

STUDY OF SAMBOOKAS QUALITY PARAMETERS

Objective: purpose of the article is study of mousses quality parameters based on semiproduct made of fat-free milk with licorice root extract.

Methods: by conduct of studies, methods as profile analysis and instrumentation methods of chemical composition specification were used; complex quality parameter has been studied with qualimetry method, foaming power and foam consistency determined by standards the method of Lurie, determined chemical composition of wares in the automatic mode in one test on an instrumental device «Bentley-150» за ISO 9001:2000.

Results: based on conducted studies, set of properties of developed products, has been identified; energy value, biological value, organoleptic properties that condition the quality of the food products have been identified.

Academic novelty includes specification of quality parameters of mousses based on semiproduct made of fat-free milk with licorice root extract, as energy, biological value, structural and mechanical, organoleptic, and microbiological properties prove high quality of developed products practicality of their application.

Practical implication: use of this semiproduct in HoReCa applications allows extension of the products range, improvement of its quality, and minimization of number of technological process stages, reduction of costs for transportation and storage of raw feed, improvement of sanitary condition of the enterprise, rhythmical operation of the enterprise during the year.

Key words: quality parameters, semiproduct made of fat-free milk with licorice root extract, mousse, complex quality parameter, energy value, organoleptic properties, sweet dishes, desserts.

Issue of quality and safety of food products is a bottleneck today. Upon believe of well-known scientists of the world, as V.G. Topolnyk, A.S. Ratushnyy, Z.P. Matiukhina, Ie.P. Korolkova, and A.A. Nesterenko, J.R. Brunner, H. Mulder, P. Walstra and others, the very problem of poor quality of food products contributes to significant aggravation of the human health status especially at inhabitants of big cities. At this time, almost every consumer sees problems of milk products quality. Especially now when in difficult economic situation, the production process is mainly oriented to perceptible and prompt economic effect. Therefore, problem is arising that related to preservation of national experience of milk products manufacture and creation of new technologies of semiproducts with high biological value and low caloric value, extended terms of storage, enhanced quality and improved structure is an actual issue for dairy product industry companies.

At contemporary stage, dislocation of balance between production and consumption of sweet dishes, a matter of prospect is use of semiproducts with high degree of preparedness that have range of benefits including stability of raw feed and products made with use of it, reduction of costs for transportation and storage of raw feed, improvement of sanitary condition of the enterprise, rhythmical operation of the enterprise during the year, and low product costs.

Specific **aspects of theory and practice** of milk-based products have been addressed in studies of national and foreign scientists as N.A. Didukh, G.V. Deynychenko, N.N. Lipatov, O.Yu. Prosekov, P.A. Rebinder, and A.G. Khramtsov. Conducted complex of experimental and theoretical studies became a pre-condition for making of new kinds of semiproducts, sweet dishes, and items with foam structure based on fat-free milk. Factor that effected combination of the range is process of culinary products which's structure is disperse system with rather developed phase interface.

Solution for this **problem** is use of multifunctional semiproduct based on fat-free milk with licorice root extract, application of which allows obtaining of high-quality desert products with rather low cost and reduce technological process of production [1].

Conducted studies revealed that use of semiproduct is possible at preparing of sweet dishes and desserts [2]. Hierarchical structure of desert product properties based on developed semiproduct in case of mousses that are required for proper assessment of their quality presented in a figure 1 [3].

