

АУЫЛ ШАРУАШЫЛЫҒЫ, ВЕТЕРИНАРИЯ ҒЫЛЫМДАРЫ ЖӘНЕ ТАМАҚ ӨНІМДЕРІН ҚАЙТА ӨҢДЕУ

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(Пробел)

Development of technology for a new cottage cheese product with fruit and berry fillers

Abstract

Main problem: The unfavorable conditions in which a significant part of the population of our country lives (living in conditions of harmful, stressful, physical, chemical and radiation effects), an imbalance in nutrition dictate the need to create a variety of functional products enriched with pro- and prebiotic factors.

In the science of nutrition, a functional direction has been developed - this is nutrition, which provides for the consumption of such products of natural origin, which, when used daily, have a regulating effect on the body as a whole, its certain systems, organs, providing a drug-free positive correction of their function.

Compared with traditional types of dairy products with high organoleptic and commodity characteristics, produced on the basis of classical technological techniques, dairy products of the new generation should have increased nutritional and biological value.

The article is devoted to the research and development of the technology of a new cottage cheese product - cottage cheese paste produced with the addition of lactulose concentrate and fruit and berry fillers. This article discusses the steady trend towards the use of fermented milk products with functional properties in the diet of modern humans.

Purpose: Study and development of technology of thermized cottage cheese paste enriched with prebiotic lactulose and fruit and berry fillers.

Methods: Analysis and generalization of theoretical information, organoleptic evaluation, physicochemical methods of analysis, microbiological methods of evaluation of cottage cheese paste, quality control of the finished product.

Results and their significance: The positive role of prebiotic substances in the vital activity of the macroorganism was studied. It is not for nothing that academician Andrei Georgievich Khramtsov once called lactulose "a miracle made of milk." Lactulose, being a strong bifidogenic factor, allows stabilizing the microflora of the stomach. Lactulose activates the growth of bifidobacteria, which take root well in the intestine and ferment lactulose to form lactic acid. Lactic acid suppresses the development of pathogenic and putrefactive bacteria.

As a result of the conducted studies, it was determined that the cottage cheese paste enriched with lactulose had high quality indicators and retained its consumer properties during the entire storage period. The introduction of lactulose into the recipe of cottage cheese paste does not reduce the nutritional advantages of the finished product.

Keywords: functional nutrition, bifidobacteria, probiotics, prebiotics, lactulose, lactic acid.

Introduction

The development of affordable healthy food products is an important and urgent task of state policy, which makes it possible to strengthen health and prevent diseases among the population. At the same time, the leading role belongs to probiotic products, the microflora of which contributes to the regulation of many physiological reactions and processes [1].

The problem of nutrition correction is especially relevant for Kazakhstan, where negative trends in the health of the population are aggravated by the consequences of the economy and the unfavorable environmental situation. New products should not only satisfy the physiological needs of the human body for nutrients and energy, but also fulfill preventive, therapeutic and functional purposes.

One of the main categories of functional nutrition includes probiotic cultures – bifidobacteria. Bifidobacteria are an obligate and dominant part of the intestinal microflora of a healthy person. Bifidobacteria destroy carcinogenic substances formed by some representatives of the intestinal microflora during nitrogen metabolism, performing the function of a second liver. Bifidobacteria do not accumulate toxins, are not pathogenic to humans, do not have hemolytic properties, do not form pigments [2].

During the life of the intestinal microflora does not change in favor of bifidobacteria, the number of which is constantly decreasing under the influence of negative factors (antibiotics, ecology, stress, etc.). The lack

of bifidobacteria can be made up with the help of dairy products enriched with them. This is the most common approach in the dairy industry, which has given rise to a range of dairy functional products: bio yogurt, bio kefir, and other products competing with each other in terms of the quantity and qualitative composition of "living cells". There are numerous data on the positive effect of fermented milk products on the human body. Fermented milk is easier to digest than natural milk due to the modification of the main components of milk by the microflora of the starter culture [3].

The beneficial effect of fermented foods is due to their antagonistic effect against certain types of microorganisms, including pathogenic ones.

However, there is a different approach, both to the production of functional dairy products and to the method of influencing the intestinal microflora. It is based on the properties of some food materials to reach the large intestine unchanged, where they serve as a nutrient medium for bifidoflora. These substances are called bifidogenic, and the method of influencing the intestinal flora with their help is the method of support. With the support method, a bet is placed on their own bifidobacteria, even if they are in a depressed state.

Prebiotics or bifidogenic factors currently include a number of substances that are diverse in structure, nature and properties, among which lactulose is the most studied.

