За допомогою методів теоретичної кваліметрії проведено комплексну оцінку якості імуностимулюючого напою «Імуно плюс». Представлена ієрархічна структура властивостей готової продукції, що включає органолептичні та фізико-хімічні показники, а також показники харчової і біологічної цінностей. Наведено розрахунки конкурентоспроможності отриманого напою за методикою моделювання

Ключові слова: комплексна оцінка якості, імуностимулюючий напій, показники якості, профілактичний продукт

С помощью методов теоретической квалиметрии проведена комплексная оценка качества иммуностимулирующего напитка «Иммуно плюс». Представлена иерархическая структура свойств готовой продукции, включающая органолептические и физико-химические показатели, а также показатели пищевой и биологической ценностей. Приведены расчеты конкурентоспособности полученного напитка по методике моделирования

Ключевые слова: комплексная оценка качества, иммуностимулирующий напиток, показатели качества, профилактический продукт

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COMPREHENSIVE RESEARCH INTO QUALITY OF THE IMMUNOSTIMULATING BEVERAGE "IMMUNO PLUS"

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1. Introduction

One of the important factors, which determine health of the population, is nourishment. In recent years, the health condition of the population of Ukraine has considerably deteriorated: there has been an increase in mortality as a result of cardiovascular and oncologic diseases, hyperlipidemia and obesity. The consumption of foodstuffs, containing a large amount of animal fat and simple carbohydrates, leads to an increase in the excess body weight and obesity. Thus, a problem of the lack of macro- and micronutrients in food rations is rather acute [1].

To a considerable degree, nutrition disorders among the population of Ukraine are caused by the critical state of production and processing of food raw materials and food products, by the worsening of economic condition of the major part of the population of Ukraine, as well as by its low purchasing power.

An analysis of the structure of nutrition of the Ukrainian population at present shows that the protein deficiency in food ration of the Ukrainians amounts to 26 %. Protein insufficiency develops due to the lack of protein in the human organism, which leads to disturbances in the synthesis of ferments, functions of pancreas and intestines, negative nitrous balance, muscle atony, and decrease in the resistibility of organism to the agents of diseases [2].

In this connection, development and quality assessment of new immunostimulating beverages with the increased food and biological value is absolutely relevant.

2. Literature review and problem statement

The quality of food products covers different consumer preferences, which determine their food and energy values, full biological value of composition, assimilation, food safety, price and consumption effectiveness. Functional products are considered not as the sources of plastic substances and energy, but rather as a complex of biologically active materials.

At present, scientists are working on the compositions and technologies of products with a high content of protein and immunostimulating substances. Such new products can include dry cereals of functional purposes [3], grain breakfasts [4], oxygen beverage "Glotok zdorovia" (ukr. "A sip of health") [5], flour confectionery [6], biologically active additives [7] and others.

The composition of instant cereals of functional purposes includes extruded grain of wheat, rice, corn, collagen preparation and liquorice root. Grain cereal supplies organism with the product, balanced by its amino-acid composition.

The functional beverage based of the juice of Chinese magnolia vine, concentrated grape juice, extract of pink

radiole and sugar is well known. The beverage is considered not only as toning, but also as immunostimulating [8].

Article [9] gives description of the use of aerated functional products for preventing hypoxia. The author describes the possibility of using plasma proteins of pigs as a foaming agent, which also contributes to the optimization of amino-acid composition of the beverage.

Serum is the source of valuable milk protein, casein. A structure of the casein molecule is complicated and gives the possibility to enrich food products with an easily assimilated form of calcium [10].

For the stabilization of protein metabolism and prevention of diseases, connected with its disturbance, it is necessary that food products should include proteins and their hydrolyzates. Complex proteins may become matrices for the immobilization of vitamins, ferments and other biologically active materials. Collagen may be one of such proteins. Promising randomized studies showed that the oral intake of 10 g of hydrolyzate of collagen per day within three months decreases pain and improves the function of joints in patients with diagnosed osteoarthritis and osteoporosis [11, 12].

The integrated assessment of food products quality is used by authors for determining the competitive ability of the oxygen cocktail "Glotok zdorovia". The oxygen cocktail "Glotok zdorovia" contains the necessary amount of food fibers, vitamins and mineral substances for children's nourishment [5].