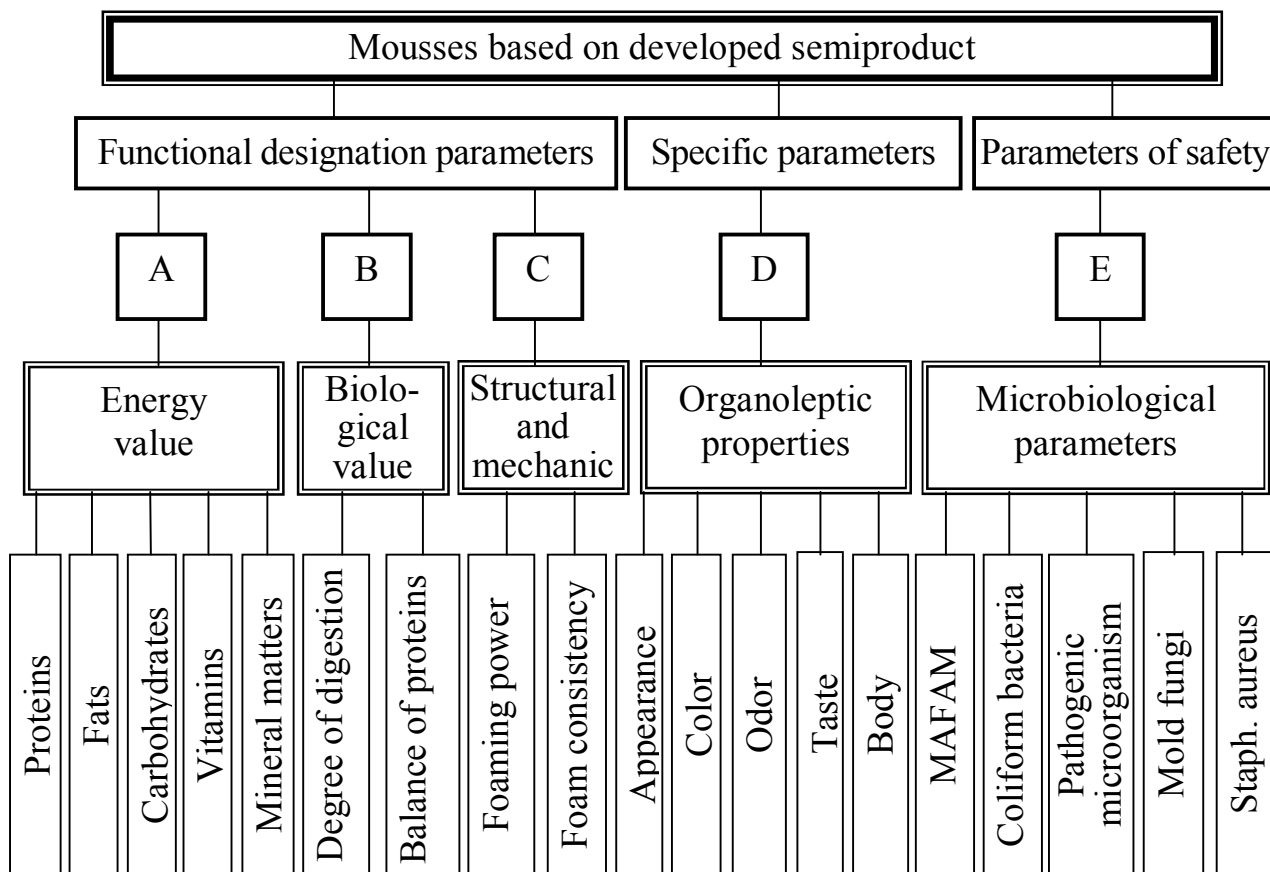


Figure 1 – The hierarchical structure of desert product properties based on developed semiproduct

Functional designation parameters are determined by:

- energy value (A): PA₁ – protein content, PA₂ – fat content, PA₃ – carbohydrate content, PA₄ – vitamin content, PA₅ – mineral matter content;

– biological value (B): PB₁ – degree of digestion with gastro-intestinal tract proteinases (pepsin, trypsin), PB₂ – consistence of protein amount with requirements to balanced diet (pursuant to requirements of FAO/WHO);

– structural and mechanic properties (C): PC₁ – foaming power, PC₂ – foam consistency;

Specific parameters are determined by:

– organoleptic properties (D): PD₁ – appearance, PD₂ – color, PD₃ – odor, PD₄ – taste, PD₅ – body ;

Parameters of safety:

– microbiological parameters (E): PE₁ – common microbial evidence, especially amount of MAFAM; PE₂ – Coliform bacteria; PE₃ – pathogenic microorganism including salmonellae; PE₄ – mold fungi; PE₅ – Staph. aureus.

