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ESSENTIAL CHALLENGES OF FRUIT CONSUMPTION¹

Abstract. *Fruit is important component of a healthy diet, and their sufficient daily consumption could provide well-being of mankind: efficient work, proper leisure and mental rest.*

Study objectives:

to investigate fruit healthfulness as a human reliable protection against senilism and pathogenic pathways;

to compare the actual and recommended fruit consumption rates;

to identify dependence between fruit consumption and morbidity level via multi-correlation relations;

to evaluate internal and external fruit consumption barriers;

to make prediction of fruit consumption rates till 2015 year;

to allocate substantial guidelines for increasing of fruit consumption rate.

There is consistent evidence, primarily from medicine, that the substantial reason of human pathogenic processes, particularly cardio-vascular conditions and oncological diseases, is excessive oxygen radicals' accumulation. The reliable protection of its disruptive effect is provided by antioxidants complex that is high in fruit.

The situation is an appropriate for state food safety and human health maintenance when actual fruit consumption is according to optimal. We find out that EU adherence to the WHO norms would involve a significant decrease in the fruit intake (25% above recommended norm). Most Ukrainians still do not consume even half of recommended fruit consumption rate (90 kg p.a.). The results of studies indicate reducing general morbidity level on 6,6% (particularly cardio-vascular conditions on 40,5%) carried out by increasing of fruit intake in 20 kg p.a. in Ukraine.

The internal and external intake barriers were revealed by using John and Ziebland methodic and the neuron network of architecture "8-4-1" multilayered perceptron. The increasing fruit consumption looking ahead to 2015 was predicted in the accordance with the following guidelines: the optimization of fruit production; government support spreading for horticulture industry, conceptual approaches to building the strategy for horticulture market development.

Problem statement

Important precondition of powerful national economy forming is guarantying of government food welfare, which is providing by creation and increasing volume of competitive agroindustrial production. The result of these changes, which is strengthening by using intensive technologies, is forming of the socially oriented food market with the saturated important segment of horticulture products.

Essential investigations and publications analysis

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Fundamental investigations were made by known Ukrainian scientists-economists which dedicated to the economic aspects of functioning of Ukrainian horticulture complex. There are O.Ermakov, V.Rul'ev, I.Cherven, O.Shestopal, O.Gutorova and others. Foreign scientists who dedicated investigations of neural architecture of multilayered perceptron were made in mathematical modeling and designing in a greater or lesser degree. There are Taner A.H., Brignell J.E. from United Kindom, Dr. Simon Haykin from Canada, Hornik K., Stinchcombe M, White H. from USA.

The horticulture production is extraordinarily important human food. The insufficient fruit consumption causes to violation of biological processes in a human organism leading to appearance of different diseases and reduction of population life-span. The horticulture products are used in different branches of food industry comes forward as raw material in pharmaceutical and chemical industry. Fruit processing wastes are a qualitative feed for all types of farming animals. The sustainable industrial fruit and berries production and its waste treatment providing millions of stable workplaces.

Aim statement

Growing of horticulture products occupies an important place in the agriculture production structure and it is consider as profitable industry of agroindustrial complex. As a result of uneffective reformation, horticulture, as well as many other agriculture industries Ukraine, appeared in the crisis state, that entailed reduction of gardens' areas and berry patches, reduction of fruit croppage and substantial changes in the structure of producers.

For the last twenty fruit gross collection in the farms of all categories diminished on 40%. It is necessary to point out that in 1990 year agricultural enterprises and households provided a country by the horticulture products practically equally. In 2012 part of households in total fruit croppage folded 83,6%. The main reasons of fruit production downstream in the agricultural enterprises are their unprofitableness, high capital-output ratio industry and difficulties is with production distribution. The rapid rates of horticulture development in the households can be

explained by abrupt price increase on food products and most families solve this problem by own fruit.

