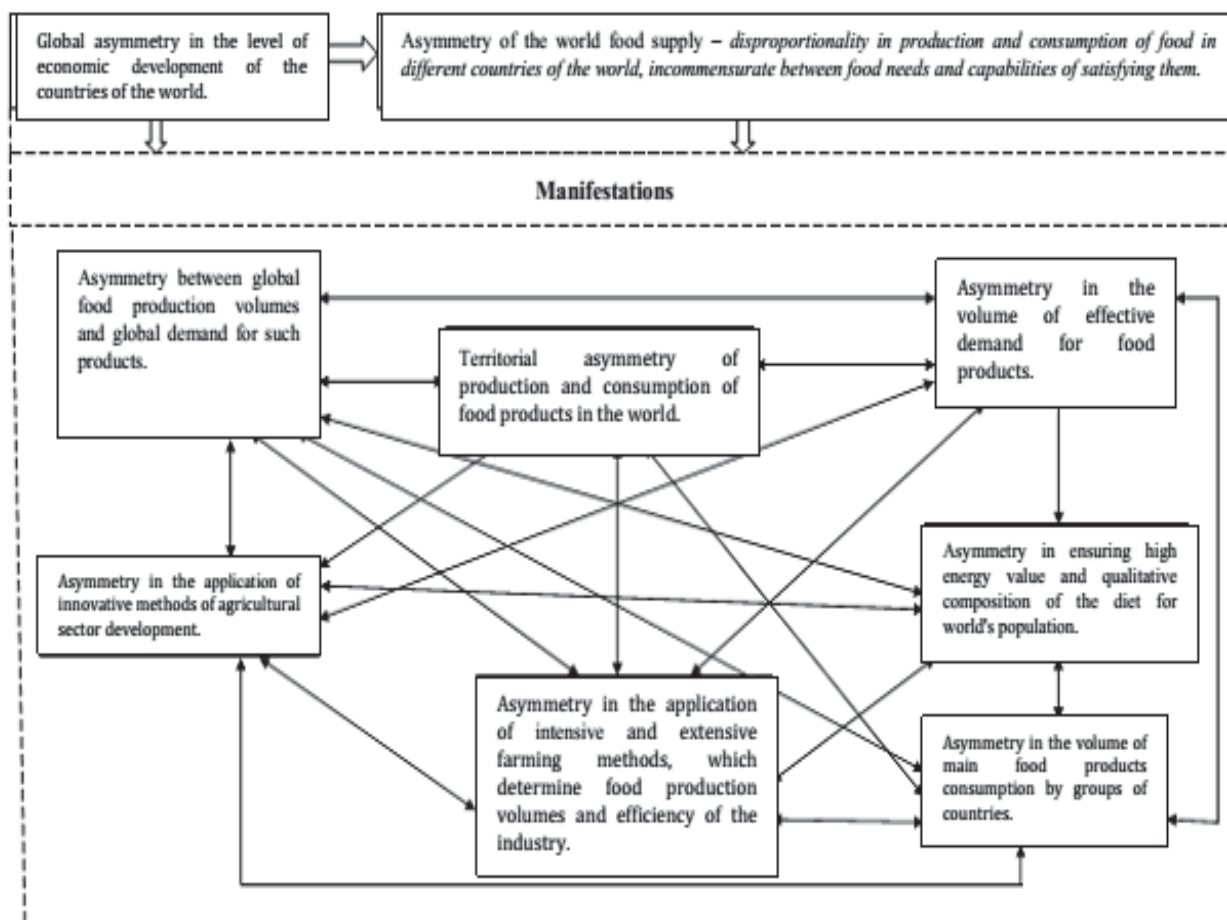


Fig. 1. Asymmetry of global food problem manifestations

Source: developed by the author

1. *Asymmetry between the global food production volumes and global food demand.* The world agricultural production scope has been growing by 2.2 % per year for the last fifteen years, including cultivated plants — by 2 %, but grain crops — by 1 % only. The considerable share of products is manufactured in the developing countries (67 %) whereas twenty-five years ago their share was only a half.

