

ISSN 2518-1483 (Online),
ISSN 2224-5227 (Print)

2018 • 6

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

БАЯНДАМАЛАРЫ

ДОКЛАДЫ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

REPORTS

OF THE NATIONAL ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

ЖУРНАЛ 1944 ЖЫЛДАН ШЫҒА БАСТАҒАН
ЖУРНАЛ ИЗДАЕТСЯ С 1944 г.
PUBLISHED SINCE 1944



Бас редакторы
х.ғ.д., проф., ҚР ҰҒА академигі **М.Ж. Жұрынов**

Редакция алқасы:

Адекенов С.М. проф., академик (Қазақстан) (бас ред. орынбасары)
Величкин В.И. проф., корр.-мүшесі (Ресей)
Вольдемар Вуйцик проф. (Польша)
Гончарук В.В. проф., академик (Украина)
Гордиенко А.И. проф., академик (Белорус)
Дука Г. проф., академик (Молдова)
Илолов М.И. проф., академик (Тәжікстан),
Леска Богуслава проф. (Польша),
Локшин В.Н. проф. чл.-корр. (Қазақстан)
Нараев В.Н. проф. (Ресей)
Неклюдов И.М. проф., академик (Украина)
Нур Изура Удзир проф. (Малайзия)
Перни Стефано проф. (Ұлыбритания)
Потапов В.А. проф. (Украина)
Прокопович Полина проф. (Ұлыбритания)
Омбаев А.М. проф., корр.-мүшесі (Қазақстан)
Өтелбаев М.О. проф., академик (Қазақстан)
Садыбеков М.А. проф., корр.-мүшесі (Қазақстан)
Сатаев М.И. проф., корр.-мүшесі (Қазақстан)
Северский И.В. проф., академик (Қазақстан)
Сикорски Марек проф., (Польша)
Рамазанов Т.С. проф., академик (Қазақстан)
Такибаев Н.Ж. проф., академик (Қазақстан), бас ред. орынбасары
Харин С.Н. проф., академик (Қазақстан)
Чечин Л.М. проф., корр.-мүшесі (Қазақстан)
Харун Парлар проф. (Германия)
Энджун Гао проф. (Қытай)
Эркебаев А.Э. проф., академик (Қырғыстан)

«Қазақстан Республикасы Ұлттық ғылым академиясының баяндамалары»

ISSN 2518-1483 (Online),

ISSN 2224-5227 (Print)

Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» Республикалық қоғамдық бірлестігі (Алматы қ.)
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 01.06.2006 ж.
берілген №5540-Ж мерзімдік басылым тіркеуіне қойылу туралы куәлік

Мерзімділігі: жылына 6 рет.

Тиражы: 500 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18,
<http://nauka-nanrk.kz>, reports-science.kz

© Қазақстан Республикасының Ұлттық ғылым академиясы, 2018

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

UDC 637.146

**E.K. Assembayeva¹, A.G. Galstyan²,
Z.Zh. Seidakhmetova¹, T.M. Velyamov¹, D.E. Nurmukhanbetova¹**

¹Almaty Technological University, Almaty, Kazakhstan;

²All-Russian Research Institute of the Brewing, Nonalcoholic and Wine Industry – branch
of the Federal Research Center for Food Systems named after V.M. Gorbатов FSBSI;
elmiraasembaeva@mail.ru, 9795029@mail.ru, s.zaure@bk.ru; ymasim58@mail.ru, dinar2080@mail.ru

INVESTIGATION OF TECHNOLOGICAL PARAMETERS OF PRODUCTION OF SOUR-MILK DRINK WITH PREBIOTIC PROPERTIES ON THE BASIS OF CAMEL MILK

Abstract. One of the priority directions of the public policy in the field of healthy nutrition is the creation of a technology of breakthrough food products designed not only for differentiating human needs in food substances and energy, but also contributing to the prevention of various diseases, strengthening the protective functions of the body and adequate adaptation of human to the environment. Accordingly, a technology has been developed for the production of sour-milk drink with prebiotic properties based on camel milk. The effect of a prebiotic on the physicochemical, microbiological and organoleptic parameters of the sour-milk product was considered. The optimum dose of fructose:isomaltulose:lactulose syrup and fermentation time are established.

Keywords: camel milk, sour milk drink, leaven, prebiotic, fructose:isomaltulose: lactulose syrup.

