Biotechnologies for healthy nutrition

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COLLECTION OF INDUSTRIAL BACTERIA

- **Lactococcus lactis subsp. lactis**: 36.5%
- **Lactococcus lactis subsp. cremoris**: 14.0%
- **Lactococcus lactis subsp. diacetylactis**: 2.8%
- **Streptococcus salivarius subsp. thermophilus**: 0.8%
- **Lactobacillus+Bifidobacterium**: 0.8%
- **Other strains**: 44.9%
# The Natural Microflora of Human Intestinal

<table>
<thead>
<tr>
<th>Lactobacillus</th>
<th>Bifidobacterium</th>
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<tbody>
<tr>
<td><em>L. helveticus</em></td>
<td><em>B. adolescentis</em></td>
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<tr>
<td><em>L. acidophilus</em></td>
<td><em>B. bifidum</em></td>
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<td><em>L. casei</em></td>
<td><em>B. lactis</em></td>
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<td><em>L. paracasei</em></td>
<td><em>B. longum</em></td>
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<td><em>L. fermentum</em></td>
<td><em>B. pseudocatenulatum</em></td>
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<td><em>L. plantarum</em></td>
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<td><em>L. gasseri</em></td>
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<td><em>L. rhamnosus</em></td>
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<tr>
<td><em>L. delbrueckii subsp. bulgaricus</em></td>
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<tr>
<td><em>L. delbrueckii subsp. lactis</em></td>
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IDENTIFICATION OF COLLECTION STRAINS

1. Strains had investigated about morphological and physiological properties.

2. Strains had investigated about biochemical properties.

3. Probiotic strains were identified with using 16S rDNA sequencing.

MAIN PROPERTIES OF COLLECTION STRAINS

1. Strains were isolated from natural sources, faeces and fermented milk products.

2. Strains have not genetic modifications.

3. All strains are safe for people and animals.

4. All strains were selected by industrial featuring.
Based on collection strains we created the technologies of complex frozen and freeze-dried bacterial starter cultures:

1. For manufacturing of fermented milk drinks (“PROBILACT”, “Biolux”).
2. For manufacturing of meat products.
3. For manufacturing of cottage cheese.
4. For manufacturing of sour cream.
5. For manufacturing of cheese.
**food products for dietary therapeutic nutrition** - specialized food products with a given food and energy value, physical and organoleptic properties and *intended for use in therapeutic diets*;

**food products for dietary preventive nutrition** - specialized food products intended for the correction of carbohydrate, fat, protein, vitamins and other kinds of metabolism with a changed natural content and(or) ratio of certain substances and(or) in the composition of which new substances or components not originally containing were included, as well as food products intended for reducing the risk of disease development;
Scientific research conducted during the creation of domestic fermented milk products with probiotic microorganisms:

- formation of the product composition in accordance with the needs of different population groups;
- multidisciplinary research of cultures, bacterial starters, as well as research of finished products on safety indicators, toxicity and pathogenicity;
- study of the influence of strains and products made from them on hematological, biochemical and immunological indicators of vital activity of warm-blooded animals;
- testing in preclinical and clinical settings (Republican Scientific and Practical Centre “Mother and Child”, Belarusian Research Center for Pediatric Oncology and Hematology, City Clinical Hospital of Infectious Diseases) of the effect of fermented milk products with probiotic microorganisms on the changes of intestinal microbiocenosis.
Fermented milk mixture for baby dietary therapeutic and baby dietary preventive nutrition for infants “Bifidobact Detsky – 0”

- Mixture is designed for therapeutic and preventive nutrition of children (from 3 weeks).
- In is used for artificial or mixed (artificial and breast) feeding of infants and young children to normalize biocoenosis of intestinal tract in case of dysbacteriosis, intestinal infections, taking of antibiotics, and decreased appetite due to other diseases, for recovery from dysbiotic disorders of intestinal tract.
- Functional properties of the mixture arise from qualities of strains of probiotics’ microorganisms used in production.
- Contraindications for application: individual intolerance.
- In the child's diet, it should be introduced gradually.