Despite the growth of the production scope, the food demand outpaces production. As a result, the number of malnourished population in the world which has reached almost one billion of people is decreasing insignificantly. This tendency is expected to continue until 2030. As provision with grain is a determinant factor of the food system sustainability, reduction in the closing stock of these products as opposed to the general need from 23.7 % in 2013 down to 22.9 % in 2014 entails destabilisation of the world market. According to FAO, world grain stock as of the end of the agricultural season which ended in 2015 was reduced down to 565.8 m t, which is 1.4 % lower than the level as of the beginning of the season (Table 1.).

Table 1. - Evaluation of the World Grain Balances, m t

Source and area of resources application	Years				
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Production	2,253.7	2,344.1	2,307.3	2,518.8	2,458.2
Trade*	281.4	293.1	310.2	335.7	330.8
General consumption	2,275.4	2,324.7	2,327.3	2,420.6	2,465.7
Food consumption	1,059.4	1,073.4	10,752	1,092	1,108.2
Coarse consumption	763.8	789.8	802.1	858.2	882.8
Other consumption	452.2	461.5	449.9	470.3	474.8
Closing stock	500.6	515.2	502.7	573.9	565.8
Ration between the closing stock and general demand, %	22.0	22.16	21.6	23.7	22.9

*Trade data include export for the selling July-June season for wheat and coarse grain and for the selling January-December season for rice.

Source: [1]

The data in the table demonstrate positive dynamics of the world grain production, trade and consumption. However, specialists state that in the long view the world grain shortage will amount to almost 530 m t, meat and seafood shortage will be substantial as well, 40 and 68 m t respectively. According to the other estimates, the food situation will be getting even tenser over time. In particular, in the World Development Report for 2008 developed by the International Bank for Reconstruction and Development it is stated that grain production has to be increased by 50 %, meat by 85 % in order to solve the food problem for the period from 2000 until 2030 [13]. It is based on the fact that dynamic development of a number of developing countries is expected to increase the world food demand due to population growth and the need for

improvement of living standards. Therefore, according to the experts, the general food demand of our planet population in 2025 may increase twofold [14].

According to FAO experts' estimates, grain production will grow by 20-21 % by 2030, and its total scope will reach 2,149-2,150 m t whereas 2,675 m t will be necessary. Meat production will grow (mainly at the expense of pork and broiler chicken) by 50-80 m t, i.e. up to 230-260 m t at the necessary scope of 300 m t. Seafood consumption will remain at the level of 100 m t with the need of 168 m t [13].

The demand dynamics will be higher as in 2030 the plant population will be equal to approximately 8.9 bn people (annual increment — 90 m people) with general uneven distribution over the regions of the world. Food support issue also gets complicated due to the countries' commitment to increase the quality of food which is now inaccessible for approximately one billion people.

2. Territorial asymmetry of food production and consumption in the world.

Food production disproportions in certain world regions such as China, India, Pakistan, Iran etc. are increased. The stability level of the food market goes down due to reduction of stocks which enable to compensate market fluctuations. Disproportions between the countries are the following:

- in the developed countries in the twenty years to come the food demand will remain at the established level, but the consumption structure will change in favour of food products of better quality and safety;

- the USA, Australia and New Zealand will steal leadership from the EU countries and rank first in the world food export;

- a number of developing countries in the Eastern Europe and Eastern Asia will turn into net importers, so large countries producing food will obtain additional selling opportunities.

The world grain export potential in the amount of 200 m t per year is formed by several countries (USA — 50 %, Canada — 12-15 %, Australia — 5-6 %, Argentina, France, England, Italy — the rest). The most substantial import is expected for grain and sugar, a bit less for meat. Such countries as Japan, South Korea, Cuba and Taiwan significantly depend on grain import. Import provides for up to 70 % of their national market needs. The most considerable and long-term factor of the grain demand dynamics is population growth. In addition, in the most populated countries (China, India) living standards are growing quickly due to substantial economic development, more and more meat is consumed, which in its turn increases the general grain demand.

