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**STATE AND
PROSPECTS OF
PRODUCTION OF
FUNCTIONAL FOOD
PRODUCTS:
INTERNATIONAL
EXPERIENCE**

The popularity of “healthy” food throughout the world is constantly growing. The current development of the world market of health nutrition describes the following figures: in 1995, the sales of “health products” amounted to 10 billion US dollars, after 5 years, in 2000 – 15 billion dollars, in 2002 – about 33 billion dollars, in 2008 – 75 billion dollars. Today, the potential of this segment of the food market is estimated at \$ 120 billion, representing 5% of the total volume of the world food market. Almost 40% of the market for health foods is owned by the United States, 25% by Japan, and more than 30% by Central European countries, among which Germany, Great Britain and France are leading [1].

The populations of these countries are increasingly adhering to the rules and standards of rational nutrition. In Europe, caterpillars began to take into account the personal wishes of customers for cooking from “healthy” ingredients. Retailers are forced to adapt products that are marketed to individual consumers who prefer health products when choosing food.

The food industry solves this need by increasing the number of products with new ingredients that can improve their health and have therapeutic and prophylactic properties.

The development of medical and prophylactic foods is carried out in two directions:

- Creation on the basis of already developed general purpose products with the inclusion in their recipe of one or several components of the target direction, or with the replacement of components of the product, and others;

- Development of new therapeutic and prophylactic products without taking into account the basis of recipes and technologies of traditional food products.

“Unhealthy” diets and lack of physical activity are the main causes of the emergence of most non-infectious diseases associated with diet and physical inactivity.

According to international experts, soon functional products in Japan can push some medicines on the market. So, probiotics and functional nutrition, including using bifidobacteria, in the first quarter of the XXI century will shorten the existing market for medicines by pushing out many traditional pharmacological agents [2].

In European law, “functional foods” are products that: provide one or more of the target functions of the body that is appropriate for any improvement in health and well-being and reduce the risk of the disease; not tablets, capsules or other forms of dietary supplements; consumed as part of a normal diet [3].

Schuhnemann Veren, refers to a nutritional diet that meets the nutritional and physiological requirements of specific population groups. Therefore, it offers functional food to consider foods with additional functions, useful, nutritional and physiological characteristics.

Goldberg expanded the concept of functional nutrition and reduced it to three basic provisions:

- Must be part of a daily diet;
- The ingredients of food should be natural (of natural origin);
- Food components, along with nutritional value, should help regulate the proper function of the body.

In 2000, the World Health Organization (WHO) presented the first “WHO Action Plan on Food and Nutrition in the WHO European Region for 2000-2007”, 2007 – the second “Action Plan on Food products and nutrition for 2007-2012” and 2014 – the third “Action Plan for Food and Nutrition for 2015-2020”. It is worth noting the main

objectives of these documents are “... providing stable supply of the population with safe and healthy food products; ... the need to promote the appropriate enrichment of the main food products with micronutrients and the development of products for supplementary food with sufficient content” [4].

There is a long, positive experience of developed countries to compensate for the inadequate consumption of vitamins A, D, group B, iodine, iron. In most economically developed countries (USA, UK, Italy, Belgium, etc.), the problem of optimizing vitamin content niche is solved by regulating the enrichment of vitamins food products of mass consumption: flour, pasta and bakery products – on vitamins B1, B2, PP and folic acid, margarines – vitamins A, D and E, sugars – on vitamins A and C, fruit juices – vitamin C.

In the United States, the enrichment of dry breakfast cereals with vitamins and minerals in the amount of 15 to 25% of the recommended daily intake per serving is carried out since the 1970's, and since the 1980's, calcium enrichment is carried out - at a dose of 30% of the recommended consumption rate.

Today, there are many baby food products on the market that can replace mother's milk and give children all the necessary vitamins, minerals and many other nutrients.

The baby food market is divided into three major segments: female milk substitutes (dry or liquid), which includes:

1. Modern adaptive mixtures containing serum proteins enriched with taurine, carnitine and other biologically active substances; adapted casein formulas; partially adapted mixtures; “the following formulas”, intended for children older than 6 months.
2. Livestock products: fruit juices and mashed potatoes, vegetables, meat, milk or cereals; porridge is dry and ready; baby water and ready-made dishes for children.
3. Products for medical nutrition of children – various types of products intended for dietotherapy of hereditary diseases of metabolism, food allergy, lactase deficiency.

All three segments are developed in approximately the same degree. Each of them is a necessary part of the daily diet of the child. However, the most underdeveloped categories belong to the second segment – these are special products for children, such as baby water, desserts, prepared dinners, etc.

