

Problems and prospects of food security in Ukraine

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Abstract

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Each country is responsible for life, health and welfare of its citizens. Thus, it has to provide food security. Maintaining its proper state and positive dynamics belongs to management obligations. The aggregate assessment of the food basket including 8 basic products consumed in Ukraine was offered to control a quality of management. Such assessment supports comparing regional inequality in providing food and determines products' priorities for improving food security management. It was found that, firstly, its enhancement needs the planned increase in availability of meat, milk, fruit and berries obtained from the national producers for saturating the domestic market according to the norms of rational nutrition. Secondly, improvements in food security management are connected with the planned rise in food affordability that is affected by the poor and uneven incomes of the regional population. The world target countries in the long run and the target EU-28 countries for the near future were specified for developing insufficient production of meat, milk, fruit and berries and arranging effective food security management. Comparing minimal wages and expenditures on food in Ukraine and European countries made it possible to substantiate goals of strengthening competitiveness of the national economy in favor of reinforcing regional affordability of the balanced dietary. The information base of the research results consisted of FAO data and those of Ukrainian State Statistics Service.

Keywords: food security; management; aggregate assessment; regional inequality; food availability; affordability; target EU-28

Introduction

Food and Agriculture Organization of the United Nations identifies food security as the condition “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO, 2018). Providing food security belongs to the strategic economic objectives in every country. It is management that has to meet this goal being, simultaneously, means, mechanism, and tool of operating resources at both macro- and microeconomic levels. Management facilitates general coordination of activity and makes its planning, arranging, and controlling.

Certainly, integration into oilseeds and cereals segments of the global food security system is a tangible contemporary achievement of Ukrainian agriculture which reflects in saturating a domestic market and increasing export capacities (Vasylieva, 2018). Imperfect food security management caused a growing misbalance between crop production and animal husbandry as well as an irrational food provision of Ukrainian consumers. Poor population's purchasing power hinders improvements of agrarian management and affects aligning regional food security in Ukraine. Thus, under crisis circumstances Ukraine needs a precise identification of problems typical of food security management and a clear substantiation of perspectives of their solving following the best agricultural practices in Europe and the world.

It is supposed that the Earth population will reach 9 bln people by 2050 (Kavallari et al., 2014; Grafton et al., 2015). Thus, the expected accelerating increase in demand for food means that providing food security belongs to the issues of the global scale. The numerous studies of the methods to monitoring food security levels clarified indicators for comparing countries' states and evaluating dynamics of availability, affordability, stability, and utilization of food products (Barrett, 2010; Gibson, 2012; Headey & Ecker, 2013). Namely, they concerned dietary energy supply, consumptions of the proteins retrieved from crop and animal origins, volumes of the national food production, gross domestic product per capita, rail lines density, prevalence of undernourishment, depth of the food deficit, dependence on the food import, share of the irrigated agricultural lands, political stability and absence of terrorism, inequality in food production and supply to the country's population, access to the improved water sources and sanitation facilities, percentages of children under 5 years of age affected by wasting, stunting and underweighting (FAO, 2018).

According to conclusions of Babenko (2013), Godfray and Garnett (2014), Shorikov and Babenko (2014), Katan et al. (2018) providing food security supposes sustainable development of agriculture and innovative revision of management methods and approaches. Khalatur et al. (2018) grounded their tight connection with maintaining financial state security. Recently Beierlein et al. (2013), Popescu and Jean-Vasile (2015); Vdovenko et al. (2018) compiled contemporary foundations of agricultural and agribusiness management. Their applications to supporting a productive component of regional food security in Ukraine were explored by Vasyliieva (2013, 2015). The relevance of the similar developments for the consumer component of regional food security implied a necessity of a separate research considering the perspectives of Ukrainian integration with Europe.

Materials and Methods

The research objective was to develop assessments of food security management in Ukrainian regions and substantiate the major directions of its improvement with regard to EU-28 countries.

