Венера Серикбаевна Жамурова – ауыл шаруашылығы ғылымдарының кандидаты, «Тағам өнімдерінің технологиясы және қауіпсіздігі» кафедрасының қауымдастырылған профессоры; Қазақ ұлттық аграрлық зерттеу университеті, Алматы қаласы, Қазақстан Республикасы; e-mail: zhamurova@yandex.ru. ORCID: https://orcid.org/0000-0002-0972-2785.

Акылжан Туралыевич Кожабергенов – ауыл шаруашылығы ғылымдарының кандидаты, «Тағам өнімдерінің технологиясы және қауіпсіздігі» кафедрасының қауымдастырылған профессоры; Қазақ ұлттық аграрлық зерттеу университеті, Алматы қаласы, Қазақстан Республикасы; e-mail: kozhabergenov79@yandex.ru. ORCID: https://orcid.org/0000-0002-5963-1435.

Сведения об авторах

Амина Болатовна Намысбаева* – докторант кафедры «Технология и безопасность пищевых продуктов»; Казахский национальный аграрный исследовательский университет, город Алматы, Республика Казахстан; e-mail: namysbayeva_a@mail.ru. ORCID: https://orcid.org/0000-0002-0998-331X.

Венера Серикбаевна Жамурова – кандидат сельскохозяйственных наук, ассоциированный профессор кафедры «Технология и безопасность пищевых продуктов»; Казахский национальный аграрный исследовательский университет, город Алматы, Республика Казахстан; e-mail: zhamurova@yandex.ru. ORCID: https://orcid.org/0000-0002-0972-2785.

Акылжан Туралыевич Кожабергенов – кандидат сельскохозяйственных наук, ассоциированный профессор кафедры «Технология и безопасность пищевых продуктов»; Казахский национальный аграрный исследовательский университет, город Алматы, Республика Казахстан; e-mail: kozhabergenov79@yandex.ru. ORCID: https://orcid.org/0000-0002-5963-1435.

Information about the authors

Amina Namysbayeva* – Doctoral student of the Department of Technology and safety of food products; Kazakh National Agrarian Research University, Almaty, Republic of Kazakhstan; e-mail: namysbayeva_a@mail.ru. ORCID: https://orcid.org/0000-0002-0998-331X.

Venera Zhamurova – Candidate of Agricultural Sciences, Associate Professor of the Department of Technology and safety of food products; Kazakh National Agrarian Research University, Almaty, Republic of Kazakhstan; e-mail: zhamurova@yandex.ru. ORCID: https://orcid.org/0000-0002-0972-2785.

Akylzhan Kozhabergenov – Candidate of Agricultural Sciences, Associate Professor of the Department of Technology and safety of food products; Kazakh National Agrarian Research University, Almaty, Republic of Kazakhstan; e-mail: kozhabergenov79@yandex.ru. ORCID: https://orcid.org/0000-0002-5963-1435.

Редакцияға енуі 11.02.2024
Өңдеуден кейін түсуі 01.04.2024
Жариялауға қабылданды 02.04.2024

DOI: 10.53360/2788-7995-2024-2(14)-32

IRSTI: 65.09.03

Zh.A. Abish[1], R.S. Alibekov[1], G.E. Orymbetova[2]*, A.A. Utebaeva[1], E.V. Sysoeva[3]
[1]M. Auezov South Kazakhstan University,
160012, Republic of Kazakhstan, Shymkent City, Tauke khan avenue, 5
[2]South Kazakhstan Medical Academy,
Republic of Kazakhstan, Shymkent, Al-Farabi Square, 1/1
[3]Kazan National Research Technological University,
420015, Russian Federation, Kazan, 6 Karl Marx Street
*e-mail: orim_77@mail.ru

CHARACTERISTICS OF MILK WHEY BASED MOUSSE

Annotation: *Now consumer interest in the use of natural ingredients and products in nutrition for therapeutic purposes is increasing. Such kind of the products include milk whey. In our country, they are produced in limited quantities. In connection with such recommendations, it is necessary to look for ways and means of solving the problems of rational processing of secondary raw materials by developing functional foods.This paper shows results of the textural analyses, sensory evaluation and some physicochemical parameters, also content or mineral elements of the developed mousse samples based on milk whey. For the*

stabilization and to reach foamy consistency were used pectin and agar. From the results of texture analyzer, sample with the use of pectin as a fixative, the mousse becomes more resistant to mechanical stress, and the strength of the mousse increases. The peak strength of the sample was 1,605 N. The sample with pectin has an elasticity – 1,569 N, the viscosity is – 1,448 N. It can be established that the sample with pectin has a more delicate consistency. Based on the study's findings, it can be noted that all physicochemical indicators are acceptable, according to the standards. The results shows that the composition of whey-based mousse samples contains basic microelements. For mousse with pectin are carbon – 12,45%, potassium – 14,14%, sodium – 10,84% and phosphorus – 9,10%, calcium – 8,33% of the total mineral content. For mousse with agar are carbon – 18,97%, potassium – 15,99%, sodium – 9,20% and chlorine – 6,93%, phosphorus – 7,39%, calcium – 5,23% of the total mineral content.

