# Features of Food Security of the Country in Conditions of Economic Instability

***[1*]Grygorii M. Kaletnik, [2]Olena V. Shubravska, [3]Marat I. Ibatullin, [4]Dmytro F. Krysanov, [5]Yevhenii M. Starychenko, [6]Kateryna V. Tkachenko, [7]Olha O. Varchenko***

*[1*]Vinnytsia National Agrarian University, Vinnytsia, Ukraine.*

*[2]NASU Institute for Economics and Forecasting, Kyiv, Ukraine.*

*[3]National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine.*

*[4]Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine.*

*[5]Ukrainian Institute for Plant Variety Examination, Kyiv, Ukraine.*

*[6]Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine.*

*[7]Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine.*

**[1*]Corresponding Author, E-mail:** katgrm@urk.net

**Received: 06 October 2019 Accepted: 09 November 2019**

## ABSTRACT:

The article shows that the level of actual production over the consumption of basic foodstuffs is exceeded, however, the level of production did not reach the threshold (80% of the rational norm) for the main types of livestock products. Consumption of meat and meat products per person in 2017 amounted to 51.4 kg, which is less than the rational norm (80 kg) by 28.6 kg, and milk and dairy products per person person for the year in 2017 - 200 kg, with a scientifically substantiated rate - 380 kg. Exceeding the threshold of import in the volume of consumption by the population are fishery products, fruit and berry products, vegetable oil of all kinds - respectively 75,4, 38,1 and 30,5%.

It is estimated that average monthly total household expenditures in 2017 amounted to UAH 5720, which is 16% more than in 2016. The most significant item of total household expenditures in 2017 was food expenditures - 48%, according to food security indicators. the criterion is 60%. It has been analyzed that after the increase until 2014, there was a decrease in calorie intake in 2017 to 2707 kcal per day. Although higher than the 2500 kcal limit, this diet should be provided at 55% for animal products, but now only 29%.

An integrated assessment of the state of food security based on the methodology of integral assessment of the level of economic security of the state and calculation of a global indicator of food security of international organizations is offered. The calculation of the integrated indicator takes into account the availability of available information and the maximum approximation to the features of calculations of food security indicators at the national level, which includes the following components: economic accessibility, physical security, sufficiency of consumption. According to the integrated indicator, the food security situation is characterized as satisfactory.

**Key words:** *Food Security, Household Income, Indicators of Adequacy of Food Consumption, Rational Consumption Rates.*

## INTRODUCTION

Ensuring food security is an important component of a country's national security, a factor in preserving its statehood and sovereignty, a major component of demographic policy. The strategic goal of

food security is to provide the population with quality and safe food for human health. The guarantee of achieving this goal is the stability of domestic production, as well as the availability of necessary reserves and reserves. Among the main risks that threaten the food security of Ukraine in the near term are: increasing the share of acreage under industrial crops; lack of analogues of imported equipment and, as a consequence, slowdown in the modernization of certain branches of the agro-food sector; insufficient level of development of the transport goods infrastructure and storage of food products; macroeconomic factors and exchange rate fluctuations; raising prices for logistical and energy resources; epizootic risks, the manifestation of which is most probable in case of outbreaks of especially dangerous and quarantine diseases of animals in the country [1,2].

The main strategic goals of Ukraine's food security are to determine the stability of food supply throughout the country throughout the year; economic availability of food to all sections of the population; high quality and safety of food products; rational consumption structure. For Ukraine, the problem of food security today is of particular importance due to the lack of adequate nutrition of the majority of the population due to the decline in purchasing power of some of its groups, and, on the other, to the volatility of the global and domestic food markets, global climate change and the influence of other adverse factors.

**The purpose of the research** is an assessment of the level of food security in Ukraine, a study of the dynamic changes in the basic indicators of the volume and structure of consumption of basic foodstuffs, indicators of the physical and economic availability of food, the relationship between food production, consumption of foodstuffs and household income.

