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## FOOD SECURITY AND THE MARKET FOR CROP PRODUCTION IN THE CHERNIVTSI REGION

**Background.** *The prerequisites for the study are methodological developments of the scientists of the Institute of Agrarian Economics and attempts to implement them at the regional level. They are based on the assessment of the food market capacity, taking into account the regional agricultural specialisation of the production of certain agricultural products, the purchasing power of the population and the demand for various types of agricultural products. Simultaneously, this implies taking into account, in addition to intra-regional production and demand, inter-regional product movement and the formation of expert potential. The article considers the concept of the food market and the features of its formation. The minimum and rational consumption norms are indicated. The object of the study is the food market of the regional region from the position of filling it with plant products.*

**Methods.** *The research methodology consists of assessing the actual volume of the capacity of the intra-regional consumer food market and agricultural product markets, taking into account the consumption of food products at the level of minimum and rational nutritional standards of the population of the regional region. To achieve the set goal, a number of scientific methods were used. Namely, horological; mathematical modelling; economic; balance and normative; abstraction and generalisation; statistical method were used.*

**Results.** *The current state of plant production development is analyzed and an assessment of the formation of supply on the food market with plant products in the Chernivtsi region is carried out. In the agriculture of the Chernivtsi region, the trends of dominance of plant production over livestock farming in the structure of agricultural production, growth in areas and gross yields of technical and fruit crops continue. Reduction in the number of cattle and the general dominance of agricultural formations in crop production (except for potato, vegetable, etc.) and households in livestock (except for poultry). When forming regional food markets, it is necessary to take into account such an aspect as the production of agricultural products by households for self-sufficiency rather than for sale.*

**Conclusions.** *The regional food market for plant products in the Chernivtsi region can be considered quite balanced, characterized by potential niches for the production of vegetables, potatoes, grain products and export-oriented fruit growing.*

*When forming regional food markets, it is necessary to take into account such an aspect as the production of agricultural products by households for the most part for self-sufficiency, and not for sale. There is also a certain share of products that are outside the scope of commodity-money relations.*

*The possibilities of selling agricultural products by individual households have a significant number of infrastructure problems (place of sale, possibilities for storing products, packaging and sorting, etc.). All this provides non-competitive advantages to large agricultural enterprises for the formation of inflated prices.*

**Keywords:** *food market, food security, minimum consumption rate, rational consumption rate, agricultural production, crop production, rural population, urban population.*

### Background

The prerequisites for the study are methodological developments of the scientists of the Institute of Agrarian Economics and attempts to implement them at the regional level. They are based on the assessment of the food market capacity, taking into account the regional agricultural specialisation of the production of certain agricultural products, the purchasing power of the population and the demand for various types of agricultural products. Simultaneously, this implies taking into account, in addition to intra-regional production and demand, inter-regional product movement and the formation of expert potential.

**Relevance of the Research.** The current problems of agricultural production in Ukraine are atypical for such a powerful agrarian state, as they concern the population's ability to provide itself with food in volumes deemed optimal. This directly pertains to the field of food security, which ensures a person's constant physical, social, and economic access to sufficient, safe, and nutritious food that meets their needs and dietary preferences for an active and healthy life (Food and Agriculture ..., 2002).

Accordingly, the key concepts are accessibility, availability, sustainability, and utilisation, which mostly depend on the required agricultural production volumes, trade policies, the

development of trade relations, and cooperation in food markets. Under martial law, it is essential to focus on agricultural production, as the logistics of agricultural trade have been significantly disrupted. It is advisable to assess the capacity of the regional consumer market for agricultural crop production and food products within the Chernivtsi region to justify necessary directions for trade policy and cooperation.

### *The analysis of the latest research and publications.*

The basis of food security lies in the agricultural and food market understood as a system of territorial clusters that interconnect agricultural production, the food industry, food trade, public catering, and market infrastructure. Current research on Ukraine's food market, carried out by the National Scientific Center "Institute of Agrarian Economics," focuses on determining market capacity, substantiating minimum and optimal consumption standards for various products, analyzing trends in consumption and purchasing power, justifying the composition of the consumer basket, and evaluating the volume of agricultural products that exist outside the framework of monetary and trade relations.

**The aim of the study** is to analyze the current state of crop production and assess its contribution to the food market in the Chernivtsi region.