Key words: *mousse, stabilizers, secondary raw materials, whey, black currant, functional ingredients.*

Introduction

Numerous research organizations are actively engaged in developing novel products from secondary raw materials to effectively preserve bioactive compounds for subsequent utilization by food industry entities. Given emerging trends, exploring the potential and viability of producing products derived from cottage cheese whey is both scientifically and practically intriguing. A persistent issue encountered across dairy facilities, particularly those involved in cottage cheese and cheese production, is the generation of waste-whey. It's worth noting that whey, in its composition, aligns well with the principles of balanced and nutritious consumption [1,2].

In the production of dessert dairy products, milk processing products are used, such as buttermilk, curd whey, sour cream, skimmed milk. Various pre-packaged desserts such as dairy and non-dairy jellies, creams, and puddings have been developed and incorporated into dietary practices internationally. In Switzerland, a technique is employed to create a sweet dairy dessert consisting of two layers: a lower layer of fruit and an upper layer composed of a dairy product like yogurt. Agar is introduced into the mixture to solidify the structure of the upper layer. The dairy component is derived from skimmed milk [3]. Dessert manufacturing involves the use of stabilization systems, which offer colloidal protection to the protein, enabling heat treatment in an acidic environment, providing a specific viscosity to the product, and safeguarding it against separation during storage. It is recommended to utilize pectins and starch in this process. Pectin's prebiotic attributes stem from its ability to serve as a growth medium for the native flora of the human gastrointestinal tract, which includes up to 90% bifidobacteria [4]. Mousse more often than not utilizing topping cream, which is prepared into whipped cream at that point included new dairy drain and with a bit of gelatin as a binder [5].

Canistle contains special nutrients, so it has potential as a functional food. One way to use fruit is to process it into innovative foods, such as dessert mousse. The aim was to investigate the differences in foam quality using animal and vegetable recipes treated with a gelatin stabilizer substitute [6,7]. This article describes the production technique and quality of the «Protein Tiramisu» dessert. Protein Tiramisu is made from milk protein concentrate, a new type of non-traditional protein-rich raw material, characterized by an increased content of all essential amino acids, a better balance of amino acid composition and an optimal correlation of essential amino acids [8]. Ready to eat whipped chocolate dairy desserts can have many nutritional and sensory advantages over home made desserts, with fresh taste, digestibility and higher vitamin level.Therefore studies were carried out to formulate Chocolate dairy Mousse with good sensory appeal. Three samples were prepared by changing level of Sugar as 12%, 14,5%, 16%, while keeping other ingredients constant. Organoleptic qualities of samples were evaluated with 25 experienced taste panel using nine hedonic scales [9].

In this paper authors provide that aerated dairy desserts have demonstrated considerable market promise, and mousse, characterized by its stabilized foamy structure, has transitioned from a traditionally homemade treat to being industrially manufactured on a large scale, steadily claiming its share in the dessert market [10]. Although there is no specific legislation about physical-chemical standards for the product, all the values found were similar to similar studies. Since developing and publishing results of new products for people with nutritional restrictions is of extreme necessity for the food manufacture [11]. Agar, a gelatinous polysaccharide found in the cell walls of numerous red algal species, is commonly employed as a gelling, thickening, and stabilizing agent. It boasts a

significant soluble fiber content and has been demonstrated to slow gastric emptying (GE) while not affecting glycemic response [12].

Authors provide that black currant has notable levels of ascorbic acid ranging from 50 to 280 mg. per 100 g. or 300 mg. per 100 ml. of juice, coupled with a rich flavonoid content, these berries exhibit enhanced antioxidant capacity. This combination augments their potential to offer health benefits, with the antioxidant properties of BC mainly attributed to its phenolic compounds. [13]. Studies showed very strong biological activity, including inhibition of cell proliferation, in addition to antimutagenic, antimicrobial, anti-inflammatory, anti-cancer and antihypertensive properties [14].

The aim of the work was to determine the expediency of replacing standard traditional high-calorie confectionery products with dietary functional sweet dishes of reduced calorie content mousses based on whey. The novelty of the work was to expand the range of mousse desserts through the use of secondary dairy raw materials, in particular whey and using of agar and pectin as a stabilization system.

Reaserch methods

The main object of the study is a mousse based on whey. During the work, 2 samples with different stabilizers were developed. In the course of research, agar and pectin were introduced in the form of stabilization systems to preserve the foam-like structure of the mousse. Black currant was used as a berry raw material.

Description of the technological process preparation of mousse samples. Soak the stabilizer (agar-agar and pectin) in water. Bring the whey to a boil, add sugar, pour a stabilizer (agar-agar or pectin) and add pre-cooked black currant puree, after boil for 2 minutes. Strain the obtained mass. Then cool the mass and beat with a mixer for 10-15 minutes, until it doubles in volume and brightens.

The acidity of the mousse was determined according to GOST 5898-87 «Confectionery products. Methods for determining acidity and alkalinity» [15]. The texture analysis of mousse samples was performed on a Lamy rheology Texture analyzer TX-700 device. Mousse samples stored at 5±1^{o}C were placed in the center under a cylindrical probe. The tests were carried out at an ambient temperature of 18±2°C. The speed of the probe was 5 mm/s. The depth of immersion was 10 mm. The organoleptic evaluation was performed using GOST 18488-2000 «Food concentrates of sweet dishes. General specifications» [16].

Research results

Traditionally, the technology of mousse production is based on the use of water, in this work we used whey to create functional products. This technological approach was based on the prospects of using whey for food purposes, which is due to a number of factors: the properties and composition of whey, its relative cheapness and accessibility, and the solution of an environmental problem [17].

