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INNOVATIVE STUDIES OF THE QUALITY OF THE SEMI-FINISHED SOUFFLÉ WITH POSITION OF THE NORM OF PHYSIOLOGICAL NEEDS OF HUMAN

Introduction. Confectionery is one of the most attractive sectors of the food industry of Ukraine. The confectionery composition is a high-calorie foods that are high in fat and carbohydrates. The main raw material in the confectionery industry is sugar. Today the question of production of sweet products that can be eaten by all population groups, including diabetics. To achieve this goal in Ukraine is widely used sweeteners [1]. They are used not only to reduce calorie content, but also to improve the quality of the food.

The quality of food products understand the set of properties that determine their practical use to the human body. Food must meet the physiological needs of the human body and meet energy needs and nutrients. Also, food products must conform to the requirements of the organoleptic, physical and chemical properties, hygienic norms against chemical and biological structure [2].

The quality indicators are grouped into simple and complex. Single indicators of quality are established industry-standard technical documents characterize one of the properties of the products (water

content, sugar, fat, etc.).

The complex index is a measure of several properties of products or a single complex property that has some simple. It is the expression of the assessment of the level of a single number, which is obtained by combining the selected single indicators into one complex index. If one single indicator is zero, the complex index is also taken equal to zero [3-5].

October 2, 2017, was approved by decree of «Norms of physiological needs of the population of Ukraine in main nutrients and energy», where a separate daily need of children and adults in basic macro- and micronutrients (vitamins, minerals, minor and biologically active substances) [6]. The law is the daily energy consumption is determined for people according to age, sex, body weight during the metabolism, and some physical activity, which is divided into 5 groups: workers mostly mental work with very light physical activity; workers engaged in light labor with a light physical activity; employees of average weight of labor's average physical activity; workers heavy physical labor with high physical activity; workers in particularly heavy physical labor with a very high level of physical activity, and also depending on ratio of physical activity, calculated individual daily energy consumption.

The aim of work is to assess the quality of semi-finished soufflé from the perspective of the norms of physiological needs of man and of the daily diet.

Methodology and research methods. Scientific field that combines quantitative quality assessment methods [6-14], is used to justify decisions in the management of the quality of the products [15-20] and standardization, and develops a theoretical base of these methods is called qualimetry.

Comprehensive evaluation method [12, 14, 19, 20, 21] is to Express an assessment of the level of quality by a single number, which is obtained by combining the selected single indicators into one complex index [15, 16, 19, 21].

Methods of complex evaluation of the quality of the diet [21-24]:

1) The value of the absolute values for the semi-finished soufflé determined by the formula:

$$P_{ij} = \frac{M_{ij}}{\sum M_{ij}}, \qquad (2.1)$$

in M_{ij} – the contents *i* nutrients in the *j* group of substances with the diet.

2) According to the energy consumption norms of the adult population is aged 18-29 years are determined by a base value:

$$P_{ij}^{basic} = \frac{M_{ij}^{basic}}{\sum M_{ij}^{basic}}, \quad (2.2)$$

in M_{ij}^{basic} – the value *i* nutrients in *j* the group of substances according to the norms of physiological needs.

3) Evaluation of individual indicators of proteins, fats and carbohydrates is calculated by the formula:

$$K_{ij} = \left(\frac{P_{ij}}{P_{ij}^{basic}}\right)^{z}, \quad (2.3)$$

in P_{ij} – index of a nutrient material in daily ration;

P_{ij}^{basic} – basic (balanced) value of index of a nutrient material in daily ration (according to norms of physiological needs);

z – index, that considers the influence of changing index value on qualitative rate of an object, that is equal to plus 1 in proteins and carbohydrates content estimating and minus 1 in fats content estimating.

4) The values of the weighting factors m_{ij} of nutrients calculated by the formula:

$$m_{ij} = \frac{\frac{\sum M_{ij}^{basic}}{M_{ij}^{basic}}}{\sum \frac{\sum M_{ij}^{basic}}{M_{ij}^{basic}}}. \quad (2.4)$$

5) A comprehensive indicator of the quality of a single meal in a balanced ration of nutrients for the duplex structure determined using the additive model:

$$K_o = \sum_{i=1}^{t} M_j \bullet \sum_{j=1}^{n_i} m_{ij} \bullet K_{ij}, \quad (2.5)$$

in M_j – weighting factor groups of nutrients.