### Methods

To achieve the set goal, a number of scientific methods were used. Namely, horological (for perception of the peculiarities of growing agricultural products); mathematical modelling (for calculation of the normative capacity of the domestic food market); economic (for estimation of the normative capacity of the food market); balance and normative (for comparison of agricultural production volumes with scientifically grounded norms of the food market capacity); abstraction and generalisation (provided search for stable typical characteristics of the food market formation); statistical method (for collecting the necessary indicators) were used.

**The research methodology** involves evaluating the actual capacity of the internal regional consumer food market and agricultural product markets, taking into account the consumption of food products based on minimum and rational dietary norms for the regional population.

The food market serves as the environment for the distribution of a portion of the societal product intended for personal consumption in exchange for monetary income. This process embodies economic relations concerning the production, exchange, and consumption of food products. The primary components of this market are the segments for specific food items such as meat, milk and dairy products, grains, sugar, fruits, vegetables, potatoes, and oils.

The food market is also vulnerable from social and economic perspectives, as its functioning is closely linked to, on one hand, the population's standard of living and purchasing power and, on the other, the volumes of agricultural production and the cost of its production.

The assessment of the normative capacity of the internal food market is determined as the sum of the products of the consumption norm of a specific type of food by the population and the average consumer price for that type of food.

The calculation is performed for the entire population using the formula.

$$\text{ЄРП} = \sum_{n=1}^c (\text{Hc}_n \times \text{CЦ}_n) \times \text{H}$$

Where: **ЄРП** is the capacity of the internal food market, in UAH; **Hc<sub>n</sub>** is the consumption norm of the *n*-th type of food per person, in kilograms; **CЦ<sub>n</sub>** is the consumer price of the *n*-th type of food, in UAH; **H** is the average annual population size, in individuals; **n** is the type of food resources that contribute to the capacity of the internal food market; **c** is the number of types of food resources contributing to the capacity of the internal food market.

To calculate the normative capacity of the food market, consumer prices for food products (regional average prices) are used. Given the seasonal nature of the consumption of certain vegetables and fruits, during the winter-spring period, the prices of processed products are considered for calculations within the vegetable group. However, consumption norms for vegetable and fruit groups remain unchanged.

When assessing the capacity of the regional food market, it is essential to consider the level of urbanization and the demand for specific products based on minimum and rational consumption norms, excluding products outside monetary and trade relations.

Resolution of the Cabinet of Ministers of Ukraine No. 656 of April 14, 2000 "On approval of food sets, sets of non-food products and sets of services for major social and demographic groups of the population" specifies the nutritional composition of average daily food sets for the population (see Table 1)

**Table 1**

**The calorie content of average daily food rations for the population in Ukraine, which are provided for by the subsistence minimum (Shpychak et al., 2013)**

Indicator	For children aged					For working citizens	For the disabled citizens
	0–3	4–6	7–10	11–13	14–17		
Proteins, g	63	65	78	87	96	87.1	58.6
Of these, animal proteins	33	37	39	44	48	–	–
Fats, g	53	58	70	77	84	98.4	65.7
Of these oils	6	10	16	18	20	–	–
Carbohydrates, g	212	305	365	408	446	388.1	295.8
Energy value, kcal	1540	2000	2400	2675	2925	2790.8	2008.9

The most suitable methodology for assessing the food market's capacity is calculating based on minimum and rational consumption norms for essential food items included in the consumer basket. Accordingly, determining consumption norms requires considering the population's age structure. In the Chernivtsi region, the age structure is as follows: 6.3 % are children aged 0–6 years, 11 % are children aged 6–18 years, 60.7 % are working-age individuals, and 22 % are older adults. Based on this age structure, the minimum annual consumption norms per person, according to the consumer basket, are as follows: bread and bakery products – 93.8 kg; potatoes – 99 kg; vegetables – 105 kg; fruits – 66 kg; milk and dairy products – 330 kg; meat (all types) – 50 kg; eggs – 220 units; fish and fish products – 12 kg.

The rational consumption norms are higher: bread and bakery products – 102 kg; meat and meat products – 83 kg; milk and dairy products – 380 kg; eggs – 290 units; fish and fish products – 20 kg; potatoes – 120 kg; vegetables and melons – 160 kg, fruits and berries – 90 kg.

### Results

In the agriculture of Chernivtsi region, over the past 5 years, the trends of dominance of crop production over livestock production in the structure of agricultural production, growth in areas and gross yields of technical and fruit crops, a decrease in the number of cattle, and the general dominance of agricultural formations in crop production (except potato growing, vegetable growing, etc.) and households in livestock production (except for poultry farming) have generally continued.