## MATERIALS AND METHODS

The study proposes the calculation of an integral indicator, similar to the method of calculating the global food security index, which is divided into three components (sub-indices), for each of which there are indicators of a set of legally defined indicators of food security, as well as the indicator of self-sufficiency. The indicators are broken down by sub-indices as follows: economic (social) accessibility: economic affordability of food (share of food costs in total household consumer spending,%); physical (production) availability: self-sufficiency by major product groups (ratio of production to domestic consumption (feed, seeds, consumption fund); indicator of food independence of major product groups (ratio between the volume of imports of an individual product in kind and the sufficiency of its internal market); consumption: an indicator of the sufficiency of consumption of the main product groups (the ratio between the actual consumption of an individual product and the rational standard).

The integral indicator also includes the caloric intake of food. Each of the above subindices will have an equal share in the integral estimate of the total index. Alignment of indicators that are different in type (stimulants - C and stimulators - B) to information unidirectionality and dimensionality is carried out by means of normalization. The proposed rationing procedure is done by dividing the values of each indicator by the characteristic values. The range of values is measured from 0 to 1 and is divided into 5 intervals: 0.2 - minimum or critical level; dangerous level does not exceed 0.4; unsatisfactory level - from 0.4 to 0.6; satisfactory level - from 0.6 to 0.8; values above 0.8 correspond to the optimum level.

The type C indicator is normalized according to the following algorithm:

$$y_i = \begin{cases} 0{,}2\frac{x_i}{x_{crit}}, 0 < x_i < x_{crit}; & 0{,}2 + 0{,}2\frac{x_i - x_{crit}}{x_{dang} - x_{crit}}, x_{crit} \le x_i < x_{da} \\ 0{,}4 + 0{,}2\frac{x_i - x_{dang}}{x_{unsat} - x_{dang}}, x_{dang} \le x_i < x_{unsat}; & 0{,}6 + 0{,}2\frac{x_i - x_{unsat}}{x_{satis} - x_{unsat}}, x_{unsat} \le x_i < x_{sa} \\ 0{,}8 + 0{,}2\frac{x_i - x_{satis}}{x_{optimal} - x_{satis}}, x_{satis} \le x_i < x_{optimal}; & 1, x_{optimal} \le x_i \end{cases} \quad (1)$$

by type B:

$$y_i = \begin{cases} 1, x_i < x_{optimal}; \\ 0{,}6 + 0{,}2\frac{x_i - x_{unsat}}{x_{satis} - x_{unsat}}, x_{satis} \le x_i < x_{unsat}; \\ 0{,}2 + 0{,}2\frac{x_i - x_{crit}}{x_{dang} - x_{crit}}, x_{unsat} \le x_i < x_{crit}; \end{cases} \quad \begin{cases} 0{,}8 + 0{,}2\frac{x_i - x_{satis}}{x_{optimal} - x_{satis}}, x_{optimal} \le x_i < x_{satis} \\ 0{,}4 + 0{,}2\frac{x_i - x_{dang}}{x_{unsat} - x_{dang}}, x_{unsat} \le x_i < x_{dang} \\ 0{,}2\frac{x_i}{x_{kcrit}}, x_i \ge x_{crit} \end{cases} \quad (2)$$

Where – optimal, satisfactory, unsatisfactory, dangerous and critical level of the indicator respectively

## RESULTS AND DISCUSSION

The study found that the country has a significant increase in the level of actual production compared to consumption, and this is evidence that this is due to a decrease in the purchasing power of the population. Thus, for the main types of livestock products the level of production has not reached the threshold (80% of the rational norm). If one analyzes the level of self-sufficiency on the basis of rational consumption of meat products, then it is close to the threshold of sufficiency of consumption solely by increasing the production of poultry meat.

Consumption of meat and meat products per person in the year 2017 amounted to 51.4 kg, which is less than the rational norm (80 kg) by 28.6 kg. At the same time, compared to 2000, consumption increased by 18.6 kg. Per capita consumption of meat has a positive trend and in 2017 it increased by 0.5 kg or 1% compared to 2016.

According to the rational rate of consumption of beef and veal 32 kg in 2017 consumed 8.1 kg (25,3% of the norm), pork respectively 28 kg and 19 kg (67,9%), poultry meat - 20 kg and 23,6 kg (118%). A similar situation is observed in the consumption of milk and milk products. Thus, the consumption of milk and dairy products per person in 2017 amounted to 209.5 kg for a scientifically justified norm of 380 kg. As a result, we can conclude that in fact, the main indicator of living standards is nutrition, Ukraine is at the level of the 1970s.