According to the fruit balance in the country, fruit consumption by the population of Ukraine makes up 2203 Tt/Jahr in 2012 year (against 1721 Tt/Jahr in 1995). Calculations testify that one ordinary citizen of the state in 2012 consumed 48 kg of fruit for a year, and it is the best result for investigated period. It is possible to investigate a tendency to the increase of average level of fruit consumption. The author calculations prove that the AV fruit consumption for a year one ordinary Ukrainian inhabitant in 2012 practically does not differ by the regions.

Results

Food safety is one of decision constituents of national safety in a medium-term prospect as an independent subject internal and external state policy. Steady socio-economic development of society, its demographic recreation depends on the food providing condition in the country. State food independence is provided by food safety of the country when physical, social and economic availability is assured for the population of sufficient, safe and nourishing foodstuff that fits with foodration, culinary taste in volumes in accordance with the recommended consumption norms for active and healthy way of life [1].

Situation is considered as optimal, when the actual consumption of foodstuffs by a population during a year is equal to a rational standard, i.e. the correlation coefficient of between an actual and rational consumption is unity.

The actual consumption of the most of the foodstuff basic types went down below rational norms. Most lag of actual consumption from rational was observed in relation to horticulture products — on 52%, milk a dairy products —on 54%, meat and meat foods—on 35%, potato — 26%, fish — on 25 % (table 1).

**Calculation of adequacy indicator of foodstuffs
consumption in Ukraine***

Foodstuff	The rational consumption norm	The actual consumption		The adequacy indicator	
		2011 p.	2012 p.	2011 p.	2012 p.
Bread and grain products (calculated on meal)	101,0	101,6	104,2	1,01	1,03
Meat and meat foods (calculated on meat)	80,0	48,9	51,9	0,61	0,65
milk a dairy products (calculated on milk)	380,0	176,3	176,5	0,46	0,46
Fish and fishery products	20,0	17,0	15,0	0,85	0,75
Eggs (pcs.)	290	271	290	0,93	1,00
Vegetables, melons and gourds	161,0	144,3	157,7	0,90	0,98
Fruit	90,0	39,7	43,3	0,44	0,48
Potato	124,0	95,7	91,9	0,77	0,74
Sugar	38,0	37,6	39,3	0,99	1,03
Vegetable oil	13,0	14,6	14,2	1,12	1,09

* Author calculations with the use of sources [3, 7], (kg/a on a person)

Estimating groups of “bread and grain products”, “vegetable oil”, “sugar” an actual consumption exceeded a rational norm. However such exceeding on the specified groups of foodstuff, especially in relation to grain products, is the evidence of unbalanced of food ration, cause Ukrainian people try to provide own power necessities due to more economically accessible foods. Especially critical is an sufficiency indicator of fruit consumption in Ukraine, that laid down 0,48 in 2012 year. During the last fifteen years the level of actual fruit consumption did not reach at even the half of the recommended requirement.

Domestic production possibilities to provide the population requirement in the horticulture products, that equals the rational norm of consumption, were lowest in 2006 and 2009 and presented 10,5% and 12,5% correspondingly. This index was approached to half from the level of the recommended requirement in 2005, 2007, and 2008. For the last fifteen years the households prevails in total fruit croppage – at the average 85,3%, the main item in fruit balance shit – it is “expended for consumption” – at the average 78.6% from total use. Thus, a principal orientation of this category of subjects is self-sufficiency (table 2).

**The necessity and provision with horticulture production
in Zaporizhe region in Ukraine***

Description of indices	Years					
	2007	2008	2009	2010	2011	2012
The recommended consumption norm, Tt/Jahr	168,9	167,5	166,2	164,9	163,9	162,1
The actual consumption, Tt/Jahr	69,3	53,1	71,1	73,8	72,2	78,2
The adequacy indicator of consumption	0,41	0,32	0,43	0,45	0,44	0,48
The part of own production is for contentment in fruit consumption according to recommended norm , %	48,1	10,8	40,1	41,0	12,5	36,2
- agricultural enterprises	8,5	1,5	4,4	4,1	2,4	5,7
- households	39,6	9,3	35,7	36,9	10,1	30,5
The part of own production is for contentment in fruit actual consumption, %	117,2	34,1	93,7	91,7	28,3	75,1
- agricultural enterprises	20,6	4,7	10,4	9,2	5,4	11,9
- households	96,6	29,4	83,3	82,5	22,9	63,2