In 2023, approximately 310,000 hectares were allocated to agricultural producers in the Chernivtsi region, of which 36 % were managed by enterprises and 64 % by households. Compared to the previous two years, an increase in cultivated areas (up to 1,500 hectares) was observed, primarily due to growth in household farming (possibly to enhance food self-sufficiency). It is worth noting that this figure is 10 % lower compared to 1990. In the structure of cultivated areas, compared to the 1990s, there is a continued trend of increasing the share of technical crops (from 11 to 30%), potatoes and vegetable-melon crops (from 9 to 16 %), and grain crops (from 38 to 40 %). Meanwhile, the share of forage crops has decreased significantly from 42 to 14 % (Ardelyan, & Koropotynska, 2023).

In 2023, 121 thousand hectares were allocated for grain crops in the Chernivtsi region, which is 3% more than in 2022. The increase in sown areas occurs both in

agricultural formations and in households. The volume of production of grains and legumes (together with corn) amounted to 764.2 thousand tons, which is 19% more than in 2022, with an average yield of 63 centners/hectare. In the structure of grain production, the largest gross harvests are corn (476.6 thousand tons), wheat (172.9 thousand tons) and barley (100.1 thousand tons). Buckwheat cultivation is significant, for which 3526 hectares were allocated, and the harvest was 68130 quintals (99 % produced in agricultural enterprises). Of the legume crops, the area under beans is insignificant – 945 hectares and peas – 174 hectares, of which 16,778 tons (of which 99 % by households) and 3,606 tons (of which 95 % by households) were harvested, respectively. The total need for bread products, according to the recommended norms, does not exceed 70 thousand tons. About 50 large and a significant number of small enterprises are engaged in bread production in the region (see Table 2).

Table 2

These figures reflect actual consumption and recommended norms for food consumption in Ukraine  
(Shpychak et al., 2013; Verner, 2023)

Main products	Recommended consumption rate	Actual consumption of basic foods, kg/person							Difference between actual consumption and recommended consumption rate, kg/person						
		1990	1995	2000	2005	2010	2013	2022	1990	1995	2000	2005	2010	2013	2022
Meat and meat products	83	68	39	33	39	52	56.1	53	-15	-44	-50	-44	-31	-32.9	-30
Milk and dairy products	380	373	245	199	226	205	2209	202	-7	-135	-181	-154	-175	-159.1	-158
Eggs, units	290	272	171	166	238	290	309	272	-18	-119	-124	-52	0	+19	-18
Fish and fish products	20	18	4	8	14	37	14.6	13.2	-2	-16	-12	-6	+17	-5.4	-6.8
Bread and bakery products	101	141	124	125	124	111	1084	93	+40	+23	+24	+23	+10	+6.6	-2.6
Potatoes	124	131	124	135	136	129	135.4	132	+7	0	+11	+12	+5	+11.4	+12
Vegetables and melons	161	103	97	102	120	144	163.3	166	-58	-64	-59	-41	-17	+2.3	+5
Fruits and berries	90	47	33	29	37	14	56.3	59	-43	-57	-61	-53	-76	-33.7	-31
Sugar	38	50	32	37	38	37	37.1	29	+12	-6	-1	0	+1	-0.9	-9

The area of industrial crop in the Chernivtsi region is growing. For example, in 1990, 0.5 thousand hectares and 30 thousand hectares were allocated for sunflower crops, in 2010 – 6.2 and 4.2 thousand hectares, respectively. Since 2016, sugar beet cultivation has been discontinued (due to the closure of sugar factories in Chernivtsi and neighbouring regions), and the area of sunflower crops is increasing from 10.5 thousand hectares to 22 thousand hectares (in 2021) and somewhat less in 2023 – 20.3 thousand hectares. In enterprises, the area of sunflower crops decreased by 16 %, and in households by 4 %. In 2023, The sunflower seed harvest was 65.5 thousand tons (30.5 % more than in 2022). The largest areas of industrial crops are occupied by soybean crops – 59.4 thousand hectares (increasing by 2.5 % each year). Gross soybean harvests are also growing – 141.2 thousand tons (23 % more than the previous year).