During 2014–2018, the average daily nutrition of the Ukrainian population is decreasing. According to statistics, in 2018 the level of consumed energy of products amounted to 2706 kcal per day, which is almost equal to the value of the previous year. However, compared to the value of 2016, the figure is 36 kcal less. The caloric content of the diet is still almost 10% higher than the limit for this indicator - 2500 kcal (Fig. 1)

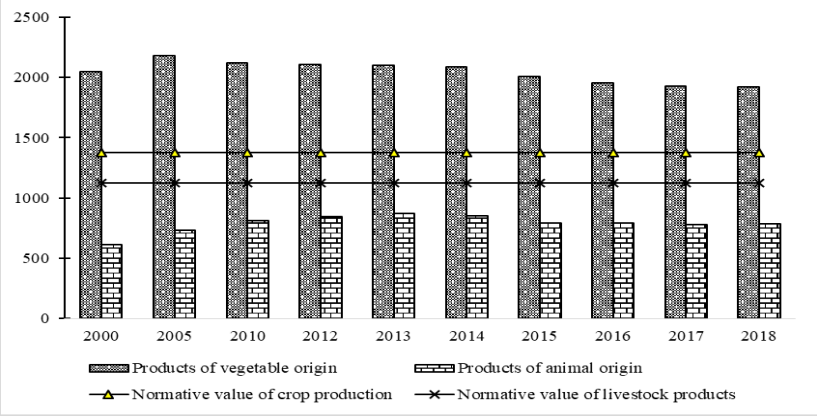


**Fig. 1: The level of consumed energy by the population of Ukraine, kcal / day ***
*** Source: Created by the authors on the basis of [3]**

According to statistics, the average citizen of Ukraine tends to be vegetarian, but for the most part, this is not due to vital beliefs, but mainly to financial capacity. Thus, in 2017, only 29% of the average daily diet was provided by the consumption of livestock products, which is almost half the level required for healthy nutrition (55%). Note that a balanced diet is considered, in which the daily diet is maintained by the ratio of the mass of the main components - proteins, fats and carbohydrates as 1: 1: 4.

In 2017, the Ukrainian population consumed an average of 84 g of protein, which is one of the lowest in the EU and 18% less than the average in developed countries (103 g per day) [4]. According to the statistics of the Households' Costs and Income of Ukraine, the caloric content of daily diet of one person in 2017 amounted to 2994 kcal, the protein content of consumed food - 84 g, fat - 134 g, carbohydrates - 370 g. The calorie intake of household food increased by 1.0%. Protein and carbohydrate content of food consumed increased by 1%, while fat content decreased by the same amount.

It is established that the diet of the population of Ukraine during 2006–2017 is not balanced in terms of fat, protein and carbohydrate content. According to physicians and nutritionists, in the diet of a resident of Ukraine for sufficient protein intake, a large part (79%) of them are proteins of plant origin (at the rate of 1: 1), which leads to the spread of dangerous diseases.

According to a comparative analysis of the caloric content of food consumption and the value of gross domestic product (GDP) per person, in some countries of the world and Ukraine the level of economic well-being directly affects the caloric content of the diet (Fig. 2).

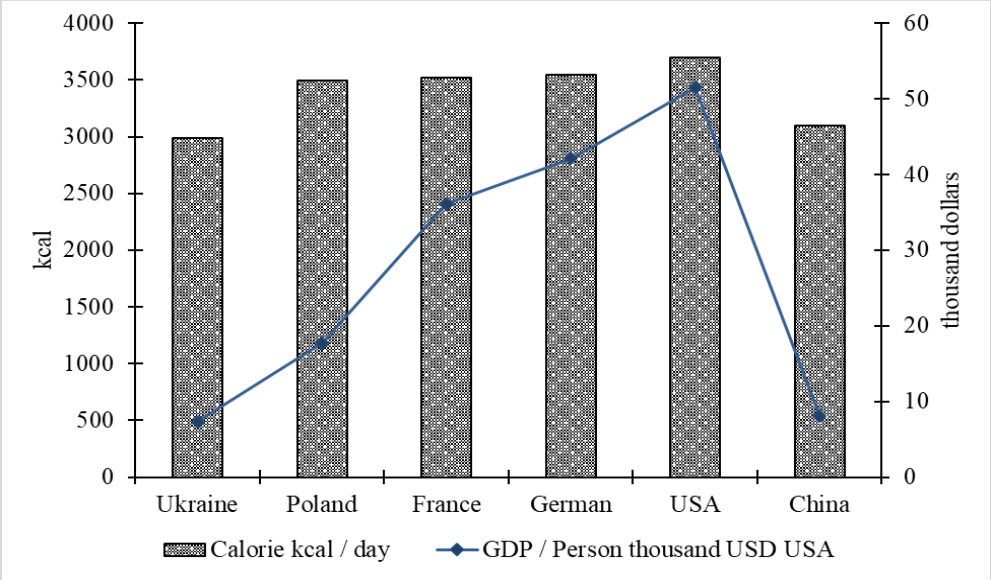


**Fig. 2: Caloric value of food consumption and GDP in some countries of the world and Ukraine, 2016**

**Source: Created by the authors on the basis of [3].**

Consequently, consumption and calorie intake depend directly on two main factors: the level of income and prices for basic foodstuffs, which collectively characterize the purchasing power of the population. The economic affordability of food provides for a sufficient level and positive dynamics of household income of all categories with a socially acceptable level of food prices.

The average monthly total expenditure per household in 2018 amounted to UAH 8,308.6, which is 45.2% more than in 2016. At the same time, the aggregate expenditure on food and non-alcoholic beverages per month per household per 2018 is insignificant. decreased (by 0.6 pp), but their share in the total cost is significant. Thus, the most significant item in the total expenditures of households in Ukraine remained the cost of food, the absolute value of which tends to increase, which accordingly adversely affects the indicator of economic affordability of food, whose value in 2018 was 40.9% (Fig. 3).

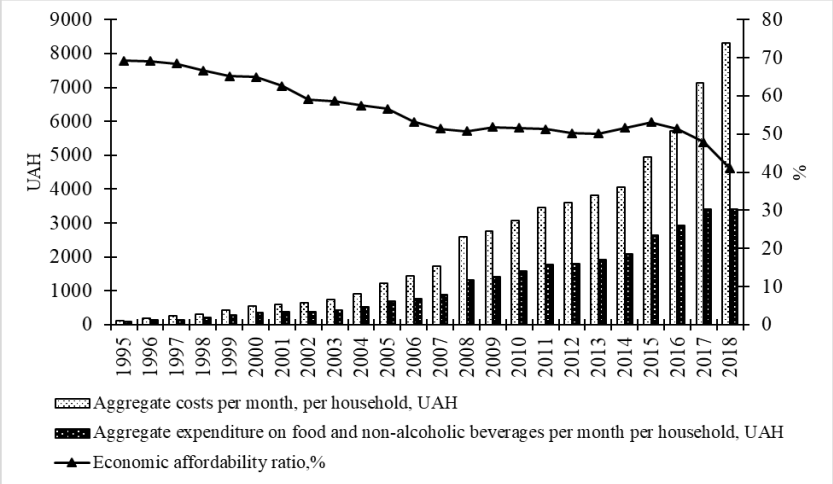


**Fig. 3: Dynamics of food affordability in Ukraine ***
**Source: Created by the authors on the basis of [3].**

Analyzing the indicator of affordability of food over the observed period, it is worth pointing out its decrease by an average of 1%. It has been established that in the European countries the share of food expenditure in total household expenditures is in the range of 20-25%, and the expenditures of households in Ukraine exceed them twice [5].

It should be noted that in the Republic of Belarus the population spends almost 50% on foodstuffs, about the same expenditure on the population of Iran. The cost of nutrition in the leading countries of the world is 10-30% of total costs, including Switzerland - 10, Norway - 11, the United States - 20, France - 23, the Netherlands and Denmark - only 10% [6].

In 2017, in Ukraine, the average for Ukraine, the share of household cash expenditures on food was 46.3% in 2017 (47.8% in urban areas, 42.7% in rural areas). Compared to 2016, this indicator decreased by 1.5 pp, which indicates an improvement in the economic accessibility of our population to food. However, taking into account the food security indicators analyzed, such as the caloric content of the diet and the sufficiency of consumption of certain products, for which there is a noticeable deterioration, it should be understood that the affordability indicator does not reflect the reality.

