

UDC 637.131.8

IMPROVING THE QUALITY OF NORMALIZED PASTEURIZED MILK BY FORTIFYING IT WITH VITAMINS

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Insufficient intake of vitamins and essential trace elements continues to be a serious problem worldwide, both in industrialized and developing countries. Foods fortified with vitamins and minerals are part of a group of foods fortified with functionally and physiologically useful food ingredients that improve human health. A reliable way to improve the vitamin status of the population is to fortified mass-consumption food products with vitamins, in our case, this is milk.

The main purpose of the research is to study of technologies for the production of fortified drinking milk, indicators that affect its development, and principles for evaluating and controlling its quality.

Milk and dairy products are most widely used in the nutrition of children and adults. Milk contains all the necessary substances for the body's vital activity (protein, carbohydrates, calcium, fat-soluble vitamins A and beta-carotene, Riboflavin), well-balanced, so that they are easily and completely absorbed. However, the content of vitamins in dairy products is unstable, and in quantitative terms is not enough to provide the human body with normal amounts of consumption of dairy products: in order to get a daily norm of these vitamins, you need to drink from 1 to 1.5 – 2 liters of milk or eat up to 1 kg of fat curd or cheese.

The vitamin value of milk varies significantly depending on the season and conditions of the year. For example, in the winter months, due to insufficient consumption of green feed by livestock, milk contains much less vitamin A and beta-carotene than in the summer. Thus, to cover the vitamin deficiency that occurs in winter, it is necessary to standardize the content of vitamin A.

Also significant losses of vitamins are caused by separation, normalization, pasteurization, sterilization, boiling and long-term storage.

Reducing the fat content of milk, useful in terms of removing part of the milk fat, simultaneously leads to the removal of fat-soluble vitamins A, D, E and various carotenoids contained in it. All this made additional fortification of dairy products with vitamins not only expedient, but also necessary [1].

Mass surveys of the population of Kazakhstan, regularly conducted by the Kazakh Academy of Nutrition, in various regions of the country, indicate significant dietary deviations in almost all groups of the population, which has an extremely negative impact on the health of the nation: the average life expectancy is reduced, the productivity of the working-age population is reduced, and the resistance to diseases is reduced.

Among the most common and dangerous nutritional disorders in Kazakhstan is a widespread and deep vitamin deficiency. Vitamins are essential food substances that are absolutely necessary for normal metabolism, growth and development of the body, protection from diseases and harmful environmental factors, and reliable provision of all vital functions. The human body is not able to synthesize vitamins and store them for future use, they must come with food regularly, in full set and quantities corresponding to the physiological needs of the person.

There are the most important principles of fortification:

- it is advisable to enrich food products of mass consumption (available to all groups of children and adults, regularly and universally used in everyday nutrition), as well as those foods that are subjected to technological influences that lead to significant losses of micronutrients;
- for fortification of food products, you should use those vitamins and minerals which insufficient consumption and (or) signs of deficiency are quite widespread;
- fortification of food products with vitamins and minerals should not impair the consumer properties of these products: reduce the content and digestibility of other food substances contained in them, significantly change the taste, aroma, freshness of products, reduce their shelf life;
- the amount of vitamins and minerals added to the products they enrich should be calculated taking into account their natural content in the initial product or raw materials used for its manufacture, as well as losses during production and storage;
- the criteria for selecting the list of enriching nutrients, their doses and forms are safety, usefulness and effectiveness for improving the nutritional status of the population.

According to The Micronutrient Initiative (USA), prevention of micronutrient deficiency allows you to:

- prevent four out of ten child deaths;
- reduce maternal mortality by more than a third;
- increase performance by 40%;
- increase the IQ of the population by 10-15 points;
- increase the country's gross product by 5% [2].

One of the examples of successful implementation of the concept of enriched products is the «Rastishka» series of fermented milk products («Danon» company, Russia). The main idea of creating this product is to provide the child's body with important nutrients for healthy growth of the skeleton and physical development-calcium and vitamin D. The scientific basis for their development was data on the deficit of calcium consumption against the background of a significant decrease in the consumption of milk and dairy products by children of preschool and school age in our country.

Milk and dairy products occupy an important place in the human diet. Milk contains all the nutrients necessary for the human body 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. The digestibility of milk and dairy products ranges from 95 to 98 %. Milk also contributes to the absorption of other foods. Especially important for the body are fermented milk products that have a

high dietary and therapeutic value. Milk can be fortified with vitamin mix 730/4 (12 vitamins), vitamin mix H33053 (10 vitamins), vitamins A and D [3].