Results and their discussion. Hierarchical structure of indicators of quality of diets is shown in Figure 2.1.

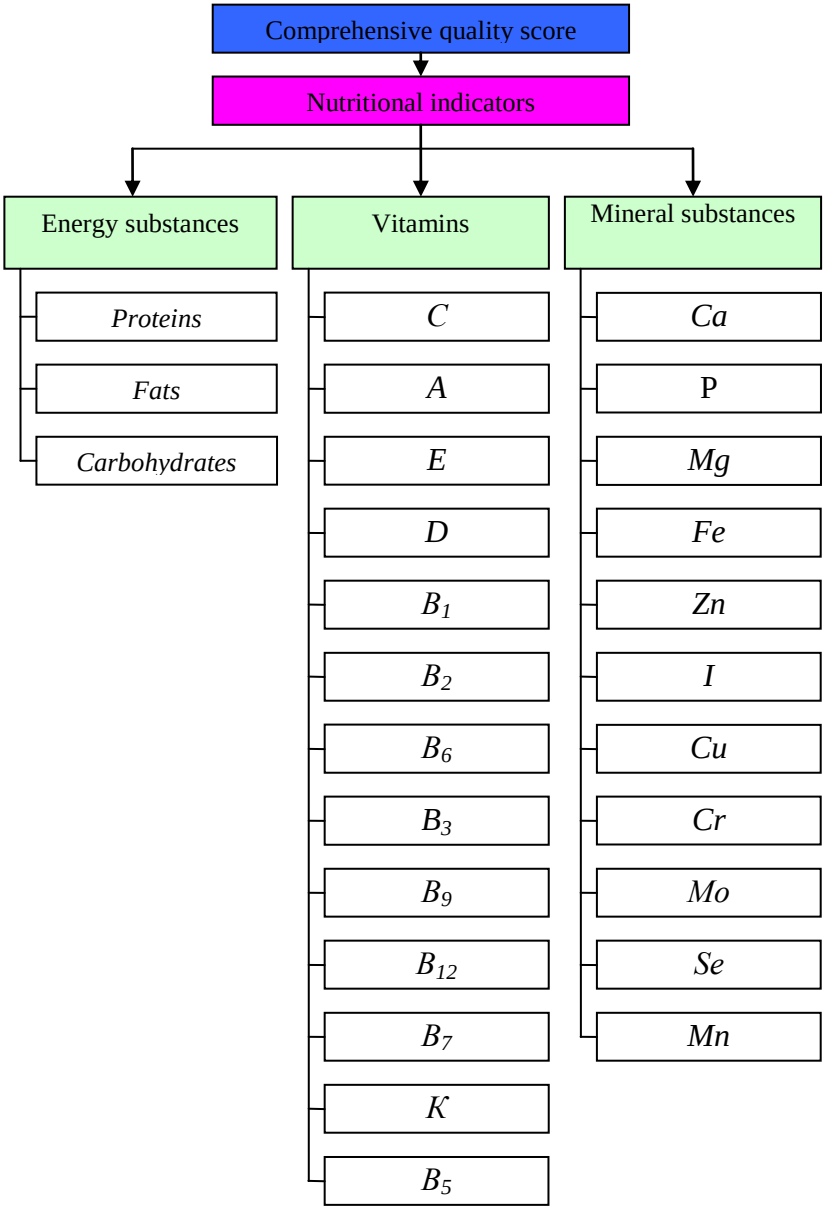

Figure 2.1 The hierarchical structure of dietary quality indicators

Given the norms of physiological needs of the adult population is aged 18-29 years was calculated comprehensive evaluation of the quality control sample of prefabricated soufflé: total amount of nutrient materials – 153 g (proteins – 61 g; fats –30 g; carbohydrates – 62 g); total amount of mineral matters – 2832,32 mg (*Ca* – 1100,00 mg, *P* – 1200,00 mg, *Mg* – 500,00 mg, *Fe* – 17,00 mg, *Zn* – 12,00 mg, *I* – 0,15 mg, *Cu* – 1,00 mg, *Cr* – 0,05 mg, *Mo* – 0,07 mg, *Se* – 0,05 mg, *Mn* – 2,00 mg); total amount of vitamins – 112,258 mg (C – 70,000 mg, *A* – 1,000 mg, *E* – 15,000 mg, *D* – 0,005 mg, B_1 – 1,300 mg, B_2 – 1,600 mg, B_6– 1,800 mg, B_3 – 16,000 mg, B_9 – 0,400 mg, B_{12} – 0,003 mg, B_7 – 0,050 mg, *K* – 0,100 mg, B_5 – 5,300 mg).