Due to the sharp decline in real incomes, the population is forced to spend less on food. At the same time, with the rise in price of food, the population should not only increase the cost of food, but also reduce their consumption. The cost of a minimum product basket for an able-bodied person in Ukraine in January 2018 amounted to about 1423.7 UAH, with the cheapest diet recommended by the Ministry of Health of Ukraine for an adult per month estimated at about 1540 UAH, or 83% of the level the living wage for an able-bodied person.

No significant changes were observed in the structure of consumer spending on food during 2015–2017. First place is spent on meat and meat products - 22% (UAH 657 per household per month), bread and bread products - 15% (UAH 439), milk and dairy important - 13% (UAH 386).

In the current difficult economic environment, the main source of food supply, especially for members of rural households, is the production of personal farms (OSG). They produced 64.9% of potatoes consumed in households, about half - other fresh, chilled, frozen meat, 27.2–32.2% - eggs and vegetables and melons, 22.7% milk and dairy products.

The problem of food availability is also another component of food security, which is primarily related to income sharing. The share of population spending on food is known to be inversely proportional to the income level of a given social group. Such a statistic is a reliable indicator of living standards. In developed countries, it is always less than 20%, and in the US - at the level of 12-13%. In Ukraine, it now averages

around 40%, which is only possible in a low-living country and is characteristic of third world countries.

The coefficient of differentiation of consumption of bread and bread by quintile groups (Table 1), decreased from 1.6 in 1999 to 1.2 in 2017, which is mainly due to a decrease in consumption of the richest part of the population by almost 30%, consumption of the poorest the share of bread products has remained almost unchanged, amounting to an average of 8 kg per month in the last years, or 96 kg per person per year, which is almost equal to the rational consumption indicator.

The analysis of the differentiation indicator shows slight differences in the level of consumption of potatoes in social groups, which are decreasing annually (note the absence of such stratification in 2007, as well as a certain increase in recent years) of the differentiation of consumption of vegetables and melons by social groups decreased to level 1, 52 compared to 2006, when, according to the State Statistics Service of Ukraine, the consumption of vegetables by the wealthier part of the population is almost twice as high as their consumption by the poorest sections of the population.

The level of differentiation of sugar consumption is 1.43 points, which is significantly less than in 1999, when consumption in the higher quintile three times exceeded the consumption value of the lower one. This tendency is due both to an increase in the consumption of the poorer part of the population (in terms of annual consumption rate now stands at 27.6 kg per person per year) and a decrease in the higher social group (39.6 kg per person per year).

According to the indicator of differentiation, oil consumption in the lower social group is 7% less than in the higher one. It is worth noting that the highest differentiation rate was recorded in 2003 - 2.9 (190% difference).

The negative tendency, which does not allow the population to increase the consumption of fruits and berries, is the high prices, which during 2002–2017 increased by 76.5% more than the average level of prices for all food products. In particular, the manifestation of the impact of high prices is an indicator of differentiation. Despite a threefold decrease in this value compared to 1999, the current divergence in consumption is critical: the consumption of fruits and berries by lower-income populations is half that of the higher-income group.

As for the indicator of differentiation of egg consumption, it is worth noting a decrease in the stratification level (the highest level was recorded in 2000 - 2.9). Currently, this value is 1.23, or in absolute terms, 48 pcs.

The high value of the indicator of differentiation of consumption by social groups is observed in the group of milk and milk products, even though it decreased from 2.9 to 1.63 during the analysis period. That is, consumption in the lower quintile is less than 63% of consumption in the higher quintile, even in which the consumption level is only 75% of the rational norms (285 kg per person).

It is established that in 2017, there remains a differentiation in food consumption between different welfare levels of households: first decile households, monthly per capita income groups below the subsistence level, below the actual subsistence level, and tenth decile households. The last group of households spent on food compared to the 1.4-1.3 times lower share of total expenditures (43%), and the cost per person consumed per day was 2.6-1.9 times and calories, respectively. (3583 kcal) is 1.6-1.3 times higher. Therefore, a low income level does not allow the population of the country to eat well, which makes its diet unbalanced. For the most part it is fat-carbohydrate diet: Ukrainians consume a lot of bread and potatoes. This situation is detrimental to health, especially to children.

