Program name: BR10764998 "Development of technologies using new strains of beneficial microorganisms, enzymes, nutrients and other kits in the production of special dietary foods"

Relevance: In the last decade, the health status of the population has been characterized by negative trends: morbidity and mortality due to cardiovascular and oncological diseases have increased, the problem of deficiency of vitamins and micronutrients (iodine, iron, etc.) is acute.

The nutrition structure of Kazakhstanis is characterized by a continuing decline in the consumption of the most biologically valuable products, such as milk and dairy products, fruits, vegetables, eggs, fish, meat, vegetable oil. In the actual diet, there is an imbalance in proteins, fats and carbohydrates, a deficiency of full-fledged proteins, polyunsaturated fatty acids, vitamins, trace elements with excessive consumption of carbohydrates.

Among the various food groups currently used by the population of our country, dietary functional products are of great interest from the point of view of the possibility of creating new products of increased nutritional value. These products can be considered as an optimal form of food product, which should be used to enrich the diet of any person with all essential nutrients, as well as biologically active substances that favorably affect the functional state, metabolism and immune resistance of the body.

One of the important areas of work of domestic enterprises and firms to expand the product range is the development of new dietary products enriched with essential nutrients, as well as biologically active additives (nutraceuticals). This applies both to mass-consumption products, the purpose of which is to fully satisfy the body's needs for essential macro- and micronutrients, and special dietary products with a given chemical composition, with therapeutic and preventive properties, for certain populations and people in extreme conditions.

The program is aimed at the implementation of the "Strategy "Kazakhstan-2050": a new political course of the established state", the Message of the President of the Republic of Kazakhstan N. Nazarbayev dated October 5, 2018 "The growth of the welfare of Kazakhstanis: increasing income and quality of life" and other strategic and program documents.

Solving the tasks of the Program will allow the agricultural sector of the Republic of Kazakhstan to become a highly profitable branch of the economy that ensures food and environmental security, the development of export potential, will lead to the development of small farming; will increase the volume of agricultural products produced in value terms; will increase the country's GDP, as well as tax revenues to the budget; will strengthen the position of domestic producers of high-quality food products in the domestic and foreign markets.

Purpose: Development of innovative technologies for processing and storage of crop and livestock products

Expected results:

At the end of the program:

The technology of functional food products from sheep and goat milk will be developed.

Technologies of fast food products for functional purposes will be developed.

Technologies of combined fermented milk protein products of long-term storage will be developed.

Technologies of lactose-free cottage cheese raw materials and bifidoyogurt will be developed.

Technologies for the production of food products of increased nutritional value and long shelf life using nutrients and nanocarboxylates (trace elements) will be developed.

Technologies of preventive drinks will be developed.

Resource-saving technologies of economy-class dairy products from whey (whey cheese, refreshing and tonic drinks) will be developed.

New food products with a reduced content of trans fats based on animal and vegetable raw materials will be developed.

Technologies of meat herodietic products enriched with biologically active ingredients from secondary meat raw materials will be developed.

3 seminars and round tables will be held, 14 articles published in peer-reviewed foreign scientific publications with a non-zero impact factor, 2 articles in peer-reviewed foreign scientific publications indexed in the Science Citation Index Expanded database of Web of Science and (or) having a CiteScore percentile in the Scopus database of at least 30 (thirty), 32 publications in foreign and domestic publications recommended by The Committee for Quality Assurance in the Sphere of Education and Science of the Ministry, 1 monograph in a Kazakh publishing house, 6 patent applications filed with the Kazakhstan Patent Office, 1 application for a patent of the EAEU, at least 2 patents for the invention have been obtained from them.

2 pilot-industrial approbations will be carried out, calculations of the economic efficiency of new technologies will be carried out.

14 undergraduates and 9 PhD doctoral students will be involved, and it is also planned to improve the skills of young scientists in leading foreign scientific centers for at least 3 people per year.

The results obtained in 2021:

- the technology of obtaining goat and sheep milk coagulant has been developed;

- a technology has been developed for the production of Lactobacillus lactis and Lactobacillus bulgaricus, Streptococcus thermophiles for use as starter cultures in technologies for the production of cheese and probiotic products from goat and sheep milk;

- a technology has been developed for the production of Bifidobacterium bifidum and Bifidobacterium breve Bifidobacterium for use in technologies for the production of probiotic products and goat and sheep milk;

- the production of enzyme preparations and starter cultures has been organized at the National Center of Biotechnology with a production capacity of up to 200 grams of enzyme preparation, 10 kg of starter preparations per month;

- - functional low-lactose products (bifidoc cottage cheese and bifidoyogurt) have been developed that have characteristic characteristics of products and have probiotic activity;

- 10 lactic acid bacteria were isolated, after studying the maximum viability index among the isolated isolates, 4 isolates were taken to study further biological characteristics. The index of viable cells corresponded to 107 CFU/ml;

- the formulation of a preventive drink enriched with mineral supplements, vitamins and prebiotic has been developed: starter culture (consortium): Lactobacillus casei Y1, Lactobacillus brevis 4 LB B-RKM 0610, Lactobacillus paracasei Y2; pectin; prebiotic component inulin; vitamin and mineral premix (vitamins A, C, B1, B2, trace elements iodine); natural milk;

- formulation of a drink based on milk whey enriched with vitamin and prebiotic: starter culture (consortium): Lactobacillus casei Y1, Lactobacillus brevis 4 LB B-RKM 0610, Lactobacillus paracasei Y2; prebiotic component inulin; vitamin C; milk serum;

- a technology has been developed for the production of a meat product with a low content of transisomers using vegetable raw materials (oleogel 10%);

- a technological scheme for the production of protein hydrolysate from wool by-products is proposed. Based on the conducted research, a technological scheme for the production of boiled sausages enriched with biologically active ingredients from secondary meat raw materials is proposed.