In the last decades, the problem of creating functional food products with prebiotics has received a large-scale evolution due to the scientific interest and the set of concomitant scientifically grounded developments [1,2]. This actually allowed to create a wide range of modern products with high biological value, primarily on a dairy basis. An essential component of the technology is the sour-milk microflora, which is essential for the normal operation of the body. At the same time, to improve the effectiveness of the perception of fermented milk products of the body, it is recommended to enrich it with prebiotics. In this regard, the development of formulations of fermented milk products using fructose: isomaltulose: lactulose syrup as a prebiotic and a sweetening agent is a timely and relevant task.

It should be noted that the use of prebiotics in the production of foodstuffs makes it possible to give the product not only functional properties, but also to improve the fabricating characteristics, the quality of the finished products, to improve flavor properties as well as to increase their terms of storage [2,3,4].

Combination of prebiotics and probiotics allows to achieve maximum physiological effect on the human body, promotes the improvement of intestinal microflora [5].

Probiotics are non-pathogenic, non-toxic microorganisms entering the human intestine and normalizing the composition and biological activity of the microflora of the digestive tract. The most studied probiotics are lactobacilli of the *Lactobacillus* genus (eg strains of species *L.*

acidophilus, *L. casei*, *L. delbrueckii* subsp. *bulgaricus*, *L. helveticus*, *L. fermentum*, *L. lactis*, *L. rhamnosus*, *L. plantarum*) and bifidobacteria (*Bifidobacterium*) – *B. adolescentis*, *B. bifidum*, *B. breve*, *B. infantis*, *B. Longum* [6,7,8,9].

Prebiotics strengthen the immune activity of beneficial intestinal microflora, stimulating the production of immunomodulating substances, and enhance cellular immunity. In the process of fermentation of prebiotics of carbohydrate nature, acids are formed - acetic, lactic, propionic and oleic, which reduce the pH value in the large intestine, that leads to the destruction of pathogenic microorganisms and the cessation of the formation of protein putrefaction products that exhibit toxic and carcinogenic effects. In the presence of prebiotics, the absorption of calcium and magnesium increases in the intestine due to the interaction of minerals with lactic acid produced by probiotics; The resulting calcium and magnesium lactates are better soluble and easier to digest. Some prebiotics normalize the level of cholesterol and glucose in the blood, and also bind and remove from the body some toxic substances coming with food [10,11].

The creation of sugar substitutes of a new generation, possessing not only pure sweet taste, safety and high technological characteristics, but also capable of exerting functional properties, having a positive regulatory effect on the organism as a whole or on its separate organs and systems, is one of the main tasks, facing scientists in the field of functional nutrition [12].

The subject of thorough study, after the discovery of their specific biological action, has become some sugar substitutes (not digestible) that have particular value for human health. It was found that they are prebiotics - substances that are not hydrolyzed and not absorbed in the upper part of the gastrointestinal tract, but enter its lower parts and promote the development of beneficial bacteria that live in the large intestine. Like all prebiotics, these substances regulate the intestinal microflora, induce beneficial effects both at the level of the gastrointestinal tract and the body as a whole, contributing to the maintenance of the human immune system [13,14].

Natural sweeteners are sweet-tasting substances, isolated from natural raw materials. They are certainly safer than artificial, but this does not mean that their use should be uncontrolled. They are necessary for diabetics, since they do not increase the level of blood sugar. As for caloric content, according to this indicator, they cannot cede to sugar, which means that with chronic consumption, the possibility of obesity persists.

Natural sweeteners can be found in many plants and fruits, berries and vegetables. The most popular ones are stevia, xylitol, fructose, sorbitol, sucralose, etc. Since dietary nutrition remains the main way to treat and prevent diabetes, the production of all sorts of sweets using fructose as a sweetener and sugar substitute has become especially relevant. Fructose is one of the most promising sugar substitutes that are used in the food industry, it is recommended for dietary nutrition, since it is very well absorbed and is not needed in the presence of insulin. Its glycemic index is 4.6 times lower than that of glucose, and 2.8 times that of sucrose [15,16].

