

РЕЗЮМЕТА НА НАУЧНИТЕ ТРУДОВЕ

НА ДОЦ. Д-Р ИЛИАНА НАЧЕВА

представени за участие в конкурс за заемане на академичната длъжност „професор” по ш. 5. Технически науки, професионално направление 5.12. Хранителни технологии, научна специалност „Технология на биологично активните вещества (вкл. ензими, хормони, белтъчини)“, обявен от Институт по криобиология и хранителни технологии - София, в Държавен вестник брой 36, от дата 27.04.2018 г.

ПУБЛИКАЦИИ В МЕЖДУНАРОДНИ СПИСАНИЯ С ИМПАКТ ФАКТОР/ИМПАКТ РАНГ

1. Ivanova, S., **Nacheva, I.**, Miteva, D., Loginovska, K. and Tsvetkov, Tsv., 2009. Effect of Gamma Sterilization on the Fatty Acid Profile of Lyophilized Buffalo Cheese. *Bulgarian Journal of Agricultural Science*, 6, 494 -500.

SJR₂₀₀₉ = 0,138

Abstract: The changes in the fatty acid profile of buffalo cheese after lyophilization and gamma rays treatment at 2 kGy and 4 kGy doses have been studied with the objective of its shelf-live prolongation. The results of the experiments show a decrease of the content of the saturated fatty acids after irradiation at the aforesaid gamma rays doses. A favorable effect on human organism has the decrease of the quantity of the short-chain fatty acids - by 13.16 % on irradiation at 2 kGy and by 18.73% on irradiation at 4 kGy, compared to the control sample. A satisfactory correlation between the essential fatty acids omega-6/omega3 has been observed in the lyophilized buffalo cheese. In the process of irradiation this balanced correlation changes and increases up to 7.32 and 8.31 at 2 kGy and 4 kGy respectively.

2. Ivanova S., **Nacheva, I.**, Miteva, D., Dimov, K. and Tsvetkov, Tsv., 2010. Physicochemical Composition, Atherogenic Index and Preventive Lipid Score of Buffalo Yoghurt after Technological Treatment and Preservation. *Bulgarian Journal of Agricultural Science*, volume 16 (4), 407- 411.

IF₂₀₁₀ = 0,153

Abstract: The physicochemical composition and the content of fatty acids in the mild fat of buffalo yoghurt after lyophilization and treatment with gamma rays with doses 2 and 4 kGy has been studied. A comparatively constant physical-chemical composition of the buffalo yoghurt after treatment by the two technological methods and preservation for six months has been established. The indices atherogenic index /AI/ and lipid preventive score /LPS/ have been used for determining of the quality of the buffalo yoghurt. The studied buffalo milk fat after lyophilization and gamma irradiation has a relatively low atherogenic index which is a nutritionally valuable factor in relation to the risk of cardio vascular diseases. The buffalo yoghurt has a high lipid preventive score which is an index of a relatively high

content of saturated fatty acids (SFA) and low concentration of unsaturated fatty acids (MUFA, PUFA).

- Ivanova, S., Miteva, D., **Nacheva, I.** and Tsvetkov, Tsv., 2011. Assessment of the effect of the technological processing and the storage term on the fatty acid composition of buffalo yoghurt. *Bulgarian Journal of Agricultural Science*, 17 (3), 269 -276.

IF₂₀₁₁ = 0,189

Abstract: The fatty acid composition of the milk fat of buffalo yoghurt after lyophilization and gamma ray treatment with doses of 2 and 4 kGy has been investigated. It has been established that the fatty acid spectrums of these fat contain a considerable number of short, medium and long chain fatty acids. The content of the saturated fatty acids in the treated samples does not change substantially as a result of the technological processing and during six months storage. The studied buffalo milk fat after lyophilization, gamma irradiation and storage has fatty acid composition for which the authors have established a typical specific quantitative balancing that is of considerable importance for their taste, aroma, consistency, high nutritious and biological value.

- Nacheva, I.**, Miteva, D., Todorov, Y., Loginovska, K. and Tsvetkov, Tsv., 2012. Modern high technology solutions for quality and long term vegetable preservation. *Bulgarian Journal of Agricultural Science*, 18 (2), 161-165.

IF₂₀₁₂ = 0,136

Abstract: In the publication the authors present the results of the applying of two modern technologies for long term and safe vegetable preservation - freeze-drying and gamma sterilization. The freeze-dried vegetables feature minimum moisture - from 2 - 5% and taste-aroma complex preserved to the highest degree. The carried out gamma sterilization ensures a high microbial purity of the vegetables and guarantees for their long term preservation (up to 5 years) in polymer packing, under usual conditions.

- Nacheva, I.**, Aleksieva, K., Dimov, K., Miteva, D. and Tsvetkov, Tsv., 2013. Identification of Gamma Irradiated Lyophilized Forest Fruits by EPR Spectroscopy. *Bulgarian Journal of Agricultural Science*, 19 (2), 293-297.

SJR₂₀₁₃ = 0,174

Abstract: The objective of the present study was to prove the radiation treatment of a set of lyophilized forest fruits (blackberry, blueberry, aronia, strawberry and black elder), irradiated with doses of 2 and 4 kGy by the method of Electronic Paramagnetic Resonance (EPR). A low intensive singlet line was registered for all samples before the irradiation. The results show that after irradiation the intensity of the natural signal is increased, as the so-called "cellulose like" EPR spectrum was registered only for aronia. From the studied lyophilized fruits, according to the protocol for irradiated foods, containing cellulose (EN 1787), and radiation treatment can be proved only for aronia. Protocol EN 13708 for irradiated foods, containing crystalline sugar is not applicable for these samples.

6. Todorov, Y., **Nacheva, I.**, Metodieva, P., Doneva, M. and Tsvetkov, T., 2013. Soft computing applications in food technology. *Bulgarian Journal of Agricultural Science*, 19(3), 503-507.

SJR₂₀₁₃ = 0,174

Abstract: This paper describes the potentials of the application of modern soft computing techniques into development stage of contemporary food products. Recently, soft computing has been extensively studied and applied for scientific research and engineering purposes. In biological and food engineering, researchers have developed methods of fuzzy logic, artificial neural networks, genetic algorithms, decision trees, and support vector machines to study complex characteristics of many products in order to be adopted cost effective measures satisfying the production constraints and consumer expectations.

7. Miteva, D., Dimov, K., **Nacheva, I.**, Todorov, Y., Doneva, M., and Metodieva, P., 2014. Modern Technological Approaches for Ensuring of Harmless and Quality Fruits. *Bulgarian Journal of Agricultural Science*, 20(2), 243-245.

