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Д.В.Сокольский атындағы «Жанармай,
катализ және электрохимия институты» АҚ

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ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
АО «Институт топлива, катализа и
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NEWS

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OF THE REPUBLIC OF KAZAKHSTAN
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NAS RK is pleased to announce that News of NAS RK. Series of chemistry and technologies scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of News of NAS RK. Series of chemistry and technologies in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential content of chemical sciences to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы "ҚР ҰҒА Хабарлары. Химия және технология сериясы" ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Web of Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабарлары. Химия және технология сериясы Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді химиялық ғылымдар бойынша контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Известия НАН РК. Серия химии и технологий» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Известия НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному контенту по химическим наукам для нашего сообщества.

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THE USAGE OF VEGETABLE RAW MATERIALS IN THE PRODUCTION OF COTTAGE CHEESE PRODUCTS

Abstract. In the present work the technology of production of cottage cheese products based on the use of herbal supplements is considered. Fiber and stevia are used as products that increase the nutritional value of the product. The results of experimental studies show that the addition of plant components have a positive effect on the quality and nutritional value of the product.

Key words: cottage cheese, cottage cheese products, fiber, stevia.

Milk and dairy products are obligatory and irreplaceable food of the person. Kazakhstan is one of the twenty world consumers of milk and dairy products and is a large dairy market. The volume of consumption of milk and dairy products in natural terms in Kazakhstan annually increases by an average of 9% per year over the past five years [1].

In order to increase agricultural production with an emphasis on the most popular types of food and the development of exports of processed agricultural products, in the coming period it is necessary to provide maximum coverage of agricultural producers with state support by creating favorable conditions and infrastructure for the production of primary processing, storage and marketing of competitive products[2].

Also, Government of Kazakhstan has been done a larger work in developing strategic framework regarding safety of organic food, that are aiming to get an healthy and functional food products[3].

One of the leading ingredients among food processors, including dairy products, are dietary fibers. Diets that rich in dietary fiber have a positive impact on human health, as their consumption reduces the risk of cancer. The use of dietary fiber in the form of fiber and bran can enrich the product with insoluble dietary fiber, reduce the deficit of their consumption. The influence of vegetable additives on the properties and chemical composition of cottage cheese products was studied. According to the study, the protein content increased by 1.92% [4].

The state program of development of agro-industrial complex of the Republic of Kazakhstan for 2017 - 2021, in accordance with the strategic objectives of the development of Kazakhstan, outlined in the National Plan "100 concrete steps" and the Strategy "Kazakhstan-2050" will be aimed at ensuring the internal needs of the population by popular types of agricultural products, the definition of a targeted export policy.

According to statistics for 11 months of 2018, Kazakh companies have provided demand for milk and cream by 96.2%, against 94% in the same period a year earlier; for cheese and cottage cheese — by 56.5%.

There was a significant increase of exports of milk and cream: just 47.6% per year. Export of cheese and cottage cheese products also increased by 4.2% [5]. The dynamics of growth in demand for dairy products in the Republic of Kazakhstan is shown in figure 1.