Lactulose is an ideal prebiotic that selectively stimulates the growth and activity of the fermented intestinal microflora. The rate of bacterial fermentation of lactulose disaccharide, that is, its digestibility by fermented milk bacteria, and the minimum energy consumption of this fermentation ensure rapid growth of the intestinal normoflora and, consequently, high therapeutic and preventive effectiveness of products enriched with a minimum amount of lactulose. It is estimated that 1 g of lactulose provides the same bifidogenic effect as 7-10 g of other oligosaccharides (dietary fibers) with a prebiotic effect.

This property of lactulose - to provide high bifidogenicity at low dosages – that was the foundation of our research on the use of lactulose in the production of cottage cheese thermized paste with fruit and berry fillers.

When developing new types of products with lactulose, it is of great importance to choose the optimal concentration of lactulose in the finished product [4].

The most valuable and essential components of food are proteins. Once in the body, they are broken down under the influence of enzymes to amino acids, some of which break down into organic ketoacids; amino acids, proteins and substances of a protein nature are synthesized from them again.

Cottage cheese and cottage cheese products are considered indispensable products for all age groups of the population. Cottage cheese is a protein fermented milk product. The presence of sulfur-containing amino acids - methionine and lysine, choline allows the use of cottage cheese for the prevention and treatment of certain diseases of the liver, kidneys, and atherosclerosis. Cottage cheese contains a significant amount of minerals (calcium, phosphorus, iron, magnesium, etc.) necessary for the normal functioning of the heart, central nervous system, brain, for bone formation and metabolism in the body. Particular importances are calcium and phosphorus salts, which in cottage cheese are in a state most convenient for assimilation [5].

The enrichment of cottage cheese products with lactulose seems to be a promising and effective method in the production of functional dairy products that can significantly limit the spread of dysbiosis among the population.

Materials and methods

Experimental studies were carried out in three to five repetitions according to generally accepted, standard methods of research of physicochemical and microbiological parameters of raw materials and finished products.

At the first stage of the study, the formulation of a new cottage cheese paste was developed, a stabilizer and a fruit filler were selected, the selection and experimental determination of the main ingredients of the fermented milk product was carried out.

At the second stage, the technology of a fermented milk product with probiotic properties was worked out, technological parameters were determined.

The third stage of the research was aimed at studying the organoleptic, physicochemical and microbiological parameters of the new product.

At the fourth stage of research, the effect of additives of various doses of lactulose concentrate on the physicochemical, organoleptic properties of the product was studied.

At the final stage, the nutritional, biological and energy value of the product was determined.

Results

Cottage cheese is a protein fermented milk product produced by fermenting milk with pure cultures of lactic acid bacteria with or without the use of calcium chloride, rennet or pepsin and removing part of the serum from the clot. It has a pure fermented milk taste and smell, a white slightly yellowish color and a delicate consistency.

Depending on the mass fraction of fat, a new product was produced of the following types:

- thermized low-fat cottage cheese paste;
- thermized cottage cheese paste of 4.0 % fat content.

Thermized cottage cheese paste with fruit and berry filler is produced from low-fat cottage cheese made from normalized skimmed milk with or without the addition of cream, yogurt, sugar, with the addition of stabilizer, fruit and berry fillers, water, followed by heat treatment and is intended for direct consumption.

The product was produced according to the technological instructions, in compliance with the applicable sanitary rules and regulations for dairy industry enterprises, approved in accordance with the established procedure.

The recipe for cottage cheese paste per 1t of the finished product without taking into account losses is given in Table 1:

Table 1 – Recipe of cottage cheese paste

Name of raw materials	Unit of measurement	Quantity
Stabilizer Hamulsion QNA-10	kg	5
Fruit filling: either pineapple or strawberry	kg	100 80
Sugar	kg	60
Yogurt 2.5 % fat content	kg	95,6
Water	kg	80-100
Cream 30 % fat content	kg	124,4
Low-fat cottage cheese	kg	535
Total	kg	1000
Losses	kg	16

The consumption of raw materials for the production of one ton of product is taken into account in accordance with the actual losses. The norms of losses of raw materials and fat in the production of the product are established in relation to the existing technological equipment.

The consumption of auxiliary materials, chemicals, containers and packaging materials per 1 ton of product is taken into account at actual costs.

Organoleptic, physicochemical, microbiological parameters of cottage cheese paste were studied (Tables 2, 3, 4).

Table 2 – Organoleptic characteristics of the product

The name of the indicator	Characteristic
Taste and smell	Fermented milk, moderately sweet, with a taste of added fruit and berry filler.
Consistency	Pasty, homogeneous, slightly powdery, with the presence of fruit and berry filler particles.
Color	Due to the color of the introduced fruit and berry filler, uniform throughout the mass.