An accomplishment of the set purpose reduced to solving the following tasks:

- to offer assessment of conditions and inequality in food security by Ukrainian regions;
- to calculate indicators to availability and affordability of the basic products in the food basket of Ukrainian population;
- to define priorities for improving regional food security management for the remote and near future.

The research results were focused at facilitating controlling, planning, and arranging regional food security management in Ukraine. Indeed, the proposed controlling assessment of regional food baskets involved 8 basic products such as:

1. meat and fish (in kg);
2. milk (in kg);
3. eggs (in pieces);
4. bread products (in kg);
5. sugar (in kg);
6. potatoes (in kg);
7. vegetables (in kg);
8. fruit and berries, including grapes and nuts (in kg).

Let us denote by A_i^j the annual consumption of i^{th} product in j^{th} region, $j = 1, \dots, 24$, B_i – the annual norm of the rational consumption to i^{th} product, $i = 1, \dots, 8$. Undernourishment with meat, milk, eggs, vegetable, fruit and berries as well as overnutrition with bread products, sugar, and potatoes are dangerous for health. That is why the values:

$$C_i^j = -\text{Min}(A_i^j - B_i, 0) / B_i \text{ for } i = 1, 2, 3, 7, 8,$$

$$C_i^j = \text{Max}(A_i^j - B_i, 0) / B_i \text{ for } i = 4, 5, 6, \quad (1)$$

evaluate food security of j^{th} region by i^{th} product, $j = 1, \dots, 24$. It is noteworthy that sorting indicators C_i^j in the ascending order clarifies increasing priorities to improving food security management in the selected region. Then the aggregate assessment of regional food security was offered to be calculated as follows

$$D^j = \sum_{i=1, \dots, 8} C_i^j, \quad j = 1, \dots, 24. \quad (2)$$

It is worth emphasizing that sorting indicators D^j in the ascending order allows performing relative and absolute inter-regional comparisons over effectiveness of food security management. Dynamic analysis of indicators D^j maintains a quality monitoring of food security management in the selected regions. The state and dynamics of inequality between regional food security are depicted by the coefficient of variation, decile and quintile coefficients, calculated over the samples of the aggregate assessments D^j , $j = 1, \dots, 24$.

Statistics shows that in recent years the average calorie content of the daily dietary in Ukraine was above 2700 kcal per capita which is a quite acceptable quantity (State Statistics Service of Ukraine, 2018). Thus it is more important to focus at planning improvements in food security management as for balancing physical availability and economic affordability of the basic products in the food basket. At present Ukrainian agriculture is obliged to saturate demand for food at the domestic market. Indeed, qualitative and safe foreign food products are much more expensive than those ones from the national producers. Thus, import mainly contains food which cannot

be produced under natural and climatic conditions in Ukraine. Regional agricultural specializations and existing infrastructure justify sufficiency to assess food availability at the national level. Namely, let us denote by E_i the annual production of agrarian raw material to i^{th} food product per capita, F_i – the volume of agrarian raw material for providing the annual norm of the rational consumption to i^{th} product, $i = 1, \dots, 8$. Deficit in manufacturing i^{th} product is described as follows:

$$G_i = \text{Max}(F_i - E_i, 0)/F_i, i = 1, \dots, 8. \quad (3)$$

Then the aggregate assessment of the physical availability of the food basket content takes the form:

$$H = \sum_{i=1, \dots, 8} G_i. \quad (4)$$

Its monitoring supports planning food security management which should be enhanced by the products with the positive indicators G_i .

Annual regional income per capita was chosen as the key economic indicator of food affordability. In such a case coefficients of variance characterize dynamics concerning uneven saturation of food baskets of Ukrainian population. Correlation between incomes of regional consumers and assessments of food security management D_i^j , on the one hand, reveals reasons of irrational nutrition. On the other hand, it shows population's awareness about healthy dietary.

It was proposed to perform improvements in arranging food security management in the light of foreign practices. In particular, enhancing physical availability of the basic products in the food basket should be coordinated with the world prime examples of providing food security in the long run. Considering Ukrainian integration with Europe, an increase in production in weak segments of Ukrainian agriculture ought to be associated with the compatible agricultural results in EU-28 countries for the near future. Similarly, the objectives of rising purchasing power in Ukraine, i.e. economic affordability of the balanced dietary, may be established via analyzing minimal wages and expenditures on food in European states.