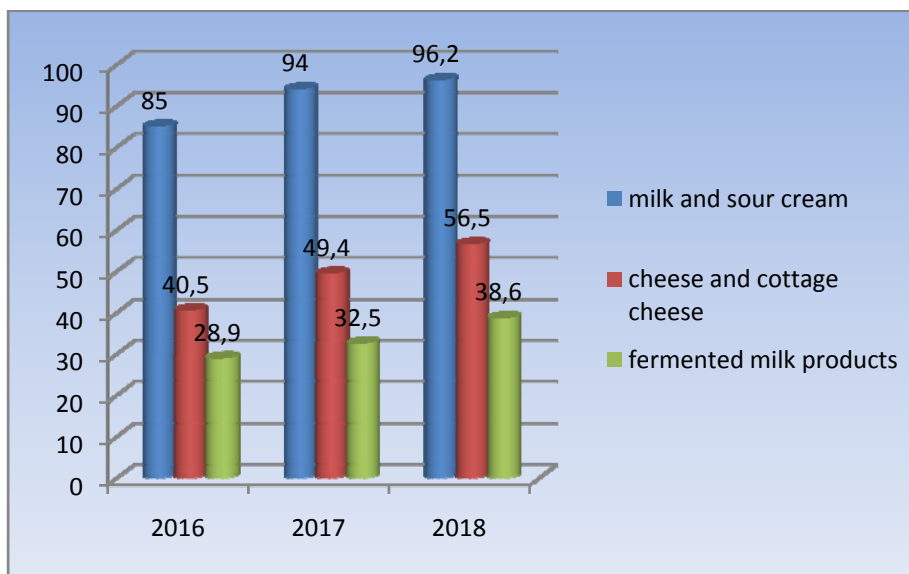


Figure 1 - Demand for dairy products

Cottage cheese production in Kazakhstan is concentrated mainly in the following regions: Almaty region: 26.7%, East Kazakhstan region (12.7%) and Almaty (11.7%). The data are shown in figure 2.

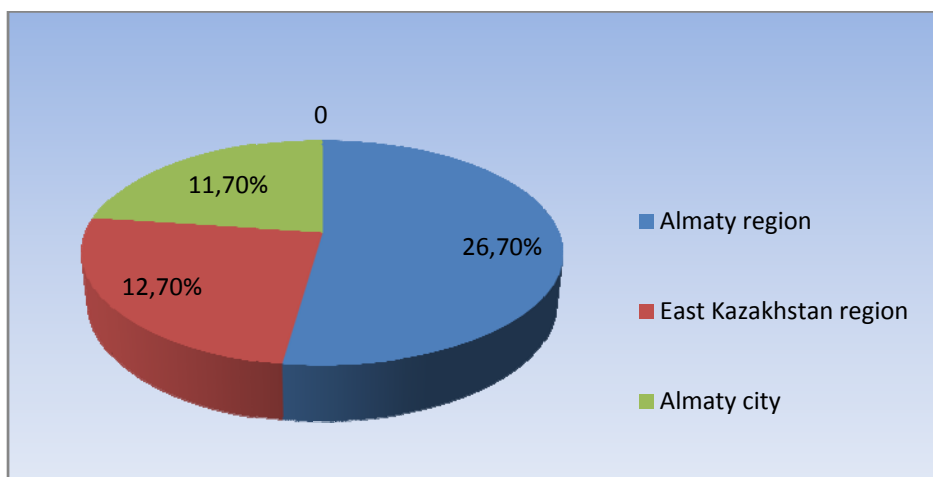


Figure 2 - Leaders of cheese and cottage cheese production

Among the producers of milk and cream Almaty region is also among the leaders: 113.7 thousand tons, production growth by 13% per year. In addition, North Kazakhstan (140,8 thousand tons, +20% for the year) and Kostanay (78,3 thousand tons, -1% for the year) regions entered the top three "dairy" regions.

As noted, at the end of 2017 Almaty region was the leader in the production of dairy products, but the data for 2018 in the regional context were not provided [6].

The current level of human nutrition is unsatisfactory both quantitatively and qualitatively. The qualitative aspect of nutrition is associated with a deficiency in the diet: a full protein, polyunsaturated fatty acids, vitamins, minerals, dietary fibers. In accordance with the changes in the structure of nutrition of the population and the existing protein deficiency, special attention is paid to the creation of new biologically valuable protein products, including dairy products.

Dairy products have long been considered one of the most popular foods in the diet of mankind. New products in this industry have a number of advantages and demand. The use of non-traditional methods in production will make it possible to save resources[7,8].

According to modern concepts of nutrition science, cottage cheese as a protein product is of great importance for a balanced diet of people. In this regard, the question of expanding the range of cottage cheese is relevant. In this regard, various fillers are added to the cottage cheese, which has a complex of taste, medical, dietary and nutritional properties. One of the promising directions of expanding the range is the production of various types of functional products based on milk with the addition of plant ingredients [9].

With the passage of circumstances and the modern rhythm of life, the factors depleting the human body has increased markedly. Therefore, the enrichment of cottage cheese products with vegetable additives, with higher nutritional properties and immuno-enhancing actions are an important factor. Biologically active additives are ingredients of non-dairy origin, but the development of current technology allows to enrich the composition of food by any methods.