* Author calculations with the use of sources [3, 5]

The standard of state provision with horticulture production and its availability in a sufficient amount for various strata of society at the internal food market influences on the state food safety. Guaranteeing of food welfare is impossible without determination of definite indices of its level and boundary (threshold) criteria. The food safety indices, which allow tracing the increase of calorie content of fruit daily energy value, are estimated (table 3). The adequacy indicator of fruit providing Ukrainians during period (2008-2012) remained invariable (almost 50%).

The standard of import dependence for the last five years upon the average is 60, 2%. The threshold criterion according to Methodology of determination of basic indicators of food safety in Ukraine equals 30%, thus the “surplus” import standard transforms from addition to internal production in the narrowing factor of reproductive domestic horticultural industry possibilities. Thus, import predominance potentially fairs into horticulture industry decay. Gradually a difference diminishes in the fruit consumption between higher and lowest sections of the population depending on the annual income. Horticulture products consumption by a people with total revenues for a month lower than living wage has a tendency to increasing on 23%.

Dynamics of fruit consumption in Ukraine*

Description of indices	Years				
	2008	2009	2010	2011	2012
Daily energy fruit value, kcal	62,0	74,0	77,0	81,0	85,0
Adequacy indicator of provision dietary intake with horticulture products, %	38,6	46,7	48,3	50,7	53,0
Daily costs of consumed fruit, hrn on a person	0,59	0,76	0,98	1,06	1,10
Fruit consumption by sections of the population depending on the annual income, kg/m on a person	3,0	3,6	3,7	3,4	3,5
lowest section, kg/m on a person	1,2	2,2	2,3	2,1	2,3
highest section, kg/m on a person	5,9	5,6	5,9	5,5	5,5
with total revenues for a month lower than living wage, kg/m on a person	1,7	2,2	2,1	1,9	2,2
Correlation of higher and lowest sections	4,9	2,6	2,6	1,9	2,3
Fruit import dependence, %	70,0	64,0	61,4	54,2	51,3

*Author calculations with the use of sources [3, 4]

It was determined, that the main consumers of horticulture products are dwellers, as possibility of fruit self-sufficiency of this category is low and major part of production must be bought. The consumption of purchased fruit in 2012 approached to 95, 8% of total amount of the used products by the urban community. Consumers that live in rural area have an advantage in fruit providing through individual household ownership, but their consumption level of own products goes down, that testifies of re-orientation on realization.

The retentive factor of horticulture products acquisition in Ukraine is an insufficient income level of population for the fruit consumption of the recommended norm, as this product do not belong to the top priority foodstuffs, but is characterized its medical and preventive action.

Various factors influence on the fruit consumption level by Ukrainian people. A cross -correlation-regressive analysis gives an opportunity to define action direction of different indices on a resulting factor using the statistical data. Fair price influence on the horticulture products, hrn /t (x_1), household's part in total

croppage,% (x_2), income level of Ukrainian population, hrn/a (x_3) on the fruit consumption output, kg on one person (y_{xi}). The result of calculations is expressed by a cross-correlation-regressive model (formula 1).

$$y(x) = 47,0373 - 0,0117x_1 - 0,327x_2 + 0,0041x_3, \quad R=0,804 \quad (1)$$

Calculations showed that the correlation coefficient had strong influence on the investigated index. The results a cross-correlation-regressive analysis resumed, that the income level increasing of population stimulates the consumption output growth, while a fruit market price and household's part in total gross collection restrain the rise of resulting factor.