SJR₂₀₁₄ = 0,197

Abstract: The problem of the rational use of the food sources and their long-term preservation is of particular importance. Modern technologies offer a solution of this problem by applying of new methods for fruits preservation. Gamma sterilization is identified as a safe technology for reducing the risk of spoilage and prolongation of the storage term. It has been proved that the low irradiation doses are appropriate for fruits processing, which is a prerequisite for obtaining of high quality produce. In the present study was investigated the effect of the irradiation with low gamma ray doses (2.5÷3.5 κGy) on the chemical and microbiological characteristics of fruits not subject to long-term storage. By irradiation of packed strawberries and raspberries with 2.5 κGy dose the refrigerated storage term is prolonged with 12÷13 days, which is of substantial importance for preserving of their quality characteristics.

8. **Nacheva, I.**, Doneva, M., Todorov, Y., Metodieva, P., Miteva, D., Dimov, K. and Tsvetkov, T., 2014. Innovative technologies for creation of probiotic foods. *Bulgarian Journal of Agricultural Science*, 20(4), 830-833.

SJR₂₀₁₄ = 0,197

Abstract: Lyophilized probiotic products have been developed by high technology methods for nutrition prophylaxis and healthy nutrition to ensure a maximum working capacity and well-being of each individual. In their composition are included natural sources of essential bioelements and physiologically active substances – a complex of probiotic lactic acid bacteria, oligosaccharides, antioxidants, vitamins and others. Their fine consistency and chemical composition create a possibility for rhythmical introduction in the organism of nutritious mixtures with adequate content of plastic substances and energy. Their proved healthy effect makes them suitable to be included in combined nutrition diets for ensuring

of better quality of life in terms of the effective prevention and improvement of the health status of the population.

9. Doneva, M., **Nacheva, I.**, Metodieva, P., Todorov, Y., Miteva, D., Georgieva, L. and Tsvetkov, T., 2014. Application of cryobiotechnologies for development of lyophilized polyenzyme complexes. *Bulgarian Journal of Agricultural Science*, 20(6), 1401-1405.

SJR₂₀₁₄ = 0,197

Abstract: Good nutrition is key factor for human health. Conditions of secondary insufficiency of the gastric gland and a decreased production of digestive enzymes lead to changes in the gastric-intestinal metabolism, which imposes the intake polyenzyme products as food supplement. The created on the basis of freeze-drying complex polyenzyme product with its composition, containing the main groups digestive enzymes (chymosin, α – amylase, bromelain, lipase), incorporated in a hydrocolloid matrix and in combination with plant biologically active components is appropriate for prophylaxis in cases of gastric-intestinal tract discomfort and disturbed digestion. The obtained product was qualified by organoleptic, biochemical, physical-chemical and microbiological characteristics. The retaining of the catalytic activity of the enzyme substances and the chemical composition of the incorporated biologically active substances has been established.

10. Miteva, D., Dimov, K., **Nacheva, I.**, Todorov, Y., Doneva, M., Metodieva, P. and Tsvetkov, T., 2015. Prolongation of the Storage and Quality Preservation of Potato Semi-Finished Foods by Specific Technological Treatment. *Bulgarian Journal of Agricultural Science*, 21(1), 174-178.

SJR₂₀₁₅ = 0,229

Abstract: In the food industry are applied modern methods for processing and storage of products of animal and plant origin. In contrast to the past when more attention was paid to productivity, now the requirements are moving towards searching of technologies which guarantee the obtaining as end product of foods with high purity and preserved nutritious value. One of the approved technologies in this field is the gamma-ray sterilization, the so called cold sterilization. According to many years researches of IAAE and FAO the consumption of foods irradiated with doses up to 10 kGy is absolutely harmless for the human organism. During the study was investigated the effect of gamma irradiation on potato semi-finished foods. The samples were irradiated a single time with doses 100, 150 and 200 Gy. They were stored at temperature 0-4°C for three months term and prolongation of the preservation of the irradiated samples with 30 days was established. The results have shown that the applying of the traditional technology is an appropriate method for obtaining of harmless and with preserved taste qualities foods.

11. Doneva, M., Miteva, D., Dyankova, S., **Nacheva, I.**, Metodieva, P., and Dimov, K., 2015. Efficiency of Plant Proteases Bromelain and Papain on Turkey Meat Tenderness. *Biotechnology in Animal Husbandry*, 31(3), 407-413.

CEON/CEES IF₅= 0.597

Abstract: The main subject of study is the effect the plant proteases bromelain and papain exert on turkey meat tenderness. Experiments are conducted with samples of raw meat in 3 different concentration levels of the enzyme solutions (50U/ml 100U/ml and 200 U/ml) and in 3 different time periods (duration) of treatment (24 h, 48 h, 72h). An increase in enzyme concentration and treatment duration results in a higher degree of protein hydrolysis in the turkey meat. The optimal conditions for hydrolysis with minimal loss of protein and highest retention of organoleptic qualities of the meat samples are established.

12. Aleksieva, K., **I. Nacheva**, K. Dimov and Tsv.Tsvetkov, 2016. Natural and gamma induced free radicals in dried fruits. An EPR study. *Bulgarian Journal of Agricultural Science*, 22(6), 1010-1013.

SJR₂₀₁₆ = 0,229

Abstract: The aim of the present study is to prove radiation processing in air dehydrated dates, prunes and figs, as well as to recommend which part of the fruit to sample. The detection method is Electron Paramagnetic Resonance (EPR) spectroscopy. Before irradiation in date stone, prune stone and fig stone, and fig seeds EPR spectroscopy was detected a weak singlet line, whereas date fig stone and fig fig stone are EPR silent. After gamma-irradiation in date stone and fig stone, and fig fig stone a “sugar-like” EPR spectrum is recorded. In prune stone a typical “cellulose-like” spectrum is detected, whereas in prune fig stone and fig fig stone only singlet line is recorded as before radiation treatment. Of research done it can be seen that the irradiation is proved in a different part of the fruit. European Protocol EN 13708 is applicable to irradiated dried dates and figs, whereas Protocol EN 1787 for dried prunes.

13. **Nacheva, I.**, 2018. Kinetic and microbiological dependencies in the process of fermentation of goat milk, enriched with lactulose. *Bulgarian Journal of Agricultural Science*, (in press).