Analysis of the market of protein foods shows increasing consumer interest in cottage cheese and cottage cheese products as the most affordable for all segments of the population.

The high nutritional value of cottage cheese is due to the increased content of amino acids important for the body, especially methionine, lysine. The high content of mineral substances in cottage cheese has a positive effect on the construction of tissues and bone formation [10].

Cottage cheese— fermented milk product obtained by fermentation of milk with subsequent removal of whey.

Cheese contains protein, minerals, lactose (milk sugar), fat, enzymes, vitamins a, D, C and b vitamins are Also in large quantity are calcium, iron, phosphorus. The vitamin composition of cottage cheese is shown in table 1.

Table 1– vitamin Content in cottage cheese.

Vitamins	Content in cottage cheese	Daily norms of vitamins	The percentage of content in 100 gr. cottage cheese from the daily rate (%)
Vitamin C (ascorbic acid)	0.5 mg	75 mg	0.66
Vitamin B1 (thiamine)	0.04 mg	2.25 mg	1.7
Vitamin B2 (riboflavin)	0.31 mg	2.50 mg	12.4
Vitamin B3 (PP, niacin)	3.17 mg	15 mg	21.1
Vitamin A (retinol)	0.08 mg	1 mg	8

Useful properties of cottage cheese are caused by its curative structure. Milk protein – casein, contained in cottage cheese, has a high nutritional value and can replace animal proteins.

Cottage cheese products enriched with cereals and berries, improve the activity of the gastrointestinal tract, normalize intestinal peristalsis. It regulates the functions of the nervous, digestive, cardiovascular and muscular systems [11]. For the effective solution of actual problems in the field of nutrition and health of residents of the Republic of Kazakhstan, the production of cottage cheese enriched with cereals is a promising direction.

In this aspect, the actual task is to develop the technology of cottage cheese products characterized by high levels of nutritional and biological value with a given composition and properties based on the addition of natural components of plant origin.

The developed technology of cottage cheese enriched with wheat bran is a source of fiber, essential macro-and microelements, b vitamins, vitamins E and A. Fiber is especially important for the good functioning of the intestine and the normal functioning of the digestive system as a whole [12].

Regular inclusion of fiber in the diet contributes to the maintenance of normal intestinal microflora, prevents the development or exacerbation of diabetes, significantly reduces the risk of cardiovascular disease, normalizes the functions of the liver and gallbladder, radionuclides and slags, is powerful prevention of cancer, in particular, colon cancer [13,14].

According to medical research, almost the entire population of the world suffers from fiber deficiency to one degree or another. In the average person uses from 5 to 15 g of fiber per day, while the body needs much more – about 40 g per day (for people with diabetes, - 50 g) with the energy value of the diet of 2500 kcal. It is this amount of dietary fiber that ensures the normal functioning of all organs and systems of the body [15]. Given that a significant part of the population prefers to consume cottage cheese with sugar, it is advisable to develop a cottage cheese with fiber and the addition of sugar substitutes.

The market for low-calorie sweeteners has developed very rapidly over the past 30 years, and there is no doubt that some developments in the field of food ingredients have recently been very important. The range, composition, and quality of foods that use sweeteners, especially in the dietary and low-calorie sector, have undergone significant changes in recent years [16,17]. Currently, manufacturers have the opportunity to offer a large part of the population food products that are fully consistent with or even superior to similar types of products made on sugar and have additional functional properties. One of such possibilities is the replacement of high-calorie sugars with low-calorie sweetening additives of plant origin – a natural sweetener from stevia [18,19,20].

It is necessary to note an important property of stevia – its high antioxidant activity [21].

The purpose of this study is to develop the technology of cottage cheese products of increased biological value. As plant additives, wheat fiber and a substitute for sugar of plant origin –stevia were used.