The integrated assessment of beverages quality, taking into account the content of macro- and micronutrients based on milk serum, was also conducted by the scientists at Albert University (Edmonton, Canada) [13]. Seven different beverages based on serum, including six commercial products, and the experimental laboratory prototype, were analyzed to establish the content of protein, carbohydrate and other basic components. The scientists concluded that serum-based beverages might be recommended as effective sources of calcium and riboflavin.

Relying on the method of QFD-methodology, demands of users for grain products were generalized and structured, and then their needs were ranked by priorities.

It was established that the most important quality indicators of grain loaves include organoleptic indicators, the presence of biologically active substances, health-improvement effect, safety and low price [14].

Thus, development of a new immunostimulating serum-based beverage and determination of its competitiveness on contemporary market appears quite promising.

3. The aim and tasks of the studies

The purpose of present work is to carry out a comprehensive assessment of the immunostimulating beverage "Immuno plus" taking into account the content of the most important nutrients, as well as marketing characteristics.

To accomplish the aim, the following tasks were to be solved:

– to develop the formulation of the beverage with a high content of immunostimulating substances;

– to determine the content of basic macro- and micronutrients;

– to conduct a comprehensive product-marketing estimation of the new product and to run an analysis of competitiveness of the beverage "Immuno plus".

4. Materials and methods for developing an immunostimulating beverage

In order to obtain a comprehensive quality indicator, which would be the function of particular quality indicators, its product-marketing estimation was carried out. A comprehensive product-marketing estimation considers all requirements for the organoleptic, physical-chemical indicators, indicators of food and biological value, as well as safety indicators.

Glutin was obtained by the method of multistage alkaline hydrolysis, as it is described in the patent for a useful model [15]. Molecular weight and homogeneity of glutin were determined by the method of electrophoresis in the 15 % polyacrylamide gel by the Lamley method. Amino-acid composition of the glutin macromolecule was defined on the amino-acid analyzer Hitachi L-8900 (Japan) (Fig. 1).

Fig. 1. Amino-acid analyzer Hitachi L-8900

It is possible to find a more detailed description of materials and methods for developing the immunostimulating beverage in paper [16].

5. Results of examining the quality indicators of the beverage "Immuno plus"

To determine the factors, which influence quality of the finished product, we carried out the analysis of technology of the product manufacturing at a modern enterprise. According to the obtained data, the Ishikawa diagram was constructed (Fig. 2).

This approach is a graphic method for investigating and determining the essential causal interrelations and it allows us to reveal key interrelations between different first order factors:

– raw materials;

– production technology and modes of processes;

– applied equipment;

– qualification of personnel;

– duration of the implementation of technological process (Fig. 2).

In Fig. 2:

– 1.1 – maintaining the formulation and standard documentation;

– 1.2 – sanitary-hygienic indicators of technology;

– 1.3 – parameters of technological processes;

– 1.4 – maintaining the dosage of components;

– 1.5 – sanitary-hygienic conditions;

– 2.1 – product quality;

– 2.2 – quality of basic raw material;
– 2.3 – quality of auxiliary raw material;
– 2.4 – maintaining the storing conditions of raw material;
– 3.1 – technical equipment of an enterprise;
– 3.2 – productivity of lines;
– 3.3 – proper working order of equipment;
– 3.4 – existence of control points;
– 4.1 – qualification of personnel;
– 4.2 – interest of workers;
– 4.3 – industriousness of personnel;
– 4.4 – working conditions;
– 5.1 – timely preparation of components;
– 5.2 – timely reception of orders (for restaurants) or existence of sale schedule (for health resorts);
– 5.3 – manufacturing collagen preparation;
– 5.4 – availability of basic raw material;
– 5.5 – availability of all auxiliary materials.