Rapeseed was sown, 22 % more than in 2021, on 14.2 thousand hectares. At the same time, all crops of this crop are concentrated in agricultural formations. The production of winter and spring rapeseed in 2023 was 40.8 thousand tons (24.5 % more than in 2022). Industrial crops are not used as food products but are the basis to produce oil. There are one small and several small oil producers operating in the Chernivtsi region.

In 2023, 48.2 thousand hectares were allocated for potatoes and vegetable and bell pepper crops in the Chernivtsi region (1 thousand hectares less than in 2022). The main producers of these types of crop production are households, which account for 99.7 % of the total regional sowing. Given this, the areas allocated for potatoes have practically not changed over 20–25 years (32–35 thousand hectares), similarly for vegetable crops (11–13 thousand

hectares). The dynamics of gross harvests during this period fluctuated mainly depending on the yield and amounted to about 669 thousand tons of potatoes and 247 thousand tons of vegetables. These gross harvests are largely the basis for household food self-sufficiency, as a result of which a niche for export products is created in the food market. Of the vegetable crops grown in 2023, head cabbage (328,357 tons, of which 99 % were in private households), cauliflower and broccoli (7,483 tons, 99 % – private households), dill in open ground (4,744 tons, 100 % – private households), parsley in open ground (8,224 tons, 100 % – private households), sorrel in open ground (322 tons, 100 % – private households), sweet peppers (79,108 tons, 99 % – households), cucumbers and gherkins (193,602 tons, 88 % – households), eggplants (23,930 tons, 100 % – households), tomatoes (529,707 tons, 100 % – households), pumpkins (84,028 tons, 98 % – households), zucchini (140,717 tons, 99 % – households), garlic (87,088 tons, 100 % – households), onions (276,098 tons, 100 % – households), carrots (242,631 tons, 99 % – households), beets (337,659 tons, 99 % – households), radishes (1,134 tons, 100 % – households). Of the melon crops, watermelons were grown (72,007 tons, 99 % – households of the population), melons (20,915 tons, 100 % – households of the population) (Ardelyan, Koropotynska, 2023). The volume of potato production in the region by a third, and vegetables by two-thirds, provide the rational and almost completely minimal needs of the population.

In the Chernivtsi region, 263 thousand tons of fruit and berry crops were harvested in 2023 (6 thousand tons more than in 2022), with 76.9 % of the total volume obtained by individual households. The productivity of orchards and berry orchards was about 170 centners/ha, in agricultural farms – 200 centners/ha, in households – over 160 centners/ha. It should be noted that the area of fruit and berry crops in 1990 was – 26.0 thousand hectares, in 2000 – 17.6 thousand hectares, in 2010 – 15.1 thousand hectares, and in 2020 as now – 16.8 thousand hectares. At the same time, the production of fruit and berry crops increased, 1990 – 870 thousand tons, 2000 – 526 thousand tons, 2010 – 972 thousand tons, 2020 – 2169 thousand tons and now 2600 thousand tons, which indicates a significant intensification of their production. Chernivtsi region occupies a leading position in Ukraine in terms of the production of fruits and berries. Horticultural and berry products are sold in the region, transported to other regions of Ukraine and exported abroad. The total production of fruits in the region is three times higher than the recommended consumption rates and forms export potential. When forming regional food markets, it is necessary to take into account such an aspect as the production of agricultural products by households for self-sufficiency, rather than for sale. At the same time, the possibilities of their sale of agricultural products have a significant number of infrastructure problems (place of sale, possibilities of storage of products, packaging and sorting, etc.). All this provides non-competitive advantages to agricultural enterprises (especially agro holdings) for the formation of inflated prices, especially during the "off-season" period, when they remain dominant in the food market. It is also necessary to take into account that there is a certain share of products that are outside the boundaries of commodity-money relations.

#### Discussion and conclusions

The food market is an environment for the sale of part of the social product aimed at personal consumption in

exchange for the monetary income of the population, in the process of which economic relations regarding the production, exchange and consumption of food products are implemented. The main components of such a market are the markets of individual food products – meat, milk and dairy products, grain, sugar, fruits, vegetables, potatoes, oil, etc.

It is advisable to assess the capacity of the food market based on indicators of minimum and rational norms of consumption of basic food products included in the consumer basket/

In the agriculture of the Chernivtsi region, the trends of the dominance of crop production over livestock production in the structure of agricultural production, growth in areas and gross yields of technical and fruit crops, reduction in the number of cattle and, in general, the dominance of agricultural formations in crop production (except potato growing, vegetable growing, etc.) and households in livestock farming (except poultry farming) continue/

The regional food market for plant products in the Chernivtsi region can be considered quite balanced, characterized by potential niches for the production of vegetables, potatoes, grain products and export-oriented fruit growing.