3. Asymmetry in the scope of the effective demand of the population for food products, which is preconditioned by the living standards which have formed in a certain country. The effective demand depends on the GDP per capita, a wage level and nominal income.

There is a huge gap between the income and consumption levels between populations of the developed and developing countries.

The lowest effective demand is in the countries of the South-African region. In this region the share of the population which is the largest in the world lives for \$ 1.25 per day and is 48.5 %, and the smallest share of this category of population reside in Europe and Central Asia (0.7 %). The number of people living in desperate poverty has plummeted for the last three decades. In 2012 the number of people living in desperate poverty, i.e. less than for \$ 1.25 per day, reduced by 721 m people as opposed to 1981, but it included 400 m minors. It is one third of the population residing in terrible conditions. However, minors make up a proportionally small part among the poorest population. In 2010 minors were one third of those living in desperate poverty and only one fifth of those living above the poverty line. In the countries with the low income level this indicator was even worse: each second person in need was a minor.

4. Asymmetry in the scope of consumption of the main food products by the world country groups. When food consumption in the world grows, differences by country groups remain. In the developed countries consumption is approaching standards, and its structure and quality are improved. In the developing countries food support is of top priority whereas its quality is of less importance. In the transition economies food support is growing, but consumption will be 6-10 % lower than the level achieved at the beginning of the 80s in the 20th century. The adequate nutrition standard is unachievable for a billion of people even in the long term. When discussing positive food support tendencies in the world, it shall be noted that its dynamics by country groups varies substantially (Table. 2).

According to the research, food support stability and quality improvement are typical of industrial countries where optimum consumption of bread products and sugar has been reached, provision with grain, vegetable oil is approaching standards, the share of food of animal origin as well as products characterising national consumption specifics and improving nutrition quality increases.

Despite the general tendency of increase in food support in the developing countries, its level is still insufficient: less than 80 % of the standard value during the analysed period and approximately 85 % in the long term. The ration structure also fails to comply with the standards. These countries are characterised by low level of provision of grain, oil, food of animal origin and other products improving adequate balance of the ration in terms of the most important nutritional substances.

Table 2. - Food Consumption by Country Groups (kilos per person per year)

Years	Food products										Total (kcal per person per day)
	Grain crops (consumption)	Grain crops (total)	Root crops and potato crops	Sugar	Legumes (dry)	Vegetable oil and seed oil	Meat (slaughtered)	Milk and dairy products, excluding butter (recalculated into milk)	Other food (kcal per person per day)		
World											
1964-1966	147	283	83	21	9	6	24	74	208	2 358	
1974-1976	151	304	80	23	7	7	27	75	217	2 435	
1984-1986	168	335	68	24	6	9	31	79	237	2 655	
1997-1999	171	317	69	24	6	11	36	78	274	2 803	
2015	171	332	71	25	6	14	41	83	280	2 940	
2030	171	344	74	26	6	16	45	90	290	3 050	
Developing countries											
1964-1966	141	183	75	14	11	5	10	28	122	2 054	
1974-1976	150	201	77	16	8	5	11	30	129	2 152	
1984-1986	172	234	62	19	8	8	16	37	155	2 450	
1997-1999	173	247»	67	21	7	10	26	45	224	2 681	
2015	173	265	71	23	7	13	32	55	240	2 850	
2030	172	279	75	25	7	15	37	66	250	2 980	
Industrial countries											
1964-1966	136	483	77	37	3	11	62	186	461	2 947	
1974-1976	136	504	68	39	3	15	74	192	485	3 065	
1984-1986	147	569	69	33	3	17	81	212	510	3 206	
1997-1999	159	588	66	3	4	20	88	212	516	3 380	
2015	158	630	63	32	4	22	96	217	540	3 440	
2030	159	667	61	32	4	23	100	221	550	3 500	
Transition economies											
1964-1966	211	556	148	37	5	7	43	157	288	3 223	
1974-1976	191	719	132	45	4	8	60	192	356	3 386	
1984-1986	183	766	114	46	3	10	66	181	384	3 379	
1997-1999	173	510	104	34	1	9	46	159	306	2 906	
2015	176	596	102	35	1	12	54	169	330	3 060	
2030	173	685	100	36	1	14	61	179	350	3 180	