In accordance with contemporary principles of nutrition, products shall contain wide range of ingredients needed by human organism. For this reason, we have conducted study of mousse chemical composition on the base of developed semiproduct, their balance of nutritional and biological value.

Results of studies are presented in Tables 1, 2.

Table 1 – Chemical Composition of Mousses Based on Semiproduct (per 100 gr)

Name of Kind of Test, Unit	Control Mousse	Novel Technologies		
		Vanilla Mousse	Osoblyvyy Mousse	Fruit Mousse
Proteins, g	3,46	8,82	4,37	3,69
Fats, g	1,02	0,19	0,09	0,07
Carbohydrates, g	34,53	19,83	15,7	16,84
Mineral matters, mg Ca	35,16	94,84	50,7	13,48
Mg	13,18	11,25	9,99	8,7
P	26,47	71,51	37,63	13,98
Fe	1,11	9,05	5,57	5,8
Vitamins, mg A	сл	0,002	0,021	0,334
B ₁	0,67	0,105	0,052	0,05
B ₂	0,73	0,563	0,265	0,22
PP	0,62	0,375	0,294	0,624

Data presented in Table 1 show that mousses based on developed semiproduct have high content of protein and mineral matters, low fat and carbohydrate content compared with control one that is critical in view of provision of body needs in complete proteins.

In Table 2 are given results of study of the consistency of developed dessert products with requirements of nutrition science regarding balanced nutrition [4].

It should be noted that mousses based on developed semiproduct show rather high content of nutrients required for human body, viz sodium, potassium, phosphor, and ferrum, and meet daily demand in protein by 12,2% (Control Value 4,7%), at low fat content.

Table 2 – Consistency of Developed Dessert Products with Requirements of Nutrition Science

Name of Kind of Test, Unit	Daily Nutrients Demand	Control Value	Novel Technologies		
			Vanilla Mousse	Osoblyvy Mousse	Fruit Mousse
Proteins, g	85	4,07	10,38	5,14	4,34
Fats, g	102	1	0,19	0,09	0,07
Carbohydrates, g	382	9,04	5,19	4,11	4,41
Mineral matters, mg Ca	800	4,39	11,86	6,34	1,69
Mg	400	3,3	2,81	2,5	2,17
P	1200	0,09	0,75	0,46	0,48
Fe	14	7,92	64,64	39,79	41,43
Vitamins, mg B ₁	1,7	39,41	6,18	3,06	2,94
B ₂	2,0	36,5	28,15	13,25	11
PP	19	3,26	1,97	1,55	3,28

Previous studies of structural and mechanical properties show enhancement of foaming power and consistency of the foam of products based on semiproduct made of fat-free milk with licorice root extract by 17...34% [5].

Studies of microbiological parameters show that in case of adherence to sanitary and hygienic conditions and consistency of production process with regulation provisions, at controlled terms and conditions of storage, micro-organisms of sanitary-indicative and commensal groups and pathogenic microorganisms have not been detected in developed products [6].