Subsequently, a group of various sweeteners used in the food industry expanded significantly. In recent years, consumers are increasingly interested in sweeteners related to natural compounds. As one of the promising, isomaltulose can be considered, which also with good reason can claim a close relationship with the "a queen in her own right", i.e. sucrose. Isomaltulose does not cause caries of teeth, digestion of isomaltulose slightly affects the concentration of glucose and insulin in the blood. Isomaltulose is not metabolized by most bacteria and yeast, is stable in acidic solutions, does not have hygroscopic properties. Abroad isomaltulose is widely used commercially as a substitute for sucrose in foods, soft drinks and medicine [17].

Among the prebiotics, the most studied is lactulose. Lactulose is a carbohydrate belonging to the class of oligosaccharides and the subclass of disaccharides, its molecule consists of the

remains of galactose and fructose. Lactulose is a white crystalline substance that is odorless, highly soluble in water and sweet to taste. But the most important property of lactulose is its functional stability, that is, its ability to retain all its healing properties in the widest range of media and technological regimes. This opens up almost unlimited possibilities for using lactulose in the food industry in the production of functional foods [18]. To date, quite a lot of works have been devoted to the development of fermented milk products with lactulose [19,20], however, the joint use of fructose isomaltulose and lactulose is a relatively new direction of functional nutrition and is of practical interest.

It should be noted that most industrial technologies of fermented milk products with prebiotic are obtained on the basis of cow's milk. It is known that in Kazakhstan camel milk is quite common, it is reasonable to adapt a lot of traditional solutions taking into account the specific properties of raw materials.

In the protein of camel milk, immunoglobulin and lactoferrin predominate, possessing therapeutic antioxidant, immunostimulating properties. In addition, they have high antibacterial, antiviral and anti-inflammatory properties that protect the human body from pathogens and viruses [21,22].

In this regard, the aim of this research was to study the combined effect of fructose: isomaltulose: lactulose on the development of the starter population for drinking yogurt based on camel milk.

Objects and methods of research

Objects of the research were camel milk, the production symbiotic starter of All-Russian Scientific Institute of Dairy Industry (ASIDI) (*Streptococcus salivarius subsp. termophilus* and *Lactobacillus delbruki subsp. Bulgaricus*), fructose:isomaltulose:lactulose syrup.

In carrying out the work, conventional, standard methods of investigation were used.

The titrated acidity was determined according to GOST 3624. The method is based on the neutralization of acids and their salts contained in the product with a solution of caustic alkali in the presence of a phenolphthalein indicator. Determination of active acidity in sour-milk drinks according to GOST 32892-2014. Fermented milk microorganisms were determined in accordance with GOST 33951- 2016. Evaluation of organoleptic parameters of fermented milk products was carried out on a scale using the ASIDI method. The following parameters were monitored: odor, taste, consistency, appearance, and color.

Results and discussion

During the experiment, a sample of the sour milk drink based on camel milk with the addition of the syrup with prebiotic properties was used. As a control, the fermented milk product was used without the addition of the syrup. For mowing the samples, the production symbiotic starter of ASIDI (*Streptococcus salivarius subsp. termophilus* and *Lactobacillus delbruki subsp. Bulgaricus*).

The starter was added in the amount of 10% by weight of the mixture and the samples were ripened at a temperature of (40 ± 2) °C until a dense clot formed. The end of the fermentation process was determined by the formation of a characteristic consistency of the clot, and also by the acidity, the value of which should be $\text{pH } 4.7\pm 0.05$. Then the finished product was poured and cooled in the refrigerating chamber at (4 ± 2) °C, where within 4-6 hours, its further maturation takes place. In the finished samples, titrated acidity, clot pH change, microbiological indices were determined.

To further use the obtained results during the development of the technology, studies of organoleptic characteristics were carried out on full-scale product models with the addition of different amounts of syrup: 5; 7.5 and 10% (Table 1).

Table 1 - Organoleptic estimation of models - product analogues

Indicator	Variant of the yogurt formulation		
	5%	7,5%	10%
Taste and odor	Moderately sweet without foreign tastes and odors	Sweet without foreign tastes and odors	Unusual sweet without foreign tastes and odors
Consistency	Homogeneous, normally viscous	Homogeneous, viscous	Homogeneous, viscous
Colour	White with a weak cream shade	White with a cream shade	White with a cream shade
Scores by the ASIDI methodology	10	8	7

The calculated amount of syrup was added to the fermented milk and, after completion of the fermentation process, the organoleptic indicators were commissioned. As a result of the research, it was found that the most rational is the dosage of 5% syrup. For further investigations, this sample was taken.