Considering whey as the perspective basis of mousse having high nutrition and biological value, with purpose of improvement of the production technology of the whipped products, we have conducted researches on studying of frequency rate and stability of foams of the whipped mousses depending on type of foamers and conditions of whipping, in view of, shortcomings of traditionally used foamers. Formation of foam in the products happens, thanks to foam-forming ability of whey proteins [19].

During the experimental work, two mousse samples were developed, the first using pectin and the second with agar as a stabilizing agent.

The results of the sensory evaluation of mousse prototypes according to GOST 18488-2000 [16] are shown in Table 1.

Based on the data in the table, It can be stated that the sensory parameters of both samples of whey-based mousse correspond to GOST 18488-2000 [15] have a homogeneous foamy whipped mass and retain their shape well. A mousse sample using agar has a denser consistency compared to a mousse sample using pectin as a fixative, stabilizing agent.

The results of the mass fraction of titrated acids (in terms of citric acid) and pH, as well as the mass fraction of moisture content of whey-based mousse samples are presented in Table 2.

Table 1 – Sensory parameters mousses based on milk whey

Name	Mousses with pectin	Mousse with agar	GOST 18488-2000
Appearance	Foam-like solidified mass well beaten into foam, retains its shape	Foam-like solidified mass well beaten into foam, retains its shape	Characteristic of the corresponding dishes prepared in the usual culinary way
Colour	The burgundy color is characteristic of added berry	The rich burgundy color is characteristic of added berry	Characteristic of the corresponding dishes prepared in the usual culinary way
Smell and taste	The smell is berry, the taste is moderately sweet and sour. Without of foreign odors and flavors	The smell is berry, the taste is moderately sweet and sour, moderately tart is inherent in the berry. without of foreign odors and flavors	Characteristic of the corresponding dishes prepared in the usual culinary way
Consistency	Elastic lush delicate	Elastic, lush, delicate, slightly dense	Foamy, homogeneous

Table 2 – Physicochemical parameters mousses based on milk whey

Name	Mousses with pectin	Mousse with agar
Titrated acidity, %	1,3	1,2
pH,psc	3,5±0,5	3,68±0,5
Mass fraction of humidity, %	74,35	76,42

From the data that shown in the table, It is important to observe that the acidity level of the 1st mousse sample was – 1,3%; the 2nd sample was – 1,2%. Based on the findings of the research, it can be observed that all three indicators are acceptable, according to the standards. The results of texture analysis of mousse samples based on milk whey is depicted in the figure 1.

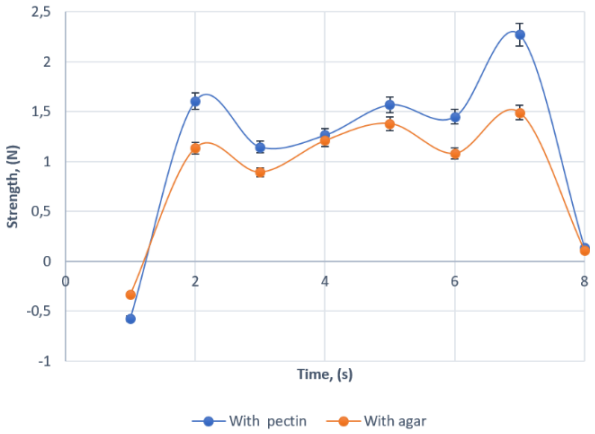
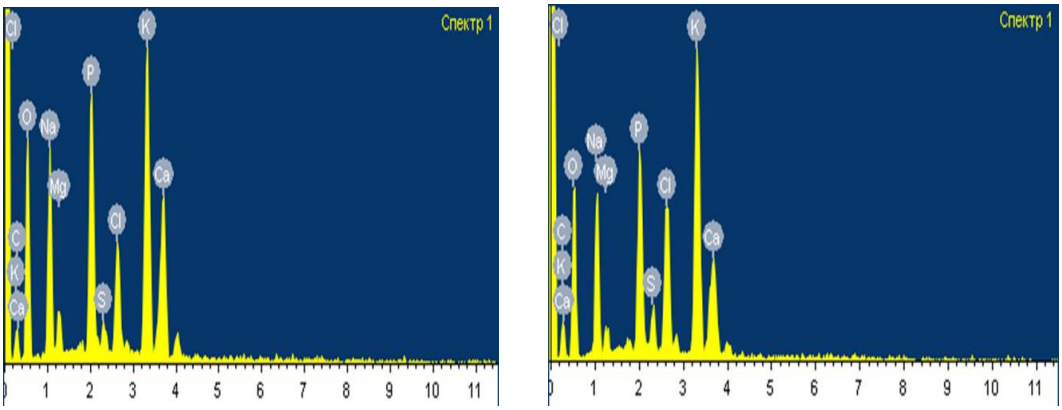


Figure 1 – Textural characteristics of whey-based mousse samples

The texturometer readings in figure 1 indicate that with the use of pectin as a fixative, the mousse becomes more resistant to mechanical stress, and the strength of the mousse increases. As depicted in figure 1, the force continues to increase until the mousse structure breaks. The peak strength of the sample was – 1,605 N, the sample with agar was – 1,134 N. The sample with pectin has an elasticity – 1,569 N, the viscosity is – 1,448 N, and the chewiness was – 2,272. The sample with agar has an elasticity of – 1,380 N, viscosity – 1,080 N and chewiness – 1,490. From the aforementioned, it can be concluded that the sample with pectin has a more delicate consistency. Figure 2 shows spectrograms of whey-based mousse samples using pectin and agar as a fixative and stabilizer.



a) b)

Figure 2 – Spectrograms of mousse with pectin (a) and mousse with agar (b)

The results of processing the experimental data shown in figure 2 in the form of a table are displayed in Table 3.