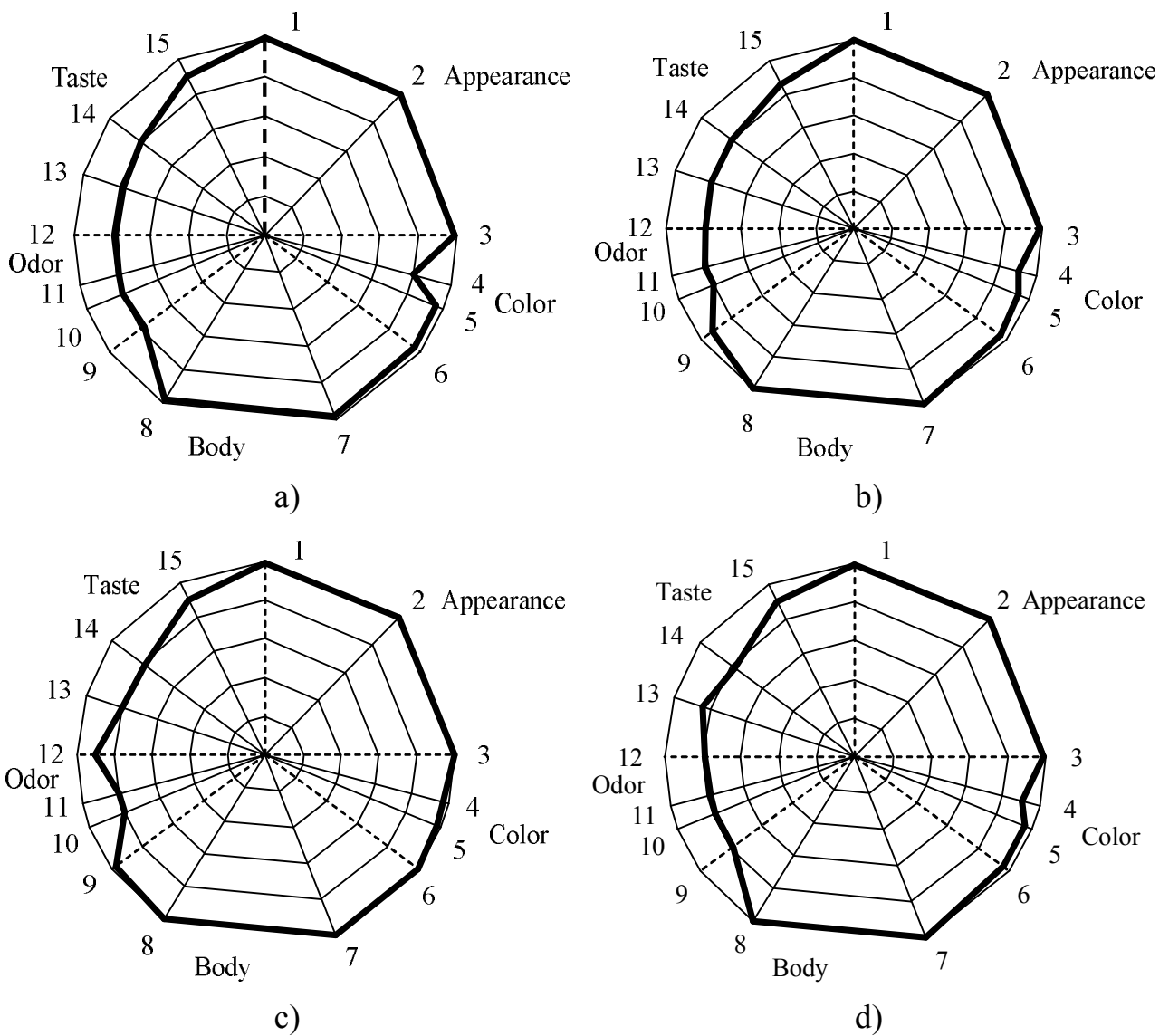
Besides the nutritional value and consistency with provisions of balanced nutrition formula, quality of products is determined by organoleptic parameters and presented in a table 3.

Table 3 – Specification of Organoleptic Parameters of Mousses

Name of Parameters	Specification of Semiproduct
Appearance, Body	Foam Mass with Velvet Surface, Porous, Homogeneous along Whole Mass, Non-Liquid, Consistent
Color	A little creamy, specific for that product. Allowed are insignificant speckles of particles of fruits without foreign admixings
Odor	Clean, strong, with no foreign smells
Taste	Clean, strong, specific for that sort of dish and raw feed which is used in it, without foreign flavors

Organoleptic profiles of mousses have been plotted presented in a figure 2.

Analysis of organoleptic parameters that are presented in Table 3 shows the high quality parameters of sweet dishes prepared based on semiproduct. General note of Osoblyvy, fruit, and vanilla mousses makes 4,64, 4,73, 4,66 respectively as compared with control one, which's general note is 4,60 scores. It means that mousses prepared based on developed semiproduct exceeds the control by 1...3%.



a – Mousse (Control); b – Osoblyvy (Special) Mousse;
c – Fruit Mousse; d – Vanilla Mousse.