The results obtained in 2022:

- 1 technology of making drinks with honey has been developed and their storage periods have been established;

- Optimal parameters of freeze-drying of various types and varieties of berries have been established: it has been established that the content of vitamin C decreases in freeze-dried berries as the storage time increases. Organoleptic indicators of freeze-dried berries after storage indicate that after the storage time, the quality of the product changes slightly;

- 13 types of pests and 8 types of diseases have been identified. The main types of pests and diseases of economic importance and affecting the development of diseases that manifest themselves during the storage period are: apple moth, several types of leaf-twigs, shield. Of the diseases that pose a danger, the following objects are noted: rot of various etiologies, scab, desiccation diseases (cytosporosis and black cancer), along with the main causative agent of fruit rot (species of the genus Monilia), other types of fungi from the genera Fusarium, Alternaria, Trichotecium, Penicillium, Botrytis cause fruit damage during the growing period.

- The effect of 4 selected immunostimulants on fruit preservation was studied. Biochemical, organoleptic, physico-chemical and microbiological characteristics of fresh berries, fruits and grapes with various storage methods were carried out. Biochemical analysis of fruits was carried out during the period of removable maturity of apples, grapes and raspberries. As an object, varieties of local selection of grapes of Taifi Rozovyi (standard), Karakoz, Kyzyl Tan and apple trees of domestic varieties Maksat and Voskhod, as well as raspberries of the Babiye Leto variety of the autumn ripening period were used.

Members of the research group:

Full name	Scopus Author ID, Researcher ID, ORCID
T. Tultabayeva	Scopus Author ID: 57190225030, ID 0000-0003-2483-7406
G. Ospankulova	SC 57194595106, ID 0000-0002-6043-4658, WOS - AAN-4822-2020
G. Aidarkhanova	SC 57205141237, ID 0000-0002-5108-8036, WOS - AAF-1046-2022
B. Bulashev	SC 57218825492, ID 0000-0003-1831-3315
S. Kamanova	SC 57216961883, ID 0000-0001-9534-2721, WOS - ABB-8697-2021
D. Toiymbayeva	ID 0000-0001-9595-0559
I. Temirova	SC 57205296556, ID 0000-0002-9717-3236
M. Muratkhan	SC 57225141708 ID 0000-0002-7248-1531, WOS AAZ-2910-2021
L. Murat	ID 0000-0001-5684-0621
A. Aldiyeva	ID 0000-0003-1078-928X
A. Igembayev	SC 57192087520, ID 0000-0002-9903-2912
M. Kakimov	SC 57191586199, ID 0000-0002-1190-2195
M. Mustafayeva	SC 57191168472, ID 0000-0002-9627-7543, WOS - AAF-2628-2022
K. Maqangaly	SC 57203767726, ID 0000-0003-4128-6482, WOS AAR-1107-2020
N. Mashanova	SC 57090982200, ID 0000-0001-8664-5173, WOS - AAR-3666-2020
D. Kanysbayeva	– SC 57203761986, ID 0000-0002-7986-3380 WOS - AAE-8547-2022
G. Tokysheva	ID 0000-0003-3818-7635, WOS - AAR-6876-2020
Co-executing organizations	
National center for biotechnology	
B. Khassenov	SC 36096620800, WOS AAM-8657-2020, ID 0000-0003-4572-948X
Zh. Akishev	SC 56674741700, WOS N-6206-2017, ID 0000-0001-9943-1625
A. Kiribayeva	SC 57215499873, WOS N-6774-2017, ID 0000-0002-8293-2340
A. Mussakhmetov	SC 57203751227, WOS AAQ-9945-2020, ID 0000-0002-6182-3487

S. Aktayeva	SC 57439359000, WOS AAR-5133-2020, ID 0000-0001-6346-5866
Y.Ramankulov	SC 57218821167, WOS AAG-7450-2019, ID 0000-0001-6786-3028
RSE "Republican Collection of Microorganisms"	
Z. Sarmurzina	SC 57193954216, WOS AAO-9105-2020, ID 0000-0003-0667-5669
G. Abitayeva	SC 57191261653, WOS ABD-4881-2021, ID 0000-0001-6999-8807
G. Bissenova	SC 57193948135, WOS AAD-9945-2021, ID 0000-0002-1758-9451
National laboratory Astana	
S. Kozhakhmetov	SC 57223210171, WOS N-4128-2017, ID 0000-0001-9668-0327
A. Kushugulova	SC 16550428900, WOS B-8309-2019, ID 0000-0001-9479-0899
M.Nurgaziev	SC 16550428900, WOS B-8309-2019, ID 0000-0001-9479-0899
N.Mukhanbetzhanov	SC 57217094269, ID 0000-0002-6708-7871
LLP «SPE «Инноватор»	
Bekbolatova M.	SC 57205298460, ID 0000-0002-5594-6181
Shaimerdenova D.	SC 57021854800, ID 0000-0001-8961-8955

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Information for potential users:

Additional information: