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Development Of Technology Of Fermented Milk Drink With Immune Stimulating Properties.

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ABSTRACT

This paper describes the recipe and production technology of fermented milk drink with immune stimulating properties. Three formulations of fermented milk drink are prepared which includes different quantity of parsley and dill. Physicochemical, organoleptic characteristics and safety parameters are evaluated. Safety indicators are in accordance with the norms, the product can be used for dietary and mass nutrition.

Keywords: fermented milk, parsley, technology, safety, dill

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INTRODUCTION

The most important strategic task of the food industry is to meet the needs of all population groups in high-quality, biologically-complete and safe food products. For the prevention of diseases it is necessary to eat foods enriched with additives of preventive purpose, including vitamins, prebiotics, probiotics, etc. [1].

The main technology of functional food products is the modification of traditional products, providing an increase of useful ingredients in their content to a level corresponding to physiological norms of consumption (10-15% of the average daily requirement) [2].

Fermented milk products play an important role in people nutrition especially elderly, children and sick. Dietary properties of fermented milk products are that they improve metabolism, stimulate the secretion of gastric acid and stimulate appetite. The presence of microorganisms in their composition, that are able to settle down in the intestine and suppress putrefactive microflora, leads to inhibition of putrefactive processes and the cessation of the formation of toxic products of protein cleavage entering the human blood [3, 4].

The most famous fermented milk drinks and their dietary and remedial properties are:

- *kumys* which is recommended for improving metabolism, for diseases of gastroenteric tract, cardiovascular system, liver, and other;
- *kefir* which that is recommended for improving metabolism, for diseases of gastroenteric tract, cardiovascular system, liver, chronic bronchitis, pulmonary tuberculosis and other, stimulate appetite, salivation, gastric acid, intestine, bile, has a diuretic effect, has a depressing effect on the growth of fungi and proteas - conditionally pathogenic microorganisms;
- *curdled milk* (mechnikov's, acidophilic, ordinary, fermented baked milk (ryazhenka), clotted cream, Caucasian milk) is beneficent for people with reduced appetite, for colitis and gastritis, liver and biliary tracts diseases.
- yogurt reduces the level of cholesterol in blood plasma, positive influence on lactose intolerance is ascertained [5, 6].

Of course, all healthy and fresh food, one way or another, help to strengthen the immune system, as they are sources of vitamins, minerals and nutrients. However, there are several recognized leaders in this process.

Parsley: This green is used for recuperation and appetite, strengthening and preserving eyesight, improving metabolism, treating renal diseases and regulating their operation as well as fresh or in the form of decoction is used for menstruation call. Parsley juice normalizes heart and blood vessels, is used in the treatment of conjunctivitis and cataract. In its composition there are vitamins E, PP, B1, B2 [7]. In folk medicine, parsley is used to normalize high blood pressure, as an excellent choleric, restorative and diuretic means. It is also used to normalize metabolism and glucose levels, due to the content of inulin polysaccharide in it, it is used to increase the digestibility of manganese, which is very useful for the restoration of bone tissue. One can use parsley as a natural breath freshener, it helps to smooth even the smell of garlic.

Dill: The green of dill contains vitamin C, carotene, vitamin B, nicotinic and folic acid, as well as many valuable microelements, such as calcium salts, potassium, iron, phosphorus [8]. Thanks to this composition, dill effectively regulates the work of the gastrointestinal tract, lowers pressure and has a beneficial effect on cardiac activity. Due to its beneficial properties, dill can alleviate the symptoms of cystitis and kidney disease. Dill has diuretic and choleric properties, and is also used as a means of enhancing the secretion of milk in nursing mothers. And even the green of dill instantly relieves the headache and helps to cope with insomnia [9].

Symbilact VIVO with lactulose is a symbiotic. It contains both probiotic beneficial bacteria and a prebiotic substance (lactulose). These two components enhance each other's action, providing the maximum effect [10].

The analysis showed that in the production of fermented milk drinks, several directions are singled out:

- use of lactic acid bacteria with high symbiotic activity;
- use of immune stimulating additives in the formulation;
- combination of dairy and plant components.