Figure 2 – Organoleptic profiles of mousSES

On the basis of previous studies, complex parameter of product quality has been developed. Determination of relative parameters P_i , was performed under formula:

$$K_i = \frac{P_i}{P_{i\delta a3}}, \quad (1)$$

where P_i – value of i -parameter (and = 1, 2, 3... n) of quality of the product being assessed;

$P_{i\delta a3}$ – basic value of i -parameter.

Calculation of quality assessments K_i of specific properties has been determined with application of Harrington's Desirability Function graph for properties of the groups A, B, C, D, E. Obtained results of calculations are presented in Table 4.

Table 4 – Determination of relative parameters

Metages	Quantitative quality parameter					Relative quality parameters				
	Code	Vanilla Mousse	Osoblyvy Mousse	Fruit Mousse	Control	Code	Vanilla Mousse	Osoblyvy Mousse	Fruit Mousse	Control
%	PA ₁	8,82	4,37	3,69	3,46	KA ₁	0,994	0,658	0,544	0,506
%	PA ₂	0,19	0,09	0,07	1,02	KA ₂	0,396	0,822	0,876	0,056
%	PA ₃	19,83	15,7	16,84	34,53	KA ₃	0,948	0,994	0,990	0,412
%	PA ₄	0,011	0,01	0,012	0,02	KA ₄	0,233	0,230	0,234	0,394
%	PA ₅	1,87	1,04	0,42	0,76	KA ₅	0,996	0,788	0,412	0,614
(mg/eq%)	PB ₁	147,3	139,1	143,3	92,4	KB ₁	0,998	0,976	0,982	0,396
g	PB ₂	10,38	5,14	4,34	4,07	KB ₂	0,997	0,568	0,398	0,452
%	PC ₁	320	280	300	240	KC ₁	0,976	0,904	0,948	0,741
%	PC ₂	94	96	98	94	KC ₂	0,752	0,914	0,974	0,752
c.un	PD ₁	48	49	49	48	KD ₁	0,982	0,993	0,993	0,982
c.un	PD ₂	47	46	47	45	KD ₂	0,967	0,947	0,967	0,921
c.un	PD ₃	48	49	49	47	KD ₃	0,982	0,993	0,993	0,967
c.un	PD ₄	46	48	47	46	KD ₄	0,947	0,982	0,967	0,947
c.un	PD ₅	46	48	48	45	KD ₅	0,947	0,982	0,982	0,921
CFU/g	PE ₁	3,5·10 ²	4,7·10 ²	3,8·10 ²	5,0·10 ³	KE ₁	0,921	0,845	0,904	0,821

Weightage coefficients were determined by expert method according to:

$$\sum_{i=1}^n M_i = 1, \quad (2)$$

where M_i – weightage coefficient of i -parameter ($M_i > 0$);
 n – number of products quality parameters.

$$M_i = \frac{M_i}{\sum_{i=1}^n M_i}, \quad (3)$$

$$M_i = \frac{1}{N} \sum_{j=1}^n M_{ij}, \text{ (and } = 1, 2, 3 \dots N) \quad (4)$$

where M_i – arithmetical mean of weightage coefficient of i -quality parameter;
 N – number of experts;
 M_{ij} – weightage coefficient of i -quality parameter given by j -expert
($j = 1, 2, 3 \dots N$).

To summarize the quality assessments of specific properties, additive model of complex assessment presented with arithmetical means has been adopted:

$$K_0 = (x_1 \wedge x_2) \sum_{i=1}^N M_i \cdot K_i, \quad (5)$$

where K_0 – complex parameter of products quality;

$x_1 \wedge x_2$ – veto function that is generated by quality parameters that have alternative character;

M_i – weightage coefficient of single parameters;

K_i – assessment of parameters.