According to the production technology, all baby food products can be divided into two large groups – dry (dehydrated) and liquid or semi-

liquid products, including products ready to be consumed. The most widely used products in the world's infant food industry are dry products with a moisture content of not more than 10% – food concentrates. The assortment of concentrates for baby food is diverse, includes both female milk substitutes and supplements. Depending on the destination and recipes, dehydrated cereals and vegetable products of baby and dietary foods are divided into the following groups: Dehydrated tomatoes; Milk mixtures with decoctions; flour for children's and dietetic food; milk flour mixes; flour mixtures; vitamin milk flour mixtures; vitaminized porridges; kisses; Mashed Vegetable Soups [5].

The global baby food market is one of the most progressive markets, and its total cost is expected to be about \$ 55 billion in 2015 and \$ 63.7 billion by 2017 with an annual growth rate of almost 9% [8]. Demand in the market is due to an increase in the number of working mothers and the desire to provide the best nutrition for their children. Parents want nutritional products for children to help them save time and provide their child with all the necessary components for their development.

The leaders in the global market for infant food products are companies with very long experience:

- Mead Johnson (USA). The largest company that created and produces infant food products under the trade name “Enfamil”, designed to meet the diverse needs of pregnant women, nursing mothers and children from birth and up to three years old. The company delivers its products to 110 countries of the world;

- Nestlé (Switzerland). A great producer of infant food products for dairy, meat, fish and fruit and vegetable products for healthy children, as well as children with different pathologies and intolerance of food ingredients. For over five decades, the company has been a leader in the baby food innovation process and invests more than 1.4 billion Swiss francs each year in research and development. This allowed her to become the first manufacturer of infant food products, which offered the market a scientifically developed effective blend for the feeding of preterm infants, as well as a number of hypoallergenic and sour-milk infant formula. The company has 130 years experience in food production and has branches in many countries of the world (Finland, Germany, France, Belgium, Russia). In Finland, the company produces baby food products with the trademark “Bona”;

- Nutricia (The Netherlands), a global leader in infant nutrition innovations has been producing high-quality products for young

children for over a century. Now Nutricia is part of the “Numico” Corporation, which holds the leading position in the market for specialized food products. As part of the company – “Numico Research” – one of the largest research centers in the world on specialized nutrition issues:

- Heinz (USA). Heinz is engaged in the development and production of food products for adults and children from 1869 and supplies baby food products to more than 100 countries. In the CIS countries, the company offers 35 product names for babies of the first year of life, which are manufactured in Russia, Italy, England. All products of “Heinz” are prepared with the addition of a vitamin-mineral complex, do not contain genetically modified raw materials, dyes, preservatives and artificial flavoring additives;

- Hipp (Austria). Hipp began production of baby food products in 1899. This is the only company that has its own raw material base and produces bioorganic products. Owned factories in 5 countries of the world. The company’s products have a very diverse assortment - from mixtures to tea and water and widely sold in European countries:

- Gerber (USA). – The company was founded in 1927, today it is the largest baby food manufacturer in the world, controlling 79% of the baby food market in the US. In 2007, joined the “Nestlé”;

- Beech-Nut Nutrition Corporation (USA). – A subsidiary of “Milnot”, the third-largest baby food manufacturer in the United States, after Gerber and Heinz. Founded in 1890, it remains the main force in the infant food industry through the introduction of innovative products, including the first to launch a baby nutrition line containing DHA and Arachidonic (ARA) fatty acids contained in breast milk and considered an important component in the development of the central nervous system of the child;

- Danone (France). – The company was founded in 1919. “Danone” is an association of companies producing exclusively “healthy” products: sour milk products, mineral water and drinks, children’s and medical nutrition. The portfolio of the company includes such brands as Danone, Activ, Fantasia, Danissimo, etc. Danone Group is represented in 120 countries (including Ukraine). It was Danone that distributed such a product as yogurt worldwide, and in 1953 it introduced a new kind of fruit yogurt to the market for the first time [6].

All listed companies have a good reputation in the world market as producers of high-quality baby food products. The leading players in the US market are Nestlé and Beech-Nut Nutrition Corporation, while

Danone is leading the market in Western Europe.

The development of the market for baby food is influenced by factors such as the program of state stimulation of fertility and family protection, the growth of welfare of citizens, social changes, the emerging baby nutrition culture, the impact of the environmental situation, legislative problems, high barriers to entry, as well as insufficient level of awareness of parents about rational and functional nutrition.

The logic of further development of the market for children's products should be subordinated to modern global trends in nutrition. The most important of them is related to the growing understanding of the role of nutrition in the management of development processes and the formation of health. Within the framework of modern nutritionology topics that were not previously discussed were discussed. These include, in particular, the study of nutrition from the standpoint of information exchange of the organism with the environment and the ability of macro- and micro-nutrients to control the activity of genes. Already, on the basis of the ability of the biologically active substances of food, its macro- and micronutrients to actively activate or deactivate genes, they begin to develop programs for the prevention of cancer, obesity, type 2 diabetes and other diseases. These programs are dealt with by the working group on the problem of "Safe Food and Quality", created under the European Parliament.

