Evolution of human dairy products needs

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Abstract. The purpose of business activity is to satisfy customers’ and partners’ demands, make profit and ensure the well-being of society. The analysis of dairy industry and population needs is of great importance to commodity experts’ opinion. The objects of the study were world, national and regional (Irkutsk region) needs of the population for dairy products during 2018-2020. Empirical and sociological methods were used to analyze primary and secondary marketing information. There is a negative tendency in dairy foods consumption since it is decreasing annually (the world market by 1.12 % annually, the Russian market by 2.39 % and Irkutsk regional market by 2 %). Dairy products take the first place in the Russian federal consumer basket and make 25.6 %. The recommended annual consumption is 256-361 kg/year, the consumption range for children and adults is 25-34%. Irkutsk regional consumption of dairy products is 17 % lower than the recommended rate. Dairy products are at the top of “healthy” consumer basket and account for 36 % of its volume. The dairy market is moving towards functional food products which contribute to rational nutrition. The target consumers are people aged 15-36. The share of functional dairy products makes 68 % of the functional product market in Irkutsk region. People under the age of 35 tend to choose yoghurts and new types of sour milk drinks. Middle-aged and elderly people most often buy sour cream, cottage cheese and ryazhenka. Consumers over 45 have no interest in functional dairy products. 15 % of consumers tend to choose dairy foods with different flavor additives, 12 % are likely to choose dairy foods with minerals, 9 % prefer bifidus and lactic bacteria, 8 % of consumers choose other dairy foods, the rest of them are fond of classical products. The range of dairy products is increasing, the main emphasis is on fermented milk products. Special attention is being paid to the production of multifunctional foods produced according to the principles of naturalness and a higher biological value.

1. Introduction
Most countries with dietary guidelines recommend dairy foods as a component in a balanced diet. At global level, milk is the fifth largest provider of energy and the third large provider of protein and fat. Milk and dairy products are key to nutrition and health since they are nutrient-dense foods that supply energy and significant amounts of protein and micronutrients including calcium, magnesium, selenium, riboflavin, vitamins B5 and B12. Dairy products increase nutrient absorption and improve the digestive function.

Milk and dairy products are everyday consumer goods. The modern market offers customers a wide range of dairy products. The process of choosing a particular item is quite difficult as it is closely related to such notions as need, want, requirement and demand. Need means feeling the lack of something. Want is a need according to an individual cultural background and character. Demand is understood as
willingness and ability to purchase a commodity or a service. A good is something that has economic utility or satisfies economic wants. There exist different needs: physiological, social, psychological, intellectual and spiritual. It should be noted that many needs work in tandem with one another and they can be interchangeable. Physiological needs are most compatible with social and psychological, intellectual and spiritual needs determine to a large extent the satisfaction of psychological, social and psychological ones.

Cultural peculiarities of a particular society can be revealed taking into account our needs. The main features of the 21st century are economic globalization, the emergence and the rapid advance of information technology. Nowadays the concept of ethical marketing is being promoted as it focuses both on interests of consumers and the whole society. Its main goal is to satisfy consumers’ needs while preserving human, material, energy and natural resources. At present environmental protection is a high priority.

The integrated analysis of the changes in global needs for dairy products will make it possible to predict consumers’ demand for dairy products taking into consideration evolutionary, reproduction process; social and information aspects. This kind of analysis includes economic, administrative, legal, social-psychological demand generating factors. It is of great importance to commodity experts.

This study is devoted to the analysis of the dairy industry development and the demand for dairy products in Russia.