It is known that the growth of beneficial microorganisms in milk is stimulated by substances of different nature: plant and microbial extracts, vitamins, trace elements, mono-, oligo- and polysaccharides, etc. [23]. We have studied the influence of fructose: isomaltulose: lactulose syrup on the physicochemical, microbiological and organoleptic parameters of the fermented milk product.

As a result of the studies, it was revealed that the organoleptic estimate of the experimental product was 14.5 points, of the control sample - 12.5 points (Table 2). The resulting composition is characterized by a low glycemic index, contains bifidofactors.

Table 2 - Organoleptic indicators of fermented products

Culture medium	Parameter	Estimate, score
Control sample	The taste is sour-milk, without foreign tastes and odors, the consistency is uniform, the clot is loose, viscous	12.5
Test sample	The taste is sour-milk, moderately sweet, without foreign tastes and odors, consistency is uniform, very dense clot	14.5

When adding fructose: isomaltulose: lactulose syrup, a titratable acidity increases slightly more intensively, which may be due to the stimulating effect of the syrup on the microflora of the starter, in particular on *Streptococcus thermophilus*, which is the most powerful acid former. Thus, the maximum indication of acidity was with a fermentation time of 6 hours and with the addition of syrup, it was 79.0 °T (Table 3).

Table 3 - Change in titratable acidity during fermentation, °T

Indicator	Time of fermentation process, h					
	1	2	3	4	5	6
Control sample	21.5	32.7	48.7	55.6	64	75
Test sample	32.3	44.8	61.5	70.8	74.2	79

As can be seen from the table, in the samples with the addition of syrup there is an increase in acidity in comparison with the control sample. The sample that is added to the syrup has a high acidity compared to the control sample.

In the control sample, the pH of the clot changes faster as the fermentation time increases (Table 4). In the samples with the addition of syrup, the pH change process is less intense than in the control sample.

Table 4 - pH change in the clot depending on the fermentation time

Indicator	Time of fermentation process, h					
	1	2	3	4	5	6
Control sample	6.09	5.89	5.28	5.02	4.85	4.70
Test sample	5.60	5.52	5.16	4.92	4.72	4.65

During the work, the influence of the addition of syrup on the development of fermented milk microorganisms was studied, rational technological parameters of the production of sour milk drink were determined. Analysis of the data given in Table 5 shows that with the addition of syrup in the product, a more intensive growth of lactic microflora is observed. Adding the syrup results in a significant increase in these microorganisms compared to the control sample.

Table 5 - Change in the number of fermented milk microorganisms during the fermentation of the sour milk product from camel milk, CFU/cm³

Indicator	Time of fermentation process, h					
	1	2	3	4	5	6
Control sample	2*10 ³	4*10 ⁴	3*10 ⁵	8*10 ⁵	5*10 ⁶	2*10 ⁷
Test sample	3*10 ⁴	2*10 ⁵	8*10 ⁵	2*10 ⁶	3*10 ⁷	4*10 ⁸

To provide a beneficial effect on the human body, a fermented milk product should contain at least 10⁷ CFU/cm³ of total fermented milk microorganisms throughout the shelf life.

The finished product samples were stored at a temperature of 4±2 °C. The total amount of lactic microflora was determined on the 1,3,5,7 day of storage. The results of the experiment are presented in Table 6.

Table 6 - Change in the number of lactic acid microorganisms during the storage of fermented milk products, CFU/cm³

Indicator	Time of storage of fermented milk microorganisms, days			
	1	3	5	7
Control sample	5*10 ⁷	3*10 ⁷	2*10 ⁷	8*10 ⁶
Test sample	4*10 ⁹	2*10 ⁸	8*10 ⁷	5*10 ⁷

The data of Table 6 show that the samples with the addition of syrup during storage of the quantity of lactic acid microorganisms were maintained at the required level. In the control sample without the addition of syrup, already on the 7th day of storage, the amount of fermented milk microorganisms was below the required value.

Taking into account the obtained data, it can be concluded that the joint use of fructose, isomaltulose and lactulose has a positive effect on the technological process of obtaining a sour milk drink based on camel milk, which is of practical interest.

The developed sour-milk drink is intended for systematic consumption and is aimed at replenishing the deficiency of essential substances in the body.