Results of Calculations

Research information base incorporated indicators of consuming 8 basic products in food baskets (A_i^j) to 24 Ukrainian regions for 2015-2017 (State Statistics Service of Ukraine, 2018). The recommended annual norms of rational nutrition (B_i) were, respectively, 85 kg (in particular, 75 kg of meat and 10 kg of fish), 290 kg of milk, 265 pieces of eggs, 100 kg of bread products, 32 kg of sugar, 128 kg of potatoes, 157 kg of vegetables, 85 kg of fruit and berries per capita. The values of C_i based on

the latest data for 2017 and calculated by the formula (1) are shown in Table 1. The similar calculations were accomplished according to regional food consumptions in 2015 and 2016.

The aggregate assessments of regional food security (D_i^j), calculated via formula (2) for 2015-2016, were collected in Table 2. It also contains the coefficients of variation as well as decile and quintile coefficients which distinguish inequality of food security among Ukrainian regions.

According to the official statistic data about productions of agricultural raw materials for the basic food products (E_i) for 2015-2017, Ukrainian domestic market lacked meat, milk, fruit and berries. They were the ones which determined the aggregate assessment of food availability (H), calculated via formula (4) in Table 3.

Finally, data of Table 4 were applied to evaluate food affordability in Ukraine depending on annual average regional incomes in \$ per capita for 2015-2017 (State Statistics Service of Ukraine, 2018). Planning for food security management should rely on dynamics of the calculated coefficients of variation which reveal inequality in purchasing power of the regional consumers.

Furthermore, let us proceed with analysis of the obtained calculated results concerning controlling and planning for food security management. It will be continued by the grounded recommendations to improve its arrangement following the prime world practices which meet contemporary requirements and challenges the most effective way.

Discussion

As distinct from food security assessments developed by Barrett (2010), Headey and Ecker (2013), Stavtysky and Prokopenko (2014), the assessments presented by the formula (2) address comparing management effectiveness with regard to providing the regional food baskets balanced with the norms of rational nutrition. Data of Table 1 emphasize that all Ukrainian regions have deficiency in consuming meat, milk, fruit and berries, respectively, between 7% in Kyiv and 49% in Luhansk, 6% in Ivano-Frankivsk and 53% in Luhansk, 11% in Kyiv and 55% in Luhansk regions. Besides, there are irrational consumption of sugar within 9 regions, especially, 109% in Chernihiv, 109% in Kherson, and 115% in Cherkasy regions. Similarly, there are overnutrition of potatoes within 17 regions, specifically, 146% in Vinnytsya and Khmelnytskyi, 148% in Zhytomyr and also 149% in Ivano-Frankivsk regions. The aggregate assessments calculated in Table 2 convince in a gradual enhancement of food security

Table 1. The assessments of regional food security by components of the food basket in 2017