2. Study objects and methods
Our objects of study are consumers’ needs for dairy products examined from the point of view of the main characteristics of the goods (table 1). The research was carried out during 2018-2020.

| Goals | Objects | Methods |
|-------|---------|---------|
| studying the changes in production and consumption of dairy products, market development of functional foods | regulatory data and statistics | theoretical: analysis, comparison, synthesis, etc. |
| monitoring the assortment and the cost characteristics of dairy products | the assortment and the cost of dairy products in outlets in Irkutsk region | empirical registration |
| conducting the survey | consumers’ needs for dairy products in Irkutsk region | empirical sociological |

3. Results and discussion
Milk and other dairy foods were recognized as important foods as early as 4000 BC, evidenced by rock drawings from the Sahara depicting dairying. Some remains of cheese were found in Egyptian tombs dating back to 2300 BC. It is stated that preferences for specific dairy foods varied geographically. For example, in Greece and Rome during the Middle Ages, cheese was the most popular dairy product. In contrast, fresh milk and butter were popular in northern Europe and Asia. Writings by Marco Polo who traveled to China between 1271 and 1295 describe the drying of milk and drinking of fermented milk by nomadic tribes [1].

Processing milk into cheese, butter and different fermented milk products in the subsistence economy first appeared in the southern regions of modern Russia in the III-IV centuries B.C.

The emphasis in the Russian dairy industry was made on the production of butter. In 1575 butter was the good for export in the “Trade book of Russian merchants”. The first butter factory was built in 1893 in Kurgan. The number of such factories had increased by 1908. There were 3000 butter factories in...
total at that time in Siberia therefore more than 90% of milk produced on its territory was processed into butter and exported to the world market.

The railroad construction resulted in the intensive development of the Russian dairy industry in the XIXth century. The first city dairy factory was built in Moscow in 1910, it processed 100-150 tons of milk a day and was one of the most technically equipped enterprises. The number of cattle had increased by over 60% by 1915 and Russia became the main exporter in the world dairy market accounting for 2/5 of its total exports.

I. Vishnevetsky developed and implemented the technology of ryazhenka production on a large scale in 1955. P.A. Il’enkov studied the chemical composition of cow’s milk presenting the results of his study in the work “On chemical process of cheese making”. I.S. Inikhov dealt with biochemistry of milk and dairy products. A.S. Korolev’s findings served as the basis of microbiology of dairy products.

Nowadays the Russian Economy consists of 6 cross industries. The agro-industrial complex produces, processes and provides consumers with agricultural products. This complex includes 3 sectors; the main one is agricultural (farming 53% and animal husbandry 47%). The comparative dairy production figures of the Russian agro-industrial complex (kg per capita per year) are the following: Russia – 221, the USA – 283, Germany – 363, France – 385, Japan – 61. Food-processing and light industries make up the third sector of the agro-industrial complex. The meat and dairy industries are the basis of food-processing. The dairy industry includes the sub-industries using primary commodities (milk and butter processing) and those that use processed commodities (dairy production and butter making) [2].

According to the annual World Dairy Situation report presented by the International Dairy Federation, global milk output is estimated at 849 million tons including about 696 million tons of whole cow milk. Asia is a leading producing region of cow milk and dairy foods, the countries of the European Union account for 24% of dairy production, North and Central America’s output is 18% [3].

The latest annual survey of the world’s largest dairy companies highlights the giants of one of the world’s most valuable food sectors: Nestlé (Switzerland), Lactalis (France), Danone (France), Fonterra (New Zealand), FrieslandCampina (Netherlands), Dairy Farmers of America (US), Arla Foods (Denmark/Sweden), Yili (China), Saputo (Canada), Mengniu (China).

The Organization for Economic Cooperation and Development and the Food and Agriculture Organization of the UN report that in developed countries, the majority of milk production is processed into butter, cheese, skim milk power (SMP) and whole milk products (WMP). Developed countries produce 87% of the world’s SMP production, 79% of cheese, 43% of butter and 46% of WMP. The global production shares of developed countries for butter and WMP will decrease slightly in 2026. In terms of milk-solid basis, developed countries will increase milk production by 10% - of which 37% of that increase will go to cheese production, around 23% to SMP, 20% to butter, 10.5% to WMP and 8.5% to fresh dairy products. In developing countries, of the 33% increase in milk production in 2026, 85% will go to the production of fresh dairy products, 7% to butter, 4% to WMP, 3% to cheese and 0.6% to SMP [3, 4].