REFERENCES

- [1] Krivchenko V.N., Sheveleva O.V. Kislomolochnye produkty: innovacionnye tehnologii v proizvodstve // Vestnik Sibirskogo universiteta potrebitel'skoj kooperacii. **2013**. № 44. 123 -129.
- [2] Galstjan A.G., A.N., Radaeva I.A., Saruhanjan O.O., Kurzanov O.N., Storozhuk A.P. Nauchnye osnovy i tehnologicheskie principy proizvodstva molochnyh konservov gerodieticheskogo naznachenija // Voprosy pitaniya. **2016**. T. 86. № 5. S. 114-119.

- [3] Bepomestnyh K.V. Issledovanie biohimicheskikh i morfologicheskikh svojstv shtammov bakterij roda Lactobacillus / K.V. Bepomestnyh, A.G. Galstjan, E.V. Korotkaja // Tehnika i tehnologija pishhevyyh proizvodstv. **2011.** № 2. -S. 94-98.
- [4] Bel'mer S.V. Metabolicheskie jeffekty prebiotikov: vzgljad peditra // Vaprosy detskoj dietologii. **2005,** T. 3. № 2 - S. 33-35.
- [5] Tihomirova N.A. Sovremennoe sostojanie i perspektivy razvitija produktov funkcional'nogo pitaniya / N.A. Tihomirova // Molochnaja promyshlennost'. **2009.** № 7. S. 5.
- [6] Grishel' A.I., Kishkurno E.P. Probiotiki i ih rol' v sovremennoj medicine // Vestnik farmacii. **2009.** № 1(43) – S. 1-4.
- [7] Moiseev A.B., Miheeva I.G., Vereshhagina T.G., Gorjacheva O.A., Kitajchik V.G. Vlijanie kombinacii probioticheskikh kul'tur i prebioticheskikh volokon na formirovanie mikroflory rebenka, nahodjashhegosja na iskusstvennom vskarmlyvanii // Trudnyj pacient. **2010.** № 10, T. 8. S. 48-52.
- [8] Sabel'nikova E.A. Klinicheskie aspekty disbakterioza kischechnika // Jeksperimental'naja i klinicheskaja gastrojenterologija. **2011.** № 3. S. 111-116.
- [9] Ladodo K.S., Borovik T.Je., Skvorcova V.A. Ispol'zovanie produktov pro- i prebioticheskogo dejstvija v detskom pitanii // Voprosy sovremennoj peditrii. **2006.** T. 5, № 6. S. 64-69.
- [10] Donskaja G.A. Tehnologija obogashhenija molochnyh produktov natural'nymi ingredientami / G.A. Donskaja, M.V. Kulik // Pererabotka moloka. **2007.** № 5. 42 s.
- [11] Doronin A.F. Funkcional'noe pitanie / A.F. Doronin, B.A. Shenderov. M.: GRANT", **2002.** 296 s.
- [12] Bogatyrev A.N. Kachestvo pishhi i kul'tura pitaniya // Pishhevaja promyshlennost'. **2006.** № 8. S. 68-69.
- [13] Goshhanskaja, M.N. Aktivnost' vody rastvorov fruktozy/M.N. Goshhanskaja, E.A. Fetisov, A.N. Petrov, I.A. Radaeva, S.N. Turovskaja, A.G. Galstjan//Tehnika i tehnologija pishhevyyh proizvodstv. **2010.** № 3. C. 100-106.
- [14] Kaprel'janc L.V. Prebioticheskie pishhevyje ingredienty. Sovremennoe sostojanie i perspektivy // Produkty i ingredienty. **2005.** № 6. S. 60 - 62.
- [15] Shenderov B.A. Probiotiki, prebiotiki i sinbiotiki // Pishhevyje ingridienty, syr'e i dobavki. **2005.** № 2. S. 23-26.
- [16] Kibardin G.M. K38 Sahar lechit / G.M. Kibardin. Moskva: Iz- datel'stvo «Je», **2017.** 144 s. (Lechenie dostupnymi sredstvami). ISBN 978-5-699-96266-2.
- [17] Bozhko O.Ju., Shuvaeva G.P., Korneeva O.S. Izuchenie prebioticheskikh svojstv zamenitelja sahara izomal'tulozy v uslovijah in vitro // Sovremennye problemy nauki i obrazovanija. **2011.** № 5. S. 376-379
- [18] Sinel'nikov B. M. Laktoza i ee proizvodnye / B. M. Sinel'nikov, A. G. Hramcov, I. A. Evdokimov, S. A. Rjabceva, A. V. Serov, nauch. red. akad. RASHN A.G. Hramcov. SPb.: Professija, **2007.** 786 s.
- [19] Rjabceva S.A. Laktuloza v kislomolochnyh produktah: novye razrabotki / S. A. Rjabceva, M. A. Bracihina // Pererabotka moloka: tehnologija, oborudovanie, produkcija: otraslevoj specializirovannyj zhurnal. **2012.** №. 10. S. 56-58.
- [20] Dorohovich A.N. Saharozameniteli novogo pokolenija nizkoj kalorijnosti i glikemichnosti/ A.N. Dorohovich, V.V. Dorohovich, N.P. Lazorenko // Produkty & ingredienty. **2011.** №6 (8). S. 46-48.
- [21] Zhusipova G.T., Tohanov M.T., Ermahanov M.N., Menlikulova A.B., Zhorabaeva N.K., Innovacionnaja tehnologija poluchenija tabletirovannoj formy suhogo shubata iz verbljuzh'ego moloka // Uspehi sovremennogo estestvoznaniya. **2015.** № 1-2. S. 201-203.
- [22] Asembaeva Je.K., Sejdahmetova Z.Zh., Veljamov T.M., Lesova Zh.T., Nurmuhambetova D.E. Funkcional'nye pishhevyje produkty. kislomolochnye produkty iz verbljuzh'ego moloka // Doklady NAN RK. 2016. № 5. Razdel Agrarnye nauki. S. 275-284. DOI:10.32014/2018.202518-1483
- [23] L.M. Zaharova, S.V. Orehova, M.A. Zaharenko, S.S. Lozmanova Issledovanie tehnologicheskikh parametrov proizvodstva funkcional'nogo kislomolochnogo produkta // Tehnika i tehnologija pishhevyyh proizvodstv. **2012.** № 2. S. 46-48.