The satisfaction of the food needs of the population within the limits of its purchasing power in 2017, as a matter of fact since the independence of Ukraine, was ensured mainly at the expense of domestic production. At the same time, for three food groups, the share of imports has traditionally exceeded the 30% threshold for this indicator. The highest level of import dependence –73% - for the group “fish and fishery products”, since 90% of imported supplies come from species of fish that are

produced exclusively in the waters of the maritime economic zones of other countries, which is related to the peculiarities of their biological cycle (Table 1). .

**Table 1: Dynamics of food independence by individual products food in Ukraine, thousand tons ***

| | Year | | | | | 2017 | |
|---|---|---|---|---|---|---|---|
| | **2000** | **2010** | **2015** | **2016** | **2017** | **2000** | **2016** |
| Bread products | | | | | | | |
| Imports | 1010 | 175 | 190 | 240 | 255 | 25,25 | 106,25 |
| Domestic consumption | 6141 | 5106 | 4423 | 4309 | 4241 | 69,06 | 98,42 |
| Import Dependency Indicator | 0,16 | 0,03 | 0,04 | 0,06 | 0,06 | -0,10 | 0,00 |
| Meat and meat products | | | | | | | |
| Imports | 38 | 378 | 158 | 182 | 233 | 613,16 | 128,02 |
| Domestic consumption | 1611 | 2384 | 2179 | 2195 | 2195 | 136,25 | 100,00 |
| Import Dependency Indicator | 0,02 | 0,16 | 0,07 | 0,08 | 0,11 | 0,09 | 0,03 |
| Milk and milk products | | | | | | | |
| Imports | 50 | 273 | 78 | 105 | 132 | 264,00 | 125,71 |
| Domestic consumption | 9789 | 9470 | 8995 | 8942 | 8496 | 86,79 | 95,01 |
| Import Dependency Indicator | 0,01 | 0,03 | 0,01 | 0,01 | 0,02 | 0,01 | 0,01 |
| Eggs | | | | | | | |
| Imports | 2 | 7 | 11 | 5 | 7 | 350,00 | 140,00 |
| Domestic consumption | 471 | 767 | 694 | 659 | 670 | 142,25 | 101,67 |
| Import Dependency Indicator | 0,00 | 0,01 | 0,02 | 0,01 | 0,01 | 0,01 | 0,00 |
| Potato | | | | | | | |
| Imports | 11 | 30 | 17 | 27 | 24 | 218,18 | 88,89 |
| Domestic consumption | 6660 | 5914 | 5892 | 5966 | 6091 | 91,46 | 102,10 |
| Import Dependency Indicator | 0,00 | 0,01 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Vegetables | | | | | | | |
| Imports | 29 | 311 | 95 | 136 | 129 | 444,83 | 94,85 |
| Domestic consumption | 5002 | 6581 | 6890 | 6984 | 6783 | 135,61 | 97,12 |
| Import Dependency Indicator | 0,01 | 0,05 | 0,01 | 0,02 | 0,02 | 0,01 | 0,00 |
| Fruits and berries | | | | | | | |
| Imports | 179 | 1130 | 588 | 732 | 819 | 457,54 | 111,89 |
| Domestic consumption | 1439 | 2203 | 2179 | 2119 | 2242 | 155,80 | 105,80 |
| Import Dependency Indicator | 0,12 | 0,51 | 0,27 | 0,35 | 0,37 | 0,25 | 0,02 |
| Vegetable oil | | | | | | | |
| Imports | 180 | 319 | 160 | 219 | 239 | 132,8 | 109,1 |
| Domestic consumption | 461 | 680 | 525 | 497 | 497 | 107,9 | 100 |
| Import Dependency Indicator | 0,39 | 0,47 | 0,30 | 0,44 | 0,48 | 0,09 | 0,04 |
| Fish and fish products | | | | | | | |
| Imports | 298 | 466 | 259 | 306 | 338 | 113,4 | 110,5 |
| Domestic consumption | 413 | 667 | 367 | 410 | 460 | 111,4 | 112,2 |
| Import Dependency Indicator | 0,72 | 0,70 | 0,71 | 0,75 | 0,73 | 0,01 | -0,02 |

Source: calculated by the authors according to [3].

The exceedance of the marginal criterion for the group "vegetable oils" is due to the import of tropical oils (palm and coconut occupy more than 90% of imports), which are in high demand from domestic producers of the food industry. Import dependence on the group "fruits and berries" is associated with the import of large volumes of exotic fruits, cultivation of which is not peculiar to Ukraine (bananas, citrus fruits, etc.).