At present, the global dairy consumption is, on average, 220-230 kg per capita. This figure declines annually by 1.12%. Milk and dairy consumption is higher in developing countries, the leaders are China, India and Pakistan. A physiological norm of milk and dairy consumption is 360 kg per year, in Russia the average annual consumption is 247 kg, in European countries this figure is 350 kg.

According to the Russian Ministry of Health, a person should consume 325 kg of dairy products per year. Today this consumption is 233 kg per year (in European countries it is 350, a physiological norm is 360) and it is decreasing annually by 2.39%. The consumption of dairy products in Irkutsk region is 193 kg per year. It is 40% lower than the rate recommended by the World Health Organization, it is 20.9% lower than in the country and 19.1 lower than the global consumption. This figure is declining annually by 2% [5].

The possible reasons for the falling demand for dairy products are: decline in the overall resources of milk and dairy products; soaring prices along with declining incomes; consumers’ distrust.
According to the Federal Service for Veterinary and Phytosanitary Surveillance, the proportion of adulterated products in stores is over 19%. This figure was about 5-6% a few years ago, apart from cheese and butter this segment has always had many cases of adulterated products.

Most milk and dairy products that have not been sold were kept for storage. Cheese, butter and milk supplies have increased by 20%.

The quality of milk is of major concern to the food processors, consumers, and public health authorities as it is increasingly important for most of the world population. It is recommended that properly pasteurized milk should be employed in the preparation of various milk products intended for human consumption. Special attention should be paid to proper packaging and storage under strict hygienic conditions. Provision of safe wholesome and acceptable milk and milk products, through control of contamination is essential from food safety point of view [6].

The International Dairy Federation (IDF) plays a key role in helping the global dairy sector feed the world with safe, sustainable and nutritious dairy products. IDF is a worldwide federation of the dairy sector with a National Committee in every member country. Acting with global consensus, and working in partnership with intergovernmental organizations and key stakeholders, IDF has a longstanding cooperation with the International Organization for Standardization (ISO), dating back to 1963. Both these bodies have established a joint IDF/ISO work programme for the development of standard methods of analysis and sampling for milk and milk products. IDF has working relationships with several global intergovernmental organizations, and has a formal status with the Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE) and the Joint FAO/WHO Food Standards Programme - Codex Alimentarius.

The milk processing chain demands accurate and quality products from farm to plate and for all of its products, e.g., fluid milk, milk powders, etc. It must start with the raw material at farm level including; dairy herd improvement testing, to payment parameters, and quality control of the raw milk. Optimization is important in the processing of milk in the dairy chain as 73 plus tests are carried out including chemical physical and microbiological tests, set against ISO standards, EU, USFDA regulations, and most countries internal regulations. Advances are slowly being made to have modern and optimized methodologies approved. The regulatory bodies are setting new standards from verified inter-laboratory studies, targeting the advancement in instrumentation and for at-line and in-line production analysis for improved predictability and control of manufacturing processes. The finished product must be safe and comply with regulatory requirements [7].

The Russian legislative framework of the dairy industry includes:

- Russian Federation Federal Law No. 88-ФЗ of June 12, 2008 “Technical Regulations for Milk and Milk Products”.
- Standardization documents of milk and dairy products: Technical Regulation CU TR 033/2013 “Safety of milk and dairy products”; GOST 31450-2013. “Drinkable milk. Specifications”; GOST 31457-2012. “Milk ice, ice-cream and plombir. Specifications”.
- Standardization of the methods for the analysis of milk and dairy products quality: GOST 31659-2012: “Food products. Methods for the detection of Salmonella spp”; GOST 32901-2014: “Milk and milk products. Methods of microbiological analysis”; GOST 32031-2012: “Food products. Methods for detection of Listeria monocytogenes”; GOST 30347-97: “Milk and milk products. Methods for determination of staphylococcus aureus”; GOST 32915-2014: “Milk and milk products. Determination of fatty acid content by gas chromatography method”; GOST 31665-2012: “Vegetable oils and animal fats. Preparation of methyl esters of fatty acids”; GOST 10444.15-94: “Food products. Methods for determination quantity of mesophilic aerobes and facultative anaerobes”; MU 4.1/4.2.2484-09: “Guidelines for the assessment of authenticity and identification of falsification of dairy products”.
- Consumer basket: Federal Law № 227-FZ of 03.12.2012 «On the consumer basket in the whole of the Russian Federation»; the Decree of the Government of the Russian Federation №54 of
28.12.2013 “Guidelines for determining the consumer basket for the major socio-demographic groups of the population in the entities of the Russian Federation”.

The consumer basket is a set of goods and services necessary for an average person used during a certain period. It affects the minimum wage. The consumer basket includes food products and non-food goods and services, it is revised every 5 years [2].

Dairy products take the first place in the federal consumer basket and make 25.6 %. The recommended annual consumption is 256-361 kg/year, the consumption range for children and adults is 25-34%. Children’s diet should include 6-7 % more of dairy food.

The consumer basket of Irkutsk region is of two types based on the climate: southern and northern (figure 1). The consumption difference is 5 % on average, it is 30-40 % for children and adults. The consumption of dairy products in Irkutsk region is 17 % lower compared with the federal consumer basket.

Figure 1. Consumer basket for the southern parts of Irkutsk region 2019-2023, kg/year.

The system of the consumption basket is changing its structure. The consumption is becoming rational that is consistent with the current trends in healthy nutrition.

The Russian Ministry of Health published the basic monthly basket that is a part of the health promotion system. Dairy products are at the top of the list and account for 36.38 % of “healthy” consumer basket.

There has been a price rise for almost all dairy products by 7-8 % per year for quite a long time. If we take into consideration the period from 2013 to 2018, the prices for milk and dairy products increased by 35 % in Russia [2]:

- 37.1% - unpasteurized milk
- 32.8 % - sterilized milk
- 39.5% - pasteurized milk
- 32.2% - hard cheese
- 63% - butter
- 35.8% - cream
- 43.9% - cottage cheese

The prices for dairy products have risen considerably in Irkutsk and Irkutsk region for the last 5 years (pasteurized whole milk by 23.43 %, sterilized milk – 30.74 %; butter – 96.31, sour cream – 26.55 %) [5].

We devoted the second part of our study to the assortment of dairy products on the world and Russian markets nowadays. Dairy products includes milk, cream, butter, spread, fermented milk products (drinks, sour cream, cottage cheese), canned milk (sweetened condensed and dried milk), ice cream, cheese (natural cheese and cheese products).
According to the survey conducted by the agro-industrial giant Cargill [8], there are some differences concerning the purchase of dairy products by decision makers in various parts of the world. For example, yogurt and ice cream are popular all over the world. Respondents in Asian countries, North and South American prefer flavoured milk. Cream cheese and dairy desserts are popular among Europeans.

Today functional food products supplement a wide assortment of traditional products and compete successfully with them. Milk and bread foods are major on the world market of functional food products accounting for 72.9 % [9].

The creation of theoretical foundations for the production and proper use of functional products in technological processes are the key elements at the stage of moving away from research on healthy eating and nutrition to industrial production of functional foods [10].

Japan has been an innovator in the field of producing functional food products since it offered the concept of healthy diet (positive, functional nutrition) at the beginning of 1980s [11]. In 1989 Japan adopted the law concerning functional food production that said: “Functional foods are not medicine but natural foods included in daily diets and having a certain influence on physical and mental state of a person”. The Japanese Ministry of Health determined the list of food flavorings, additives, microorganisms contributing to functional properties of foods such as protein, peptides, amino acids, unsaturated fat, vitamins, minerals. Today Japan produces more than 150 types of functional foods worth $ 9 million per year, their production is adopted at the legislative level and controlled by the government. The average life span in Japan has increased by 20 years due to the introduction of functional products.