Table 3 – The mineral element composition of mousses made from milk whey

Name	The content of mineral elements, %								
	C	O	Na	Mg	P	S	Cl	K	Ca
Mousse with pectin	12,45	38,02	10,84	1,91	9,10	0,98	4,23	14,14	8,33
Mousse with agar-agar	18,97	33,48	9,20	1,18	7,39	1,64	6,93	15,99	5,23

The results of tabulated data reveals that the composition of mousse samples based on whey contains an adequate amount of essential mineral elements enter the human body. It can be noted that the major elements of the mousse with pectin are carbon – 12,45%, potassium – 14,14%, sodium – 10,84% and phosphorus – 9,10%, calcium – 8,33% of the total mineral content. For mousse with agar are carbon – 18,97%, potassium – 15,99% sodium – 9,20% and chlorine – 6,93%, phosphorus – 7,39%, calcium – 5,23% of the total mineral content. Thus, based on the study of the mineral composition, it can be argued that mousse based on whey can expand the range of desserts for functional purposes in the food industry. In addition to producing a new product, the production of aerated desserts increases the power of consumer choice and increases profitability for the producer and can effectively contribute to the growth of the industrial economy [18].

Discussion of scientific results

Nowadays, the production of functional products is an urgent task of the food industry. All over the world, on a large scale, there is constant work on the development and creation of new functional food products with a broad spectrum of uses, as well as a certain focus on biotope, system, disease. Whey, boasting a low energy content but high biological value, serves as a rich source of essential nutritional elements. Hence, it is recommended for utilization as a foundation for the creation of products with functional attributes. One promising avenue for whey usage is in producing items enriched with functional ingredients, imparting preventive properties against various diseases such as those affecting the digestive system, cardiovascular system, and diabetes. The array of products derived from whey is extensive, predominantly comprising beverages, so it can be established that desserts based on whey are one of the promising directions. Mousse based on whey to diversify the selection of desserts for functional purposes.

Conslusion

The studies carried out showed the following results:

– the sensory evaluation provide that mousse samples based on milk whey have foam-like solidified mass well beaten into foam, retains its shape and without any foreign taste and smell.

The results of physicochemical parameters of mousses were have been showed that all indicators of the samples comply with the standards.

The texture analyzer readings indicate that with the use of pectin as a fixative, the mousse becomes more resistant to mechanical stress, and the strength of the mousse increases. The peak strength of the sample was 1,605 N. The sample with pectin has an elasticity – 1,569 N, the viscosity

is – 1,448 N, and the chewiness was – 2,272. Established that the sample with pectin has a more delicate consistency.

Both samples of mousses are rich in basic macroelements. For mousse with pectin are carbon – 12,45%, potassium – 14,14%, sodium -10.84% and phosphorus – 9,10%, calcium – 8,33% of the total mineral content. For mousse with agar are carbon – 18,97%, potassium – 15,99% sodium – 9,20% and chlorine – 6,93%, phosphorus – 7,39%, calcium – 5,23% of the total mineral content.

According to the totality of studies, it was decided that mousse based on whey with pectin is a promising product.