In general, all the above listed areas are intended for the immune status of a person, improving the nation and developing skills of rational and balanced nutrition [11].

Useful properties of symbilact:

- restores and maintains healthy microflora of the intestine, urogenital system, upper respiratory tract
- stimulates the growth and vital activity of its own microflora (*bifidus* and *lactobacilli*)
- helps to strengthen immunity and develop its own interferon
- resists intestinal infections and putrefactive bacteria
- normalizes digestion, improves peristalsis, prevents constipation
- effective in topical application to combat bacterial and fungal lesions of the skin and mucous membranes [12].

Lactulose is a natural substance obtained by deep processing of milk. In an unchanged form reaches the large intestine, where it stimulates the growth and development of extremely beneficial bifidus and lactobacilli. Lactulose is absolutely harmless (with the exception of rare cases of individual intolerance), on its basis a lot of medical preparations have been released, including for children of the youngest age, pregnant and breastfeeding women [13].

Properties of lactulose:

- stimulates the growth of useful microflora,
- inhibits the activity of pathogenic bacteria,
- provides protection against intestinal infection,
- reduces the burden on the liver,
- activates local immunity,
- stimulates the synthesis of vitamins,
- prevents the formation of stones in the liver,
- reduces the flow of neurotoxins into the bloodstream,
- promote the assimilation of minerals,
- activate intestine function.

Bacteria of symbilact is a complex combination of a large number of strains of *bifidus* and *lacto-bacteria*. This combination is called symbiosis, because each of the bacteria enhances the action of each other. *Bifidus* bacteria carry out physiological protection of the intestinal barrier from the penetration of microbes and toxins into the internal environment of the body; have high antagonistic activity in relation to pathogenic and conditionally pathogenic microorganisms; through the production of organic fatty acids are involved in the utilization of food substrates and the activation of parietal digestion; synthesize amino acids and proteins, vitamin K, pantothenic acid, B vitamins: B1 - thiamine, B2 - riboflavin, B3 - nicotinic acid, B9 - folic acid, B6 - pyridoxine; promote the enhancement of absorption through the intestinal walls of ions of calcium, iron, vitamin D [14].

Lactobacilli

- in the process of vital activity they enter into a complex interaction with other microorganisms, as the result of which putrefactive and pyogenic conditionally pathogenic microorganisms are suppressed, primarily protea, as well as pathogens of acute intestinal infections;
- In the process of normal metabolism, they are able to form lactic acid, hydrogen peroxide, produce lysozyme, other substances with antibiotic activity: reuterin, plantaricin, lactocidin, lactolin;
- in the stomach and small intestine, lactobacilli in cooperation with the host organism are the main microbiological link in the formation of colonization resistance. They have high antagonistic activity in relation to pathogenic and conditionally pathogenic microorganisms [15].

The purpose of this work is to develop the recipe and technology of fermented milk drink with adding plant ingredients with high immune stimulating properties.

Development of a recipe for fermented milk drink

Theoretical selection and justification of the choice of ingredients for a new fermented milk drink made it possible to compose experimental formulas for fermented milk drinks. Table 1 shows the formulation of a fermented milk drink.

Table 1: Formulations of developmental prototypes

Ingredient	Developmental prototypes			Control Kefir 2,5 %
	Formulation 1, g	Formulation 2, g	Formulation 3, g	
Milk with a mass fraction of fat 2.5%	948,50	928,50	898,50	950,00
VIVO Ferment	1.5	1,5	1,5	
Parsley	25	35	50	
Dill	25	35	50	
Kefir ferment				50,00

Experimental samples of the formulation were studied for various indicators - physicochemical, organoleptic. Table 2 shows the physicochemical parameters of the developmental prototypes.