Source: [15]

Countries with transition economies have food instability. They have not managed to retain a considerably high level of food consumption existing in the 80s of the 20th century (almost 97 % of the standard level, which is ten points higher than the level of industrial countries) whereas qualitative characteristics have deteriorated. According to FAO specialists, food support in the transition economies will be lower than the level of the 80s of the previous century even as of the end of the forecast period, i.e. by 2030.

The researches demonstrate that in case of food shortages consumption of not only main products, but also the ones which characterise national consumption specifics and their quality (specified in Table 1.2 as «other food») decreases. And if in the industrially developed countries the specific weight of this food in the consumption structure is 15-16 %, in the transition economies — 10-11 %, and in the developing countries — 8 % only.

5. Asymmetry in provision of calorific value and qualitative content of the food ration of the world populations. There is a physiological need for food: a man needs 2,700 kcal per day, a woman needs 2,100 kcal. The lowest limit is 2,000 kcal. A human body needs approximately eighty main chemical elements to function properly. These standards are not common, and they change subject to the person's age, weight, health, profession etc. A person is believed to consume the quantity of food which equals to his or her weight every month. The optimum average person's menu is approximately 1 kg of dry substance, including 750 g of vegetable origin and 250 g of animal origin [16]. Non-compliance with the nutrition standards results in many diseases which people have been suffering from for a long time.

The human need for food is mainly satisfied owing to use of protein, carbohydrates and fats. The food value per capita in the world has grown from 2,287 up to 2,718 kcal (by 18.8 %), including value of vegetable origin — from 1,927 up to 2,286 kcal per day, or by 18.6 %, of animal origin — from 359 up to 428 kcal (by 19.2 %) for the last thirty-three years.

Detailed analysis of the world statistics as to the level of human nutrition demonstrates that the following daily calorie intake was achieved as of the end of the 20th century: in Europe — 3,41 kcal per day, in North America — 3,384, in Pacific Countries — 3,199, in South America — 2,689, in Africa — 2,718, in Asia — 2,585 kcal per day [1].

If the world food resource statistics is analysed, a conclusion can be made that products of vegetable and animal origin make the principal and

unvalued complementary contribution into the human ration; food of vegetable origin provides 84.3 % of the energy consumed by a human, and the food of animal origin — 15.7 %. Adequate nutrition takes a certain decrease in the share of vegetable food and increase in the animal share. It shall be noted that there is a very big difference in the share of the calorific value of vegetable food for humans by continents: in Pacific countries — 66.5 %, in Europe — 67.9 %, in North America — 72.2 %, in South America — 81.3 %, in Asia — 89.4 %, and in Africa — 92.6%. The share of the energy received from the food of animal origin was much lower and equalled: in Africa — 7.4 %, in Asia — 10.6 %, in South America — 18.7 %, in North America — 27.8 %, in Europe — 32.1 %, in Pacific countries — 33.5 % [1].

Changes in the ratio between the sources of vegetable and animal energy in the world for this period were insignificant at first sight whereas changes on separate continents were substantial. For instance, for the last third part of the century the share of vegetable-food energy increased from 67.5 % up to 72.2 % and the share of the animal-food energy decreased from 32.5 % down to 27.7 % in North America; the share of vegetable-food energy decreased from 93.9 % down to 89.4 % and the share of the animal-food energy increased from 6.0 % up to 10.6 % in Asia; the share of vegetable-food energy decreased from 71.9 % down to 67.9 % and the share of the animal-food energy increased from 28.1 % up to 32.1 % in Europe; the share of vegetable-food energy increased from 60.7 % up to 66.5 % and the share of the animal-food energy decreased from 39.3 % down to 33.5 % in Pacific countries. Therefore, there have been significant structural changes in the ratio between vegetable and animal sources of energy in human nutrition on continents, which means in different countries as well.