Table 5 – Complex Assessment of Quality of Protein and Vegetable Semiproducts

Sample	Quality Value per Groups of Properties					Complex Assessment K_0
	KA ₀	KB ₀	KC ₀	KD ₀	KE ₀	
Vanilla Mousse	0,789	0,997	0,874	0,958	0,921	0,909
Osoblyvy Mousse	0,709	0,760	0,909	0,980	0,845	0,840
Fruit Mousse	0,621	0,672	0,960	0,977	0,904	0,825
Control	0,423	0,426	0,746	0,942	0,821	0,681

Analysis of obtained data proves that complex parameter of products quality based on developed semiproduct makes 0,909...0,825 units compared with control one (0,681 units), that enables to position them within 'very good' quality range.

Therefore, determined quality parameters as energy, biological value, structural and mechanical, organoleptic, and microbiological properties, prove high quality of developed products practicality of their application.

Prospective of further researches is determination of possibility to use the developed semiproduct in processes of dressings and study of their quality parameters.

Список літератури / References:

- Гніцевич В.А. Технологія молочно-рослинного напівфабрикату для солодких страв та його властивості / В.А. Гніцевич, Н.В. Вольнова // Обладнання та технології харчових виробництв. – 2010. – Вип. 25. – С. 64-69.
Gnitsevych, V.A. and Volnova, N.V. (2010), "Development technology of milk intermediate product is for production of sweet foods with foamy structure", *Obladnannia ta tekhnolohii kharchovykh vyrobnytstv*, vol. 25, pp. 64-69.
- Гніцевич В.А. Использование молочно-растительного полуфабриката в технологии десертной продукции / В.А. Гніцевич, Н.В. Вольнова // Харчова наука, техніка та технології. – 2010. – Вип. LVII, ч. 1. – С. 91-95.
Gnitsevych, V.A. and Volnova, N.V. (2010), "Useing of milk-plants intermediate product in technology of dessert products", *Kharchova nauka, technika ta technologii*, vol. LVII, part 1, pp. 91-95.

3. Топольник В.Г. Квалиметрия в ресторанном хозяйстве: монография / В.Г. Топольник, А.С. Ратушный. – Донецк: ДонНУЭТ, 2008. – 243 с.
Topolnik, V.G. and Ratushnyy, A.S. (2008), *Kvalimetriya v restorannom khozyaystve* [Kvalimetriya in restaurant facilities], DonNUET, Donetsk, Ukraine.
4. Химический состав блюд и кулинарных изделий. Справочные таблицы содержания основных пищевых веществ и энергетической ценности блюд и кулинарных изделий: в 2-х т. / Под ред. И.М. Скурихина и М.И. Волгарева. – М., 1994. – Т. 2. – 304 с.
Khimicheskiy sostav blyud i kulinarykh izdeliy. Spravochnyye tablitsy soderzhaniya osnovnykh pishchevykh veshchestv i energeticheskoy tsennosti blyud i kulinarykh izdeliy (1994), Tom 2, Moscow, Russia.
5. Гніцевич В.А. Порівняльна характеристика функціонально-технологічних властивостей напівфабрикату на основі знежиреного молока / В.А. Гніцевич, Н.В. Вольнова, Н.С. Вискребенцева // Хлібопродукти. – 2010. – Вип. 38, т. 1.
Gnitsevych, V.A., Volnova, N.V. and Vyskrebentseva, N.S. (2010), “Comparative description of functionally-technological properties of intermediate product on the basis of fat free milk”, *Khliboprodukty*, issue 38, vol. 1.
6. Гніцевич В.А. Обґрунтування термінів зберігання напівфабрикату на основі знежиреного молока з використанням екстракту кореня солодки / В.А. Гніцевич, Н.В. Кравченко // Науковий вісник Полтавського університету економіки і торгівлі. – 2011. – Вип. 1 (52). – С. 141-144.
Gnitsevych, V.A. and Volnova, N.V. (2011), “Ground of shelf-lives intermediate product on the basis of fat free milk with the use licorice root extract”, *Naukoviy visnyk Poltava University of Economics and Trade*, vol. 1 (52), pp. 141-144.

Мета: метою статті є дослідження показників якості самбуків на основі напівфабрикату зі знежиреного молока з екстрактом кореня солодки.