Список литературы

1. The prospects of using milk whey / Zh.A. Abish et al // Proceedings international scientific-practical conference: «Auezov readings–21: new kazakhstan – the future of the country» dedicated to the 80th anniversary of M. Auezov south kazakhstan university – Shymkent: M. Auezov SKU, 2023.
2. Characterisation and processing alternatives of milk whey / Zh.A. Abish et al // Bulletin of Shakarim University. Technical Sciences. – 2024. – №. 1(13).
3. Назаренко Т.А. Разработка многокомпонентной рецептуры и способа производства десертного пудинга / Т.А. Назаренко // Вестник ИнЕУ. – 2012. – № 2. – С. 92-95.
4. Гаврилова Н.Б. Научные и практические аспекты технологии производства молочно-растительных продуктов: Монография / Н.Б. Гаврилова и др. – Омск: Издательство ОмГАУ, 2006. – 336 с.
5. Panji D.D. Pemanfaatan Buah Nangka Sebagai Subtitusi Gula Dan Lemak Nabati Pada Mousse 2019 / D.D. Panji, V. Octaviany, D. Gusnadi // eProceedings of Applied Science. – 2019. – Т. 5, №. 3.
6. Characteristics Of Vegetable Canistel Mousse Dessert (Pouteria campechiana) Using Polysacaride Stabilizer / E. Hesthiati et al // Proceedings of the 6th North American International Conference on Industrial Engineering and Operations Management, Monterrey, Mexico, 2021/ – № 3. https://doi.org/10.46254/NA06.20210634.
7. Deinychenko L. Technology and quality of whipped desserts based on milk-protein concentrate / L. Deinychenko // Редакційна колегія. – 2018. – С. 189.
8. Dahanayaka T.P. J. Formulation and sensory evaluation of ready to eat whipped chocolate dairy dessert.(chocolate mousse): дис. – 2004.
9. Potentially probiotic and synbiotic chocolate mousse / L.C. Aragon-Alegro et al. // LWT-Food Science and technology. – 2007. – Т. 40, № 4. – С. 669-675.
10. Preparation of milk dessert type mousse type sweet potato flavor (ipomoea potatas l) / Menezes L.M.F. et al // No lactose and no added sugar. – 2021.
11. Factors affecting yield and gelling properties of agar / W.K. Lee et al // Journal of Applied Phycology. – 2017. – Т. 29. – С. 1527-1540. https://doi.org/10.1007/s10811-016-1009-y.
12. Clegg M.E. The effect of agar jelly on energy expenditure, appetite, gastric emptying and glycaemic response / M.E. Clegg, A. Shafat // European journal of nutrition. – 2014. – Т. 53. – С. 533-539.
13. Cortez R.E. Blackcurrants (Ribes nigrum): A review on chemistry, processing, and health benefits / R.E. Cortez, E. Gonzalez de Mejia // Journal of food science. – 2019. – Т. 84, №. 9. – С. 2387-2401. https://doi.org/10.1111/1750-3841.14781.
14. Bioactive compounds and antimicrobial activity of black currant (Ribes nigrum L.) berries and leaves extract obtained by different soil management system / S.M. Paunović et al // Scientia Horticulturae. – 2017. – Т. 222. – С. 69-75. https: //doi.org/10.1016/j.scienta.2017.05.015.
15. ГОСТ 5898-87. Изделия кондитерские. Методы определения кислотности и щелочности. – Москва: Стандарт информ, 2012. – 10 с.
16. ГОСТ 18488-2000. Концентраты пищевые сладких блюд. Общие технические условия. – Минск: Межгос-й совет по стандарт., метрол. и сертификации, 2000. – 8 с.
17. Взбитый десерт на основе молочной сыворотки с пищевыми волокнами Citri-Fi / Е.А. Плеханова и др. // Техника и технология пищевых производств – 2014. – Т. 1, № 32. – С. 73-77.

18. Optimization of Formulation for Aerated Dessert Containing Whey Protein and Xanthan Gum Concentrate using Response Surface Methodology and Investigation on Rheological and Texture Properties / P. Sara et al // Research and Innovation in Food Science and Technology. – 2022. –Т. 1, № 16. https://doi.org/10.22101/JRIFST.2020.254462.1192.
19. Mousse from caseic whey / M. Kassymova et al // Научный журнал «Доклады НАН РК». – 2021. – № 6. – С. 50-57.

References

1. The prospects of using milk whey / Zh.A. Abish et al // Proceedings international scientific-practical conference: «Auezov readings–21: new kazakhstan – the future of the country» dedicated to the 80th anniversary of M. Auezov south kazakhstan university – Shymkent: M. Auezov SKU, 2023. (In English).
2. Characterisation and processing alternatives of milk whey / Zh.A. Abish et al // Bulletin of Shakarim University. Technical Sciences. – 2024. – №. 1(13). (In English).
3. Nazarenko T.A. Razrabotka mnogokomponentnoi retseptury i sposoba proizvodstva desertnogo pudinga / T.A. Nazarenko // Vestnik INEU. – 2012. – № 2. – S. 92-95. (In Russian).
4. Gavrilova N.B. Nauchnye i prakticheskie aspekty tekhnologii proizvodstva molochno-rastitel'nykh produktov: Monografiya / N.B. Gavrilova i dr. – Omsk: Izdatel'stvo OMGAU, 2006. – 336 s. (In Russian).
5. Panji D.D. Pemanfaatan Buah Nangka Sebagai Subtitusi Gula Dan Lemak Nabati Pada Mousse 2019 / D.D. Panji, V. Octaviany, D. Gusnadi // eProceedings of Applied Science. – 2019. – Т. 5, №. 3. (In English).
6. Characteristics Of Vegetable Canistel Mousse Dessert (Pouteria campechiana) Using Polysacaride Stabilizer / E. Hesthiati et al // Proceedings of the 6th North American International Conference on Industrial Engineering and Operations Management, Monterrey, Mexico, 2021/ – № 3. https://doi.org/10.46254/NA06.20210634. (In English).
7. Deinychenko L. Technology and quality of whipped desserts based on milk-protein concentrate / L. Deinychenko // Redaktsiina kolegiya. – 2018. – S. 189. (In English).
8. Dahanayaka T.P. J. Formulation and sensory evaluation of ready to eat whipped chocolate dairy dessert.(chocolate mousse) : dis. – 2004. (In English).
9. Potentially probiotic and synbiotic chocolate mousse / L.C. Aragon-Alegro et al. // LWT-Food Science and technology. – 2007. – Т. 40, № 4. – S. 669-675. (In English).
10. Preparation of milk dessert type mousse type sweet potato flavor (ipomoea potatas l) / Menezes L.M.F. et al // No lactose and no added sugar. – 2021. (In English).
11. Factors affecting yield and gelling properties of agar / W.K. Lee et al // Journal of Applied Phycology. – 2017. – Т. 29. – S. 1527-1540. https://doi.org/10.1007/s10811-016-1009-y. (In English).
12. Clegg M.E. The effect of agar jelly on energy expenditure, appetite, gastric emptying and glycaemic response / M.E. Clegg, A. Shafat // European journal of nutrition. – 2014. – Т. 53. – S. 533-539. (In English).
13. Cortez R.E. Blackcurrants (Ribes nigrum): A review on chemistry, processing, and health benefits / R.E. Cortez, E. Gonzalez de Mejia // Journal of food science. – 2019. – Т. 84, №. 9. – S. 2387-2401. https://doi.org/10.1111/1750-3841.14781. (In English).
14. Bioactive compounds and antimicrobial activity of black currant (Ribes nigrum L.) berries and leaves extract obtained by different soil management system / S.M. Paunović et al // Scientia Horticulturae. – 2017. – Т. 222. – S. 69-75. https: //doi.org/10.1016/j.scienta.2017.05.015. (In English).
15. GOST 5898-87. Izdeliya konditerskie. Metody opredeleniya kislotnosti i shchelochnosti. – Moskva: Standart inform, 2012. – 10 s. (In Russian).
16. GOST 18488-2000. Kontsentraty pishchevye sladkikh blyud. Obshchie tekhnicheskie usloviya. – Minsk: Mezhgos-i sovet po standart., metrol. i sertifikatsii, 2000. – 8 s. (In Russian).
17. Vzbityi desert na osnove molochnoi syvorotki s pishchevymi voloknami Citri-Fi / E.A. Plekhanova i dr. // Tekhnika i tekhnologiya pishchevykh proizvodstv – 2014. – Т. 1, № 32. – S. 73-77. (In Russian).