Table 3 – Physical and chemical parameters of the product

The name of the indicator	Quantity	
	low - fat	4 % fat content
Mass fraction of fat, % not less	-	4,0
Mass fraction of moisture, %, no more	76,0	70,0
Total amount of sugars, %, not less	11,0	11,0
Acidity, °C, no more	200,0	180,0
Temperature at release, °C, no more	6,0	6,0
Phosphatase	absent	

Table 4 – Microbiological indicators of the product

The name of the indicator	Quantity	
	low - fat	4 % fatcontent
Bacteria of the E. coli group (coliforms) in 0,01 g of the product	absent	absent
Yeast and mold,	50	50
CFU/g no more	absent	absent
Pathogenic microorganisms, including Salmonella in 25 g	absent	absent

The chemical composition and energy value (per 100 g of the product) are given in Table 5

Table – Chemical composition and energy value (per 100 g of product)

Product Name	Mass fraction, g.			Energy value, kcal per 100 g of product
	fats	proteins	carbohydrates	
Cottage cheese paste of 4 % fat content	4,0	13,66	13,53	144,76
Low-fat cottage cheese paste	-	14,94	13,48	113,68

Discussion

Further, experimental samples of cottage cheese paste with bifidogenic properties were developed using a prebiotic for nutrition of various age groups of the population. The studies were carried out with a threefold repetition.

The Russian lactulose concentrate of CJSC "Shekhon-Lactulose" was chosen as a prebiotic.

When developing new types of products with lactulose, it is of great importance to choose the optimal concentration of lactulose in the finished product.

The tests carried out showed the possibility of using lactulose concentrate for enriching thermized cottage cheese paste with fruit and berry fillers in a dose of 5 to 12.5 g / l, which corresponds to the mass fraction of lactulose in the finished product from 0.2 to 0.5 %. The addition of lactulose in these concentrations gives the product a fuller, sweet taste, practically does not affect the pH value, titrated acidity. The consistency of the product does not change.

Cottage cheese paste enriched with lactulose had high quality indicators and retained its consumer properties throughout the storage period.

The recipe for cottage cheese paste with the addition of lactulose concentrate per 1t of the finished product without taking into account losses is given in Table 6.

Table 6 – Recipe of cottage cheese paste with the addition of lactulose concentrate

Name of raw materials	Unit of measurement	Quantity
Stabilizer Hamulsion QNA-10	kg	5
Fruit filling: either pineapple or strawberry	kg	100 80
Lactulose Concentrate	kg	5
Sugar	kg	60
Yogurt 2.5 % fat content	kg	95,6
Water	kg	75-95
Cream 30 % fat content	kg	124,4
Low-fat cottage cheese	kg	535
Total	kg	1000
Losses		16

Conclusion

The new cottage cheese paste is produced from low-fat cottage cheese made from pasteurized skimmed milk, with the addition of cream, yogurt, sugar, stabilizer, followed by heat treatment. After thermization, lactulose concentrate is added together with fruit and berry fillers. Thermized cottage cheese paste in a hot state is sent for packing and packaging. Packaged and packed in polymer containers, thermized cottage cheese paste with fruit is immediately cooled in the refrigerator at a temperature of $(4 \pm 2) ^\circ\text{C}$.

As a result of the conducted research, the following conclusions can be drawn: thermized fruit and berry cottage cheese paste enriched with lactulose had high quality indicators and retained its consumer properties throughout the storage period. The introduction of lactulose into the recipe of cottage cheese paste in an amount from 5 to 12.5 % does not reduce the nutritional advantages of the finished product. With a further increase in the concentration of lactulose, a salty taste appears. Since the lactulose content even during sterilization (115-117 °C with an exposure of 15 to 30 minutes) does not decrease, but also increases due to partial hydrolysis of milk lactose, then with our thermization modes (65-70 °C) the complete safety of the introduced lactulose is guaranteed.

This product is intended for direct consumption and fully performs its functional properties.

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Жеміс-жидек толтырғыштары бар жаңа сүзбе өнімінің технологиясын жасау

Біздің ел халқының едәуір бөлігі өмір сүретін қолайсыз жағдайлар (зиянды, стресстік, физикалық, химиялық және радиациялық әсер ету жағдайында өмір сүру), тамақтанудың теңгерімсіздігі про – және пребиотикалық факторлармен байытылған функционалды мақсаттағы әртүрлі өнімдерді жасау қажеттілігін туындатады.

Тамақтануғылымында функционалды бағыт дамыды-бұл күнделікті қолдан укезінде ағзаға тұтастай алғанда, оның белгілі бір жүйелері мен мүшелеріне олардың функцияларын дәрі-дәрмексіз оң түзетуді қамтамасыз ететін табиғи өнімдерді тұтынуды қамтамасыз ететін тамақтану.