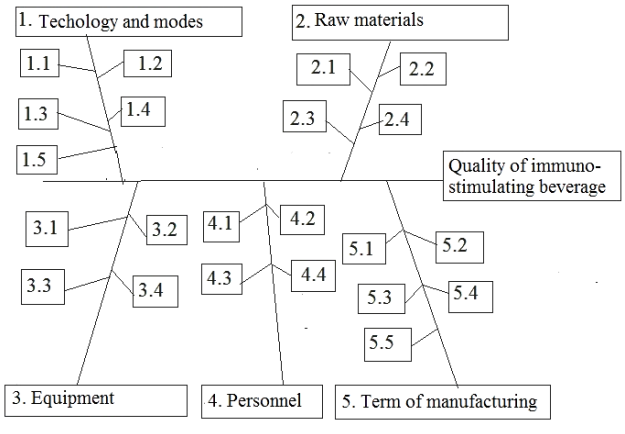

Fig. 2. Causal diagram of quality formation of immunostimulating beverage

Taking into account specific factors of the first level, factors of the second level were established, which are presented with the appropriate cipher. There are a number of common factors in the technologies for preparing any culinary production, and their effect was considered even at the stage of enterprise designing. In order to enhance the quality level, it was necessary to consider the role of all factors in the technological process. The factors of the second order, which are specific when creating the quality level, determined special features of the developed technologies, namely, the development of preventive products for elderly people, athletes and children, who require special quality control over the immunostimulating beverage.

Functional properties of collagen imply physical and chemical characteristics, which determine its behavior when made into foodstuffs, and those, which provide the necessary structure, technological and consumer properties of a product. The most important functional properties include durability of foam and foaming, ability to stabilize dispersed systems (foam, emulsion, suspension), to form gels, adhesive and rheological properties of protein systems.

The collagenic preparation of the rare amino acid of hydroxyproline, which is high in protein (13...15 %), was used as a hydrocolloid-foaming agent for the production of the immunostimulating beverage (Table 1).

General estimation of the beverage "Immuno plus" according to organoleptic indicators is 29.3 points in comparison with the control sample, the overall estimation of which is 27.6 points. In other words, the enriched beverage, produced with the introduction of glutin, exceeds the control sample by 5.8 %.

Table 1

Formulation of the beverage "Immuno plus", which is high in immunostimulating substances

Components	Amount
Apple juice, cm^3	20
Serum, cm^3	45
Sweetbrier pulp, g	5
Banana puree, g	10
Honey, g	5
Glutin, g	15

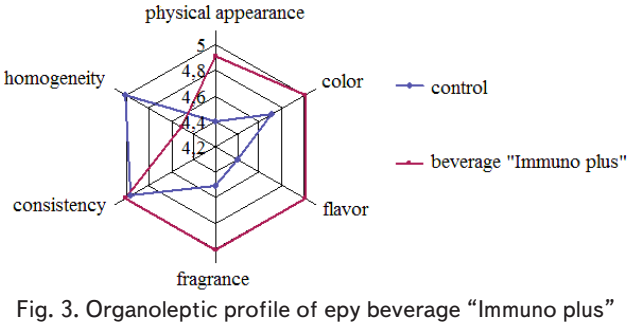

Fig. 3. Organoleptic profile of epy beverage "Immuno plus"

Microbiological indicators of the beverage "Immuno plus" are presented in Table 2.

Table 2

Microbiological indicators of the beverage "Immuno plus"

Indicators	Norm (DSTU 4552:2006)
Escherichia coli, in 0.1 cm^3	Not found (GOST (State Standard) 30726-2001))
Pathogenic microorganisms, including bacteria of salmonella genus, in 25.0 cm^3	Not found (DSTU IDF 122C:2003)
S. aureus, in 10 cm^3	Not found (GOST (State Standard) 30347-97))

The beverages, which meet requirements of normative documentation, were selected as the base indicators (P_{bas}).

Relative quality indicators of the control sample and the beverage "Immuno plus" are given in Table 3. The profiles of vitamin and mineral composition of the developed beverage "Immuno plus" are shown in Fig. 4.

A study of vitamin composition of the beverage "Immuno plus" revealed a high content of vitamins-antioxidants. An introduction of sweetbrier pulp and banana puree contributes to the enrichment of the beverage with food fibers (0.9 g/100 g), which on average covers 6...18 % of the daily need. The use of glutin makes it possible to obtain the beverage, which satisfies the need for protein by a human on average by 7.57 %. The content of fats and carbohydrates is 0.2 and 12.02 g/100 g, respectively. Energy value of the beverage "Immuno plus" in this case was 77.28 kcal.