Методика: під час проведення досліджень використано методи профільного аналізу, інструментальні методи визначення хімічного складу; комплексний показник якості визначали методом кваліметрії, піноутворювальну здатність та стійкість піни зразків визначали методом Лур'є, хімічний склад виробів визначали в автоматичному режимі в одній пробі на інструментальному приладі «Bentley-150» за ISO 9001:2000.

Результати: на підставі проведених досліджень встановлено сукупність властивостей розробленої продукції, визначено енергетичну, біологічну цінність, органолептичні властивості, що обумовлюють якість харчових продуктів.

Наукова новизна полягає у визначенні показників якості самбуків на основі напівфабрикату зі знежиреного молока з екстрактом кореня солодки, а саме енергетичної, біологічної цінності, структурно-механічних, органолептичних та мікробіологічних властивостей, підтвердження високої якості розроблених виробів та доцільності їхнього застосування.

Практична значущість: використання цього напівфабрикату на підприємствах ресторанного господарства дозволить розширити асортимент продукції, підвищити її якість, знизити стабільність технологічного процесу, затрати на транспортування та зберігання сировини, сприятиме покращенню санітарного стану підприємства, ритмічній роботі підприємства протягом року.

Ключові слова: показники якості, напівфабрикат зі знежиреного молока з екстрактом кореня солодки, самбук, комплексний показник якості, енергетична цінність, органолептичні властивості, солодкі страви, десерти.

Цель: целью статьи является исследование показателей качеств самбуков на основе полуфабриката из обезжиренного молока с экстрактом корня солодки.

Методика: при проведении исследований использованы методы профильного анализа, инструментальные методы определения химического состава; комплексный показатель качества определяли методом квалитметрии, пенообразующую способность и стойкость пены образцов определяли методом Лурье, химический состав изделий определяли в автоматическом режиме в одной пробе на инструментальном приборе «Bentley-150» по ISO 9001:2000.

Результаты: на основании проведенных исследований установлена совокупность свойств разработанной продукции, определены энергетическая, биологическая ценность, органолептические свойства, которые обуславливают качество пищевых продуктов.

Научная новизна заключается в определении показателей качества самбуков на основе полуфабриката из обезжиренного молока с использованием экстракта корня солодки, а именно энергетической, биологической ценности, структурно-механических, органолептических и микробиологических свойств, подтверждения высокого качества разработанных изделий и целесообразности их применения.

Практическая значимость: использование этого полуфабриката на предприятиях ресторанного хозяйства позволит расширить ассортимент продукции, повысить ее качество, снизить стадийность технологического процесса, затраты на транспортировку и хранение сырья, будет способствовать улучшению санитарного состояния предприятия, ритмичной работе предприятия на протяжении года.

Ключевые слова: показатели качества, полуфабрикат из обезжиренного молока с экстрактом корня солодки, самбук, комплексный показатель качества, энергетическая ценность, органолептические свойства, сладкие блюда, десерты.

*Рекомендовано до публікації д-ром техн. наук,
проф. Пересічним М.І.*

Дата надходження рукопису 11.02.2013 р.

УДК 641.85:637.247

**Gnitsevych V.A., Dr. Sci. (Tech.), Prof.,
Fedotova N.A., Cand. Sci. (Tech.),
Assoc. Prof.,
Mechetna K.Y.**

Donetsk National University of Economics and
Trade named after Mykhailo Tugan-Baranovsky in
Donetsk, Ukraine,
e-mail: tehno1@kaf.donduet.edu.ua

DEVELOPMENT OF TECHNOLOGY FOR PROTEIN-VEGETABLE SEMI-FINISHED PRODUCTS ON THE BASIS OF MILK WHEY AND DETERMINE ITS SHELF LIFE

Objective is to develop the technology of protein-vegetable semifinished using raw material which is a carrier, on the one hand, functional and technological (proteins, pectins), and on the other – functional and physiological ingredients (essential aminoacids, vitamins, micro- and macroelements) that can be process in whipped dessert products without the use of special equipment and extra time.

Therefore, the development of technology of semifinished high degree of readiness will rationally use of secondary raw milk and plant resources, expand the range of culinary products with controlled structural and mechanical and organoleptic characteristics and enriched biologically active substances.