SJR₂₀₁₇ = 0,223

Abstract: The obtaining of the fermented dairy product – kefir, based on goat milk and enriched with prebiotic component - lactulose is a quality addition to the existing range of dairy products with functional purpose. It is investigated the influence of lactulose at a concentration of 1, 3 and 6% on the acidification rate in the fermentation of yogurt and the amount of microorganisms during storage. The results demonstrate that the addition of lactulose, regardless of its concentration results in the activation process of the propagation of the microorganisms during the fermentation. It has been found that the addition of 3% lactulose provides optimal growth of the main groups of microorganisms during fermentation and more prolonged retention of their number during storage.

14. Doneva, M., **Nacheva, I.**, Dyankova, S. Metodieva, P. and Miteva, D., 2018. Application of plant proteolytic enzymes for tenderization of rabbit meat. *Biotechnology in Animal Husbandry*, (in press, Manuscript number BAH 18-2, 9).

CEON/CEES IF₅ = 0.597

Abstract: The purpose of this study is to assess the tenderizing effect of plant proteolytic enzymes upon raw rabbit meat. Tests are performed on rabbit meat samples treated with the papain

and two vegetal sources of natural proteases (extracts of kiwi fruit and ginger root). Two variants of solutions are prepared from the vegetable raw materials– 50% (w/w) and 100% (w/w), with a duration of processing 2h, 24h, and 48h. Changes in the following physico-chemical characteristics of meat have been observed: pH, water-holding capacity, cooking losses and quantity of free amino acids. Differences in values of these characteristics have been observed, both between control and rest of variants, as well as depending of treatment duration. SDS-PAGE is performed on control and tenderized meat samples after 48 h of treatment. In all variants of samples treated with papain and vegetal extracts there is a reduction in the intensity of actin and myosin bands.

15. **Nacheva, I.,** Miteva, D., Metodieva, P. and Doneva, M., 2018. Improving the quality of meat products through gamma irradiation. *International Journal of Development Research*, 8, (04), 19995-19999.

SJ IF 2017 = 5.667

Abstract: The aim of the current study is to determine the effect upon experimental meat product samples (flat sausage) prepared with start bacterial cultures, sterilized through irradiation under their biological effectiveness. The experimental types of meat were divided into 3 groups: flat sausage with Megacarn starters, flat sausage with Lactina starters and flat sausage without starters. These groups have been irradiated with 4kGy gamma rays. Biological experiment with white male mice weighted 20 - 30 g, took place. The experimental species were separated into groups of ten and were fed on the studied types of sausages for a period of 20 days. On the 20th day the species were irradiated with 7.5Gy. Mice separately irradiated in advance with 3.5Gy were fed on flat sausage with Megacarn starters. On the 20th day this group was once again irradiated with 7.5Gy. Studied were their weight, survival and the number of leucocytes. Our results showed that after the first irradiation, 40% of the animals fed on non irradiated flat sausage with Megacarn starters died and after the second irradiation 60% of them died. In the group fed on Lactina starters, 100% from the non irradiated and 80% from the irradiated species died. In our study we established that leucocytes restoration was delayed in the mice from the group fed on non irradiated samples. On the 20th day feeding the irradiated animals had a 60% death rate in the group fed on irradiated Megacarn, 10-20% death rate in the group fed on irradiated Lactina and 0% in the control group fed on non irradiated food. The presence of staphylococcus in Megacarn starters gave us grounds to test it independently. The experimental scheme was repeated but the animals were fed on Megacarn water solution. The experimental groups of animals were irradiated with 4kGy and after 20 days on Megacarn water solution they were once again irradiated with 8Gy. During the first irradiation we did not observe dynamical changes in the studied criteria. After the second irradiation the control group resulted in 60% death rate and the group fed on Megacarn water solution resulted in 30-40% death rate.

16. Ivanova, S., **Nacheva, I.** and Miteva, D., 2010. Fatty acid composition of buffalo milk yellow cheese after technological proceeding. *Journal of Mountain Agricultural on the Balkans*, 13(3), 619-632.

Abstract: The fatty acid composition of buffalo milk yellow cheese in fresh condition and after combining of two technological approaches - lyophilization and gamma sterilization with 1, 2 and 4 kGy, aiming at a prolongation of its shelf life, was investigated. The fat extraction from the milk samples was realized by the method of Roesse-Gottlieb. The analysis of the fatty acids was made with the aid of gas Shimadzu 2010. Minimal changes in the fatty acid composition of the buffalo milk yellow cheese after freeze-drying and gamma ray treatment were established.

17. Ivanova, S., Miteva, D., **Nacheva, I.** and Dimov, K., 2011. Changes in the lipid composition of buffalo milk cheese during storage after lyophilization and gamma sterilization. *Journal of Mountain Agricultural on the Balkans*, 14 (2), 200-209.

Abstract: The objective of the present investigation was to study the changes in the fatty acid composition of buffalo milk cheese after treatment by two methods of preservation- freeze-drying and dry (gamma) sterilization (with 2 and 4 kGy) aiming at the prolongation of its shelf-life. The analysis was made with gas chromatograph SHIMADZU 2010. The content of saturated fatty adds didn't change considerably while increase of the total quantity of the monounsaturated fatty acids-after gamma sterilization was observed. The polyunsaturated fatty adds deceased as a result of the applied radiation and remained unchanged during storage.

18. Ivanova, S., **Nacheva, I.** and Miteva, D., 2011. Assessment of the indicators atherogenic index and lipid preventive score of white brine cheese by buffalo milk after technological processing and storage. *Journal of Mountain Agricultural on the Balkans*, 14 (3) 410-417.

Abstract: The present investigation had the objective to study the changes in the atherogenic index (AI) and the lipid preventive score (LPS) as nutritious indicators for assessment of the risk of cardio-vascular diseases, on the basis of the fatty acid composition of white brine cheese by buffalo milk after applying of two methods of preservation - freeze-drying and dry (gamma) sterilization with 2 and 4 kGy. The analysis was made with the aid of gas chromatograph SHIMADZU 2010. The lyophilized cheese is characterized by a comparatively low AI (2,59 after lyophilization) and is preserved during storage (2,55). After lyophilization the LPS of the cheese was the highest – 103,70, while after irradiation a decrease of its value was observed up to 97,73 with 2 kGy and 96,91 with 4 kGy.

19. **Nacheva, I.**, Miteva, D., Metodieva, P., Todorov, Y. and Loginovska, K., 2012. Effect of gamma irradiation on the qualitative characteristics of freeze dried forest fruits. *Journal of Mountain Agricultural on the Balkans*, 15 (3), 712-725.

Abstract: The purpose of the preset investigation was to establish the effort of a combined technological processing-freeze drying and gamma sterilization (with irradiate doses of 2 and 4 kGy) on the qualitative characteristic on a set of forest fruits (blackberry, blueberry, aroma, strawberry and black elder). The results prove that the freeze drying technology and the applied irradiate dose of 2 kGy is sufficient to preserve the quality and prolong the shelf life of the studied products without damage of their physical-chemical and microbiological characteristics.