Table 3

Determining the relative quality indicators of the control sample and the beverage "Immuno plus"

Measurement units	Quality indicators			Relative quality indicators		
	Designation	Control sample	"Immuno plus"	Designation	Control sample	"Immuno plus"
Points	$P_{1.1}$	4.4	4.9	$KP_{1.1}$	0.86	0.96
	$P_{1.2}$	4.4	5.0	$KP_{1.2}$	0.86	0.99
	$P_{1.3}$	4.4	5.0	$KP_{1.3}$	0.86	0.99
	$P_{1.4}$	4.5	5.0	$KP_{1.4}$	0.88	0.99
	$P_{1.5}$	4.9	5.0	$KP_{1.5}$	0.96	0.99
	$P_{1.6}$	5	4.4	$KP_{1.6}$	0.99	0.86
%	$P_{2.1}$	1.5	2.5	$KP_{2.1}$	0.51	0.96
%	$P_{2.2}$	3.0	5.0	$KP_{2.2}$	0.58	0.98
units. pH	$P_{2.3}$	2.0	4.5	$KP_{2.3}$	0.44	0.98
g	$P_{3.1}$	0.20	0.9	$KP_{3.1}$	0.21	0.95
kcal	$P_{3.2}$	63.0	77.28	$KP_{3.2}$	0.81	0.99
mg	$P_{4.1.1}$	0.05	0.18	$KP_{4.1.1}$	0.27	0.97
mg	$P_{4.1.2}$	0.06	0.19	$KP_{4.1.2}$	0.31	0.97
mg	$P_{4.1.3}$	0.1	0.25	$KP_{4.1.3}$	0.38	0.98
mg	$P_{4.1.4}$	0.1	0.48	$KP_{4.1.4}$	0.20	0.98
mg	$P_{4.1.5}$	0.12	0.41	$KP_{4.1.5}$	0.29	0.98
mg	$P_{4.2.1}$	1.0	22.0	$KP_{4.2.1}$	0.04	0.96
mg	$P_{4.2.2}$	5.0	28.0	$KP_{4.2.2}$	0.07	0.97
mg	$P_{4.2.3}$	3.0	9.0	$KP_{4.2.3}$	0.3	0.90
mg	$P_{4.2.4}$	2.0	37.0	$KP_{4.2.4}$	0.05	0.97
mg	$P_{4.2.5}$	0.5	2.9	$KP_{4.2.5}$	0.17	0.97
mg	$P_{4.3.1}$	0.2	0.83	$KP_{4.3.1}$	0.24	0.99
mg	$P_{4.3.2}$	0.11	0.39	$KP_{4.3.2}$	0.28	0.98
mg	$P_{4.3.3}$	0.10	0.80	$KP_{4.3.3}$	0.12	0.94
mg	$P_{4.3.4}$	0.20	1.70	$KP_{4.3.4}$	0.12	0.99
mg	$P_{4.3.5}$	0.02	0.18	$KP_{4.3.5}$	0.11	0.95
mg	$P_{4.3.6}$	0.12	0.59	$KP_{4.3.6}$	0.20	0.98
mg	$P_{4.3.7}$	0.01	0.17	$KP_{4.3.7}$	0.10	0.94

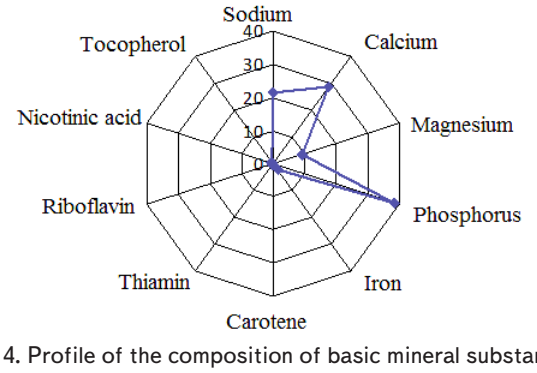

Fig. 4. Profile of the composition of basic mineral substances and vitamins of the beverage (mg/100 g)