**Dosage:**
- for children less than one year: 10 ml;
- for children older than one year: from 50-100 ml.
- For artificial and mixed (artificial and breast) feeding, infants mixture is recommended to use throughout the feeding period.
- For dietary therapeutic nutrition, mixtures can prescribed to use by a doctor.
- For preventive nutrition, mixtures can be used continuously.
Fruit fermented milk biological product “LisaVeta” for baby dietary preventive nutrition for children from 1 to 3 years old.

- intended for baby dietary preventive nutrition of young children older than one year as an additional source of protein.
- Bioproducts are produced by fermentation of balanced on protein and carbohydrate content milk base with the addition of fruits and dietary fiber.

contains dietary fiber – inulin which stimulates the growth of bifidobacteria and lactobacilli. Promotes digestion of calcium.

- Shelf life 10 days.
Baby food bioproducts “Wishing flower” are for children from 1 to 3 years old.

Produced with the use of dry concentrated starter cultures «Probliact-3» and «Probilact-6», containing specially selected combination of probiotic strains of lacto- and bifidus bacteria. The content of bifidus bacteria is not less than $1 \times 10^6$ CFU per 1 cm$^3$ of product.

Clinical testing was conducted at City Clinical Hospital of Infectious Diseases and it was established that “wishing flower” has clinical efficiency for children having functional disorders of gastrointestinal tract. The positive effect was reached due to the content of products of probiotic microflora (L. helveticus /L. Acidophilus, L. casei, Bifidobacterium ssp. и Streptococcus salivarius subsp. thermophilus), which have positive impact on the activity of gastrointestinal tract of children, normalize functional disorders of GIT and digestion process, increase the number of probiotic microflora – bifidus bacteria.

Product range:
- Bioproduct “wishing flower” with fructose, fat content 2,8% and 3,2% for nutrition of babies;
- Bioproduct “wishing flower” with fructose and apple puree, fat content 2,8% and 3,2% for nutrition of babies;
- Bioproduct “wishing flower” with fructose and vanilla, fat content 2,8% and 3,2% for nutrition of babies.
Fermented milk bioproducts “Bifi-mult” for dietary therapeutic and dietary preventive nutrition of preschool and school age children

Bioproducts “Bifimult” are produced with the use of poli-specific probiotic dry concentrated starter “Probilact 6”, containing specially selected combination of probiotic strain of lactic acid and bifidus bacteria

Bioproducts contain dietary fiber inulin as a prebiotic

Product range:
- Sweetened enriched with calcium;
- Sweetened enriched with calcium and vitamins;
- Fruit enriched with vitamins.

- for recovery of digestive functions of children with functional disorders of GIT (intestinal infections, constipation, intestinal colic), having decreased appetite caused by other diseases, for recovery from dysbiotic disorders of intestinal tract as well as to supplement the loss of micronutrients: calcium and vitamins.

- Consumption of 100 g of bioproduct provides daily need in calcium for 19% for children of the age of 3, 17% - for children of the age of 4-6, 14% - for children of the age of 7-10 and 12% for children of the age of 11-14/
Fermented milk Bioproducts “Bifitat” for dietary therapeutic and dietary preventive nutrition

Bioproducts “Bifitat” are produced with the use of concentrated starter cultures “Probilact 2”, which contains specially selected combinations of strains of acidophilous bacterium, streptococci thermophiles and bifidus bacteria.

- fermented milk bioproduct "Bifitat" for dietary therapeutic and dietary preventive nutrition of children with fat content of 3.5%, 3.2%, 2.9%, 2.5%, intended for the nutrition of young children older than one year;
- fermented milk bioproduct "Bifitat - Sc" for dietary therapeutic and dietary preventive nutrition of children with fat content of 3.5%, 3.2%, 2.5%, intended for the nutrition of children of preschool and school age;
- fermented milk bioproduct "Bifitat" for dietary therapeutic and dietary preventive nutrition of children with fat content of 3.5%, 3.2%, 2.5%, 1.5% and fat free, intended for adult nutrition.

Shelf life: 5 days.