Region	Meat	Milk	Eggs	Bread products	Sugar	Potatoes	Vegetables	Fruit and berries
Cherkasy	0.28	0.29	0.00	0.14	0.15	0.24	0.00	0.40
Chernihiv	0.32	0.25	0.00	0.13	0.09	0.37	0.00	0.49
Chernivtsi	0.41	0.17	0.00	0.06	0.00	0.22	0.00	0.27
Dnipropetrovsk	0.11	0.31	0.00	0.00	0.00	0.00	0.00	0.28
Donetsk	0.27	0.44	0.01	0.08	0.00	0.00	0.08	0.51
Ivano-Frankivsk	0.40	0.06	0.06	0.15	0.03	0.49	0.08	0.42
Kharkiv	0.29	0.24	0.00	0.00	0.00	0.00	0.00	0.35
Kherson	0.23	0.30	0.00	0.15	0.09	0.09	0.00	0.43
Khmelnyskiy	0.33	0.23	0.00	0.10	0.00	0.46	0.05	0.30
Kirovohrad	0.24	0.31	0.00	0.06	0.02	0.18	0.00	0.46
Kyiv	0.07	0.29	0.00	0.00	0.00	0.04	0.00	0.11
Luhansk	0.49	0.53	0.20	0.00	0.00	0.00	0.24	0.55
Lviv	0.31	0.26	0.00	0.00	0.00	0.44	0.01	0.43
Mykolayiv	0.31	0.30	0.02	0.02	0.00	0.00	0.00	0.40
Odesa	0.26	0.38	0.00	0.04	0.00	0.00	0.04	0.32
Poltava	0.28	0.28	0.00	0.02	0.00	0.15	0.00	0.39
Rivne	0.36	0.31	0.00	0.00	0.00	0.39	0.05	0.52
Sumy	0.34	0.34	0.00	0.07	0.06	0.39	0.00	0.53
Ternopil	0.35	0.19	0.00	0.00	0.00	0.31	0.00	0.47
Vinnitsya	0.20	0.31	0.00	0.14	0.06	0.46	0.00	0.32
Volyn	0.27	0.28	0.00	0.04	0.00	0.44	0.01	0.50
Zakarpattia	0.36	0.24	0.04	0.14	0.02	0.12	0.01	0.40
Zaporizhya	0.24	0.43	0.00	0.00	0.03	0.00	0.00	0.42
Zhytomyr	0.24	0.29	0.00	0.10	0.00	0.48	0.00	0.42

Source: calculated by the author via formula (1)

in the most of Ukrainian regions for 2016 and 2017. However, increasing coefficients of variation as well as decile and quintile coefficients show a strengthening inequality in regional food consumption. It is explained by more intensive improvements in food security management in the regions with more balanced food baskets.

Dynamics of assessments to food availability from the national producers disclose a slightly decreasing tendency over providing food security in Ukraine. The domestic market had uncovered demands for 27% of meat, 17% of milk, 32% of fruit and berries in 2017 (Table 3). For certain, these sectors of agricultural production should be the main targets for planning improvements in food security management in Ukraine.

A gradual increase in population's average incomes measured in the national currency took place for 2015-2017. Nevertheless, high inflation resulted in a drop of an annual average income per capita by 31% from \$2252.49 in 2014 down to \$1720.4 in 2017. At the same time, there was an increase in the coefficient of variation between regional in-

comes that means a growth of regional inequality with respect to food affordability. However, the coefficient of correlation between regional assessments of food consumption and incomes was on average equal to -0.75. In other words, a financial component explained a balance of food basket only by 56%. Evidently, the planned issues of food security management are not only procuring an increase in purchasing power of population, but also promote and encourage healthy dietary.

At last, let us pass to considering organizational offers for improving food security management in relation to indicators of physical and economic access to the basic products in food basket of Ukrainian consumers. Unlike recent study by Vasylieva (2017), Vasylieva and Velychko (2017) focused at searching inner reserves in meat and milk productions; let us concentrate at the foreign practices of effective agricultural management.

According to conclusions of Kearney (2010), urbanization, trade liberalization, and global marketing create tendency of expanding meat consumption and shrinking milk

Table 2. Dynamics of the aggregate assessments to regional food security in Ukraine for 2015-2017