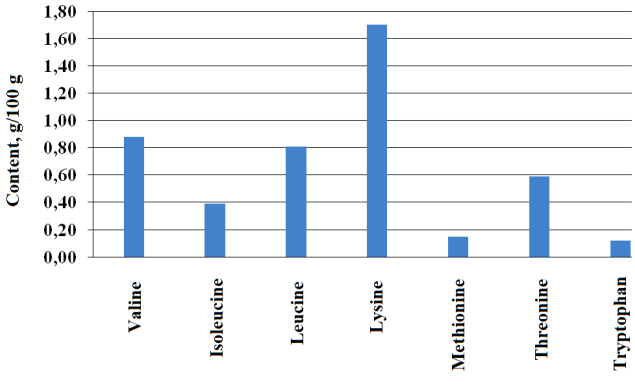

Fig. 5. Contents of nonreplaceable amino acids in the beverage "Immuno plus" (g/100 g)

As it is shown in Fig. 4, the beverage "Immuno plus" contains such mineral substances, necessary for the human organism, as sodium, calcium, magnesium, phosphorus and iron.

Fig. 5 shows the content of nonreplaceable amino acids in the beverage "Immuno plus".

To evaluate the finished produce and the methods of its treatment, we use the concept of quality as the totality of all qualities, which characterize the produce or the techno-

logical process. The variety of methods of manufacturing culinary produce has a special purpose and causes the need for its assessment and ranking in order to reveal the most effective and promising [24]. Quality assessment of the culinary produce is characterized by the generalized indicator, where the comprehensive indicator of quality (CIC) is accepted as the optimization criterion. The calculation of comprehensive criterion (CIC) of the developed beverage "Immuno plus" was conducted according to data on the actually established single indicators, which are converted into the dimensionless ones. Determining the CIC makes it possible to construct graphically the quality models of the developed beverage. The importance of the indicators in the range of each group and between the group indicators was determined by experts. According to their data, coefficients of importance of each indicator and intergroup coefficients were calculated. After calculating the weight coefficients, their alignment with the conditions was tested. According to data in Table 2, the following importance factors were calculated:

$$\sum_{i=1}^{6} MP_1 = 0,2+0,1+0,2+0,1+0,2+0,2=1,$$

$$\sum_{i=1}^{3} MP_2 = 0,35+0,3+0,35=1,$$

$$\sum_{i=1}^{2} MP_3 = 0,5+0,5=1,$$

$$\sum_{i=1}^{17} MP_4 = 0,06+0,06+0,05+0,06+0,05+$$
$$+0,06+0,06+0,06+0,06+0,06+0,06+$$
$$+0,06+0,06+0,06+0,06+0,06+0,06=1.$$

To bring together quality assessments of separate properties, the additive model of comprehensive assessment was accepted in the form of the weighted average arithmetical magnitudes:

$$K_0 = \sum_{i=1}^{n} M_i \cdot K_i, \quad (8)$$

where M_i is the importance coefficient of the i-th indicator; K_i is the relative quality indicator.

For the group of organoleptic indicators:

$$KP_1 = (MP_{1.1} \cdot KP_{1.1}) +$$
$$+(MP_{1.2} \cdot KP_{1.2}) + (MP_{1.3} \cdot KP_{1.3}) +$$
$$+(MP_{1.4} \cdot KP_{1.4}) + (MP_{1.5} \cdot KP_{1.5}) + (MP_{1.6} \cdot KP_{1.6}).$$

For the control sample KP_1=0.71, for the examined sample KP_1=0.76.

For the group of physical and chemical indicators:

$$KP_2 = (MP_{2.1} \cdot KP_{2.1}) +$$
$$+(MP_{2.2} \cdot KP_{2.2}) + (MP_{2.3} \cdot KP_{2.3}).$$

For the control sample KP_2=0.507, for the examined sample KP_2=0.973.

For the group of indicators of nutritive value:

$$KP_3 = (MP_{3.1} \cdot KP_{3.1}) + (MP_{3.2} \cdot KP_{3.2}).$$

For the control sample KP_3=0.51, for the examined sample KP_3=0,97.