Э.К. Асембаева¹, А.Г. Галстян², З.Ж. Сейдахметова¹, Т.М. Велямов¹, Д.Е. Нурмуханбетова¹

¹ Алматы технологиялық университеті, Алматы, Қазақстан;

²Бүкілресейлік сыра қайнату, алкогольсіз және шарап өнеркәсібі ғылыми-зерттеу институты - ФМБС филиалы В.М. Горбатов атындағы «Азық-түлік өнімдерінің федералдық ғылыми орталығы» ПФА РАН Мәскеу, Ресей

ТҮЙЕ СҮТІ НЕГІЗІНДЕ ПРЕБИОТИКАЛЫҚ ҚАСИЕТТЕРІ БАР СҮТҚЫШҚЫЛДЫ СУСЫНДАРДЫ ӨНДІРУДІҢ ТЕХНОЛОГИЯЛЫҚ КӨРСЕТКІШТЕРІН ЗЕРТТЕУ

Аннотация. Салауатты тамақтану саласындағы мемлекеттік саясаттың басым бағыттарының бірі адамды тек азық-түлік заттарымен және энергиямен қажеттіліктерін қамтамасыз ету үшін ғана емес, әртүрлі аурулардың алдын алуға, дененің қорғаныш функцияларын күшейтуге және адамның қоршаған ортаға бейімделуіне бағытталған жаңа сапалы азық-түлік өнімдерінің технологиясын құру болып табылады. Түйе сүтіне негізінде периобиотикалық қасиеттері бар сүтқышқылды сусын өндірісі үшін технология әзірленді. Пребиотиктің сүтқышқылды сусынның физика-химиялық, микробиологиялық және органолептикалық көрсеткіштеріне әсері қарастырылды. Фруктоза:изомальтулоза:лактuloза шырынының оңтайлы дозасы анықталды.

Түйін сөздер: түйе сүті, сүтқышқылды сусын, ашытқы, пребиотик, фруктоза: изомальтолоза: лактулоза сироптары.