20. Ganchev, I., **Nacheva, I.**, Loginovska, K. and Tzvetkov, Tzv., 2012. Cereal-based probiotic products – state and perspectives. *Journal of Mountain Agricultural on the Balkans*, 15 (5), 1090–1110.

Abstract: There are numerous scientific studies revealing the physiological effect of the probiotic microorganisms on human organism. Mainly they find application for obtaining of fermentation lactic acid products. The modern comprehension of rational nutrition imposes the necessity to reassess the grain cultures as raw materials for obtaining of specific probiotic foods. The objective of the present review was to systematize the knowledge of the application of lactic acid bacteria for obtaining of fermentation grain products with a potential probiotic effect.

21. Димов, К., Митева, Д., **Начева, И.**, Донева, М., Методиева, П., 2013. Приложение на математически методи за оценка на въздействието на гама облъчване при семена от зимна пшеница. *Journal of Mountain Agricultural on the Balkans*, 16 (3), 728-741.

Резюме: Настоящото изследване има за цел да изследва влиянието на предпосевното облъчване на семена от три сорта зимна пшеница. Изследвани са четири показателя, отнасящи се до фотосинтетичния апарат и продуктивността на изследваните обекти. Дозите на облъчване са в диапазона 10÷40 Gy. Чрез използване на метода на многокритериалната оптимизация са определени оптималните дози на облъчване, отговарящи на поставените в изследването две цели: повишаване на сухоустойчивостта на растенията и увеличаване на продуктивността.

22. **Nacheva, I.**, Doneva, M., Miteva, D. and Metodieva, P., 2013. Survival of lactic acid bacteria after lyophilization using new cryoprotective media. *Journal of Mountain Agriculture on the Balkans*, 16(2), 404-417.

Abstract: The survival of strains *Lactobacillus delbrueckii ssp. bulgaricus* 1381 and *Lactobacillus casei ssp. casei* 1014 after freezing and freeze drying in an installation with contact plates heating was investigated. The optimal process parameters were determined by applying of differential thermal analysis (DTA). As cryoprotective media were used solutions of saccharose, pectin, guar gum and chitosan. A high survival was achieved for both strains after freezing and lyophilization with their inclusion in the hydrocolloid solutions, and the

highest percentage was determined for the variant with chitosan as protective agent. The obtained results are of great importance for the applied scientific research for creation of healthy lyophilized foods with high content of viable bacteria with probiotic properties.

23. Dimov, K., Miteva, D., **Nacheva, I.**, Doneva, M., Metodieva, P. and Valchkov, A., 2014. Using of innovative technologies for improvement of the quality of animal produce during preservation. *Journal of Mountain Agriculture on the Balkans*, 17(4), 816-833.

Abstract: In the food industry are applied modern technologies for processing, preservation and obtaining of safe for the health foods of plant and animal origin. The irradiation of foods is also identified as a safe technology for reducing the risk of food spoilage, being in such a way an element for production of high quality production, processing and preparation. The objective of the present study was by the method of mathematical modeling to propose a mathematical model by which to be determined the optimum parameters of irradiation of buffalo meat with the task to preserve the physical-chemical, technological, microbiological and organoleptic characteristics of the treated samples during their preservation. The irradiation of the buffalo meat was carried out in a gamma-ray installation Gamma 1`300, charged with radionuclide Cs-137, at power of the dose 1,5 kGy/min. Two regimes of refrigerated storage were used – (-4°C) and (-18°C) for a term of 9 months. The trial samples were divided into 6 groups depending on the irradiation dose – 4 and 8 kGy and the regime of refrigerated storage. The results show that the irradiation model with a dose of 4 kGy during refrigerated storage at (-4°C) is most favorable for preserving of the quality of the studied characteristics.

24. Doneva, M., **Nacheva, I.**, Metodieva, P., Miteva, D. and Dimov, K., 2014. Stabilizing effect of the xanthan biopolymer on the survivability of strains lactic acid bacteria in model conditions of gastrointestinal tract. *Journal of Mountain Agriculture on the Balkans*, 17(4), 834-848.

Abstract: The ability of lactic acid bacteria strains to survive and to maintain their viability in the gastrointestinal tract is one of the basic characteristics and requirements for the probiotic properties. The effect of the xanthan biopolymer on the survivability of strains *Lactobacillus delbrueckii ssp. bulgaricus* 1381, *Lactobacillus casei ssp. casei* 1014 in model conditions of gastrointestinal tract was investigated. Experimentally were simulated in consequence the conditions in the stomach and the intestines by changing of the pH value – pH 2 with included pepsin and pH 7 with included pancreatin. The immobilization of the lactic acid bacteria in a xanthan matrix contributes to their higher survivability when treated with low and neutral pH values compared to the free cells of both strains. The inclusion of lactic acid bacteria in hydrocolloid gel increases their probiotic value and expands the possibilities for their application in the production of fermented dairy products.

25. **Nacheva, I.**, Doneva, M., Metodieva, P., Miteva, D. and Dimov, K., 2014. Cryobiotechnological approaches to the formulation of a new range lyophilized foods with functional purpose. *Journal of Mountain Agriculture on the Balkans*, 17(4), 889-904.

Abstract: In the article are presented scientific results from carried out cryobiological, physical-chemical, microbiological investigations related to the creation of new, lyophilized

bioproducts with functional purpose. The using of modern cryobiotechnological approaches – immobilization, fermentation, cryoprotection and lyophilization in the process of formulation and development of the new foods guarantees their high quality and biological full value. In the composition of the obtained lyophilized symbiotic concentrates are included various sources of nutrients and of biologically active substances- probiotic complex of active lactic acid bacteria, polysaccharides, fruits, grain ingredients, bee products, antocyanes, plant oils and others. By their optimum combination in the composition of the new functional foods a high summary physiological effect has been achieved.

26. **Nacheva, I.**, Loginovska, K., Metodieva, P. and Doneva, M., 2016. The effect of starter culture concentration on the basic microbiotic groups in goat milk kefir. *Journal of Mountain Agriculture on the Balkans*, 19(1), 15-25.

Abstract: The authors present data from bio fermentation experiments to obtain a fermented milk product (kefir) of goat milk with different concentration of starter kefir grain culture (1, 2 and 5%). The main technological parameters of the fermentation process are recorded throughout the experiment: the active acidity, titratable acidity and the duration of the fermentation process. During the study was investigated the dynamics of development and survival of existing microflora in the kefir and the ratio of the various microbial groups in the process of storing up to 21 days. Post analysis we established that the 2% kefir starting culture is the variant with the best ratio between the quantity of the kefir grains used for fermentation and the microflora parameters in the process of storage.

