

## BIOLOGICAL IMPORTANCE OF MILK PROTEIN COMPONENTS IN THE ORGANIZATION OF RATIONAL NUTRITION OF THE POPULATION OF OUR REPUBLIC

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**Annotation.** *This article presents the biological significance of the protein components of milk, as well as the production and quality of milk protein in the organization of rational nutrition of the population of our republic.*

**Key words:** *Milk protein, casein, biological value, chemical indicators*

Dairy products, which have high biological value, are of great importance in organizing proper nutrition for the population of our republic. The technology of milk and dairy products is constantly developing and improving based on the achievements of fundamental sciences. The technology of milk and dairy products is aimed at obtaining a product with certain specified properties from raw materials. To do this, first of all, it is necessary to preserve all the valuable natural properties of raw materials during the period from their collection on dairy farms to their entry into the distribution network.

Dairy products, which have high biological value, are of great importance in organizing proper nutrition for the population of the Republic of Uzbekistan. In the production of dairy products, the main raw material is milk, which is a valuable food product of biological origin. Milk contains all the vital substances necessary for the normal development of the human body: proteins, fats, milk sugar, mineral salts and water, organic acids, vitamins, enzymes, hormones, immune bodies, gases, pigments, etc.

The technology of milk and dairy products as a scientific discipline is based on a deep knowledge of chemical disciplines, especially organic, colloidal, physical and biological chemistry, physics and chemistry of milk, microbiology, processes and apparatus of the dairy industry. The technology of milk and dairy products substantiates the requirements for milk as a raw material, studies technological schemes and technological parameters of milk processing and production of dairy products, the essence of technological processes, the formation of commercial and nutritional properties of products, conditions for their packaging, storage and transportation, quality control and assessment.

The main indicators of milk are the chemical composition, degree of purity, organoleptic, biochemical, physical and mechanical properties, as well as the presence of toxic and neutralizing substances in it. Milk contains more than a hundred organic (fat, proteins, carbohydrates, enzymes, vitamins, hormones) and inorganic (water, mineral salts, pigments, gases) substances. Milk is a complex polydisperse system. Milk sugar - lactose is dissolved in a dispersed medium (water - 85-89%) of milk, the size of its molecules is 1-1.5

nm. Milk salts are in the form of colloidal particles, protein substances form colloidal solutions. Milk fat is in a warm state in the form of an emulsion, in a cold state - in the form of a suspension. Milk consists of water and nutrients distributed in it - fats, proteins, carbohydrates, enzymes, vitamins, minerals, gases (Table 1).

**Table 1**  
**Chemical composition of milk**

<u>Component</u>	<u>Average value, %</u>	<u>Mass fraction, %</u>
<u>Water</u>	87,5	85-89
<u>Dry matter, total</u>	12,5	11-15
<u>Including: milk fat</u>	3,8	2,9-5
<u>phospholipids</u>	0,04	0,03-0,05
<u>Proteins, total</u>	3,3	3,3
<u>Including: - casein</u>	2,6	2,3-2,09
<u>- whey proteins (albumin and globulin)</u>	0,7	0,6-0,8
<u>Non-protein nitrogenous compounds</u>	0,05	0,02-0,08
<u>Carbohydrates (lactose)</u>	4,7	4,5-5,0
<u>Galactose, glucose</u>	0,55	0,01-0,1
<u>Ash (minerals)</u>	0,73	0,6-0,85
<u>Salts of inorganic acids</u>	0,8	0,5-0,8
<u>Gases, ml<sup>0</sup>%</u>	6,5	5-8

Milk protein concentrates (MPC) are products obtained from skim milk, buttermilk and whey or a mixture thereof by removing water and ballast substances - lactose, mineral salts and biologically active substances with simultaneous concentration of protein at the level of 15 - 85%. MBC are widely used for food fortification, feed, medical and technical purposes. Casein is a traditional product of the dairy industry. It is a fraction of milk proteins that coagulates at the isopotential point with a pH of 4.6 to 4.8. Depending on the mass fraction of dry substances, milk protein concentrates are divided into liquid (paste) and dry. In addition, each of the groups is divided depending on the type of protein (casein, whey coprecipitates) and solubility in water

Casein is obtained by acid (or rennet) coagulation of proteins from skim milk, coprecipitates - by thermocalcium coagulation of the complex of casein and whey proteins from skim milk

Caseinate is a casein salt, soluble in water, obtained by dissolving acid casein in hydroxides or salts of alkali (or alkaline earth) metals, used in the food industry of the agro-industrial complex (enriched in dairy, meat and food products, baby and diet food). Currently, the following types of caseinate are produced: - sodium caseinate, obtained by dissolving food acid casein in a solution of sodium hydroxide, followed by spray drying of the solution; - ordinary and special casecite, obtained from freshly precipitated lactic acid casein by dissolving it with a mixture of salts (sodium bicarbonates and sodium and magnesium nitrates).

Whey proteins are obtained by thermal denaturation with a change in the reaction of the medium, or by membrane methods - ultrafiltration, difiltration. In recent years, increasing attention has been paid to the production of coprecipitates, the production of which involves the complex isolation of milk proteins, i.e. casein together with whey proteins. Food soluble

coprecipitates are produced mainly of two types: soluble food coprecipitate high-calcium and low-calcium. High-calcium coprecipitates are a complex of proteins isolated from skim milk, heated to a temperature of  $93 \pm 2$  °C, exposed to a solution of calcium chloride and subsequent washing, pressing the curd, treating it with tripolyphosphate and sodium hydroxide and drying the resulting solution. Low-calcium coprecipitate is a complex of proteins isolated from skim milk, heated to a temperature of  $93 \pm 2$  °C and cooled to a temperature of 45 - 49 °C, treated with a solution of hydrochloric acid or acid whey, followed by washing, pressing the curd, treating it with a solution of sodium hydroxide and drying the resulting solution. In addition to edible casein, industrial casein is also produced from recycled materials. GOST 17626 - 81 "Technical casein" applies to technical casein in grain and to ground casein. Depending on the method of production, technical casein is divided into two types: – technical acid casein; – technical rennet casein. Depending on the acid used to coagulate skim cow's milk proteins into: – lactic acid; – hydrochloric acid. 199 According to the degree of grinding, technical casein is divided into: - casein in grain (acid and rennet) - ground casein (acidic) according to quality indicators, technical casein is divided into: - acid casein in grain of the highest, 1st and 2nd grades; – rennet casein in premium, 1st and 2nd grade grains; – ground acid casein of premium and 1st grade/

Raw casein belongs to the class of insoluble, casein-only, liquid and paste milk protein concentrates; Milk protein concentrate in blocks is a class of soluble milk protein concentrates containing casein and whey proteins, liquid and paste. Food casein, casein for food caseinates, industrial casein and rennet casein are insoluble, containing only casein, dry milk protein concentrates. Sodium caseinate and ordinary food casein are a class of soluble, casein-only, dry milk protein concentrates. Soluble food coprecipitates, dry milk protein concentrate belong to the class of soluble dry milk protein concentrates containing casein and whey proteins. The nutritional value of all types of food MBC is determined solely by the protein content - casein and whey proteins. Particularly useful are the soluble forms of MBC - caseinates and caseinates, for baby and dietary nutrition. The biological value of food types of MBC is confirmed by the completeness of milk protein in terms of amino acid scores.

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