The international community adopted the term “functional foods” in 1993 and started their production. Most European countries have started a lot of research and production companies for the last decade that study and expand the list of functional foods. Japan remains a leader of functional food producing countries.

The main advantages of functional foods are [12]:

- eliminating micronutrient malnutrition in the body;
- maintaining functional activity of organs and systems;
- reducing the risk of various diseases, creating proper nutrition (reducing risk factor of different diseases);
- maintaining beneficial microflora and healthy functioning of gastrointestinal tract.

Functional foods are divided into [13]:

- Health foods are aimed at treating diet-related diseases. Health foods are necessary to prevent these diseases and mobilize body defenses. Depending on the type of a disease, health foods can contain food supplements or, on the contrary, they should be free from nutrients affecting the disease. For example, diabetes and obesity require reducing sugars. In case of liver disease, cardiovascular pathology it is recommended to have foods with reduced quantity of salt.
- Therapeutic foods preventing diseases (cardiovascular diseases, obesity etc.) are for people exposed to risks in the industrial environment. These foods are also used in therapeutic practices. Therapeutic foods contain biologically active substances improving mainly functioning of damaged organs and systems, reducing and removing harmful substances from the body.
- Special foods are narrowly focused on improving some body functions (for sportsmen, people having increased physical activity). For example, sportmen need foods fortified with B-group vitamins (B₁, B₂, B₆, nicotinic and pantothenic acids) as well as vitamins C and E playing an important role in oxidation-reduction. Cosmonauts’ rations are fortified with vitamins, essential amino acids, fiber, macronutrients Ca, K, Mg to satisfy biological body needs.
- Fortified foods are saturated with biologically active substance, vitamins, macro- and microelements, dietary fibres, probiotic microorganisms. The amounts of these components are calculated taking into account their natural content in the original product or used raw material.
Adding biologically active substance or macro- and microelements must be no less than 10% of the physiological needs of the body. Fortified foodstuff can be marketed as functional (emphasizing health benefits) if they include ingredients that are in the list of functional foods [14].

- Biologically active substances are compounds of natural or identical to natural substances to use with meals or add to foods. They are extracted from plants, animal or mineral raw materials. They are also made by means of chemical or biological synthesis [15]. There are three main groups of biologically active substances: nutraceuticals, parapharmaceuticals and probiotics (eubiotics).
- Health foods for children and elderly people.
- Functional ingredients are the main components of functional food products. Physiological functional food ingredients are a substance or substance complexes of animal, plant, microbiological or mineral origin. They are also substances identical to natural or living microorganisms which are a part of functional foods, having a positive effect on one or some physiological functions or metabolism if they are used on a regular basis. Their amount should be 10-50% of daily physiological requirements in this ingredient [16].

Biologically active and/or physiologically useful, safe for health having exact physical-chemical characteristics of ingredients refer to physiological functional foods. Their properties are scientifically based. In addition, their daily intake has been established to maintain and improve health [16].

The following functional ingredients are used effectively at the current market stage [10]:

- soluble and insoluble dietary fibres;
- vitamins (A, B, C, D, etc.);
- minerals (calcium, iron, iodine, magnesia, selenium, etc.);
- polyunsaturated fats (vegetable oil, fish oil, fatty acids, omega-3);
- antioxidants (β-carotene, ascorbic acid, tocopherol);
- prebiotics (inulin, lactose, lactic acid, etc.);
- probiotics including bifido- and lactobacteria, yeast and even higher fungi.

The use of physiological functional ingredients is strictly controlled taking into account their maximum permissible concentration and daily intake. The increase in the amount of some biologically active supplements above the physiological standards is permitted for B-group vitamins (3 times), minerals (6 times), etc. However, it should be noted that biologically active supplements are effective meeting recommended daily intake, their excessive intake can be harmful in case there is an increase of their use [17].