In the global food market, the segment of sports nutrition is widely represented, with special attention being paid to the minds of both the mass sports and the sports of higher achievements (premium food).

The interest in sports nutrition is the result of an incredible rise in interest in a healthy lifestyle. In Germany, for example, 40% of the population cares about their physical development and is actively engaged in sports, and in the United States this figure is almost 60%. Thus, the United States has the largest market for sports nutrition.

The combined consumption expenditure for sports nutrition, beverages and nutritional supplements around the world amounted to 32 billion US dollars in 2006 and increased to 54 billion dollars by 2015. The highest growth is observed in Asian countries: from 2007 it is 8.5% per year.

The leaders in the world market of sports nutrition products are companies with extensive experience:

– Optimum Nutrition (the United States is the world leader in the production of sports nutrition products. The products of this company

are of high quality, good working properties, a wide range and a fairly reasonable price. Products of the company – proteins, amino acids, glutamine, gainers, vitamins and other products occupy the leading positions in their categories and enjoy the highest demand. Optimum Nutrition is consistently among the top five market leaders. The manufacturer boasts some of the world's best sellers, including 100% Whey Gold Standard Proteins, which many experts call the best fast (serum) protein, amino acids SuperiorAmino 2222 and others.

– BSN (USA) – the top producer of sports nutrition, in the BSN arsenal there are sales leaders in the category of proteins, gamers, amino acids. The “BSN” brand is very popular among professional sports bodybuilders in the United States. The company quickly develops and regularly replenishes the range of its products. Since 2001 has been released a large number of decent high-quality and efficient sports nutrition products have been produced, using the latest developments in the field of biotechnology. The Syntha-6 protein has become a true legend among bodybuilders, and the Nitrix product made a real revolution in its time.

– “Universal Nutrition” (USA) – the food from this company is quite expensive, high quality, originality of its components, it is possible to mention separately the world famous Animal series (AnimalPak, AnimalTest).

– Gaspari Nutrition (USA) is the author's project of the world-renowned bodybuilder Rich Gaspari, who using his personal experiences and bodybuilder practices has created his own production of sports nutrition. “Gaspari Nutrition” products are average for the price of goods and at the same time are of high quality as products for athletes with a large assortment. An excellent combination of price, quantity and quality in the aggregate generates a high demand for the goods of this company. An enormous success is the amino acid complex of this brand Amino Mach 8000, as well as ANVITE vitamins.

– Dymatize Nutrition (The United States has been producing sports nutrition since 1994 and seeks to provide the necessary sports supplements for athletes of all categories, offering them at an affordable price, while not producing quality products. Today, Dymatize Nutrition is particularly popular, as specialists The company launches new and new products that deserve attention on the market.

– Cellucor (USA) is considered an innovative brand, as it produces sports nutrition on the latest scientific technology. Products “Cellucor” – high-quality products for athletes with the most efficient working

properties. Efficiency is the main goal in the creation of sports nutrition products by Cellucor [7].

Sports nutrition today is organic, healthy foods, therapeutic and prophylactic and restorative nutrition that has a balanced and / or directed functional composition; this nutrition, enriched with biologically active and mineral components, is aimed at influencing the body of the athlete, depending on the task posed to him, taking into account his individual condition, that is, based on the identification of the individual characteristics of the body of this person for physical activity / overload, stressful situations, adaptive possibilities through useful nutritional ingredients.

In the commodity turnover only the products of sports nutrition passed, which was checked at the level of state expert organizations.

Taking into account the fact that the number of consumers is steadily increasing.

The main factors influencing the decision to buy a product are as follows: price, consultations seller and trainer [8].

The most popular in sports nutrition due to availability and low price are dry mixes. At the same time, there is a clear tendency towards an annual increase in the share of consumption of bars, gels and beverages [9]. Regarding the chemical composition of goods that consumers choose on the market for sports nutrition, the advantage belongs to proteins (59% of the total volume of goods in this segment). Vitamins, macro- and micronutrients, amino acids are selected by 50% and 48% of consumers.

At present, the market is presenting a series of heroodietic food products on a milk basis: low-fat cottage cheese with buckwheat or semolina, with an extract from sprouted seed of buckwheat and millet; Sour-milk bioproducts enriched with probiotics (bifidobacteria and lactobacilli) – kefir and yogurts “Bifidok”, “Bifilife”, “Bifilan”, “Biooghurt”, “Activia”, sour milk and vegetable yogurt product enriched with ether of plant sterols “Danakor” lowers cholesterol levels; milk, cream, cheese, ice cream with split lactose; dairy products enriched with Calcium; fruit and milk cocktails from the series “Biomax”, juices and juice drinks, berries “Miracle-Yagoda”, 100% Gold Premium and others.