18. Optimization of Formulation for Aerated Dessert Containing Whey Protein and Xanthan Gum Concentrate using Response Surface Methodology and Investigation on Rheological and Texture Properties / P. Sara et al // Research and Innovation in Food Science and Technology. – 2022. –Т. 1, № 16. https://doi.org/10.22101/JRIFST.2020.254462.1192. (In English).
19. Mousse from caseic whey / M. Kassymova et al // Nauchnyi zhurnal «Doklady NAN RK». – 2021. – № 6. – S. 50-57. (In English).

Ж.Ә. Әбіш[1], Р.С. Алибеков[1], Г.Э. Орымбетова[2]*, А.А. Утебаева, Е.В. Сысоева[3]
[1]М. Әуезов атындағы Оңтүстік Қазақстан Университеті., Шымкент,
160012, Қазақстан Республикасы, Шымкент қ., Тәуке хан даңғылы, 5
[2]Оңтүстік Қазақстан медицина академиясы,
Қазақстан Республикасы, Шымкент, әл-Фараби алаңы, 1/1
[3]Қазан Ұлттық Технологиялық Зерттеу Университеті,
420015, Ресей Федерациясы, Қазан қ., Карл Маркс көшесі, 6
*e-mail: orim_77@mail.ru

СҮТ САРЫСУЫ НЕГІЗІНДЕ ЖАСАЛҒАН МУССТЫҢ СИПАТТАМАСЫ

Қазір тұтынушылардың табиғи ингредиенттер мен өнімдерді емдік мақсатта тамақтануда қолдануға деген қызығушылығы артып келеді. Мұндай өнімдерге сүт сарысуы жатады. Біздің елімізде олар шектеулі мөлшерде шығарылады. Осындай ұсыныстарға байланысты функционалды тағамдарды әзірлеу арқылы қайталама шикізатты ұтымды өңдеу мәселелерін шешудің жолдары мен құралдарын іздеу қажет. Бұл мақалада текстуралық талдаулардың, сенсорлық бағалаудың және кейбір физика-химиялық параметрлердің нәтижелері, сондай-ақ сүт сарысуы негізінде әзірленген мусс үлгілерінің минералды элементтері құрамы көрсетілген. Тұрақтандыру және көбік консистенциясын жасау үшін пектин мен агар қолданылды. Пектинді фиксатор ретінде қолдана отырып, текстуралық анализатордың, сынаманың нәтижелері бойынша мусс механикалық кернеуге төзімді болады, ал мусстың беріктігі артады. Үлгінің ең жоғары беріктігі – 1,605 Н болды. Пектині бар үлгінің серпімділігі – 1,569 Н, тұтқырлығы – 1,448 Н болды. Пектині бар үлгінің неғұрлым нәзік консистенциясы бар екенін анықтауға болады. Зерттеу нәтижелеріне сүйене отырып, стандарттарға сәйкес барлық физика-химиялық көрсеткіштер қолайлы екенін атап өтуге болады. Нәтижелер сарысу негізіндегі мусс үлгілерінің құрамында негізгі микроэлементтер бар екенін көрсетеді. Пектині бар мусс үшін көміртегі – 12,45%, калий – 14,14%, натрий – 10,84% және фосфор – 9,10%, кальций – жалпы минералды құрамның 8,33% құрайды. Агар қосылған мусс үшін көміртегі – 18,97%, калий – 15,99% натрий – 9,20% және хлор – 6,93%, фосфор – 7,39%, кальций – жалпы минералды құрамның 5,23% құрайды.