For the group of indicators of biological value:

$$KP_4 = (MP_{4.1.1} \cdot KP_{4.1.1}) + (MP_{4.1.2} \cdot KP_{4.1.2}) +$$
$$+(MP_{4.1.3} \cdot KP_{4.1.3}) + (MP_{4.1.4} \cdot KP_{4.1.4}) +$$
$$+(MP_{4.1.5} \cdot KP_{4.1.5}) + (MP_{4.2.1} \cdot KP_{4.2.1}) +$$
$$+(MP_{4.2.2} \cdot KP_{4.2.2}) + (MP_{4.2.3} \cdot KP_{4.2.3}) +$$
$$+(MP_{4.2.4} \cdot KP_{4.2.4}) + +(MP_{4.2.5} \cdot KP_{4.2.5}) +$$
$$+(MP_{4.3.1} \cdot KP_{4.3.1}) + (MP_{4.3.2} \cdot KP_{4.3.2}) +$$
$$+(MP_{4.3.3} \cdot KP_{4.3.3}) + (MP_{4.3.4} \cdot KP_{4.3.4})$$
$$+(MP_{4.3.5} \cdot KP_{4.3.5}) + (MP_{4.3.6} \cdot KP_{4.3.6}) + (MP_{4.3.7} \cdot KP_{4.3.7}).$$

For the control sample KP_4=0.188, for the examined sample KP_4=0,966.

The calculation of the comprehensive quality assessment of the immunostimulating beverage "Immuno plus" is:

$$KP_0 = (MP_1 \cdot KP_1) + (MP_2 \cdot KP_2) +$$
$$+(MP_3 \cdot KP_3) + (MP_4 \cdot KP_4).$$

Obtained data on the comprehensive quality assessment of the beverage "Immuno plus" are presented in Table 4.

Table 4

Comprehensive quality assessment of the beverage "Immuno plus"

Samples	Quality assessment				
	Properties				Comprehensive assessment
	$MP_1 \cdot KP_1$	$MP_2 \cdot KP_2$	$MP_3 \cdot KP_3$	$MP_4 \cdot KP_4$	K_0
Control	0.25·0.71	0.20·0.507	0.20·0.51	0.35·0.188	0.45
Examined sample of beverage	0.25·0.76	0.20·0.973	0.20·0.97	0.35·0.966	0.92

Since a consumer first pays attention to the organoleptic indicators and nutritive value, these criteria were given the highest weight coefficient (Table 5).

Results of calculation of competitiveness of the control sample and the immunostimulating beverage are presented in Table 6.

Table 5

Scale of assessment of competitiveness of the immunostimulating beverage and the control sample

Title of indicator	K_{weight}	Quality level, points			Characteristics of quality levels		
		4	3	2	Good (4)	Satisfactory (3)	Unsatisfactory (2)
Organoleptic parameters							
Appearance	5	20	15	10	Homogeneous, uniformed	Homogeneous	Non- homogeneous
Color	3	12	9	6	Uniform throughout all surface	Uniform	Not pronounced
Flavor	5	20	15	10	Intensively pronounced	Weakly pronounced	Not pronounced
Fragrance	3	12	9	6	Intensively pronounced	Weakly pronounced	Not pronounced
Consistency	3	12	9	6	Homogeneous surface	Homogeneous surface	Non- homogeneous
Homogeneity	4	16	12	8	Homogeneous	Weakly homogeneous	Non- homogeneous
Physical and chemical parameters							
Mass fraction of carbohydrates, %	10	40	30	20	not less than 2.5	1...2	less than 1
Mass fraction of dry substances, g/100 g of product	5	20	15	10	not less than 5	2...5	less than 2
Active acidity	10	40	30	20	not less than 4.5	3...4.5	less than 3
Indicators of nutritive value							
Mass fraction of food fibers, g	9	36	27	18	not less than 0,9	0.9...0.4	less than 0,4
Energy value, kcal	10	40	30	20	not more than 80	60...75	less than 70
Preventive properties	8	32	24	16	many directions	3–4 directions	1–2 directions
Indicators of innovative activity							
Formulation novelty	10	40	30	20	Protected by patent	Not protected by patent	Not available
Indicators of marketing studies							
Advertisement	7	28	21	14	Television, newspapers, outdoor advertisement	Newspapers, magazines, outdoor advertisement	Not available
Market analysis, demand	8	32	24	16	No competitors, high demand	Weak competition, high demand	Strong competition, weak demand