The modern market has a wide range of bakery products of the hero-orientation (enriched with food fibers, iodinated and fortified bread), cereal products (porridges) with various additives and phyto-components. Among confectionery products are products on natural sugar substitutes, which are diabetic in nature with vitamin supplements.

Certain hero-orientation is noted in the meat processing industry. For example, in the market are boiled sausages, sausages, ham with the addition of cumin, thistle oil, lactulose [10].

Theoretical and practical researches of leading world and domestic scientists have proved the effectiveness of the approach to accelerated improvement of the population through alimentary correction. Thus, the organization of a fully-fledged balanced diet became the most important social task and a priority direction of the modern food industry. Today, the most up-to-date direction in nutrition is the medical (clinical) diet, which includes the feeding of sick people and certain groups of healthy people who are under medical supervision, such as pregnant women and athletes. Medical nutrition plays a prominent role in the complex treatment of cancer, severe infectious and neurological diseases, acute exogenous poisoning, diseases of the gastrointestinal tract. It is also used in post-stool states, lack of body weight, protein deficiency, in the pre- and postoperative periods, etc. [11].

Medical nutrition in many countries has become an integral part of complex therapy for many diseases, the problem with the provision of quality nutritional support and today does not lose its relevance. The analysis conducted by the European Association of Enteral and Parenteral Nutrition (ESPEN) states that patients suffer from a trophic disorder: in surgery – 27-48%, therapy – 46-59%, geriatrics – 26-57%, orthopedics – 39-45%, oncology – 46-88%, pulmonology – 33-63%, gastroenterology – 46-60%, among infectious patients – 42-59%, with chronic renal insufficiency – 31-59% [12].

Against this backdrop, the role of medical nutrition significantly increases, which affects the growth of the market, which experts describe as dynamic and very promising. This segment of the food market in 2013 was estimated at \$ 10.7 billion and is expected to grow by an average of 4.1% from 2014 to 2020. In place of leaders of the growth of the past years – Europe, Japan and the United States are coming to dynamic countries – China, India and Brazil.

The global market for clinical nutrition is highly concentrated: the four players account for about 69% of the market. Nestlé SA has been leading the market since 2013. The management of the company decided that medical nutrition can become an effective and economical means of preventing and treating acute and chronic diseases in the XXI century, and in 2010 a new unit for the production of medical nutrition for the prevention and treatment of diabetes mellitus, obesity, cardiovascular diseases was created and Alzheimer's Diseases – “Nestle

Health Science SA". In addition, the company announced the opening of its own Institute of Public Health at the Ecole Polytechnique Fédérale de Lausanne (EPFL), which invests 5 billion francs annually [13, 14].

The general qualities of modern preparations for enteral nutrition are the balanced ratio of different substances, taking into account the daily human need in each of them, the presence of mixtures of proteins of high biological value (optimal set of amino acids), lack of lactose, sucrose, gluten and cholesterol.

Constantly developing new nutrient mixtures, especially directed action, to correct not only inferiority of nutrition, but also metabolic disorders in specific diseases and pathological conditions.

The segment of the market of medical nutrition in the world will continue its growth, which will contribute to an increase in real costs of the population, extending the age limits and improving consumer literacy. The main competition will be on the regional markets, due to which the growth of the segment will continue to be ensured in light of the intensification of mergers and acquisitions in the industry. Experts expect an increase in investment activity by foreign companies in the segment of nutritional support of developed countries.

Currently, in all countries of the developed world there is a significant change in the attitude of people, and especially social assets of the population, to Functional nutrition. It becomes increasingly clear that functional nutrition determines the ability to work and competitiveness of a person in a modern society and, accordingly, the standard of living and well-being, is the most convenient, intensely form of providing the human body with the necessary nutrients.

According to analysts' forecasts, by 2025 the probes will spend no more than 30 minutes per day for the purchase of food, and therefore, the release of functional foods ready for consumption or with a minimum cooking time is required. "Healthy food on the go" gradually turns into a trend of the 21st century.

The Japanese government recognizes functional nutrition as an alternative to drug therapy and defines it as a Food Specific Health Use (FOSHU).

Thus, a review of the global market for functional food products suggests that it is confidently developing. Dominant in this market are the USA, Europe and Japan, which accounts for about 90% of the total volume of sales of functional food products. The ratio of consumers to functional nutrition is positive therefore this segment of the food market is promising enough.

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