The initial data for the calculation of semi-finished soufflés of the control sample: sugar – 17,87 g; glucose syrup – 8,94 g; butter – 11,31 g; egg white (native) – 3,21 g; agar – 0,25 g; condenced milk – 5,31 g; citric acid – 0,20 g; sum – 50,00 g.

The initial data for the calculation of semi-finished soufflé of innovative technology are given: dryed egg white – 2,25 g; citric acid – 0,04 g; fructos – 20,15 g; isomalt – 13,4 g; agar – 0,5 g; dried briar – 5 g; sum – 55,00 g. In Tables 2.2-2.3 shows the allocation of the control and innovative sample prefabricated soufflé the standards for energy, minerals and vitamins in food.

The second stage involves the calculation of a comprehensive assessment of the quality of the control and innovation of the semi-finished soufflé. The calculation of a comprehensive quality assessment is presented in Figure 2.2.

Conclusions. The method of assessing the quality of dishes in hotels and restaurants is considered. The structure of quality indicators and the results of studies of complex-quantitative assessment of the quality of semi-finished soufflé is presented. Taking into account the norms of physiological needs for women aged 18-29 years, a comprehensive assessment of the quality of the control and innovation of the semi-finished soufflé product has been calculated. After calculating the content of energy, minerals and vitamins in the control sample, it was proposed to increase the vitamin content in the innovative technology of the semi-finished soufflé as a result of adding dried wild-buckthorn to the formulation, as well as to make a dairy semi-finished product as a result of the addition of sugar substitutes. By analyzing a comprehensive assessment of the quality of a semi-finished control sample and of innovative technology, it can be argued that the technology innovation soufflé is more balanced than the control sample.

Table 2.2

Recalculation of the contents of energy, minerals and vitamins for a test sample of prefabricated soufflé and innovative soufflé semi-finished technology

Energy nutrient	Control sample		Innovative sample	
Mass, g	100	50	100	55
Energy nutrients, g				
Proteins, g	22,800	0,800	89,800	2,044
Fats, g	91,500	8,400	3,200	0,110
Carbohydrates, g	311,400	27,800	325,100	36,304
Mineral substances, mg				
Ca, mg	345,0000	21,1000	135,0000	4,6870
P, mg	294,0000	19,4300	211,0000	5,2150
Mg, mg	56,0000	3,2700	46,0000	1,5020
Fe, mg	1,8500	0,1800	5,0000	0,2240
Zn, mg	1,2300	1,0500	0,8100	0,0180
I, mg	0,0140	0,0023	0,0250	0,0006
Cu, mg	0,0230	0,0030	0,1800	0,0710
Cr, mg	0,0820	0,0000	0,0110	0,0002
Mo, mg	0,0070	0,0001	0,0140	0,0003
Se, mg	0,0030	0,0008	0,1262	0,0030
Mn, mg	0,0040	0,0004	0,0300	0,0006
Vitamins, mg				
C, mg	1,0000	0,0500	1000,0000	50,0000
A, mg	0,0470	0,5000	0,8170	0,0400
E, mg	0,2000	0,1100	3,8000	0,1900
D, mg	0,0000	0,0000	0,0000	0,0000
B_1, mg	0,0640	0,0030	0,0750	0,0036
B_2, mg	0,9900	0,0390	2,3000	0,0600
B_6, mg	0,1400	0,0070	0,0000	0,0260
B_3, mg	0,4000	0,0170	2,7000	0,0930
B_9, mg	0,0031	0,0000	0,0000	0,0000
B_{12}, mg	0,0005	0,0000	0,0006	0,0001
B_7, mg	0,0102	0,0000	0,0000	0,0000
K, mg	0,0006	0,0000	0,0000	0,0000
B_5, mg	1,0400	0,0560	0,0000	0,0000

Table 2.3

Calculation of complex assessment of quality of control and innovative sample of semi-finished soufflé