Түйін сөздер: *мусс, тұрақтандырғыштар, қайталама шикізат, сарысу, қарақат, функционалды ингредиенттер.*

Ж.А. Абиш[1], Р.С. Алибеков[1], Г.Э. Орымбетова[2]*, А.А. Утебаева[1], Е.В. Сысоева[3]
[1]Южно-Казахстанский Университет им.М. Ауэзова,
160012, Республика Казахстан, г. Шымкент, проспект Тауке хана, 5
[2] Южно-Казахстанская медицинская академия,
Республика Казахстан, г. Шымкент, площадь Аль-Фараби, 1/1
[3]Казанский Национальный Исследовательский Технологический Университет,
420015, Российская Федерация, г. Казань, ул. Карла Маркса, 6
*e-mail: orim_77@mail.ru

ХАРАКТЕРИСТИКА МУССА НА ОСНОВЕ МОЛОЧНОЙ СЫВОРОТКИ

В настоящее время растет интерес потребителей к использованию натуральных ингредиентов и продуктов в питании в лечебных целях. К таким продуктам относится и молочная сыворотка. В нашей стране они производятся в ограниченном количестве. В связи с такими рекомендациями необходимо искать пути и средства решения проблем рациональной переработки вторичного сырья путем разработки функциональных продуктов питания. В данной статье представлены результаты анализа текстуры, вкусовых качеств и некоторых физико-химических параметров, а также содержания минеральных элементов в разработанных образцах мусса на основе молочной сыворотки. Для стабилизации и получения пенистой консистенции были

использованы пектин и агар. Согласно результатам анализа текстуры, при использовании пектина в качестве закрепителя мусс становится более устойчивым к механическим воздействиям, а прочность мусса увеличивается. Максимальная прочность образца составила 1,605 Н. Образец с пектином имеет эластичность – 1,569 Н, вязкость – 1,448 Н. Можно установить, что образец с пектином имеет более нежную консистенцию. Основываясь на результатах исследования, можно отметить, что все физико-химические показатели являются приемлемыми, в соответствии со стандартами. Результаты показали, что в состав муссов на основе молочной сыворотки входят основные микроэлементы. В составе мусса с пектином углеводы – 12,45%, калий – 14,14%, натрий – 10,84% и фосфор – 9,10%, кальций – 8,33% от общего содержания минеральных веществ. Для мусса с агаром углерод – 18,97%, калий – 15,99%, натрий – 9,20% и хлор – 6,93%, фосфор – 7,39%, кальций – 5,23% от общего содержания минеральных веществ.

Ключевые слова: *мусс, стабилизаторы, вторичное сырье, молочная сыворотка, черная смородина, функциональные ингредиенты.*

Information about the authors

Zhansaya Abilkhairkyzy Abish – PhD student, «Technology and Safety of Food products» Department, M.Auezov' South-Kazakhstan University, Shymkent, Kazakhstan; e-mail: abish.zhansaya95@mail.ru. ORCID: https://orcid.org/0000-0001-7175-9354.

Ravshanbek Sultanbekovich Alibekov – PhD in Chemistry, Professor, «Food Engineering» Department, M. Auezov' South-Kazakhstan University, Shymkent, Kazakhstan; e-mail: ralibekov@hotmail.com. ORCID: https://orcid.org/0000-0002-0723-3101.

Gulbagi Emitovna Orymbetova* – candidate of technical science, associate professor. South Kazakhstan Medical Academy. Faculty of Pharmacy. Shymkent, Kazakhstan; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001- 8987-3366.

Aidana Askarovna Utebaeva – PhD M. Auezov South Kazakhstan university. Textile and Food Engineering higher school. Shymkent, Kazakhstan; e-mail: aidana.utebaeva@gmail.com. ORCID: https://orcid.org/0000-0003-3792-4656.

Elena Vladislavovna Sysoeva – candidate of technical science, professor. Kazan National Research Technological University, Kazan, Russia; e-mail: inonotus@yandex.ru. ORCID: https://orcid.org/0000-0003-0592-3667.

Авторлар туралы мәліметтер

Жансая Әбілхаирқызы Абиш – PhD докторанты, М. Әуезов атындағы Оңтүстік Қазақстан университеті, Тоқыма және тамақ инженериясы жоғары мектебі, Шымкент, Қазақстан; e-mail: abish.zhansaya95@mail.ru. ORCID: https://orcid.org/0000-0001-7175-9354.

Равшанбек Султанбекович Алибеков – химия ғылымдарының кандидаты, профессор, М. Әуезов атындағы Оңтүстік Қазақстан университеті, тоқыма және тамақ инженериясы жоғары мектебі, Шымкент, Қазақстан; e-mail: ralibekov@hotmail.com. ORCID: https://orcid.org/0000-0002-0723-3101.

Гулбаги Эмитовна Орымбетова* – техника ғылымдарының кандидаты, доцент, Оңтүстік Қазақстан медицина академиясы, фармация факультеті, Шымкент, Қазақстан; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001- 8987-3366.

Айдана Аскаровна Утебаева – PhD М. Әуезов атындағы Оңтүстік Қазақстан университеті, тоқыма және тамақ инженериясы жоғары мектебі, Шымкент, Қазақстан; e-mail: aidana.utebaeva@gmail.com. ORCID: https://orcid.org/0000-0003-3792-4656.

Елена Владиславовна Сысоева – химия ғылымдарының кандидаты, профессор. Қазан Ұлттық Технологиялық Зерттеу Университеті, Қазан, Ресей. e-mail: inonotus@yandex.ru. ORCID: https://orcid.org/0000-0003- 0592-3667.