Классикалық технологиялық әдістер негізінде өндірілген жоғары органолептикалық және тауарлық сипаттамалары бар сүт өнімдерінің дәстүрлі түрлері мен салыстырғанда жаңа буын сүт өнімдері тағамдық және биологиялық құндылыққа ие болуы керек. Мақала жаңа сүзбе өнімінің технологиясын – лактулоза концентраты мен жеміс-жидек толтырғыштарын енгізе отырып өндірілетін сүзбе пастасын зерттеуге және әзірлеуге арналған. Бұл мақалада функционалды қасиеттері бар қышқыл сүт өнімдерін қазіргі адамның тамақтануында қолданудың тұрақты тенденциясы қарастырылады.

Мақаланың мақсаты – пребиотик пен лактулозамен және жеміс-жидек толтырғыштарымен байытылған термиттелген сүзбе пастасының технологиясын зерттеу және әзірлеу.

Авторлар мынадай әдістерді қолданған: Теориялық ақпаратты талдау және жалпылау, органолептикалық бағалау, Талдаудың физика-химиялық әдістері, сүзбе пастасын бағалаудың микробиологиялық әдістері, дайын өнімнің сапасын бақылау.

Зерттеу нәтижесінде – макроорганизмөміріндегі пребиотикалық заттардың оң рөлі зерттелді. Академик Андрей Георгиевич Храмов бір кездері лактулозаны "сүттен жасалған керемет" деп атағаны бекер емес. Лактулоза күшті бифидогендік фактор бола отырып, асқазан микрофлорасын тұрақтандыруға мүмкіндік береді. Лактулоза ішекте жақсы тамыр алатын және сүт қышқылынықалыптастыру үшін лактулозаны ашытатын бифидо бактериялардың өсуін белсенді етеді. Сүт қышқылы патогендік және шірік бактериялардың дамуын тежейді.

Зерттеулер нәтижесінде лактулозамен байытылған сүзбе пастасы жоғары сапалы көрсеткіштерге ие және бүкіл сақтау кезеңінде тұтынушылық қасиеттерін сақтайтындығы анықталды. Лактулоза сүзбе пастасының рецептурасына енгізу дайын өнімнің тағамдық құндылығын төмендетпейді.

Түйін сөздер: Функционалды тамақтану, бифидобактериялар, пробиотиктер, пребиотиктер, лактулоза, сүт қышқылы.

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Разработка технологии нового творожного продукта с фруктово-ягодными наполнителями

Неблагоприятные условия, в которых пребывает значительная часть населения нашей страны, проживание в условиях вредных, стрессовых, физических, химических и радиационных воздействий, несбалансированность питания диктуют необходимость создания разнообразных продуктов функционального назначения, обогащенных про – и пребиотическими факторами. В науке о питании получило развитие функциональное направление - это питание, предусматривающее потребление таких продуктов естественного происхождения, которые при ежедневном применении оказывают регулирующее воздействие на организм в целом, его определённые системы, органы, обеспечивая безмедикаментозную положительную коррекцию их функции. По сравнению с традиционными видами молочной продукции с высокими органолептическими и товарными характеристиками, вырабатываемой на основе классических технологических приемов, молочные продукты нового поколения должны обладать повышенной пищевой и биологической ценностью.

Статья посвящена исследованиям и разработке технологии нового творожного продукта – творожной пасты, производимой с внесением концентрата лактулозы и фруктово-ягодных наполнителей. В данной статье рассматривается устойчивая тенденция к использованию в питании современного человека кисломолочных продуктов с функциональными свойствами.

Цель - изучить и разработать технологии пасты творожной термизированной, обогащенной пребиотикомлактuloзой и фруктово-ягодными наполнителями.

Авторами использовались такие методы, как анализ и обобщение теоретической информации, органолептическая оценка, физико-химические методы анализа, микробиологические методы оценки творожной пасты, контроль качества готового продукта.

В результате была изучена положительная роль пребиотических веществ в жизнедеятельности макроорганизма. Являясь сильным бифидогенным фактором, лактулоза позволяет стабилизировать микрофлору желудка, активизирует рост бифидобактерий, которые хорошо приживаются в кишечнике и сбрасывают лактулозу с образованием молочной кислоты. Молочная кислота подавляет развитие патогенных и гнилостных бактерий. Исследования показали, что творожная паста, обогащенная лактулозой, имеет высокие качественные показатели и сохраняет свои потребительские свойства в течение всего периода хранения. Введение в рецептуру творожной пасты лактулозы не снижает пищевых достоинств готового продукта.

Ключевые слова: функциональное питание, бифидобактерии, пробиотики, пребиотики, лактулоза, молочная кислота.

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