27. Митева, Д., **Начева, И.**, Димов, К., 2016. Изследване въздействието на гама лъчите върху микробиологичния статус на риба скумрия (*Scomber scombrus*). *Journal of Mountain Agricultural on the Balkans*, Vol. 19, 5, 47-55.

Резюме: Йонизиращите лъчения намират широко приложение в различни клонове на хранителната индустрия: за удължаване срока на съхранение, стерилизация и подобряване на качеството на хранителните продукти. Някои патогенни микроорганизми като *Escherichia coli*, *Salmonella* и *Campilobacter* са от най-широко разпространените и опасни за човешкото здраве. Използването на йонизиращи лъчения води до намаляване или елиминиране на патогенните микроорганизми, причиняващи хранителни натравяния. Целта на настоящото изследване е установяване влиянието на три дози гама лъчи (2, 3 и 4 kGy) върху микробиологичния статус на филе от риба скумрия (*Scomber scombrus*). Опитните образци - облъчена и необлъчена риба са съхранявана при ниска температура (-20°C) за период от 6 месеца. Получените резултати доказват положителен ефект от обработката с гама лъчи, като технологичен метод за запазване на микробиологичната чистота и качество на рибата, непосредствено след третиране и при съхранение.

28. **Nacheva, I.**, Miteva, D. and Dimov, K., 2017. Specialized meat-based foods for reconvalescent nutrition. *Journal of Mountain Agriculture on the Balkans*, 20 (1), 40-48.

Abstract: Dietary nutrition marked a milestone in the complex treatment of patients in stationary conditions. Because undiagnosed malnutrition significant proportion of hospitalized patients are exposed to additional risk.

In this study are presented four variants meat-based foods for reconvalescent nutrition that are characterized by standard physicochemical and microbiological methods. The developed products are freeze-dried and tested in experimental animals. Based on the conducted analyzes and biological experiments most beneficial effect was observed in animals fed a concentrate of turkey meat included grain and vegetable corrigents.

The received data suggest the authors to recommend new products for reconvalescent nutrition of patients in a state of malnutrition due health, physical or mental reasons.

29. **Nacheva, I.**, Doneva, M., Metodieva, P. and Loginovska, K., 2017. Tracing some quality and biochemical parameters of kefir from goat milk during storage. *Journal of Mountain Agricultural on the Balkans*, 20(1), 1-9.

Abstract: From raw material - goat milk is prepared a fermentation product (kefir), which was characterized by main quality indicators. According to the data obtained by organoleptic evaluation, storage of kefir at 4°C is preferably up to 14 days. After the second week, the product retains its largely useful and beneficial to the human body characteristics. Data of physicochemical and biochemical composition resulting from goat milk fermented product (kefir) characterize it as a 100% natural product with multiple health effects.

Electrophoretic studies, which establish changes in casein and whey fractions of fresh and fermented goat milk and kefir during storage, were conducted. The main casein fraction (α -casein and β - casein) and β -lactoglobulin and α - lactoalbumin of whey proteins.

30. **Nacheva, I.**, Dimov, K., Miteva, D. and Petrunov, P., 2017. Establishment of radioprotective effect of lyophilized foods in experimental animals exposed to radiation stress. *Journal of Mountain Agriculture on the Balkans*, 20(1), 30-39.

Abstract: The health of the human organism depends on the substances accepted by food - except nutrients and elements we take toxins, carcinogens and other harmful substances. A balanced and healthy diet enhances the body's resistance and helps to more quickly overcome the disease. The authors present scientific results related to the development of lyophilized foods based on turkey and buffalo meat for specialized nutrition. The new food recipes include vegetable, fruit and cereal components. The research used additional nutrients in order to enrich the knowledge for radioprotective diets. The object of this study were sexually mature mice exposed to whole body external radiation a dose of 2,25 Gy gamma rays from a source Cs137 in a dose 1,78 Gy/min. It has been analyzed the radioprotective effect of resulting series of food on experimental animals at different diets - medical (after irradiation) and preventive (throughout the study period).

The parameters weight and leukocytes in the blood were studied. It has been shown the positive effect of the feeding with the specialized foods on overall life status of experimental animals exposed to radiation stress with low doses of radiation.

31. Doneva, M., Dyankova, S., Miteva, D., Metodieva, P. and **Nacheva, I.**, 2017. The electrophoretic patterns of turkey and buffalo meat. *Journal of Mountain Agriculture on the Balkans*, 20 (1), 18-29.

Abstract: Of all range quality indicators of meat, consumers define tenderness as one of the most important factors. In recent years, treatment with exogenous proteolytic enzymes are becoming a very popular method of meat tenderization. The aim of this study is to assesses the potential impact of the application of plant proteases bromelain and papain on the electrophoretic patterns of turkey and buffalo meat. Experiments are conducted with samples of raw turkey and buffalo meat at three variants concentrations of enzyme solution (50U/ml 100U/ml and 200 U/ml) and in three different times of treatment (24h, 48h, 72h). Electrophoresis in polyacrylamide gel (SDS-PAGE) is performed with the control samples and tenderized meat samples. In all enzyme treated samples establishes a change in the type and number of protein bands relative to controls. A cleavage of high molecular weight proteins is observed, which leads to increase the fractions with higher electrophoretic mobility.

32. Doneva, M., Metodieva, P., **Nacheva, I.** and Loginovska K., 2017. Study of the effects of different temperature regimes on basic physical and chemical parameters of fermented probiotic products from goat milk. *Journal of Mountain Agriculture on the Balkans*, 20(1), 10-17.

Abstract: The basic requirements for probiotics as nutritional and dietary product related primarily to the taste, texture, durability and microbial content. Prolonged storage causes inevitable changes in the composition of the probiotic products. In the present study is detected the effect at three temperature regimes (5, 10 and 15°C) on the parameters - organoleptic assessment, active and titratable acidity, total protein and syneresis of fermented products of probiotic goat milk during storage. The obtained experimental results define the optimal conditions for receiving probiotic products with good flavor receptivity, maximum reserved qualitative parameters and high biological value.

33. **Nacheva, I.**, Miteva, D., Dimov, K., Loginovska K. and Solakov N., 2018. Lyophilized meat concentrates enriched with plant extracts. *Journal of Mountain Agriculture on the Balkans*, 21(1), 1-11.