The same way as many centuries ago, in most countries energetic nutrition of the population is still prevailed by products of vegetable origin rather than of animal ones. For instance, in Japan this ratio is 78 % to 22 %, in China — 87.3 % to 12.7 %, in Ukraine — 72 % to 28 %, in the USA — 67 % to 33 %, in Great Britain — 68 % to 32 %, in Hungary — 64 % to 36 %, in Germany — 65 % to 35 %, in France — 60 % to 40 %, in Canada — 68 % to 32 %, in Italy — 75 % to 25 %, in Poland — 67 % to 33 % [1].

It may be stated on the basis of the available world statistical data that human nutrition has improved. Moreover, it has been better in the North American, European and Pacific countries, and worse — in Africa and South

America. With account of the general population growth in the world, provision for calorific value of the human ration has virtually achieved standards on three out of five continents. Although on each continent there are countries where the population is fully and sufficiently provided with food, there are some countries with worse food support which has not achieved standards, but there are also countries where people live in poverty alongside with the rich and are malnourished.

According to FAO specialists' forecast, even if the steady tendency of food increment typical of the end of the 20th century and beginning of the 21st century remains, solution of the food problem is not unambiguous (Table 3).

Table 3. - World Actual and Forecast Food Consumption

Countries	years					
	1964-1966	1974-1976	1984-1986	1997-1999	2015	2030
Food consumption, kcal per person per day						
World	2,358	2,435	2,655	2,803	2,940	3,050
Developing countries	2,054	2,152	2,450	2,681	2,850	2,980
Industrial countries	2,947	3,065	3,206	3,380	3,440	3,500
Transition economies	3,222	3,385	3,379	2,906	3,060	3,180
Population numbers, kcal per person per day (mln people)						
Less than 2,200	1,893 ¹	228 I ¹	558	571	462	196
2,200-2,500	288	307	1,290 ²	1,487 ²	541	837
2,500-2,700	154	141	1,337 ³	222	351	352
2,700-3,000	302	256	306	1,134	2,397 ²	2,451 ²
More than 3,000	688	1,069	1318	2,464 ³	3,425 ³	4,392 ³
World in total	3,325	4,053	4,810	5,878	7,176	8,229

¹ with India and China

² with India

³ with China

Source: [15]

Paying special attention to the protein and calorie nutrition, FAO and WHO have adopted the term «protein-energy malnutrition» to define protein-energy deficiency in human nutrition. Protein malnutrition brings about major diseases, loss of health and working capacity. Present-day rational nutrition standards recommend that a human shall consume at least 2/3 protein of vegetable origin, and 1/3 protein of animal origin. According to FAO, daily consumption of food protein in the world is 71 g per person with the average need of 100 g, so the protein malnutrition is 29 %.

For the last third part of the 20th century world protein consumption percapita increased from 62.6 up to 70.8 g, or by 13.1 %. During that period its consumption structure changed almost on all continents. If the ratio to the acceptable standard of the human protein consumption is taken, 85 % of the

countries have achieved the acceptable level of protein consumption by the population whereas in 8-10 % its malnutrition exceeds 50 %. Approximately a half of the population has unbalanced nutrition due to protein malnutrition.

For the last one hundred years world average annual protein production has been growing, but the volume of vegetable protein exceeds the animal one. If the minimum human protein need is considered, it is already satisfied in most countries, but if we take the optimum protein need, its daily consumption is in general satisfied in the European, North American and Pacific countries, and is not satisfied in Asia, South America and Africa.