The presence of numerous food security indicators makes it impossible to estimate its overall level in the country. The substantiation of the general food security indicator is based on the method of integral assessment of the level of economic security of the state, which exists in two variants: the methodology of 2007 [7] and 2013 [8]. For the synthesis of the common indicator, we also used the calculation method of the global food security indicator developed by the Economist Intelligence Unit [9]. ], FAO's recommendations for the assessment of food security indicators [10], as well as recent developments in national scientific literature [11, 12, 13].

Consider developing an integrated food security indicator based on available information and maximizing approximation to the specifics of food security indicators at national level [14]. Table 2 shows the characteristic values of food security indicators for normalization. For the sufficiency indicator, a percentage of the statutory consumption rates of individual product groups is calculated. The Food Independence Indicator is calculated as the ratio of imports to the market capacity for individual products (food groups). unsatisfactory

**Table 2: Values of indicators for normalization**

| Indicator | **Stimulator** | | | | | **Destimulator** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $X_{crit}$ | $X_{dang}$ | $X_{unsatisfact}$ | $X_{satisfactory}$ | $X_{optimal}$ | $X_{optimal}$ | $X_{satisfactory}$ | $X_{unsatisfa}$ | $X_{dang}$ | $X_{crit}$ |
| Individual product consumption adequacy indicator,% | 80 | 85 | 90 | 95 | 105 | | | | | |
| Grain production per person, tons | 0,6 | 0,7 | 0,8 | 0,9 | 1 | | | | | |
| Food Independence Indicator,% | | | | | | 6 | 12 | 18 | 24 | 30 |
| Affordability,% | | | | | | 25 | 30 | 40 | 50 | 60 |
| Self-reliance,% | 40 | 60 | 80 | 100 | 120 | | | | | |

Source: calculated by the authors.

Since the calculation of the sufficiency, self-sufficiency and independence indicators was carried out for individual product groups, it is appropriate to determine the weighting indicators of each group. The relative weights of each product group in total calories, protein / protein intake, and iron were used for the evaluation. This takes into account the impact of recommended consumption rates on the total value of these indicators.

For the calculations, an estimate of the optimal caloric level at 3100 kcal / day, proteins - 86 g / day, iron 15 ml / day was used [15]. When determining the content of each element in the product groups, it is recommended to use the USDA estimate made by the USDA [16]. The corresponding estimates are given in Table 3:

**Table 3: Nutrient content per 1 kg of food ***

| Products \ Elements | **Calories** | **Proteins, mg** | **Iron, mg** | **Rate of consumption, kg / year** |
|---|---|---|---|---|
| Vegetable oil | 8841 | 0 | 0 | 13 |
| Sugar | 3867 | 0 | 1 | 38 |
| Potato | 767 | 20 | 8 | 124 |
| Vegetables and melons | 652 | 29 | 8 | 161 |
| Bread and bread products | 2642 | 90 | 16 | 101 |
| Fruits and berries | 887 | 11 | 13 | 90 |
| Meat products | 1434 | 260 | 12 | 80 |
| Milk products | 420 | 34 | 0 | 380 |
| Fish products | 2050 | 220 | 3 | 20 |
| Eggs (1 pc) | 89,57 | 12,27 | 0,693 | 290 |

*Source:* calculated by the authors [15,16].

To calculate the contribution of each product group to the total nutrient and micronutrient supply, the consumption rate for the content of the respective nutrients is multiplied. For further calculation, we determine the weight coefficients of each element of nutrients and elements of their importance in the diet. For this purpose, the weight of the relevant indicators in the EIU assessment methodology was used.

According to her, the weights are: for calories– 0,074; for protein– 0,039; for iron– 0,022. Normalizing, we get: calorie– $\frac{0,074}{0,074+0,038+0,022} = 0,55$; protein– $\frac{0,039}{0,074+0,038+0,022} = 0,29$; iron– $\frac{0,022}{0,074+0,038+0,022} = 0,16$.

The next step is to determine the proportion of each product in total nutrition. Multiplying the proportion of the total of each product by the value of the weight estimate of the nutrient element, we obtain the value of the weight coefficient for groups of products of consumption (table. 4).