The horticulture products belong to the category of foodstuffs that not only have excellent gustatory quality but also aimed to maintenance and promoting human good health. Fruit consumption helps not only to lead a healthy life but also substitute expensive medical preparations. Certainly, that fruit are a not panacea for all woes, and inhibition only of fruit diet will not be able to cure a chronic patient. But they are a powerful preventive and carry out favorable influence on motion of certain illnesses. Thus, the reasonable consumption of natural gifts can prevent the diseases or decrease them.

The dynamics of human health indices in Ukraine convincingly testifies dependence morbidity level on the fruit consumption deficit. For the last 15 years the horticulture products consumption in a calculation on a one person increased on 29% equally 48% of fruit consumption rational norm (90 kg). General morbidity for investigated period diminished on 23,2 % (316,3 cases on thousand persons), including neoplasms — on 3,8% (0,6 cases on thousand persons), the amount of cases of circulatory system diseases increased on 50,4% (18,6 cases on thousand persons).

Investigation of rate of dependency human morbidity level on the fruit consumption deficit suggestive that increasing fruit consumption in dietary ration on 5 kg/a amount of general morbidity, neoplasms and circulatory system diseases.

Dependence morbidity level on the fruit consumption deficit in Ukraine*

Показники	Equation of polynomial curve: $\acute{o}(\acute{\delta}) = \acute{a}_0 + \acute{a}_1\acute{\delta} + \acute{a}_2\acute{\delta}^2$			Approximation validity R^2	Quantity diseases adjustment of increasing fruit consumption on 20 kg/a, thousand persons	
	\acute{a}_0	\acute{a}_1	\acute{a}_2		nominal, cases	relative, %
Human general morbidity, cases on thousand persons	1278,2	-2,4646	-0,0397	0,2146	76,5	6,6
inter se: - neoplasms, cases on thousand persons	18,242	0,0562	-0,0032	0,5566	2,4	14,7
- circulatory system diseases, cases on thousand persons	30,778	2,9481	-0,062	0,1983	22,9	41,9

* Author calculations with the use of sources [3, 4, 6]; 1997-2012

The major change on decreasing human morbidity level brings in increasing of horticulture products amount in daily food consumption on 20 kg/a. The calculations ascertain that quantity adjustment of increasing fruit consumption on 20 kg/a edges down the human general morbidity on 6,6% (76,5 thousand cases), including neoplasms — on 14,7 % (2,4 thousand cases), circulatory system diseases — on 41,9 % (22,9 thousand cases).

Horticulture products are one of principal sources of vitamins supply to the human organism. It is needed for the ultimate nutrition, as rich on minerals and cellulose. These elements are useful to all systems of organism. Most fruit contain nourishing substances that operate as antioxidants, destroying dangerous radicals potentially. Horticulture products due to the chemical composition protect an individual from such diseases, as malignancy and circulatory system diseases. Adding to the food ration rich on vitamins, and also the vitamin ingestions not only satisfies the patient needs in vitamins but also removes their deficit in an organism, anticipates the hypovitaminosis.

The needs in the food consumption, irreplaceable food substances that is not synthesized independently in the human organism or appear enter in the complement of that, but in insufficient amounts, regulate metabolic processes active in small amounts and scalene influence on the life-sustaining activity, forms the human desire to buy foods of the “third dish”, specifically fruit and berries.

Author calculations give leave to do a prediction of domestic fruit consumption rates till 2015 year by the construction of neuron network on the basis of architecture “8-4-1” multilayered perceptron, which takes into account nine factors which makes influence on this index. There are factors which impact on the level of consumption of horticulture products by population of Ukraine: profits and charges of population, part of charges on food in general costs, amount of morbidity cases, part of population with profits below living wage, amount of households with children, volume of import, average selling price and part of fruit production by households for the last fifteen years.

Using of neuron network by means of construction of architecture of multilayered perceptron gives possibility to make high-quality, close to the fact sheets prediction of horticulture products consumption by Ukrainian population in 2011-2015 with a further prediction purpose of fruit market development.