In many countries protein consumption has achieved or approached the standard: in Australia — 100.4 g, in Austria — 100.8, in Argentina — 99.3, in Israel — 98.7, in Iceland — 123.3, in Italy — 108.7, in Canada — 96.1, in Germany — 100.2, in Poland — 99.3, in the USA — 112.9, in Turkey — 100.5, in Hungary — 93.6, in Finland — 94.2, in France — 116, in Sweden — 94, in Japan — 98 g. Therefore, the food protein problem can be solved on entire continents. However, in many countries protein consumption is at the low level and does not conform to the scientifically substantiated standards, in particular, in Mozambique — 30.8 g, in Liberia — 32.5, in Zaire — 32.8, in Sierra Leone — 34, in Angola — 39.6, on Haiti — 40.3, in Comoros — 41.8, in Bangladesh — 42.5, in Afghanistan — 43, in Nigeria — 43, in Somali — 43.5, on Sri Lanka — 46.9, in Cameroon — 48, in Tanzania — 48.8, in Papua New Guinea — 48.9, in Peru — 49, in Guinea-Bissau — 49.9, in Nepal — 50.1, in the Dominican Republic — 50.1, on Madagascar — 50.6, in Vietnam — 52.1, in Ecuador — 52.2, on the Philippines — 52.4, in Bolivia — 52.5 g [1].

In order to provide the population with animal protein, development of the most intensive animal breeding industries shall be of top priority, the advanced food supply shall be created, and animals and birds shall be fed in a balanced manner. In many countries a lot of money is spent and facilities are allocated for this purpose, which has solved the issue of food protein and intense development of animal breeding industries.

6. Asymmetry in application of intensive and extensive agricultural methods which precondition food production scope and industry performance.

World agricultural performance grew at the end of the previous century due to both intensive and extensive factors the most important of which are the following:

- level of technological advance in the agro-industrial complex, introduction of automation, use of chemicals, amelioration in all agricultural areas in order to increase performance of crop production and animal breeding;

- application of advanced intensive crop production and animal breeding technologies reducing the biological production cycle;

- development of selection and agrarian science in order to provide creation of highly-efficient plant sorts and animal kinds;

- increase in the area of irrigated lands;

- extension of the area of the arable land, engagement of free lands into agriculture;

- development of combined farming systems with various activities: crop production, animal breeding, wood farming, pond fishing etc. [17].

It shall be noted that intensive methods are widely used in the developed countries of the world, which enables them to increase the scope of agricultural production and prevail on the world food markets. In the developing countries and in the countries with transition economies extensive method prevails, resulting in low agricultural performance. Despite the fact that they are mainly agrarian countries, their share in the world food production is insignificant, and their population faces the most acute displays of food shortages.

7. Asymmetry in application of innovation methods of the agrarian sector development.

According to the scientists and agribusiness representatives operating genetically modified products, advantages of the agricultural products obtained by means of biotechnologies include increase in the crop yield due to establishment of their properties and increase in losses from diseases and pests; reduced use of pesticides and herbicides, and, consequently, reduction of chemical impact on soil; release of recoverable natural resources to be used in industry and replaced with more efficient kinds and sorts developed by means of biotechnologies; creation of food products with pre-established medical properties: food for people suffering from digestion diseases, cancer and AIDs, milk substitutes for babies; reduction in the extent of environmental impact as a result of application of more favourable soil treatment methods, and decrease in the level of plant and animal disease rates.

Impact of technological advance on the agro-industrial complex of different countries is not manifested in the same manner due to both development level of the agro-industrial complex itself and economic capabilities of the countries for using technological advance achievements. Developed countries have more opportunities to finance the agrarian science

and support farmers introducing innovations. That is why they achieve higher performance of agricultural production, which is a precondition of the high competitive level. It enables not only to increase agricultural manufacturers' income, but also to provide for extension of industrial expansion opportunities by improving product features [18].

Developing countries are less able to apply innovation methods to develop the agro-industrial complex due to a number of causes: absence of their own agrarian science, predominance of small farms, lack of financial resources to introduce new technical facilities and technologies, and low qualifications of agricultural staff. A barrier on the way of innovation technologies into agricultural industries of the developing countries is private property to scientific developments in the area of biotechnologies and their high capital intensity.