Special attention is paid to functional ingredients characteristics when choosing the method of using them in foods. Thus, for example, temperature and even distribution in foods are taken into account while adding vitamins. The other factors taken into consideration when using physiological food products are [12]: pressure used in technological processing; moisture of raw materials and the finished product; the amount of physiological functional products; antagonism and synergy in the use of these ingredients; compatibility of physiological functional products with the chosen basis and product; the influence of physiological functional products on nutritional qualities, taste, structural characteristics, storage and microbiological indicators of a product.

There are three ways of adding physiological food ingredients into foods: inside a product, on the surface, the combination of the former two ways. In this case the peculiarities of adding them are of great importance: the sequence of adding; restoring duration, agitation, bundling, etc.; maximum temperature reducing or stopping procession; appropriate moisture amount; constraints and recommendations concerning mechanical and thermal cooking, storage; restrictions related to some ingredients.
Functional ingredients can be used dry, mixed (some additives), hydrated, in the form of a solution, gel, suspension, protein-in-oil emulsion, brine [12]. Certain processing methods are used to add functional food ingredients:

- Dissolution of functional ingredients in water or in any other liquid;
- Dry mixing of functional food ingredients;
- Dissolution of functional ingredients in fats and oils;
- Sprinkling (coating) functional ingredients on the surface of a product;
- Adhesion of functional ingredients on a product surface;
- Special coating on a product surface (to preserve micro ingredients).

Therefore, the use of technology (that can have peculiarities in each case) is made depending on functional food ingredients.

There has been an increase in production and consumption of functional foods in most countries for the last 10-20 years. There are two reasons for the rapid development of the functional food market: producers’ efforts aimed at production characterized by functional benefits; consumers’ demand for healthy products having undeniable advantages. Dairy products account for 50-60 % of the world market of functional foods, bakery makes up 9-10 %, functional drinks – 3-5 %, other foods 20-25 % [18].

According to the recent report by Transparency Market research the global functional dairy market is majorly divided into seven regions, such as North America, Latin America, Europe, South Asia, East Asia, Middle East & Africa, and Oceania. Nowadays there are some key participants on the functional dairy market. They are Archway Food Group, General Mills Inc., Anand Milk Union Limited, Dairy Farmers of America Inc., Kraft Foods Inc., Arla Foods UK Plc., Nestle S.P.A, Megmilk Snow Brand Co. Ltd, Dean Foods Company, Fonterra Co-operative Group, Lactalis International, Danone SA. Among all the above mentioned regions North America is estimated to dominate the functional dairy market, due to the increasing awareness levels among people for a healthy diet and its benefits, also the introduction of advanced equipment for milk processing in North America. Other than that, Asian countries are expected to show significant growth in the forecasted period due to the high consumption of functional dairy products, and increasing economic growth in Asian countries. Developing regions hold significant shares in the functional dairy market in the coming years [3].

There has been growing interest in functional foods in Russia since 2000. The Russian government supports the concept of healthy nutrition promoting a healthy lifestyle [20].

Nowadays Russian scientists and researchers work in the field of producing functional dairy foods with the use of non-traditional raw materials [9]:

- Krasnikova L.V. and Zhukova A.D. have developed the technology preparation of the combined functional product containing in its composition whole milk, cottage cheese whey and dried fruits and berries (blueberry, raspberry, sweet-brier).
- Makhina Y.D., Serova O.P., Gorlov I.F. have developed the technology of the new cheese product combining functional properties of goat milk, proteins of chickpea of new selection, topinambur dietary fiber and probiotic microflora ferment.
- Kanareykina S.G., Minniekhmetova G.R., Kanareykin V.I. have offered to use smoothies as a vegetable additive including useful properties of spouted grains of wheat and Jerusalem potato in yoghurt consisting of raw cow milk, dry degreased milk. The product obtained has dietary properties, increased biological and nutritional value and it can help normalize the work of the endocrine system.
- Donskaya G.A., Drozhzhin V.M., Bryzgalina V.V. have been developed technology and formulations of fermented low-calorie dairy drinks (consisting of normalized milk, skim milk, sweet whey) supplemented with easily digestible whey proteins and water-soluble natural antioxidants to increase functional product range. Whey protein concentrated has been used as
an additional source of protein. In order to provide prebiotic properties to the drink, phytotea extracts of Sophora japonica and hibiscus flowers have been introduced into the formulation.