Abstract: Modern consumers become more and more informed about the relationship between diet and health status. The growing demand for healthy products is the result from striving to reduce healthcare costs, increase life expectancy and maintain good welfare. The authors present information for new functional meat based foods with improved fatty acid composition. Rabbit meat lyophilized products with spirulina and thyme extracts has been prepared. The received experimental results prove, that the use of this combination leads to an increase in the poly- and monounsaturated fatty acids concentrations, as well as a high content of ω -6 and ω -3 fatty acids, at the expense of reduction the saturated fatty acids

concentration. The optimized fatty acid profile of rabbit meat provides improvement of its nutritional qualities and an possibility for development safe products with high antioxidant activity, preserved nutritional value and easy assimilation.

34. **Nacheva, I.,** Valchkov, A., 2018. Comparative analysis of macro – and microelement composition of sheep's milk of the Rhodopean Tsigay and produced by it lyophilized synbiotic product. *Journal of Mountain Agriculture on the Balkans*, 21 (1), 12-20.

Abstract: The macroelement and microelement composition of lyophilized sheep's milk of the Rhodopean Tsigay breed and lyophilized synbiotic food, received from the same milk, has been compared. In the product composition are included plant components - grains (quinoa), fruits (elderberry), walnut kernels and sweetener (fructose), who are rich in biologically active substances. The content of the macroelements magnesium, sodium, potassium, calcium, phosphorus and the microelements copper, iron, zinc and manganese has been analyzed. The magnesium and sodium concentrations in the synbiotic product increase, compared to those in the raw material, by 0,12 g/kg and 1,33 g/kg, which corresponds to imported ingredients. Phosphorus and calcium levels in the synbiotic decrease by 0,47 g/kg and 1,44 g/kg, respectively. The potassium amount remains almost unchanged in the synbiotic food (4,28 g/kg), relative to the control sample (4,29 g/kg). The microelements content increases in the developed product, comparable to their high content in walnut kernels and quinoa. The microelements copper, iron and manganese amount increases by 1,49 mg/kg, 11,79 mg /kg and 5,38 mg/kg, compared to the raw material.

35. **Nacheva, I.,** Valchkov, A., Loginovska, K. and Ivanova, S., 2018. Evaluation of the fatty acid profile of goat's milk. *Journal of Mountain Agriculture on the Balkans*, 21(1), 21-31.

Abstract: An analysis of the fatty acid composition of 2% kefir obtained from goat's milk (Bulgarian White Milk Breed) has been carried out. The data shows, that the level of saturated and monounsaturated fatty acids in kefir does not differ significantly from that in the starting milk. A slight increase in their quantity has been found by 0,71g/100g fat for the saturated ones and by 0,87g/100g fat for the monounsaturated one, in the resulting fermented product, respectively. The polyunsaturated fatty acids level in kefir reduces by 1,15g/100g fat, in terms of their content in the raw material. The ω -3 and ω -6 essential fatty acids content is low in both the starting milk and the resulting product. The kefir atherogenic index possesses a lower value (1,22), than that of the raw material index (1,34), which determines the fermented product as healthier with respect to the lipid content. The lipid preventative score values of the tested samples are almost identical, 93,16g/100g product and 93,71g/100g product, respectively. Goat's milk and fermented kefir product can be identified as products with marked health effects, on the basis of the data on their lipid composition.

36. Ivanova, S., Miteva, D. and **Nacheva, I.**, 2010. Assessment of the lipid profile of lyophilized buffalo yoghurt after gamma sterilization. *Journal of the University of Chemical Technology and Metallurgy*, 45(2) 207-212.

Abstract: The present investigation studies the fatty acid profile of buffalo yoghurt after lyophilization and treatment with doses of gamma rays - 2 kGy and 4 kGy, for prolonging shelf live and preserving the composition, the properties and the structure of the product. The extraction of the fat from the milk samples has been realized by the method of Roesse-Gottlieb. The analysis of the fatty acids has been carried out with the aid of gas chromatograph Shimadzu 2010. The content of saturated fatty acids (SFA) in the treated samples does not change substantially, namely from 65.49 g/100 g fat for the control group to 66.27 g/100 g for the samples irradiated with 2 kGy and to 66.96 g/100 g fat at 4 kGy. The monounsaturated fatty acids (MUFA), including the oleic and vaccenic acids are characterized by comparatively constant quantities in the analyzed buffalo yoghurt after lyophilization and gamma-irradiation. The polyunsaturated fatty acids (PUFA) decrease from 4.70 g/100 g fat for the control group to 4.47 g/100 g fat for the samples irradiated with 2 kGy and 4.00 g/100 g fat at 4 kGy. The content of the conjugated linoleic acid (CLA) in the lyophilized buffalo yoghurt is low - 1.49 g/100 g fat and decreases to 1.43 g/100 g fat after irradiation with 2 kGy and to 1.23 g/100 g fat after irradiation with 4 kGy. On the other hand, the obtained lyophilizates are characterized by a very good proportion of the irreplaceable fatty acids: n-3: n-6 fatty which varies from 2,14 to 2,72 and has a positive effect on human health.

37. Terziyska, M., Todorov, Y., **Nacheva, I.**, Doneva, M. and Metodieva, P., 2015. Analysis of the particle distribution in granular functional food. *Journal of Technical University, branch Plovdiv, "Fundamental Sciences and Applications"*, 21(1), 361-366.

Abstract: In this paper an analysis of the particles distribution in novel granular functional food by using a laser of particle analyzer ANALYSETTE 22 NanoTecplus is studied. The main objective of the investigation is to evaluate the influence of a varying ingredient in the product on its granular distribution. A future work on the basis of the obtained results will be the assessment of the influence of the particle distribution on various physical parameters of the product composition using intelligent modeling techniques.

38. **Начева, И.**, Вълчков, А., Ангелов, Л., Логиновска, К., 2016. Лиофилизиран синбиотичен продукт от краве мляко от порода Българско Родопско говедо, богат на биологично активни компоненти. *Животновъдни науки, ЛП*, 1(2), 124- 130.

Резюме: Разработен е лиофилизиран синбиотичен продукт от краве мляко, от порода Българско Родопско говедо. за ферментация е използван пробиотичен комплекс от подобрани щамове млечнокисели бактерии: *Lactobacillus bulgaricus 1381*, *Streptococcus thermophilus 1374*, *Lactobacillus acidophilus 1379*, включени в хитозанов гел. Съставът на лиофилизирания продукт е обогатен с натурални компоненти - чия, сусамов тахан, ленено масло, манго, стевия. Кравето мляко и

полученият лиофилизиран продукт са изследвани по физикохимични показатели, мастноки- селинен състав и съдържание на макро- и микроелементи. Резултатите показват, че синбиотичният продукт е богат на белтъчни вещества, захари, полиненаситени мастни киселини, включително и есенциалните мастни киселини (ω -3 и ω -6), витамин С, минерални вещества (Mg, Na, P, Mn, Fe, Cu, Zn), част от които са внесени чрез натуралните добавки. Обогаеното на тази основа ферментирало краве мляко се отличава с подобрен качествен състав, което го определя като функционален продукт с разширен физиологичен и здравословен ефект.