Indexes	Name of sample					
	Basic values	Weight factor	Control sample		Innovative sample	
			Absolute values	Single Indicators	Absolute values	Single Indicators
	P_i^{basic}	m_i	P_i	K_i	P_i	K_i
Energy nutrients, g						
Proteins, g	0,3986	0,2489	0,0219	0,0549	0,0183	0,0458
Fats, g	0,1961	0,5061	0,2271	1,1158	0,0004	0,0019
Carbohydrates, g	0,4052	0,2450	0,7510	1,8531	0,9813	2,4216
Mineral substances, mg						
Ca, mg	0,38837	0,00001	0,48100	1,23850	0,24681	0,63549
P, mg	0,42368	0,00001	0,44256	1,04456	0,63936	1,50905
Mg, mg	0,17653	0,00003	0,07300	0,41352	0,09521	0,53932
Fe, mg	0,00600	0,00094	0,00162	0,27061	0,00880	1,46665
Zn, mg	0,00424	0,00133	0,00167	0,39521	0,00264	0,62229
I, mg	0,00005	0,10650	0,00001	0,15076	0,00008	1,54881
Cu, mg	0,00035	0,01597	0,00008	0,24036	0,00650	18,3990
Cr, mg	0,00002	0,31950	0	0,11630	0,00004	2,04941
Mo, mg	0,00002	0,22821	0	0,11076	0,00005	1,86687
Se, mg	0,00002	0,31950	0,00002	1,11133	0,00043	24,3108
Mn, mg	0,00071	0,00799	0,00002	0,03231	0,00010	0,14002
Vitamins, mg						
C, mg	0,62356	0,00003	0,06162	0,09882	0	0
A, mg	0,0089	0,00176	0,61285	68,7973	0	0
E, mg	0,13362	0,00012	0,14788	1,10673	0	0
D, mg	0,00004	0,35142	0,00018	4,03958	0	0
B_1, mg	0,01158	0,00135	0,00493	0,42567	0,00020	0,01747
B_2, mg	0,01425	0,0011	0,06162	4,32318	0,08058	5,65378
B_6, mg	0,01603	0,00098	0,00863	0,53800	0	0
B_3, mg	0,14252	0,00011	0,03532	0,24780	0,91922	6,44933
B_9, mg	0,00356	0,00439	0,00016	0,04600	0	0
B_{12}, mg	0,00002	0,58569	0,00006	2,12124	0	0
B_7, mg	0,00044	0,03514	0,00046	1,02373	0	0
K, mg	0,00089	0,01757	0,00099	1,10673	0	0
B_5, mg	0,04454	0,00035	0,06531	1,46642	0	0
Comprehensive quality assessment			*1,97753*		*1,14678*	

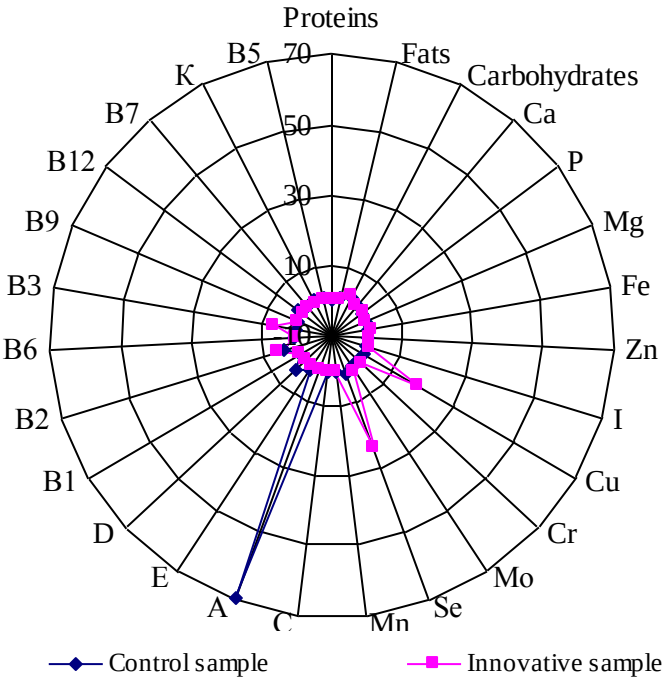

Figure 2.2 Single indexes of the quality of the semi-finished soufflé

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