Э.К. Асембаева¹, А.Г. Галстян², З.Ж. Сейдахметова¹, Т.М. Велямов¹, Д.Е. Нурмуханбетова¹

**ИССЛЕДОВАНИЕ ТЕХНОЛОГИЧЕСКИХ ПАРАМЕТРОВ ПРОИЗВОДСТВА
КИСЛОМОЛОЧНОГО НАПИТКА С ПРЕБИОТИЧЕСКИМИ СВОЙСТВАМИ
НА ОСНОВЕ ВЕРБЛЮЖЬЕГО МОЛОКА**

¹ Алматинский технологический университет, г. Алматы, РК;

² ВНИИПБиВП – филиал ФГБНУ «ФНЦ пищевых систем им. В.М. Горбатова» РАН (Россия, Москва)

Аннотация. Одним из приоритетных направлений государственной политики в области здорового питания является создание технологии качественно новых пищевых продуктов, предназначенных не только для дифференцированного обеспечения потребности человека в пищевых веществах и энергии, но и способствующих профилактике различных заболеваний, укреплению защитных функций организма и адекватной адаптации человека в окружающей среде. Соответственно разработана технология производства кисломолочного напитка с пребиотическими свойствами на основе верблюжьего молока. Рассмотрено влияние пребиотика на физико-химические, микробиологические и органолептические показатели кисломолочного продукта. Установлена оптимальная доза фруктозо:изомальтулозно:лактоулозного сиропа а также время ферментации.

Ключевые слова: верблюжье молоко, кисломолочный напиток, закваска, пребиотик, фруктозо:изомальтулозно:лактоулозный сироп.

Information about the authors:

Asembayeva Elmira Kuandykovna – PhD student at the Almaty Technological University, e-mail: elmiraasembaeva@mail.ru, <https://orcid.org/0000-0001-7964-7736>;

Galstyan Aram Genrichovich – doctor of engineering sciences, RAS corresponding member, professor, All-Russian Research Institute of the Brewing, Nonalcoholic and Wine Industry – branch of the Federal Research Center for Food Systems named after V.M. Gorbato FSBIS; e-mail: 9795029@mail.ru, <https://orcid.org/0000-0002-0786-2055>;

Seidakhmetova Zaure Zhunusovna – doctor of biological sciences, professor, Almaty Technological University, Department of Food Biotechnology, e-mail: s.zaure@bk.ru, <https://orcid.org/0000-0002-9213-7391>;

Velyamova Masimzhan Tursunovich - doctor of biological sciences, professor, Almaty Technological University, Department of Food Biotechnology, e-mail: vmasim58@mail.ru, <https://orcid.org/0000-0002-9248-5951>;

Nurmukhanbetova Dinara Erikovna – candidate of engineering sciences, acting associate professor, Almaty Technological University, Department of Food safety and quality, e-mail: dinar2080@mail.ru, <https://orcid.org/0000-0002-8939-6325>.

CONTENTS

Technical sciences

<i>Assembayeva E.K., Galstyan A.G., Seidakhmetova Z.Zh., Velyamov T.M., Nurmukhanbetova D.E.</i> Investigation of technological parameters of production of sour-milk drink with prebiotic properties on the basis of camel milk.....	5
<i>Buktukov N.S., Aitkulov M.</i> Efficiency of new generation solar photoelectric batteries.....	12
<i>Kaziev G.Z., Taurbekova A.A.</i> The decomposition methods of complex data processing systems.....	18
<i>Kenzhebeyeva Z.E., Isabayeva G.Zh., Zhunusova Zh.K.</i> Cyber security.....	21

Biological and medical sciences

<i>Bersimbaev R.I., Akparova A.Yu., Aripova A.A., Kausbekova A.Zh.</i> Role of microRNA and polymorphisms of FOXP3 and ADRB2 genes in pathogenesis of pulmonary diseases.....	25
<i>Aitkenova G.T., Yesbenbetova Zh.Kh., Abikenova Sh. K., Mukanov D. B.</i> Analysis of the effectiveness of the developed methodology for setting the type and the volume of guarantees to workers for working conditions.....	32
<i>Demchenko G. A., Akhmetbayeva N. A.</i> Adrenergic innervation of lymphatic nodes from various body regions in young and mature animals.....	40
<i>Myrzakhanova M.N., Myrzakhanov N.</i> Factors that provide movement of lymphatics of rats on lymphatic vasculars.....	45