#	2015		2016		2017	
	Region	Assessment	Region	Assessment	Region	Assessment
1	Kyiv	0.50	Kyiv	0.49	Kyiv	0.51
2	Dnipropetrovsk	0.94	Dnipropetrovsk	0.78	Dnipropetrovsk	0.7
3	Kharkiv	0.97	Kharkiv	0.87	Kharkiv	0.87
4	Odesa	1.11	Odesa	1.12	Mykolayiv	1.04
5	Poltava	1.19	Poltava	1.16	Odesa	1.05
6	Zaporizhya	1.27	Mykolayiv	1.20	Poltava	1.11
7	Chernivtsi	1.30	Zaporizhya	1.22	Zaporizhya	1.12
8	Mykolayiv	1.33	Chernivtsi	1.24	Chernivtsi	1.13
9	Ternopil	1.39	Ternopil	1.28	Kirovohrad	1.26
10	Zakarpattia	1.47	Zakarpattia	1.37	Kherson	1.29
11	Khmelnyskiy	1.49	Kirovohrad	1.42	Ternopil	1.32
12	Donetsk	1.51	Kherson	1.42	Zakarpattia	1.34
13	Kirovohrad	1.52	Donetsk	1.42	Donetsk	1.40
14	Zhytomyr	1.59	Lviv	1.49	Lviv	1.44
15	Lviv	1.60	Khmelnyskiy	1.53	Khmelnyskiy	1.48
16	Kherson	1.62	Vinnytsya	1.56	Vinnytsya	1.49
17	Vinnytsya	1.68	Zhytomyr	1.63	Cherkasy	1.50
18	Rivne	1.72	Chernihiv	1.63	Zhytomyr	1.53
19	Cherkasy	1.74	Rivne	1.68	Volyn	1.54
20	Sumy	1.75	Cherkasy	1.69	Rivne	1.63
21	Chernihiv	1.75	Sumy	1.76	Chernihiv	1.65
22	Volyn	1.82	Volyn	1.76	Ivano-Frankivsk	1.70
23	Ivano-Frankivsk	1.90	Ivano-Frankivsk	1.8	Sumy	1.73
24	Luhansk	2.02	Luhansk	2.00	Luhansk	2.01
	Variation, %	23.74	Variation, %	25.19	Variation, %	25.77
	Ratio 10:10	2.55	Ratio 10:10	2.78	Ratio 10:10	2.82
	Ratio 20:20	1.99	Ratio 20:20	2.07	Ratio 20:20	2.11

Source: calculated by the author via formula (2)

Table 3. Dynamics of assessments to availability of basic food products in Ukraine for 2015-2017

Year	Meat	Milk	Eggs	Grain crops	Sugar beet	Potatoes	Vegetables	Fruit and berries	Aggregate assessments
2015	0.28	0.15	0.00	0.00	0.00	0.00	0.00	0.31	0.73
2016	0.27	0.16	0.00	0.00	0.00	0.00	0.00	0.34	0.78
2017	0.27	0.17	0.00	0.00	0.00	0.00	0.00	0.32	0.76

Source: calculated by the author via formulae (3) and (4)

production in the developed countries. The largest shares of consumption in meat sector have beef, pork, and poultry (mostly chicken meat). Strategic goals for developing management of Ukrainian beef production are assigned by the world leaders such as New Zealand, Ireland, Australia, and Argentina where annual beef productions per capita amount to 144.4, 124.5, 97.6, and 60.3 kg. The ideal models for improving pork production in Ukraine are given by the farmers of Denmark, Belgium, the Netherlands, and Spain who obtain 276.5, 93.4, 85.5, and 85.2 kg of pork per capita

per annum. Strategic prospects for developing management in Ukrainian poultry production are outlined by Brazil, the Netherlands, and the USA where annual broiler productions reach 66.9, 61.1, and 58.1 kg per capita. The perfect models for arranging effective dairy production in Ukraine are demonstrated by the farmers of New Zealand, Ireland, Denmark, and the Netherlands who maintain 4649.7, 1449.7, 937.5, and 843.2 kg of milk per capita per annum (FAO, 2018).

Owing to Ukrainian integration with Europe, resembling natural and climatic conditions, similar agricultural and di-

Table 4. Dynamics of annual population's incomes in Ukrainian regions for 2015-2017