- Golubeva L.V., Dolmatova O.I., Pozhidaeva E.A. and other scientists used such ingredients as milk, symbiotic starter and syrup of flowers of linden and dandelion to produce fermented milk drink. The fermented milk beverage was characterized by harmonious, moderately sweet taste and fragrance of flowers, smooth consistency and pleasant yellow color, caused by insertion color syrup.

- Gavrilova N.B., Moliboga E.A., Ryabkova D.S. developed an intensive technology of semi-hard cheese for processing based on the use of lactose-reduced milk. The fermented milk beverage was characterized by harmonious, moderately sweet taste and fragrance of flowers, smooth consistency and pleasant yellow color, caused by insertion color syrup.

Thus, the development of new functional foods maintaining and improving people’s health is of great practical interest and importance today. Russian scientists’ and researchers’ work on functional dairy products with non-traditional natural additives is one of the current trends in dairy production.

The trend towards functional foods is making its way now and many companies are adapting to this trend. Dairy products have the largest share (50-60 %) in the Russian functional food market. Wimm-Bill-Dann Foods and Bio Max companies have particular segments of the market. Wimm-Bill-Dann Foods offer sour milk beverages of the trademark “Imunele” with a special complex “3 Active” (vitamins, minerals and lactobacteria) including “Imunele for men” (to boost men’s immune system) and “Imunele for kids” (to boost kids’ immune system). Bio Max trademark’s products are yogurt, kefir, milk, cottage cheese dessert.

The leaders of the Russian functional milk products market are Danone (trademarks “Danone”, “Danissimo”, “Activia”, “Actimel”, “Vitalinea”; “Wimm-Bill-Dann” (trademarks “BioMax”, “Bioyorhurt”); Ehrmann (trademarks “Biohurt”, “Ehrmihurt” [20]. Irkutsk oil and fat plant “Yanta” and PAO “Belorechenskoye” operate on Irkutsk food market.

Studying the assortment of products presented in outlets in Irkutsk region, we have found out that milk foods are leading in the category of the functional food products (table 2), they account for 68 % of all functional foods [21].

| Subgroup | Trademark | Physiological functional ingredients (PFI) |
|----------|-----------|------------------------------------------|
| Milk     | «Umnitsa» | iodized protein                          |
|          | «Nedel’ka» | iodized protein                          |
|          | «Baikalskoye» | iodized protein |
|          | «Nastasya» | vitamins C and E, beta-carotene         |
|          | «Lactovit» | vitamins C, A, E, B1, B6, PP, folate; macronutrients – iron, zink |
| Natural yoghurt | «Activia» | probiotics (bifidobacteria) |
| Bio yoghurts | «Bio Balance» | probiotics (bifidobacteria) |
|          | «BioMax» | probiotics (bifidobacteria) |
| Fermented milk products (bioproducts) | «Actimel» | probiotics (Casei Imunitass); vitamins B6, PP |
|          | «Tselebnyi» | Easily digested protein, lactic acid bacteria |
|          | «Lactovit» | probiotics (bifidobacteria), prebiotic (lactulose), vitamin C |
Therefore, the most popular dietary supplements are probiotics and prebiotics [13], they account for 45.5 % of total dietary supplements used in dairy products on Irkutsk regional market. Mineral substances make 27.3 %, the amount of lactic acid bacteria is 9 %, vitamins make 18.2 %. There is iodine deficiency in Irkutsk region [22] so iodized protein is used in food almost 2.5 more often than other mineral substances [14].