*The product is recommended:*
In Acute Intestinal Infections, as well as to treat convalescents after them; for the prevention or relief of disorders of intestine functions, people with pneumonia, sepsis and other suppurative infectious diseases.
Fermented milk bioproducts “Be healthy”

Bioproducts «Be healthy!» are produced with the use of freeze-dried concentrated starter cultures "Probilact-4", containing specially selected cultures of Streptococcus thermophilus and probiotic strains of lactobacilli.

The product contains prebiotic dietary fiber inulin, whey proteins, calcium. According to the researchers, the intake of inulin reduce the risk of atherosclerotic changes in the cardiovascular system, and enriched with it food, especially when combined with calcium-containing preparations, can be used to prevent disorders of calcium-phosphorus metabolism.

Clinical trials at State Research and Innovation Center “Institute of Pharmacology and Biochemistry of the National Academy of Sciences of Belarus” confirmed that bioproducts "Be healthy! " have geroprotector properties (it lower the content of glucose, cholesterol, triglycerides in the blood) and can be recommended for the nutrition of the elderly

Product range:
- Fermented milk bioproduct “Be healthy” with dietary fiber, enriched with calcium, fat content: 1,0 %, 1,5 %, 2,0 %, 2,5 %, 2,7%, 2,8 %, 3,0% 3,2%, 3,4 %
- Fermented milk bioproduct “Be healthy” enriched with milk proteins, fat content: 1,0 %, 1,5 %, 2,0 %, 2,5 %, 2,7%, 2,8 %, 3,0% 3,2%, 3,4 %.
Pasteurized low-lactose dairy products “MiniLact” for dietary preventive nutrition

Dairy products "Minilact" have traditional milk taste (a little bit sweetened) and smell, which is the result of activity of enzyme on lactouse, are produced from normalized cow milk, are subjected to pasteurization, processing by an enzyme of β-galactosidase and subsequent heat treatment.

The lactose content of the product is reduced from 4.5 -4.8% to 1%

*The product "MiniLakt" can be used for the nutrition of people of different age groups who keep to a low-lactose diet, and for the nutrition of healthy people either as a food or a cooking ingredient(dairy porridges, soups, mashed potatoes, etc.).

*The product can be consumed periodically or continuously.

Contraindications for application: individual intolerance.

Products “MiniLact” can have the following fat content: 1,0 %, 1,5 %, 2,5 %, 2,8 %, 3,2%, 4,0 %, 5,0 %, 6,0 %.
Low-lactose fermented milk products for dietary preventive nutrition

The lactose content of the product is reduced from 4.5 - 4.8% to 1%.

The products are intended for people, who keep to a low-lactose diet, and for the nutrition of healthy people. Duration of use can be individually specified depending on people’s state and can be used continuously.

- Contraindications for application: individual intolerance
- Products can have the following fat content: 1.0%; 1.5%; 2.5%; 3.2%; 3.7%, 4.0%; 5.0% and fat-free.

Depending on the used raw materials and starter cultures:

Fermented milk product “Zelenitsa”; Fermented milk product “Zelenitsa” with vanillin; sweetened fermented milk product “Zelenitsa”; 

Fermented milk bioproduct “Accent”; Fermented milk bioproduct “Accent” with vanillin; sweetened fermented milk bioproduct “Accent” with vanillin.

The content of bifidus bacteria in bioproducts is not less than $1 \times 10^6$ CFU per 1 cm$^3$.
food products for the nutrition of pregnant and lactating women - specialized food products with a changed natural content and(or) ratio of certain substances and(or) in the composition of which new substances or components not originally containing were included, designed to meet the physiological needs of pregnant and lactating women;
Dairy products for the nutrition of pregnant and lactating women

**Purpose of product and method of production:**
Dairy products for nutrition of pregnant and lactating women are obtained from normalized infant formula with the addition of vitamins and vitamin-like substances, mineral salts, with or without the addition of whey powder, whey protein concentrate, vegetable oils, polyunsaturated fatty acids, carbohydrate components, prebiotics, herbal infusions.