Сведения об авторах

Жансая Әбілхаирқызы Абиш – PhD докторант, Высшая школа текстильной и пищевой инженерии, Южно-Казахстанский университет им. М. Ауезова, Шымкент, Казахстан; e-mail: abish.zhansaya95@mail.ru. ORCID: https://orcid.org/0000-0001-7175-9354.

Равшанбек Султанбекович Алибеков – кандидат химических наук, профессор. Высшая школа текстильной и пищевой инженерии, Южно-Казахстанский университет им. М. Ауезова, Шымкент, Казахстан; e-mail: ralibekov@hotmail.com. ORCID: https://orcid.org/0000-0002-0723-3101.

Гулбаги Эмитовна Орымбетова* – кандидат технических наук, доцент, Южно-Казахстанская медицинская академия, Шымкент, Казахстан; e-mail: orim_77@mail.ru. ORCID: https://orcid.org/0000-0001- 8987-3366.

Айдана Аскаровна Утебаева – PhD Южно-Казахстанский университет имени М. Ауэзова, высшая школа текстильной и пищевой инженерии, Шымкент, Казахстан; e-mail: aidana.utebaeva@gmail.com. ORCID: https://orcid.org/0000-0003-3792-4656.

Елена Владиславовна Сысоева – кандидат химических наук, профессор, Казанский Национальный Исследовательский Технологический Университет, Казань, Россия; e-mail: inonotus@yandex.ru. ORCID: https://orcid.org/0000-0003- 0592-3667.

Received 03.04.2024
Revised 09.04.2024
Accepted 22.04.2024

DOI: 10.53360/2788-7995-2024-2(14)-33

ҒТАХР: 65.63.33

Б.Қ. Оспанова*, Т.Ч. Тултабаева[1], А.Е. Турсынханова[2], Ұ.Е. Асанова[2], Б. Калемшариев[1]

[1]С. Сейфуллин атындағы қазақ агротехникалық университеті,
010000, Қазақстан Республикасы, Астана қ., Жеңіс даңғылы 62
[2]Alikhan Bokeikhan University
071411, Қазақстан Республикасы, Семей қ., Мәңгілік ел 11,
*e-mail: ospanova93-93@mail.ru

ӨСІМДІК ТЕКТЕС ФУНКЦИОНАЛДЫҚ ИНГРИДИЕНТТІ ҚОЛДАНУ АРҚЫЛЫ ҰЛТТЫҚ ӨНІМ ІРІМШІКТІҢ ҚҰРАМЫН БАЙЫТУ

Аңдатпа: *Барлық уақытта өсімдік және жануарлар шикізатын кешенді өңдеудің ұтымды әдістерін іздеу, қалдықсыз технологияларды құру бойынша зерттеулер жүргізіліп келеді, бұл олардың биологиялық және тағамдық құндылығын арттыратын дәрумендермен, микроэлементтермен, ақуыздармен және басқа компоненттермен байытылған сапалы және қауіпсіз тамақ өнімдерін өндіруге негіз бола алады. Мақалада өнімге негізгі шикізат ретінде сиыр сүті және өсімдік текті қоспа ретінде итмұрын таңдалып алынды. Сиыр сүтінде адамның тамақтануына қажетті барлық пайдалы заттар бар және ағзаға өте оңай сіңетін ақуыздар, майлар, көмірсулар болады. Сонымен қатар, оның құрамында көптеген ферменттер, дәрумендер, минералдар және қалыпты метаболизмді қамтамасыз ететін басқа да маңызды қоректік заттар бар. Берілген мақалада итмұрын өсімдігін тікелей өзін емес итмұрын экстрактісін ұлттық өнім ірімшіктің құрамын байытуда қолдану туралы баяндалады. Итмұрын өсімдігінің құрамында көптеген органикалық қосылыстар, мысал ретінде табиғи антиоксиданттар – фенолды және полифенолды қосылыстар мөлшері өте көп. Жидекті өсімдіктен экстракт алу әдістемесінің құрғақ өсімдіктен экстракт алу әдістемесінен ерекшелігі сипатталған. Экстрактты қосқаннан кейінгі сүтқышқылды өнімнің сапасының, органолептикалық көрсеткіштерінің өзгеріске ұшырағаны көрсетілген. Ұлттық өнім ірімшіктің құрамын өсімдік тектес функционалдық қоспалармен байытудың себебінен өнімнің аминқышқылдық құрамы артқан.*

Түйін сөздер: *итмұрын, аминқышқылдар, экстракт, өсімдік тектес функционалдық қоспа, ірімшік өнімдері.*

Кіріспе

Бүгінгі таңда тамақтану саласында тағам өнімдерін байыту мақсатында әртүрлі бағыттар қалыптасты. Адам ағзасына пайдалы сүтқышқылды тағам өнімдерін жасаудың бір бағыты өнімдерді өсімдік қоспаларымен байыту. Функционалдық мақсатта өсімдік шикізаттарымен байытылған өнімнің тағамдық құндылығы жоғары болады. Өнімді жасауда өсімдік қоспасы ретінде қол жетімді, пайдалы, экономикалық жағынан тиімді шикізат таңдап алынуы қажет. Себебі пайдалы тағамдық өнім халықтың кең тобына қолжетімді болуы керек. Біз ұлттық өнім ірімшікті байытуда жергілікті жерде кең таралған жидекті өсімдікті таңдап алдық [1, 3].