

# Development of New Technological Solutions for the Dairy Industry

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**Abstract.** Milk and dairy products occupy an important place in the human food. The development of a popular fermented milk product - yogurt of combined composition - is a prospective direction and has practical significance for the dairy industry. The developed yogurt expands the range of the dairy industry based on dairy and plant-based raw materials. With the increasing demand for fermented milk products, it became necessary to transit from private to industrial production of these products. To produce this product, raw cow's milk, skimmed milk powder and a plant-based additive are used. As a plant-based additive, the leaves of mint were used.

## 1 Introduction

Milk and dairy products occupy an important place in the human food. Milk contains all the nutrients that the human body needs without exception. One of the most distinctive and important properties of milk as a food product is its high biological value and digestibility, due to the presence of full-fledged proteins, milk fat, minerals, trace elements and vitamins [1,2].

Milk has an excellent capacity for fermentation, acquiring a completely new taste and pleasant aroma, in this regard, fermented milk products are popular among millions of people around the world [3].

These products contain more than one hundred of the most valuable components. They contain all the necessary substances for the life of the body: proteins, fats, carbohydrates, mineral salts, vitamins. These components of milk are well balanced, so they are easily and completely absorbed. The inclusion of dairy products in the food ration increases its usefulness and contributes to better assimilation of all components [4].

Dairy industry occupies an important place in the agricultural sector. Previously, private farms were engaged in the production of fermented milk products [5,6]. Gradually, with the increasing demand for fermented milk products, it became necessary to transit from private to industrial production of these products.

To attract consumers, manufacturers are constantly working to expand the range of fermented milk products, considering the food preferences of the population. Currently, technologies are expanding the range of products through the use of various natural additives, which positively affects the value of fermented milk products and increases the demand of the population for them [7,8].

## 2 Materials and methods

The purpose of our research was to study the production of yogurt with a plant-based additive - mint; and increase its sales volumes while stimulating the demand of the population to provide the target market of consumers with high-quality products in appropriate volumes [9,10].

Last year there was an increase in milk production in the Krasnoyarsk region. Joint stock company (JSC) «Milk» of the city Minusinsk is one of the oldest processing enterprises of the dairy industry of this region. In terms of production, the plant is among the top five dairy processing plants. JSC «Milk» has the potential to increase exports of dairy products to the foreign countries [11,12]. Unfortunately, it's very expensive. But with the help of Russian banks the company can take a loan for development of the business [13].

More than 80 types of dairy products are produced under the "Sibirzhinka" brand: milk, butter, fermented milk products, cottage cheese and cheeses.

JSC «Milk» is a member of the association of agricultural producers, processors and trade of the Krasnoyarsk region "Yenisei standard" [14,15]. The goal of the association is to make high-quality local products visible, and to protect the consumer from falsification if possible. Products that have passed the test are marked with a green bump [16].

The high quality of our products allows successfully competing with other manufacturers that produce similar products.

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### 3 Results

The key factor of the company's activity is to win and retain customers by effectively meeting their needs. JSC «Milk» tries to know and understand the specifics of customer requests. The marketing and sales department of the company maintains constant communication with customers and distributes the received information to all departments. The acquired knowledge is used for manufacturing products based on customer requests [17,18].

Currently, the number of clients of JSC «Milk» is more than 100 organizations, which are large commercial companies, small firms and sole proprietors, as well as health and education institutions. In addition, the company supplies its products to many regions of Russia and CIS countries. However, the main sales of dairy products are carried out in the south of the Krasnoyarsk territory, in the Republic of Khakassia and the Republic of Tyva [19].

The strategy goal of JSC «Milk» is to provide the target market of consumers with high-quality products in appropriate volumes. For the company, this means increasing sales volumes while stimulating the demand of the population. For successful marketing activities, the company has formed and implemented a marketing strategy:

1. Increasing the share of the existing market through more effective advertising and sales promotion. (Market share expansion strategy).
2. Increase in sales of dairy products by 15%, which was provided in the business plan for 2022. (Market share expansion strategy).
3. Creating products that have no analogues on the market. (Innovation strategy).
4. Introduction of perfect service forms, as well as improvement of the sales system and product quality. (Product differentiation strategy).
5. Analysis of the sales chain.

Segmentation of the market where the products of JSC «Milk» were sold in 2018 is shown in the figure 1:

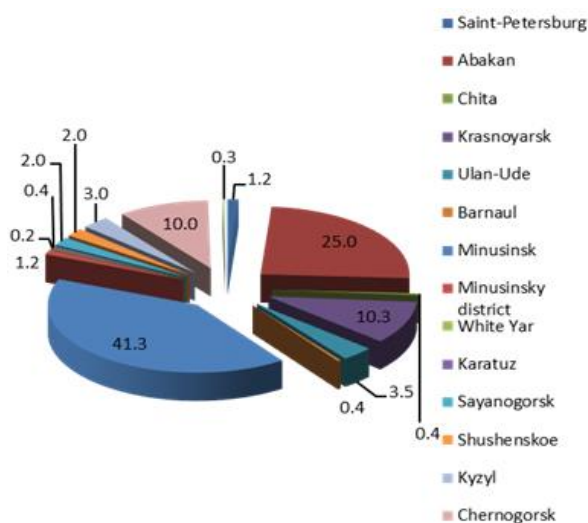


Fig. 1. Market segmentation by region, 2018.

Milk products are sold in Siberia and the central part of Russia. In 2016, the development of the market in the eastern regions of Russia (Chita, Ulan-Ude) continued. However, the consumer market in the south of the Krasnoyarsk region and the Republic of Khakassia is preferred for JSC «Milk».