During the experimental study, standard methods of analysis were used:

- determination of acidity by titrimetric method;
- definition of protein by the method of formoltitration;
- determination of moisture cottage cheese and cottage cheese products by drying to constant weight;
- determination of lactose by refractometric method;
- determination of pH by potentiometric method;

In the proposed work as the main objects of the study were taken:

- 1) Normalized, pasteurized 3,2% fat whole milk, taken from the dairy plant of S.Seifullin university.
- 2) Cottage cheese, that was made in the dairy plantof S. Seifullin university.
- 3) Dry starter culture for cottage cheese.
- 4) Wheat fiber
- 4) Stevia leaves

Experimental studies were conducted on the basis of the laboratory and dairy plant of S. Seifullinuniversity, a pilot batch of finished products obtained in the production and experimental plantof S.Seifullin university.

For the analysis, 6 samples of cottage cheese were prepared: a control sample, samples with fiber and dry stevia leaves, samples with fiber and stevia extract in different ratios. Also, cottage cheese with the addition of fiber and stevia in a dry, crushed form during fermentation, and cottage cheese with the addition of fiber and stevia extract during fermentationwere studied. These options were excluded, since the acidity index in milk with the addition of stevia extract exceeded the norm, and in milk with the addition of dry stevia leaves, the taste of the resulting cottage cheese was not expressive, as in cottage cheese with the addition of stevia extract after fermentation [22].

To assess the organoleptic properties of the developed cottage cheese product, an organoleptic evaluation was carried out. According to the results of the tasting evaluation and the data of physical and chemical analyses, there was a sample (6) with fiber and stevia extract in a ratio of 1:3. Data of physical and chemical analyses are given in table 2.

Table 2 - Data of physical and chemical analysis of samples

Parameter	pH	Acidity, °T	Moisture, %	Mass fraction of lactose, %	Mass fraction of protein, %,
Control sample (C)	4,7	160	43,52	3,42	6,528
Version 2	4,6	160	23,86	3,36	6,528
Version 3	4,7	138	45,88	3,82	6,528
Version 4	5,0	140	28,66	3,72	8,448
Version 5	5,1	144	25,38	3,77	6,528
Version 6	5,1	150	20,2	3,70	8,546

These analyses show that the resulting cottage cheese product meets the standards. The data of organoleptic evaluation are given in table 3.

Table 3 – Organoleptic characteristics of cottage cheese products with vegetable additives

Parameter	Consistency	Taste and aroma	Color
Pure cottage cheese	Soft, crumbly	Pure	White
Cottage cheese with fiber and stevia	Soft, crumbly	Pure, slightly sweet	White with brown grains of fiber

On the basis of theoretical and experimental studies, an optimal way to improve the quality of traditional cottage cheese was developed, which allows to increase the shelf life of cottage cheese, increase its biological value and increase the amount of cottage cheese from a unit of raw materials.

The improved technology of cottage cheese, which allows increasing the biological value of the product by including in the structure of cottage cheese biologically active components such as fiber and stevia.

Taking into account the results of the research, the new cottage cheese product can be recommended as dietary and therapeutic and preventive nutrition to the General population.

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ӨСІМДІК ШИКІЗАТЫН СУЗБЕ ӨНІМДЕРІН ӨНДІРУДЕ ПАЙДАЛАНУ.

Аннотация. Осы жұмыста өсімдік қоспаларын қолдануға негізделген ірімшік өнімдерін өндіру технологиясы қарастырылады. Өнімнің тағамдық құндылығын арттыратын зат ретінде жасұнық пен стевия пайдаланылады. Эксперименттік зерттеулердің нәтижелері өсімдік компоненттерінің қосылуы өнімнің сапасы мен тағамдық құндылығына оң әсерін тигізетіндігін көрсетеді.

Түйін сөздер: ірімшік, ірімшік өнімдері, жасұнық, стевия.

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ИСПОЛЬЗОВАНИЕ РАСТИТЕЛЬНОГО СЫРЬЯ В ПРОИЗВОДСТВЕ ТВОРОЖНЫХ ИЗДЕЛИЙ

Аннотация. В представленной работе рассматривается технология производства творожных изделий на основе применения растительных добавок. В качестве продуктов, повышающих пищевую ценность продукта используются клетчатка и стевия. Результаты экспериментальных исследований показывают, что добавление растительных компонентов оказывают положительное влияние на качество и пищевую ценность продукта.

Ключевые слова: творог, творожные изделия, клетчатка, стевия.

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