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MILK AND HOMOGENIZATION

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Abstract - the work is devoted to the substantiation of the physical and chemical properties of milk before and after homogenization. New advantages of the homogenization process during milk processing have been established.

Milk is a biological fluid, which includes water, proteins, fats, milk sugar, phosphatides, sterols, salts of organic acids, minerals, trace elements, vitamins and others. Milk is a heterogeneous liquid, a polydisperse system, the individual components of which are at different levels of crushing. The dispersed system is formed from two main parts: water and plasma, which is in a continuous phase, which is called the dispersed medium, and the components of milk contained in it - the dispersed phase [1].

Three main phases of milk are considered: milk fat in the form of fat globules, insoluble proteins in the form of casein micelles and submicelles, and plasma, as a solution of milk sugar and salts in water.

The fat in milk forms an emulsion of small fat droplets of a fairly regular shape, covered with a protein-lipid shell, which are usually called fat globules. According to the estimates of various authors, the average diameter of fat globules in fresh milk ranges from 2,3 to 10 μm and depends on many factors: the breed of cows, milking time, lactation time, etc. The shells of fat globules consist of a lecithin-protein complex, which is characterized by high surface activity. Lecithin is placed directly on the surface of the ball. The other side of the shell, facing the aqueous phase of milk or cream, consists of a protein complex. Adsorbed albumin, globulin and casein are additionally located on its outer surface [2].

After homogenization, the number of fat globules increases approximately 200-500 times, depending on the fat content of the milk [3,4]. The process of crushing fat globules is accompanied by an increase in their surface area (the total surface area of fat globules increases 6-10 times) and a change in the state of the distribution surface: fat/plasma. The increase in the free surface of fat globules during homogenization contributes to the formation of new, larger areas of the surface film, on which a new film is formed from the elements of milk plasma, as well as from the elements of protein micelles, which causes the restructuring of the protein and salt composition of milk. Thus, homogenization, destroying the most coarse-dispersed phase of milk, fat globules, has an indirect effect on other fractions. In the process of homogenization, the structure and properties of proteins change. The diameter of casein micelles decreases, some of them break up into submicelles, which are adsorbed on the newly formed surface of fat globules.

Homogenized milk has the following advantages [4,5]:

- increased stability during transportation and long-term storage of the original taste of milk due to the reduction of destabilization of milk fat;

- facilitating the assimilation of milk fat by the human body due to an increase in the surface of the fat phase;

- improvement of sensory and taste properties of milk due to improvement of consistency, increase of viscosity, homogeneity, reduction of absorption of extraneous odors and a more intense white color;

- the absence of a fat film during boiling, which allows you to preserve dry substances in milk;

– uniform distribution of milk fat and vitamins A and D;

- reduction of serum release and significant increase in the viscosity of yogurts;

- improvement of digestion of fermented milk products due to the formation of stronger protein clots;

– improvement of mixing mixture and structure of ice cream;

- prevention of the appearance of a watery aftertaste of reconstituted dairy products;

- no change in consistency (thinning) during kefir production.

Therefore, taking into account the above, it can be concluded that homogenization is an important technological process in the line of milk processing and production of dairy products, since the advantages of its use are undeniable.

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