Prediction of Ukrainian population provision by horticulture products till 2015 was made, which testifies that on the nearest five years is expecting the increasing of gross collection volumes, including in agricultural enterprises, on 26% (74,7 thousand tones), and in the householders on 53% (775,6 thousand tones). The Increasing of consumer’s income and, accordingly, their purchasing power will assist stimulation of fruit production (table 5). Taking into account factors that assist the increase of the consumed fruit and berries the population of Ukraine, then the consumption level in 2015 will present 54 kg/a on one person.

The prediction of fruit consumption market*

Years	The market capacity, kilo ton	The actual consumption, kilo ton	The fruit croppage, kilo ton			Import, kilo ton	Provision of market capacity with domes. prod., %	The provision of actual consump. with domestic production, %
			Households	Agricultural enterprises	Total croppage			
2009	4152,9	2100,7	1403,3	214,8	1618,1	1139,0	23,2	45,8
2010	4109,0	2203,3	1459,7	286,8	1746,5	1130,0	26,1	48,7
2011	4083,1	2152,9	1592,8	296,9	1889,7	1118,6	25,3	48,0
2012	4057,3	2219,4	1724,1	321,5	2045,6	1104,4	27,5	50,2
2013	4031,4	2183,8	1881,8	333,6	2215,4	1090,8	27,1	50,1
2014	4005,6	2214,8	2051,9	346,6	2398,5	1073,8	28,5	51,5
2015	3979,7	2386,4	2235,3	361,5	2596,8	1054,7	33,5	55,8

* Author calculations with the use of sources [3, 2]

The prediction of fruit consumption market development proves that in 2010 the fraction of untapped possibilities equaled 29,6% of general market capacity. It is occupied on a half from the general individual needs in fruit (including to 27,5% owing to import). And till to 2015 these unimproved opportunities will diminish to a 8,2% and major segment will belong to the domestic production (65,3%) and volumes of the imported production will decrease to 26,5% (diagram 1).

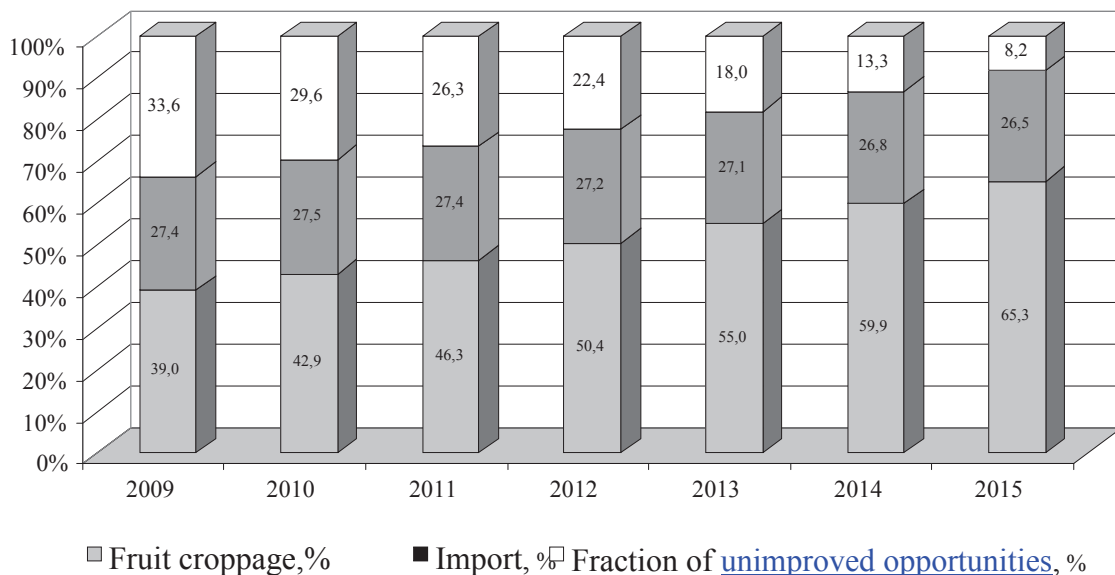


Diagram 1. Prediction of the Ukrainian fruit consumption market*

* Author calculations

These calculations testify to potential of Ukrainian horticulture production market that at an existent situation fully is not used. The chance to bring down dependence of fruit consumption market on imported products may be realized by using sweeping changes by government for the import abridgement and native fruit producer's defense, creation of corresponding operating and competitiveness orientation conditions.