39. **Nacheva, I.**, 2017. Survival of microflora of kefir from goat milk, included in the biopolymer matrices after lyophilization. *International Scientific conference with international participation "Animal science - challenges and innovations"*, *Proceedings*, 168 - 172.

Abstract: The effect of three types of biopolymers (pectin, lactulose and carboxymethylcellulose) as cryoprotectors on the survival of microbial groups in goat milk kefir after lyophilization was investigated. The optimal parameters of the freeze drying process of the variant samples were determined. Microbiological analyzes demonstrate increased survival of the microflora of kefir included in biopolymer matrices. Individual groups of lactic acid bacteria and yeast are showing different resistance to freezing and lyophilization, as best results are reported in the use of carboxymethylcellulose and lactulose. The results obtained were statistically processed and prove a high degree of reliability.

40. **Nacheva, I.**, 2017. Lyophilized functional drink on the base of kefir from goat milk. *International Scientific conference with international participation "Animal science - challenges and innovations"*, *Proceedings*, 173-178.

Abstract: In a predetermined health direction, a new recipe composition has been created. This is functional drink, based on a fermented goat milk product - kefir. The healthy effect of symbiotic kefir microflora (lactic acid bacteria and yeast), combined with the unique qualities of goat milk and the prebiotics and biologically active substances of various origins, enriches the drink composition and has a positive impact on a number of health problems such as gastrointestinal imbalance, an allergy to cow milk, lactose intolerance and so on. The optimal drying regime of the new drink has been established and organoleptic, physicochemical, biochemical and microbiological analyzes have been performed. As summarizing the data obtained, it was found that this is a lyophilized concentrate with preserved quality characteristics, balanced composition, high biological and energy value, suitable for prophylactic purposes.

41. Todorov, Y., **Nacheva, I.**, Doneva, M. and Metodieva, P., 2012. An innovative complex approach for formulation of the content of yoghurt varieties. *Jubilee X International Scientific conference "Management and Engineering '12"*, 1, 450-457.

Abstract: This paper focuses on the potentials of innovative methods based on neural networks, for formulation of the content of yoghurt varieties. A complex socio-economy approach must be adopted at first in order to be identified the consumer needs and expectations, followed by technological experiments and mathematical procedures. The major purpose of the applied methods is to adapt the content of a well-known products to the latest tendencies of the healthily nutrition, respecting the consumer profiles and the current market needs.

42. **Nacheva, I.**, Georgieva, L., Doneva, M., Metodieva, P. and Tsvetkov, Tsv., 2013. High technology solutions for production of special purpose foods. *XI International Scientific Conference "Management and Engineering '13"*, 2, 727-733.

Abstract: In the publications the authors present the possibilities and the advantages of freeze-drying, as a modern cryobiotechnological method for obtaining of varied in kind, composition and purpose long shelf life lyophilized food concentrates with maximum preserved nutritious qualities and biological value. A great part of these lyophilized bioproducts is included in the First Bulgarian space menu and in the developed special purpose functional foods. Their composition is in conformity with the changes in the metabolite processes, the energy formation, the character of the adaptive changes, of the neural-psychic load and the nature of the complex of harmful factors of the working environment.

43. **Nacheva, I.**, Doneva, M., Metodieva, P., Miteva, D. and Dimov, K., 2014. Using of Immobilized Biological Systems for Formulation of New Functional Products. *XII International Scientific Conference „Management and Engineering '14"*, 2, 791-797.

Abstract: The immobilization of biological systems is a modern and widely applied method in the contemporary biotechnological industry. In the publication have been studied the possibilities for using of sodium alginate and guar gum serving as matrices for immobilization of enzymes and lactic acid microorganisms with the aim to preserve their structural and catalytic stability. The applied biotechnological approach is appropriate for formulation and obtaining of new functional foods and guarantees their high quality and biological value.

44. Miteva, D., Dimov, K., **Nacheva, I.**, Todorov, Y., Doneva, M. and Metodieva, P., 2014. Modern radiation technologies for safe food preservation. *XII International Scientific conference "Management and Engineering '14"*, 2, 799 - 803.

Abstract: During the recent years the interest in the modern radiation technologies has increased in connection with the possibilities for their application in foods processing, ensuring of their safety and prolonging of their shelf life. In the present work the authors have followed the change in the standard indices of raw meats and meat products, preserved in a conventional

way and treated with gamma rays. Based on the obtained results a prolongation of the shelf life as well as preservation of the biological value of cold sterilized foods has been established, compared to those preserved in a traditional way.

45. Todorov, Y., Doneva, M., Metodieva, P. and **Nacheva, I.**, 2014. An Intelligent Approach for Formulation of the Contents of Novel Functional Food. *IEEE Innovations in Intelligent Systems and Applications, INISTA*, 98-102.

Abstract: This paper describes an applied approach using an Adaptive Neuro-Fuzzy Inference System to formulate the contents of novel dairy functional food. In the development stage for a new functional food, it is required a careful balancing in the product ingredients in order to be achieved not only a healthily effect but acceptable sensory properties. This impose the solving a multiparametric task how to select an optimal product composition in order to obtain products with a great percent of consumer acceptability. Since, the main sensory characteristics of the products can be assessed by trained panelists and encoded by numerical estimates, the task can be solved by a simple fuzzy input-output mapping, in order to conclude how each component of the product affects a selected sensory characteristic.

46. **Nacheva, I.**, Doneva, M., Metodieva, P., Miteva, D. and Dimov, K., 2015. Cryotechnologies – Contemporary Way to the Market of Probiotics Foods. *XIII International Scientific conference "Management and Engineering '15"*, 2, 841-847.

Abstract: Probiotics are contemporary forms of immunostimulatory products and take increasingly important place in the global preventive health and nutrition. In recent years cryotechnologies imposed by modern biotechnological solution for the production of healthy probiotic products. The publication presents experimental data from the use of sucrose and k- carrageenan as a protective medium (cryoprotectants) upon freeze - drying of probiotic bacteria, providing high survival rate and storage stability. This circumstance defines them as risk-free and extremely attractive for production and realization at the market.