**Types of products:**
Depending on the raw material and their purpose, dairy products for the nutrition of pregnant and lactating women can be of the following types:

- dairy drink for the nutrition of pregnant women;
- dairy drink for the nutrition of lactating women;
- dairy drink for the nutrition of pregnant women with herbal tea;
- dairy cocktail for the nutrition of pregnant women;
- dairy cocktail for the nutrition of lactating women.

Dairy products for the nutrition of pregnant and lactating women are produced with the following content of fat 0.8%, 0.9%, 1.0%, 1.2%, 1.3%, 1.4%, 1.5%, 1.6%, 1.7%, 1.8%, 1.9%, 2.0%, 2.1%, 2.2%, 2.3%, 2.4%, 2.5%, 2.6%, 2.7%, 2.8%, 2.9%, 3.0%, 3.1%, 3.2%, 3.3%, 3.4%, 3.5%.
Food products for sportsmen - specialized food products with a given chemical composition, high nutritional value and (or) targeted efficiency, consisting of a complex of products and containing separate types of them, which have a specific effect on increase of the adaptive capabilities, experiencing physical or emotional stresses.
FITNESS SUPER PROTEIN 60 and FITNESS SUPER PROTEIN 80 – whey protein supplements fortified with vitamins, having high content of protein (60 and 80 respectively) used for sports nutrition. Whey protein has higher rate of protein breakdown in comparison with other forms of protein, contains amino acids isoleucine, leucine, valine which have a positive effect on metabolism activity, promote normal production of other amino acids in our organism, decrease lactic acid and other products of metabolism in muscles, that are accumulating during extensive trainings. Besides, the product contains active substances, such as inositol, choline and carnitine. In order to improve organoleptic characteristics vanillin and flavors can be added to the product. Ingredients: whey powder, vitamin C, B1, B2, B6, B12, PP, BC, E, pantothenic acid, biotin

FITNESS SUPER PROTEIN 20 and FITNESS PROTEIN 20 – are high calorie carbohydrate-protein supplements designed to support body’s energy before and during trainings. Simple and complex carbohydrates provide an athlete with energy supply during workouts, and extensive vitamin complex (vitamins C, B1, B2, B6, B12, PP, Bc, pantothenic acid and biotin) compensates the losses of vitamins during the dehydration while exercising. Ingredients: WPC, fat-free instant milk powder, milk whey powder, sugar, crystalline glucose, crystalline fructose, premix 961, flavoring agent.

Beverage concentrates “Athlete” is designed for supplemental nutrition of sportsmen during workouts. They are based on natural milk protein, easily digested carbohydrates and vitamins. Flavoring agents and cocoa can be used as flavor additives. They have high content of protein (not less than 43%) and essential vitamins (C, B1, B2, B6), fill up the body with proteins, nutrients, and energy.
Specialized protein milk drinks “Leader”

Purpose of product and method of production:
- Specialized milk protein drinks "Leader" are intended for use as a specialized food product for people engaged in sports.
- Specialized milk protein drinks "Leader" are produced by mixing of milk whey and / or milk whey and skim milk obtained by ultrafiltration, diafiltration (if needed), and / or milk protein concentrates and / or whey protein concentrates with or without the addition of other dairy products and non-dairy components, stabilizers, with or without hydrolysis of lactose.

Product range:
1. Depending on manufacturing technology:
   - specialized protein milk drink “Leader”;  
   - specialized hydrolyzed protein milk drink “Leader-PL”.
2. Depending on the used raw materials:
   - specialized protein milk drink “Leader-C”;  
   - specialized protein milk drink “Leader-CM”;
   - specialized protein milk drink “Leader-KC”;
   - specialized protein milk drink “Leader–KM”.
3. The product is manufactured with different non-milk components.
Proposals for cooperation:

- Joint research of lactic acid and bifidobacteria, their biological effects on the human body caused by the consumption of dairy products.

- Creation of highly efficient technologies of dairy products for healthy nutrition, including dietary and specialized ones, ensuring its safety, balance and usefulness for different groups of population (children, athletes, the elderly, etc.)
Thank you for attention!