Planning to create conditions that ensure an increase in sales, JSC «Milk» held comprehensive advertising events in 2018. JSC «Milk» spent 1.8 million rubles on advertising campaigns that included advertising in the media (television, radio, and press), production and distribution of advertising materials, promotions, prize promotions, and tastings.

Based on the principle of minimizing costs, the distribution chain of JSC «Milk» is expanding. So, in 2016, we worked with 12 distributors, at the moment more than 20 distributors are working with JSC «Milk». The distribution chain of JSC «Milk» is shown in the figure 2:

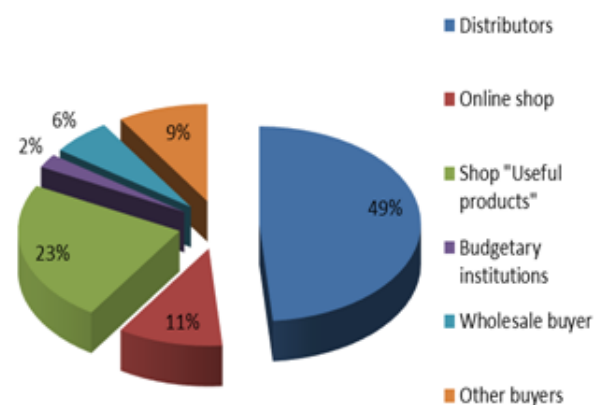


Fig. 2. The distribution chain of JSC «Milk» products for 2018.

The strategic partner of JSC «Milk» is a chain of retail stores within walking distance - Shop "Useful products". The sphere of JSC «Milk» interests also includes cooperation with large retail chains ("commander", "Krasny Yar", "VSK", "Basket", etc.), budget organizations, traditional retail companies and sole proprietors.

### 4 Discussion

The basis of our research was the expansion of the yoghurt range produced in JSC «Milk» through the development of a new product - yoghurt with mint extract. This type of yogurt will differ in taste.

Yoghurts are fermented milk products, obtained by fermentation, skimmed or normalized milk with an increased content of dry skimmed substances with a starter consisting of lactic Streptococcus, Bulgarian Bacillus with the introduction of bifidobacterium or acidophilus Bacillus and with or without the addition of various food additives [20].

Two samples were prepared:

- 1- Test sample (with the addition of mint extract);
- 2- Control sample (without the addition of mint extract).

For 100 liters of milk 20 liters of mint extract were added, which requires 0.6 kg of dry mint to prepare.

For the production of this yogurt type, mint is used as an extract, since it is widely used in medicine. Mint has a calming, choleric, analgesic, antiseptic and vasodilating effect – an indispensable tool for stomach cramps, intestinal and liver colic, as well as for sickness, diarrhea, heartburn and as an astringent, antitussive and sedative for nervous excitement. The results of the organoleptic evaluation of yogurt with mint extract are presented in table 1.

**Table 1.** Organoleptic parameters of yogurt.

Sample	Indicators			
	color	consistency	taste	smell
Control sample (without the addition of mint extract)	Milky-white uniform throughout the mass	Homogeneous moderately viscous	Nice fermented milk	Nice fermented milk
Test sample (with the addition of mint extract)	Mint uniform throughout the mass	Homogeneous moderately viscous	Pleasant fermented milk with a light mint aroma	Pleasant fermented milk with a mild mint flavor

After the completion of the yogurt production process with the addition of mint extract, a tasting evaluation of the obtained samples was carried out. The results of the evaluation are presented in table 2.

**Table 2.** Yogurt tasting score.

Sample	Control sample (without the addition of mint extract)	Test sample (with the addition of mint extract)
Appearance	5	5
Consistency of yogurt (Homogeneous)	5	5
smell	5	5
taste	4.5	5
Department serums	5	5
Note	Fermented milk flavor with a thick homogeneous clot	Fermented milk flavor with a thick homogeneous clot with a light mint flavor
Total	24.5	25

The tasting evaluation showed that the test and control samples scored almost the same number of points. However, the test sample had a light refreshing taste and therefore scored more points.

A physical and chemical analysis was performed, the results of which are presented in table 3.

**Table 3.** Characteristics of physical and chemical parameters of the finished product.

Sample	The acidity of the yoghurt, °T		content, %		Viscosity of the yoghurt, min.
	Requirements of the standard	Actually	Requirements of the standard	Actually	
Control sample (without the addition of mint extract)	70-140	80	no less 2.5	2.5 %	5.11
Test sample (with the addition of mint extract)	70-140	80	no less 2.5	2.5 %	4.5

## 5 Conclusion

According to the data obtained, it can be concluded that yogurt made with the addition of mint extract during fermentation has an acidity of 80°T, a viscosity of 4 min. 50 sec. and yogurt without the addition of mint extract has an acidity of 80°T, product viscosity of 5 min. 11 sec.

Thus, in production, manufacturers can use mint extract for making yogurt, since the product turns out to be more pleasant to the taste, more tender, with a pleasant aroma of mint.

The development of a popular fermented milk product – yogurt is a prospective direction and has practical significance for the dairy industry.

The developed yogurt meets the requirements of functional products, as it has useful properties due to the introduction of a plant-based additive. The organization of new yogurt production is possible at any existing dairy plant equipped with the necessary equipment for the production of fermented milk products.

Based on the research conducted, we can recommend that JSC «Milk» produces yogurt with mint extract to expand the product range.

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