Considerable research has been devoted to a sociological survey to correlate respondents’ needs and age.

The programme of the sociological research is the following:

- the aim is to study the dynamics of preferences for dairy products depending on consumers’ age;
- the object of our study is consumer dairy market of Irkutsk region;
- the subject matter is consumers of 6 age groups. 6400 consumers have been interviewed;
- the type of sampling is random and directed.

The questionnaire was conducted in two parts: 25 outlets of Irkutsk region, an online survey. The research period was February-May 2019. The results are presented in table 3.

Table 3. Summary analysis of Irkutsk region residents’ needs for dairy products.

| Name                        | Consumer age |
|-----------------------------|--------------|
|                             | 15-25 | 26-35 | 36-45 | 46-55 | 66 and older |
| Trademark                   |        |       |       |       |              |
| Milk and cream              | Yanta  |        |       |       |              |
| Fermented milk products     |        |       |       |       |              |
| Canned milk                 |        |       |       |       |              |
| Cheese                      |        |       |       |       |              |
| Physiological functional ingredients (PFI) |        | yes   | yes   | sometimes | no |

| Name                        | 15-25 | 26-35 | 36-45 | 46-55 | 66 and older |
|-----------------------------|-------|-------|-------|-------|--------------|
| Trademark                   | Yanta |        |       |       | Yanta        |
| Milk and cream              | sterilized (TetraPack) | sterilized (TetraPack) | sterilized (TetraPack) | pasteurized (package) |
| Fermented milk products     | yoghurt, new drinks | sour cream, curd products | sour cream, ryazhenka | sweetened condensed milk, evaparoted milk |
| Canned milk                 | sweetened condensed milk | sweetened condensed milk | sweetened condensed milk | condensed cream |
| Cheese                      | hard, processed | hard, processed | hard, brine-ripened | hard, rennet | hard, rennet |
| Physiological functional ingredients (PFI) | yes   | yes   | sometimes | no | no |
56 % of the respondents chose “classical” dairy products, 15 % preferred dairy products with different flavor additives, 12 % selected those containing minerals, about 9 % gave their preference to dairy foods with bifido- and lactic bacteria, the rest 8 % made a different choice. The trade mark “Yanta” turned out to be the leader on the Irkutsk regional market. Most consumers of different age prefer sterilized milk and cream, sweetened condensed milk, hard cheese. People under the age of 35 tend to choose yoghurts and new types of sour milk drinks. Middle-aged and elderly people most often buy sour cream, cottage cheese and ryazhenka. Consumers over 45 don’t pay attention to physiological functional ingredients. It is a wake-up call of the lack of consumers’ awareness of proper nutrition.

The main factor for consumers under the age of 25 the taste of products and they are likely to try something new. The age group of 26-35 is guided by price that is followed by taste. The age group of 36-45 takes into consideration all the factors apart from the price and those who are 46 and older aren’t interested too much in taste.

4. Conclusion
The stages of the dairy development are milk, butter, cheese, fermented milk products; canned milk; ice cream; extending the range of dairy products of different fat content and adding food flavourings; using traditional recipes (for example, thermostatic technology); innovative functional dairy products. The production of milk and dairy products in certain regions and around the world is growing, while their consumption is decreasing due to the low paying capacity and consumers’ lack of confidence in the quality of products. As a result, the stocks of dairy products begin to put pressure on the market, therefore producers have to reduce prices for their goods and lose a part of their profit. It has a negative influence on the assortment and the subsequent development of the dairy industry.

Most milk is processed into butter, cheese, skim and whole milk. The range of dairy products is being expanded, a great emphasis is being made on fermented milk drinks. The market of functional dairy products is growing. Dairy producers pay more attention to multi-function products sticking to the principles of naturalness (without substitutes and artificial additives); reduced quantity of sugar, salt, hydrogenated fats; additional nutritional value (fortified with vitamins, macro- and micronutrients etc.).

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