**Table 4: Weighting factors for large food groups**

| | **Product group share in total:** | | | **Weighting factor** |
|---|---|---|---|---|
| | **calorie content** | **proteins** | **iron** | |
| Oil | 0,100 | 0,000 | 0,000 | **0,055** |
| Sugar | 0,128 | 0,000 | 0,006 | **0,072** |
| Potato | 0,083 | 0,042 | 0,157 | **0,083** |
| Vegetables | 0,091 | 0,079 | 0,204 | **0,105** |
| Bread | 0,232 | 0,154 | 0,255 | **0,213** |
| Fruits | 0,069 | 0,017 | 0,185 | **0,072** |
| Meat | 0,100 | 0,353 | 0,152 | **0,181** |
| Milk | 0,139 | 0,219 | 0,000 | **0,140** |
| Fish | 0,036 | 0,075 | 0,009 | **0,043** |
| Eggs | 0,023 | 0,060 | 0,032 | **0,035** |
| Weighting element | **0,55** | **0,29** | **0,16** | x |

*Source*: calculated by the authors.

Based on the obtained normalized values of indicators and weights for product groups, we build a table of components and an integral index of food security (Table 5).

**Table 5: Integrated Food Security Index**

| **Year** | **Sufficiency of consumption** | **Economical accessibility** | **Production availability** | | **Integral index** |
|---|---|---|---|---|---|
| | | | **Grain production** | **Food independence** | |
| 2005 | 0,763 | 0,268 | 0,404 | 0,740 | 0,553 |
| 2006 | 0,776 | 0,336 | 0,330 | 0,782 | 0,581 |
| 2007 | 0,784 | 0,372 | 0,228 | 0,738 | 0,575 |
| 2008 | 0,805 | 0,384 | 0,749 | 0,673 | 0,629 |
| 2009 | 0,805 | 0,364 | 0,597 | 0,703 | 0,612 |
| 2010 | 0,814 | 0,368 | 0,454 | 0,748 | 0,611 |
| 2011 | 0,826 | 0,374 | 0,840 | 0,791 | 0,669 |
| 2012 | 0,837 | 0,396 | 0,613 | 0,734 | 0,642 |
| 2013 | 0,847 | 0,398 | 0,984 | 0,757 | 0,692 |
| 2014 | 0,831 | 0,368 | 1,000 | 0,805 | 0,689 |
| 2015 | 0,807 | 0,338 | 1,000 | 0,800 | 0,670 |
| 2016 | 0,800 | 0,432 | 1,000 | 0,839 | 0,679 |
| 2017 | 0,800 | 0,442 | 1,000 | 0,850 | 0,659 |

*Source:* calculated by the authors.

If we consider the general trend in the 1995–2016 time interval, it is characterized by steady growth at a rate of about 0.01 per year, the null hypothesis being rejected at the significant level of 0.01. The largest deviation from the trend was observed during the crisis in the country's economy (2008–2009; 2014–2016). However,

according to 2017, the value of the integrated food security indicator is 0.659, which indicates that its level is satisfactory according to the determined rating scales.

If we analyze the results with the international assessment of food security of Ukraine [17], the latter is significantly lower - 0,552. The difference is due to the fact that the international methodology is largely based on indicators that, at first glance, are not directly related to food security (level of corruption; quality of government; availability of infrastructure facilitating agrarian business; availability of agrarian lending, etc.).

## CONCLUSIONS

It is implemented that in order to ensure the food security of the population of the country at the present stage it is important to increase the economic availability of food and the quality of food, that is, the caloric content of the average daily diet. It is estimated that in 2017, the average household spending on food in relation to total expenditures was 47.9% (in the European countries at the level of 20-25%). The energy value of the diet is 2707 kcal per day, at the limit - 2500 kcal, but this diet is provided by animal products by only 29%. There was a significant gap between actual consumption of rational standards for dairy products - by 47%, meat products - 35%, fruits and berries - 41% and fish products - by 46%.

There is a significant differentiation in the nutrition of the population between higher and lower income quintiles of fruits and berries (100%), meat products (77%), dairy products (63%), fish products (60%). Exceeding the threshold of import in the volume of consumption of the population is characteristic of fishery products, fruit and berry products, vegetable oils of all types - by 75.4, 38.1 and 30.5% respectively.

In general, the value of the calculated integral.

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