#	2015		2016		2017	
	Region	Income, \$	Region	Income, \$	Region	Income, \$
1	Kyiv	2529.06	Kyiv	2590.62	Kyiv	3064.38
2	Dnipropetrovsk	1792.22	Dnipropetrovsk	1736.43	Dnipropetrovsk	2038.17
3	Zaporizhyya	1661.05	Zaporizhyya	1701.04	Zaporizhyya	1982.21
4	Odesa	1482.81	Odesa	1531.59	Odesa	1822.32
5	Kharkiv	1474.26	Kharkiv	1494.97	Poltava	1769.75
6	Poltava	1465.04	Poltava	1484.87	Kharkiv	1759.01
7	Sumy	1399.83	Sumy	1412.31	Sumy	1666.29
8	Vynnytsya	1357.01	Lviv	1382.58	Lviv	1661.44
9	Lviv	1352.66	Mykolayiv	1368.71	Mykolayiv	1648.56
10	Mykolayiv	1343.50	Vynnytsya	1367.18	Vynnytsya	1643.80
11	Khmelnyskiy	1341.20	Khmelnyskiy	1346.16	Khmelnyskiy	1592.09
12	Chernihiv	1302.22	Chernihiv	1300.64	Zhytomyr	1570.92
13	Kherson	1276.56	Zhytomyr	1290.77	Chernihiv	1553.41
14	Zhytomyr	1272.96	Kherson	1290.33	Kirovohrad	1536.74
15	Kirovohrad	1253.78	Kirovohrad	1281.59	Cherkasy	1525.9
16	Cherkasy	1234.88	Cherkasy	1265.25	Kherson	1512.88
17	Rivne	1222.88	Ivano-Frankivsk	1241.44	Ivano-Frankivsk	1478.40
18	Ivano-Frankivsk	1215.21	Rivne	1224.85	Rivne	1461.72
19	Volyn	1143.77	Volyn	1174.66	Volyn	1431.15
20	Ternopil	1100.74	Chernivtsi	1110.01	Chernivtsi	1330.95
21	Chernivtsi	1095.65	Ternopil	1103.51	Ternopil	1323.73
22	Zakarpattia	1028.24	Zakarpattia	1051.12	Zakarpattia	1251.19
23	Donetsk	977.40	Donetsk	819.06	Donetsk	937.88
24	Luhansk	715.82	Luhansk	539.83	Luhansk	619.11
	Variation, %	25.24	Variation, %	27.49	Variation, %	27.34

Source: compiled by the author, State Statistics Service of Ukraine, 2018

etary traditions, the nearest perspectives for improving management of meat and milk productions can be associated with EU-28 countries. At present the structure of meat production in Ukraine consists of 16.4% of beef, 32.7% of pork and 50.9% of poultry. Analysis of the official EU statistics substantiates that the closest profile to the mentioned one has Lithuania where the structural shares of beef, pork and poultry are, respectively, 19.5%, 33.3% and 47.2%. Meat production per capita per annum in Lithuania reaches 76.5 kg while the corresponding Ukrainian indicator is only 53.7 kg. Thus, the national producers will gain from implementing methods applied to food security management in Lithuania. The nearest promising European profile of food security in meat and milk sectors of Ukrainian agriculture was created in the form of linear diagram (Fig. 1). Its target countries by annual per capita productions of beef, pork, poultry, and milk were Croatia, Latvia, Portugal, and Czech Republic. It is noteworthy that their effective management was caused by keeping highly productive breeds of livestock and poultry (Vasylieva, 2017).