Table 2: Physicochemical parameters of developmental prototypes

Indicators	Developmental prototypes			Control Kefir 2,5 %
	Formulation 1, g	Formulation 2, g	Formulation 3, g	
Titrated acidity, °T	95 °T	96 °T	93 °T	100 °T
pH	4,0	4,1	4,2	4,2
Viscosity of the drink, mPa s	25	24	28	20
Beverage syneresis	2% of excreted serum	1% of excreted serum	Serum excretion was not observed	Serum excretion was not observed
Density of the drink, kg / m3	1112	1113	1117	1115
Mass fraction of protein, g.	5,8	5,8	6	3
Mass fraction of fat, g.	2,5	2,5	2,5	2,5
Mass fraction of carbohydrates, g.	4	4	4	4
Mass fraction of ash, g.	0,6	0,6	0,7	0,7
Caloric content, kcal	61,5	61,5	61,5	53
Total number of lactobacilli	1×10^7	$1,1 \times 10^7$	$1,2 \times 10^7$	1×10^7
Microscopy of the drink (staining with metelene blue)	In the field of the microscope view lactobacilli, single rod bacteria, round bacteria are visible	In the field of the microscope view lactobacilli, single rod bacteria, round bacteria are visible	In the field of microscope view lactobacilli, single rod bacteria, round bacteria are visible	In the field of microscope view yeast, rod bacteria, round bacteria are visible

Table 3 shows the organoleptic characteristics of the developmental prototypes.

Table 3: Organoleptic characteristics of developmental prototypes

Indicators	Developmental prototypes			Control Kefir 2,5 %
	Formulation 1	Formulation 2	Formulation 3	
Taste	Pure fermented milk little expressed flavor of fillers	Pure fermented milk slightly expressed flavor of fillers	Pure fermented milk with expressed taste of parsley and dill green	Pure, fermented milk, without foreign tastes and smells. The taste is slightly pungent
Smell	Peculiar to fermented milk drink, according to the filler	Peculiar to fermented milk drink, according to the filler	Peculiar to fermented milk drink, according to the filler	Milky white, homogenous throughout the mass
Consistency	Moderately viscous liquid, homogeneous	Moderately viscous liquid, homogeneous	Moderately viscous liquid, homogeneous	Homogeneous, with an undisturbed coagulate.
Appearance	Homogeneous liquid of light green color	Homogeneous liquid of light green color	Homogeneous liquid of light green color	Homogeneous, with an undisturbed coagulate.

The results of the study of organoleptic and physicochemical indices revealed that the best quality indicators are for the formulation 3. This formulation has a higher ash content of 0.7 g, which may indicate a higher mineral.

Table 4 shows the safety indices of fermented milk drink with herbs. The content of toxic elements was not detected. Studies have also been conducted on the content of mycotoxins, antibiotics, pesticides and radionuclides.

Table 4: Safety parameters of fermented milk drink

Name	Test method	Control parameter	Result of research
Toxic elements: mg / kg, not more than: Lead Arsenic Cadmium Mercury	All Union State standard (GOST) 26932-86 All Union State standard (GOST) 26930-86 All Union State standard (GOST) 26933-86 All Union State standard (GOST) 26927-86	0,1 0,05 0,03 0,005	Not detected Not detected Not detected Not detected
Mycotoxins: Mg / kg, not more than: Aflotoxin M1	All Union State standard (GOST) 30711-2001	0,0005	Not detected
Antibiotics: Levomycetin The tetracycline group	ST RK National standard of the Republic of Kazakhstan 1505-2006 ST RK National standard of the Republic of Kazakhstan 1505-2006	Not allowed Not allowed	Not detected Not detected
Pesticides: Mg / kg, not more than: Hexachlorocyclohexane	All Union State standard	0,05	Not detected

(α , β , γ -isomers) dichloro-diphenyl-trichloroethane and its metabolites	(GOST) 23452-79 All Union State standard (GOST) 23452-79	0,05	Not detected
Radionuclides, Bq / kg: No more Cesium-137 Strontium-90	All Union State standard (GOST) 32161-2013 All Union State standard (GOST) 32161-2013	Not more than 100 Not more than 25	4,1 5,2
Phosphatase	All Union State standard (GOST) 3623-73	Not allowed	Not detected

Safety indicators are in accordance with the norms, the product can be used for dietary and mass nutrition.

The results of the study show that the drink meets the requirements for fermented milk drinks.

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