Table 6

Competitiveness of the control sample and the immunostimulating beverage “Immuno plus”

Title of indicator	K_{weight}	Quality level, points			Assessment of samples	
		4	3	2	Control sample	Beverage «Immuno plus»
Organoleptic parameters						
Appearance	5	20	15	10	10	20
Color	3	12	9	6	6	12
Flavor	5	20	15	10	10	20
Fragrance	3	12	9	6	6	12
Consistency	3	12	9	6	6	12
Homogeneity	4	16	12	8	12	12
Physical and chemical parameters						
Mass fraction of carbohydrates, %	10	40	30	20	20	40
Mass fraction of dry substances, g/100 g of product	5	20	15	10	15	20
Active acidity	10	40	30	20	20	40
Indicators of nutritive value						
Mass fraction of food fibers, g	9	36	27	18	18	36
Energy value, kcal	10	40	30	20	20	40
Preventive properties	8	32	24	16	16	32
Indicators of innovative activity						
Formulation novelty	10	40	30	20	20	40
Indicators of marketing studies						
Advertisement	7	28	21	14	14	21
Market analysis, demand	8	32	24	16	16	32
Integrated indicator of competitive ability	100	400	300	200	209	389
Price for 100 ml	5,0/6.2	5.0/6.2	5.0/6.2	5.0/6.2	5.0	6.2
Competitive ability	20/16.1	80/64.5	60/48.4	40/32.3	41.8	62.7

6. Discussion of results of examining the quality indicators of the beverage "Immuno plus"

An analysis of organoleptic indicators proves high qualitative characteristics of the beverage "Immuno plus". Studies of stability indicators of the beverage allow us to assert that the enhancement of consistency, uniformity and stability of the beverage is explained by the presence of glutin, which acts as hydrocolloid; it is according to these indicators that consumers determine the quality of the beverage.

An analysis of the component composition of the developed beverage showed that the use of selected components in the optimal proportion makes it possible to obtain the product with high nutritive properties.

According to microbiological indicators, the developed beverage "Immuno plus" matches the requirements of current sanitary legislation of Ukraine. The integrated quality assessment of the beverage "Immuno plus" demonstrated that the product is characterized by the improved nutritional and biological value in comparison with the control sample.

Competitiveness of the immunostimulating beverage "Immuno plus" ia 62.7, which exceeds that of the control sample by 1.5 times. Based on this, it is possible to draw a conclusion that the immunostimulating beverage "Immuno plus" will be competitive on the consumer market of Ukraine due to the improved organoleptic indicators, increased content of food fibers, vitamins and mineral substances.

7. Conclusions

1. Based on the technological studies, the indicators, which influence the quality of production in the process of its manufacture, were determined. With the help of the Ishikawa diagram, the generalization of technological requirements for the quality of production with subsequent structuring was carried out. It was established that the most important technological parameters are the raw materials, production technology and the modes of processes, the equipment used, qualification of personnel and the duration of implementation of the technological process.

2. The optimization of component formulation of the beverage "Immuno plus" is carried out with the use of the nested folder "Solution search" in the MS Excel (WINDOWS-2010) software package. The formulation of the immunostimulating beverage includes apple juice, milk serum, banana puree, honey, sweetbrier pulp, and glutin. Data, obtained in the course of the study of the nutritive composition of beverage "Immuno plus", enables us to assert that the beverage is the source of easily assimilated macro- and micronutrients and may be considered an immunostimulating product. It was established that when developing the beverage "Immuno plus", it is necessary to provide the immunostimulating effect through the introduction of biologically active components made of non-traditional raw materials.

3. Data, obtained in the process of assessment of competitiveness of the new product, demonstrated that the immunostimulating beverage "Immuno plus" will be competitive on the consumer market of Ukraine.

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