Social sciences

<i>Ayupova Z.K., Kussainov D.U., Winston Nagan.</i> To the question of pre-trial adjusting of the conflicts in the modern legal system of the republic of Kazakhstan.....	49
<i>Abdugalina S.E., Baidalina M.Y., Iskakova Z. Zh.</i> The introduction of innovative technologies in the educational process of higher education.....	57
<i>Galiyeva A.Kh., Sadu Zh.N., Kulubekov M.T., Kazbekova L.A.</i> Education and science as factors of innovative economics development	62
<i>Dzhumabekova A.T., Alina G.B.</i> The role of monetary policy of the national bank of RK in the economic development of the state	68
<i>Erdeshova Zh.I., Sarsenova A.B., Tazhigaliyeva M.Zh.</i> Resolution of housing disputes in the civil process.....	72
<i>Eskaliyeva A.Zh., Adietova E.M., Gabdulin N.I.</i> Formation of human capital in the social sphere in the conditions of innovative economy.....	76
<i>Zhakisheva K.M., Zhumanova D.T.</i> Theoretical and practical aspects of monitoring the financial condition of agrarian sector enterprises.....	81
<i>Igibaeva Z.K., Beysenova L.Z.</i> Assessment of the effect of internal governmental audit on the use of governmental resources in the republic of Kazakhstan.....	88
<i>Karipbaev B.I.</i> Category of “contingency” as a factor in the legitimization of tolerance and pluralism	92
<i>Moldakenova E.K., Auezova K.T., Amrenova G.K.</i> Modernization of the organizational structure management of enterprises of agro-industrial complex.....	98
<i>Mukasheva G.M., Aymurzina B.T.</i> Comparative analysis of market conditions of grain economy of RK and Mongolia.....	102
<i>Nesipbekov Ye. N., Appakova G.N.</i> Investment portfolio set-up in terms of JSC NC "Kazakhstan temir zholy".....	106
<i>Omarkhanova Zh.M., Tleuzhanova D.A., Amangeldiyeva Zh. A., Baymagambetova Z.A.</i> Main directions for improving agrofranchising in the Akmolin region.....	111
<i>Panzabekova A.Zh.</i> Interdependence of tourism diversification and regional development features of Kazakhstan.....	114
<i>Sarsenbayeva K.A., Utegenova Zh.S.</i> Educational process and innovative management in modern pedagogy in higher school.....	121
<i>Seisenbina A.A.</i> Management of innovative development of food industry enterprises in RK.....	125
<i>Tatibekov B.L.</i> Development and formalization strategy of labor market in Kazakhstan under the conditions of digitalization.....	129
<i>Shugaipova Zh.</i> Market mechanisms of development of the mineral resource complex of Kazakhstan at the present stage..	137
<i>Bikenova A.S., Madisheva A.M., Nurgabylov M.N., Karabayeva R.K.</i> Total management in the sphere of tourist services.....	144
<i>Dauzova A.M., Dyrka S.</i> The issue of methodological aspects of assessment of land resources.....	149
<i>Kussainova A.A., Kozlowski Waldemar, Gerashchenko I.P.</i> Development of innovative insurance products of the financial market.....	155
<i>Uspambaeva M. K., Rakaeva A.N., Amrenova G. K.</i> State audit in the system of economic management.....	160
<i>Utepkaliyeva K.M., Sabirova R.K., Kabdulova A.S.</i> Development of small and medium entrepreneurship in agrarian sphere of Kazakhstan.....	169
<i>Shaukerova Z.M., Abdykerova G.Zh., Kasymova A.G.</i> Current problems of the audit of consolidated financial reporting.....	175
<i>Omarova A., Malgaraeva Zh., Murzaliyeva A.</i> Ensuring food security in the context of the development of integration processes.....	179
<i>Taspenova G.A., Karipova A., Alisheva D.E.</i> Analysis of factors affecting the economic strategy of diversification.....	188

Правила оформления статьи для публикации в журнале смотреть на сайте:

www.nauka-nanrk.kz

ISSN 2518-1483 (Online), ISSN 2224-5227 (Print)

<http://www.reports-science.kz/index.php/ru/>

Редакторы *М. С. Ахметова, Т.А. Апендиев, Д.С. Аленов*
Верстка на компьютере *А.М. Кульгинбаевой*

Подписано в печать 13.12.2018.
Формат 60x881/8. Бумага офсетная. Печать – ризограф.
12,5 п.л. Тираж 500. Заказ 6.