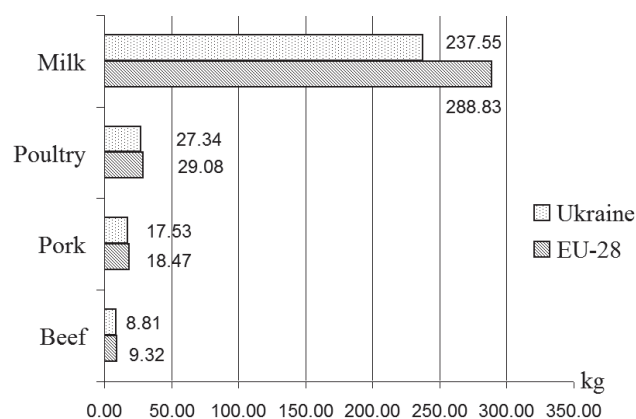


Fig. 1. European profile of food security in meat and milk sectors of Ukraine

Source: compiled by the author, FAO, 2018

Fruit and berries in the dietary of consumers in the developed countries are an important source of vitamins, minerals, useful fructose and glucose (Kearney, 2010). Natural and climatic conditions in Ukraine allow growing a wide variety of such crops, including apples, pears, plums, cherries, sour cherries, apricots, strawberries, raspberries, currants, grapes, and walnuts. Ukraine imports mostly tropical, citrus, and exotic fruit and nuts, in particular, about 4 kg of bananas, 3.5 kg of oranges, mandarins, and lemons, 1.5 kg of peaches and nectarines. In total they amount to approximately 10 kg for \$14.5 per capita per annum (FAO, 2018). However, even together with annual productions of 14 kg of melons and watermelons per capita as well as the described import, Ukrainian farmers don't provide the domestic market with the recommended annual consumption of 85 kg of fruit and berries.

The strategic goals to developing management of growing apples, raspberries, and currants are set by the world leader Poland which procures 94.3, 3.4, and 4.4 kg of these products per capita per annum. The dominant producers of pears, plums, strawberries, and sour cherries are Belgium, Romania, Spain, and Hungary with the corresponding annual indicators of 29.2, 25.9, 7.9 and 7 kg per capita. The strategic prospects to developing management of growing apricots and cherries are depicted by Turkey which procures 9.2 and 7.5 kg of these products per capita per annum. The prevailing producers of grapes and walnuts are Italy and Slovenia with the corresponding annual indicators of 138 and 1.4 kg per capita (FAO, 2018).

Due to Ukrainian integration with Europe, resembling natural and climatic conditions, similar agricultural and dietary traditions, as previously, the nearest perspectives for improving management of fruit and berries productions can be associated with EU-28 countries. The nearest promising European profile of food security in fruit and berries segment of Ukrainian agriculture was created in the form of linear diagram (Fig. 2). Its target countries by annual per capita productions of apples, pears, plums, cherries, sour cherries, apricots, strawberries, raspberries, currants, grapes, and walnuts were France, Greece, Spain, Italy, Poland, Hungary, the United Kingdom, Bulgaria, Denmark, Germany, and Slovenia. It is noteworthy that their effective management was caused by proper storage and sales logistics applied to fruit and berry products (Velychko, 2014).

Arranging food security management concerning an increase in economic affordability of the balanced food basket should be focused at rising incomes of Ukrainian population. Again it is appropriate to consider EU-28 countries and the USA as the strongest donor in supporting global food security. Table 5 comprises their indicators of food affordability in 2017.