When forming regional food markets, it is necessary to take into account such an aspect as the production of agricultural products by households for the most part for self-sufficiency, and not for sale. There is also a certain share of products that are outside the scope of commodity-money relations.

The possibilities of selling agricultural products by individual households have a significant number of infrastructure problems (place of sale, possibilities for storing products, packaging and sorting, etc.). All this provides non-competitive advantages to large agricultural enterprises for the formation of inflated prices.

**Authors' contributions:** Myroslav Zaiachuk – conceptualization, methodology, writing (review and editing); Rodika Timish – formal analysis, data validation, writing (original draft).

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## ПРОДОВОЛЬЧА БЕЗПЕКА ТА РИНОК ПРОДОВОЛЬСТВА ПРОДУКЦІЇ РОСЛИННИЦТВА ЧЕРНІВЕЦЬКОЇ ОБЛАСТІ

**Вступ.** Передумовами дослідження є методичні розробки науковців Інституту аграрної економіки та спроби їх впровадження на регіональному рівні. Вони ґрунтуються на оцінці ємності продовольчого ринку з урахуванням регіональної сільськогосподарської спеціалізації виробництва окремих видів сільськогосподарської продукції, купівельної спроможності населення та попиту на різні види сільськогосподарської продукції. Водночас це передбачає врахування, окрім внутрішньорегіонального виробництва та попиту, міжрегіонального руху продукції та формування експертного потенціалу. У статті розглянуто поняття продовольчого ринку й особливості його формування. Зазначено мінімальні та раціональні норми споживання. Об'єктом дослідження є продовольчий ринок регіонального регіону з позиції наповнення його продукцією рослинного походження.

**Методи.** Методологія дослідження полягає в оцінці фактичного обсягу ємності внутрішньорегіонального споживчого продовольчого ринку та ринків сільськогосподарської продукції з урахуванням споживання продуктів харчування на рівні мінімальних і раціональних норм харчування населення регіонального регіону. Для досягнення поставленої мети було використано низку наукових методів, а саме монографічний; математичного моделювання; економічний; балансовий і нормативний; абстрагування та узагальнення; статистичний метод.

**Результати.** Проаналізовано сучасний стан розвитку рослинництва та здійснено оцінку формування пропозиції на продовольчому ринку продукції рослинного походження в Чернівецькій області. У сільському господарстві Чернівецької області зберігаються тенденції домінування рослинництва над тваринництвом у структурі сільськогосподарського виробництва, зростання площ та валових зборів технічних і плодівих культур. Скорочення поголів'я великої рогатої худоби та загальне домінування агроформувань у виробництві продукції рослинництва (крім картоплі, овочівництва тощо) та господарств населення у тваринництві (крім птахівництва). При формуванні регіональних продовольчих ринків необхідно враховувати такий аспект, як виробництво сільськогосподарської продукції господарствами населення для самозабезпечення, а не на продаж.

**Висновки.** Регіональний продовольчий ринок продукції рослинного походження в Чернівецькій області можна вважати доволі збалансованим, що характеризується потенційними нішами для виробництва овочів, картоплі, зернової продукції та експортоорієнтованого садівництва.

При формуванні регіональних продовольчих ринків необхідно враховувати такий аспект, як виробництво сільськогосподарської продукції господарствами населення здебільшого для самозабезпечення, а не на продаж. Існує також певна частка продукції, яка знаходиться поза сферою товарно-грошових відносин.

Можливості реалізації сільськогосподарської продукції особистими селянськими господарствами мають значну кількість інфраструктурних проблем (місце реалізації, можливості для зберігання продукції, пакування та сортування тощо). Усе це надає неконкурентні переваги великим сільськогосподарським підприємствам для формування завищених цін.

**Ключові слова:** ринок продовольства, продовольча безпека, мінімальна норма споживання, раціональна норма споживання, сільськогосподарське виробництво, рослинництво, сільське населення, міське населення.

Автори заявляють про відсутність конфлікту інтересів. Спонсори не брали участі в розробленні дослідження; у зборі, аналізі чи інтерпретації даних; у написанні рукопису; в рішенні про публікацію результатів.

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