Conclusions

The principal specific features of horticulture products as a commodity conclude in that the fruit are a health of nation, in fact they are curative characteristics, large amount of vitamins and microelements. The gain of human life rise volumes of fruit realization. Fruit commodity politics is forming of commodity assortment, providing of the proper quality level and competitiveness, reduction of business agents network for diminishing realization price and increasing of fruit consumption volumes.

It is determined, that to 2015 is expected declining of fruit croppage volumes, including in agricultural enterprises on 47% (91,5 thousand tonnes) at insignificant changes in a production in the households and increasing of actual fruit consumption providing will proceed due to the further increase of import volumes on 20% (235 thousand tonnes).

It was revealed results of domestic fruit consumption prediction of the Ukrainian population using not only the construction of neuron network on the basis of architecture "8-4-1" multilayered perceptron and the data prediction of total croppage and import, got by means of cross-correlation-regressive analysis, were used for determination of fruit market dimensions development on a prospect.

Coming from an analysis, prospects for the fruit market are ponderable enough: availability unfilled segments - the canned and dried fruit and berries; growth of horticulture products volumes. The membership in WTO opens borders for the fruit export, strengthening of government attention to the decision-making in definite industry, import limitation possibility of fruit's sort growing is answered by

Ukrainian naturally-economic terms are another potential opportunities for expansion of domestic fruit market.

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***Анотація.** Фрукти - важливий компонент здорової дієти, і їх достатній щоденний вжиток - благополуччя людства: ефективна робота, належний вільний і розумовий відпочинок.*

Поставлено та досліджено наступні питання:

1. досліджено властивість фруктів, як людський надійний захист проти серцево-судинних хвороб;
2. порівняно фактичний і рекомендований норматив фруктового вжитку;
3. ідентифіковано залежність між фруктовим вжитком і рівнем захворюваності через множинну-кореляцію;
4. оцінено внутрішні і зовнішні бар'єри фруктового вжитку;
5. прогнозування норм фруктового вжитку до 2015 року;
6. запропоновано директиви для збільшення норми фруктового споживання.

Аннотация. Фрукты - важный компонент здоровой диеты, и их достаточное ежедневное потребление - благополучие человечества: эффективная работа, надлежащий свободный и умственный отдых.

Поставлены и исследованы следующие вопросы:

1. исследовано свойство фруктов, как человеческая надежная защита против сердечнососудистых болезней;
2. сравнительно фактический и рекомендованный норматив фруктового потребления;
3. идентифицирована зависимость между фруктовым потреблением и уровнем заболеваемости через множественную корреляцию;
4. оценено внутренние и внешние барьеры фруктового потребления;
5. прогнозирование норм фруктового потребления до 2015 года;
6. предложены директивы для увеличения нормы фруктового потребления.

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PROBLEMS OF AUDIT ACTIVITY

Annotation. The article highlights the issue that to improve the independence of the audit.

Keywords: audit, quality control of audit, auditing, accounting services, audit independence.

Statement of the problem. The economic situation in the country has meant that the audit market was almost unlimited. Auditor seen as a way to solve all problems, chief among which was the problem of calculating taxes. Once the certificate of the auditor by the rise of audit training centers, has become available, or nearly every, quality control of audit significantly weakened. Over the years the audit there were several thousand licenses issued, the parts of which have never engaged in auditing. Typically, managers of these firms had revenue side, not directly related to the audit, which may affect independence.

Foreign and domestic scholars recognize that "absolute independence - it's ideal that is unattainable in principle but without the desire to achieve what sorts Check lose all meaning" [7, p. 135]. Because it is impossible to achieve absolute