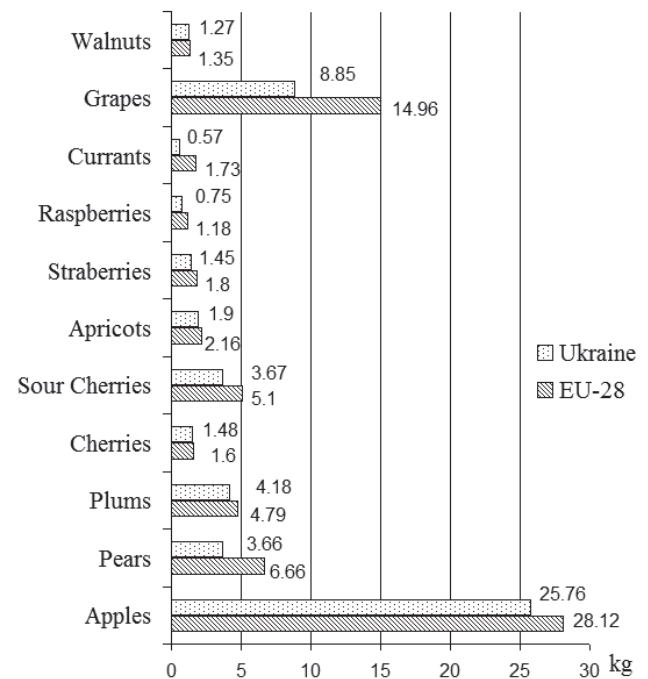


Fig. 2. European profile of food security in fruit and berries sector of Ukraine

Source: compiled by the author, FAO, 2018

A review of data in Table 5 revealed that the minimal wage in Ukraine is 2.2-16.1 times less than those ones in the USA and EU-28 countries. The share of expenditures on food in Ukraine exceeds the similar indicators in the USA and EU-28 countries by 8.4-31.7 p.p. that affects affordability of the rational dietary to Ukrainian population. Nevertheless, in compliance with general trends of pricing in Europe (Davis & Geiger, 2017), absolute expenditures on food in Ukraine are lower from 1.6 times than in Bulgaria to 5.2 times than in Denmark and Sweden. One more promising signal is incomes' evaluations in the International dollars of Geary-Khamis (Int\$). They assess Ukrainian population to have lower purchasing power merely by 13 and 15% than those ones in Bulgaria and Lithuania. To cover these gaps it is sufficient to increase the minimal annual wage in Ukraine by \$218.4 or \$252. In reality it could be done only after reinforcing competitiveness of Ukrainian economy which was ranked 81st out of 137 countries evaluated by the World Economic Forum. In comparison, the chosen target countries, Bulgaria and Lithuania took 49th and 41st positions. (The Global Competitiveness Report, 2017). To achieve their level Ukraine must develop infrastructure, especially road quality (ranked 130th), overcome inflation (ranked 129th),

Table 5. Economic indicators of food affordability

Country	Minimal wages, \$ per year	Minimal wages, Int\$ per year	Average share of expenditures on food, %	Average annual expenditures on food, \$ per capita
Ukraine	1680	7559	38.0	539
the USA	15080	15080	6.3	2408
Austria	15468	18871	9.6	2273
Belgium	20317	20479	13.4	2706
Bulgaria	3670	8514	18.7	876
Croatia	6235	10319	23.9	2164
Cyprus	6840	8960	no data	
Czech Republic	6512	10662	17.2	1510
Denmark	not set		11.3	2821
Estonia	6519	9479	20.5	1952
Finland	not set		12.2	2757
France	20272	20669	13.4	2727
Germany	20989	22430	10.6	2246
Greece	9250	12066	16.5	2245
Hungary	6034	11085	18.3	1196
Ireland	21835	19367	18.3	1973
Italy	not set		14.3	2664
Latvia	5813	9053	18.5	1617
Lithuania	4995	8687	23.0	2215
Luxemburg	27090	23791	no data	
Malta	10530	14152	no data	
the Netherlands	21348	21276	11.8	2341
Poland	7937	15957	16.5	1181
Portugal	7847	10235	17.1	2311
Romania	5630	12063	29.6	1712
Slovakia	6449	10400	17.9	1581
Slovenia	10890	14417	15.4	1821
Spain	11615	13922	13.6	2138
Sweden	not set		12.6	2820
the United Kingdom	21813	21268	8.1	1991

Source: compiled by the author, Economic Research Service, 2018; Minimum Wage Rates by Country, 2018

improve access to financial services and new technologies (ranked 120th and 107th), increase training quality and trust to professional management (ranked 88th and 123rd). In the long run, further management improvements should bring Ukraine closer to the countries with the strongest food security such as the USA, Netherlands and Germany since their competitiveness was evaluated as 2nd, 4th and 5th in the world (The Global Competitiveness Report, 2017).

Conclusion

Analysis of state and perspectives of enhancing food security is the capstone to improving health and welfare of the country's population. Aligning regional inequality in balancing food baskets is the key social and economic management issues.

The offered aggregate assessments of regional food consumption, found priorities of removing deficits in productions of meat, milk, fruit and berries, grounded target profiles to improve management following EU-28 countries are valuable means to support sustainable development of Ukrainian agriculture.

The found dependence between contents of food baskets and levels of regional incomes, uneven food affordability to regional consumers, clarified goals of increasing purchasing power of Ukrainian population via reinforcing the national economy following EU-28 countries are useful when planning social and economic agenda of developing regions and the entire country.

Finally, it seems logical to direct further investigations in question at implementing foreign practices of effective management in Ukrainian food security.

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