At the current stage the organic agricultural sector which is characterised by the high research intensity level is developed actively. With account of the great and growing demand for organic products, there is a wide network of scientific centres working on development of organic food support in the developed countries. The fundamental difference of research and development in the organic sector from equivalent works in the area of genetically modified products is consumer attributes of the product created. The research and development deliverable in the organic agricultural sector is developed of products of enhanced quality with no chemical substances and other elements hazardous for humans. This approach is more complicated as it provides for application of certain methods approximate to the natural process.

On the other hand, in the developing countries the substantial share of agriculture actually pertains to organic products as they apply few chemical fertilisers, plant protection products and growth stimulators. It preconditions demand for such products by the population of the developed countries, especially Europe which is a leader in consumption of organic products (bioproducts) at present.

Now bio-labelled products are well-known to consumers. The product may look the same as the one created in a traditional manner, but the value proposition of organic products is higher.

For the decades of its active development world trade in organic food products has acquired its own specific features and attributes which are not typical of sectors of genetically modified and traditional products. As effective demand for organic food products of higher cost is mainly focused on the highly-developed countries (EU, USA), world organic product trade flows are directed

there. In other words, organic products are mainly supplied to the countries with high level of food support. The developing countries attracted by a high price of organic products also export high-quality products into the developed countries although they have serious internal food support problems.

Conclusions. The research conducted has enabled identifying main tendencies of development of the global food problem and ways of its solution.

Firstly, it is aggravation of the food shortage problem in the world.

Secondly, it is intensification of global disproportions in food production and consumption and increase in instability on the world food markets.

Thirdly, the role of international food trade in solution of the global food problem grows. At the current stage almost 25 % of the world food and food raw materials volume are supplied to consumers through external markets.

Fourthly, the critical role in development of market condition tendencies is played by grain crops as their specific weight in the world export cost structure is 16 %.

Fifthly, one of the principal tendencies of the world food system operation in the 21st century is penetration of new products of agrarian biotechnologies, genetic modifications, into the industry.

Sixthly, a defining attribute of contemporary world food system development is its environmentalisation in the form of development and implementation of special regional environmentally-friendly arable farming programmes, development of ecological nutrition standards, development of educational and training programmes on agrarian production environmental protection, and increase in turnover of organic products.

On the basis of the research conducted a conclusion may be made that the contemporary world food system is formed under the influence of natural, economic, technological, trade and political, social and environmental parameters. There is a considerable gap in the development level of highly-developed countries and developing countries. The top-priority task of efficient operation of the global food system is to provide the planet population with food by adjustment of development of national agro-industrial complexes, their comprehensive interaction with the natural environment in order to preserve biological diversity and land resources of the planet.

At the current stage the world economy is developed under the impact of restrictive factors of global warming, growing influence on the environment, unstable production as well as growing demand for agricultural raw materials for biofuel, thus hindering prompt solution of the food problem. It shall also

be noted that unstable processes in the world economy (financial and economic crises) result in no opportunities of high rates of food and raw material resources increment event in the long term. Food product increment is expected to be reduced more than three times by 2030 as to the level achieved, whereas demand will keep growing steadily [17]. Therefore, the world food system which provides for certain approximation in food consumption by the country groups is still unable to solve the problem of supply and demand balance on the global level in the mid and long term.

When considering the food problem in general, it shall be noted that its solution both at present and in the future is expected to be rather complicated for a number of reasons, including the following:

1) in the developed countries the need for increasing the volumes of raw materials and food goes down due to limited demand and capabilities for increasing food recourses by means of technological advance achievements, first and foremost, new technologies;

2) in the developing countries the agricultural resource potential and technological advance capabilities are used insufficiently due to the complicated natural and climate conditions for production, lack of financial resources for their improvement and introduction of advanced technologies;

3) deterioration of the environment resulting in reduction of natural resources necessary to increase the production scope and create food resources as needed;

4) Earth plant disruptions and water imbalance have a negative long-term impact on food production. Therefore, advanced agricultural intensification strategies have to take into account limitedness of resources, need for their recovery and environmental protection;

5) inability of most import-dependent countries to purchase the necessary amount of food as a result of changes in the world food market conditions, which results in aggravation of the internal food crisis.

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