The technology of production of normalized pasteurized milk includes: acceptance and quality assessment (ST RK 1760-2008), heating, cleaning on the separator-milk purifier, pasteurization, cooling and intermediate reservation, normalization, heating, homogenization, sterilization, cooling, bottling, storage and sale (Figure 1).

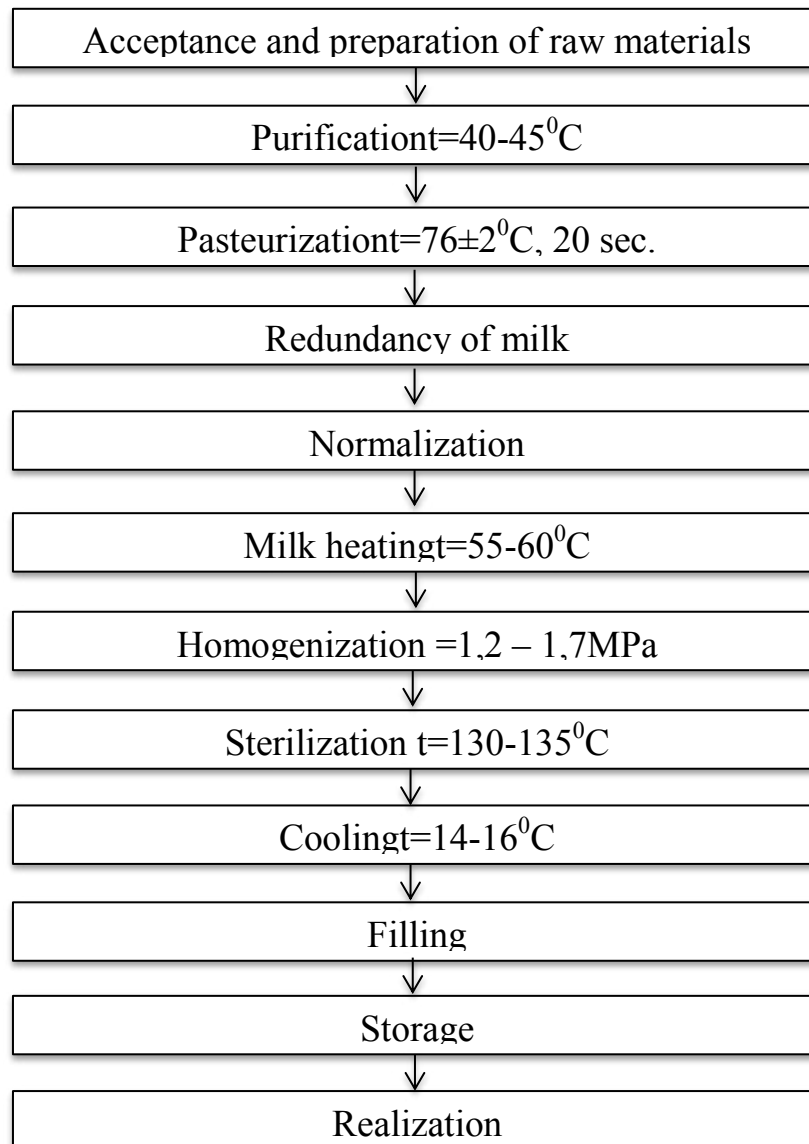


Figure 1 - Technological scheme of production of drinking milk

Fortified milk is produced from normalized pasteurized milk. The technological process of production of fortified milk is similar to the production of pasteurized milk. A special feature is the additional (after pasteurization of milk) operation of adding vitamin C or its substitute sodium ascorbate. The weight of vitamin C or sodium ascorbate added per 1000 kg is 180 and 210 g, respectively.

Vitamins are added to milk in the form of an aqueous solution: dry vitamin supplements are dissolved in 1-2 dm³ of water and poured into a container with pasteurized milk with continuous stirring. The duration of mixing after applying vitamins is 15-20 minutes. After mixing, the milk is kept for 30-40 minutes and sent for bottling [4].

Vitamins are essential food substances. They are absolutely necessary for the normal implementation of metabolism, growth and development of the body, protection from diseases and

adverse environmental factors, and reliable provision of all human vital functions. The human body does not synthesize vitamins and must get them ready-made with food. The ability to store vitamins for the future for any long period of time in the human body is absent. Therefore, they should be received regularly, in full set and in quantities corresponding to the physiological needs of the person, at all times of the year. The ultimate goal of improving the quality of normalized pasteurized milk is by fortifying it with vitamins.

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