47. **Nacheva, I.**, Loginovska, K., Metodieva, P., Doneva, M., Miteva, D. and Dimov, K., 2016. Innovation in the production of functional dairy products - the basis for increasing their competitiveness, *XIV International Scientific conference "Management and Engineering '16"*, 2, 744-750.

Abstract: The market for functional dairy products is specific and dynamic sector, oriented constantly expanding range of innovative natural products in order to fully satisfy the constantly increasing health demands of consumers. Developed a new bio fermented milk product with high biological value based on live microbial cells (kefir) and added prebiotic-lactulose. The inclusion of biologically active additives in the process of fermentation of kefir ensures stable growth and development of the lactic acid micro-organisms by increasing the nutritional value and keeps the organoleptic and sensory performance of the final product during the period of storage.

48. Miteva, D., Dimov, K., **Nacheva, I.**, Doneva, M. and Metodieva, P., 2016. Forecasting the effect and effectiveness of medical nutrition with specialist foods. *XIV International Scientific conference "Management and Engineering '16"*, 2,751-759.

Abstract: Dietary nutrition is a fundamental moment in the complex treatment of patients in stationary conditions. Necessary to use a wide range of food products to be available year round, and so as not to be influenced by the seasons and their storage happens under normal conditions. The aim of the study is to trace the radioprotective effect of two types of specialized meat foods (from Buffalo and Turkey meat) on experimental animals-mice in external irradiation with relatively low doses of radiation to forecasting the effect and cost-effectiveness of using them in patients undergoing treatment with radiotherapy. Altitudinal changes in body mass of test specimens at different diets. The comparative research between the two supplements give precedence to the add-in from Buffalo meat, both in terms of the percentage recovery of the weight which gives us reason to recommend it for use in specialized nutrition for patients in recovery period after radiation therapy.

49. Lüpcke, W., Konstantinova – Müller, T., Sarakostova, T., Kriepps, E., **Natscheva, I.**, Zvetkova, V., Boteva, M. und Botev, Z., 2017. Neue Erkenntnisse zur Rolle des Trypsin-Inhibitors und zu Nutzungsmöglichkeiten des Kolostrums, 20-33. *Deutscher Büffelkongress*, Penig, Deutschland.

Abstract: Als Folge des Kontakts mit Bakterien, Viren und anderen Antigenen werden durch die Mechanismen des Immunsystems spezifische Antikörper gegen diese gebildet. Man unterscheidet dabei lokale Antikörper, die die Schleimhäute schützen und Antikörper, die im Blutkreislauf zirkulieren und in den Körper eingedrungene Antigene neutralisieren. Im Kolostrum können gleichzeitig beide Antikörperkategorien nachgewiesen werden. Die Schleimhautantikörper bilden sich nach Kontakt des jeweiligen Antigens mit den immunkompetenten T-Zellen und führen zur sogenannten zellassoziierten lokalen Immunität. Für die Bildung der im Blut zirkulierenden Antikörper zeichnen die B-Lymphozyten des Immunsystems verantwortlich und wir sprechen von der sogenannten humoralen Immunität. Bis zur Bildung eigener Antikörper werden die Jungtiere durch eine sogenannte passive Immunität mittels Übertragung maternaler (mütterlicher) Antikörper geschützt, die bei den Säugetieren per Kolostrum (Fohlen, Kalber, Lämmer, Ferkel u.a.) bzw. anteilig plazental bereits im Mutterleib (3-10%), jedoch hauptsächlich (90-97%) mit dem Kolostrum (Hunde und Katzen) und bei den Vögeln per Eidotter übertragen werden.

50. **Начева, И.**, 2008. Оценка на липидния състав на синбиотичен лиофилизиран продукт. *Сборник доклади от юбилейна научна конференция с международно участие „80 години аграрна наука в Родопите” - Смолян, 294-297.*

Резюме: С термина пробиотици се обозначават биологични продукти или хранителни добавки, които съдържат живи микроорганизми - предимно млечнокисели бактерии и техните метаболити. При редица заболявания и лечението с антибиотици е установено нарушаване на биологичното равновесие на нормалната чревна микрофлора. Създава се възможност за поява на патогенни бактерии в чревния канал, в резултат на което се развиват ентерити и заболявания. Нарушеният баланс на микробната популация в чревния канал се възстановява с помощта на пробиотиците. Концентрацията на живите, полезни микроорганизми, които посъпват в организма главно под формата на заквасени продукти, определя техния пробиотичен ефект. Установено е, че продължителното и устойчиво съхранение на пробиотични храни се създава при сублимационното им сушене /лиофилизация/. При този технологичен метод се съчетават два способа - замразяване и сушене под вакуум при температури не превишаващи критичните, т.е. тези, при които се нарушават микро- и макроструктурата на продукта и позволяват получаване на препарати с висока концентрация на жизнеспособни клетки. Повишеният интерес към пробиотичните лиофилизираните храни се обяснява с напълно запазените им вкусови качества, хранителна и биологична стойност и продължителна съхраняемост.

51. Георгиева, Л., **Начева, И.**, Цветкова, В., Бекяров, Г., 2008. Биохимична оценка на нови функционални храни за биопротифилактика на остеопорозата. *Сборник Научни трудове на УХТ от научна конференция с международно участие – Пловдив, LV (1), 409-414.*

Резюме: Новите функционални лиофилизираните храни са формулирани на базата на биологични състави с благоприятно въздействие върху ограничаване на пиковата костна маса и с остеоиндуктивен ефект. Приложението на високотехнологични методи - лиофилизация, ензимна и клетъчна имобилизация, ферментационни процеси и др. допринася за получаване на крайни продукти с висока усвояемост и максимално съхранени хранителна и биологична пълноценност. Новите биопродукти са с минимално влагосъдържание - от 3,03-3,89%; протеини- от 8,0-17,00%; мазнини – 9,31- 24,55%, богати на есенциални мастни киселини- линолева киселина /омега-6/ и алфа-линолева киселина - омега-3 с високо съдържание на макро- и микроелементи - фосфор, калций, калий, магнезий, мед, цинк, йод, бор и др. Посочените нутриенти и биоактивни вещества в техния състав са във високи концентрации и с благотворен ефект върху костния метаболизъм.

52. **Начева, И.**, Митева, Д., Дякова, А., Димов, Кр., Тодоров, Я., 2009. Качествена и микробиологична характеристика на лиофилизирано биволско кисело мляко след гама стерилизация. *Сборник Научни трудове на УХТ от научна конференция с международно участие*, LVI (1), 555- 560.

Резюме: В настоящата разработка са представени основните технологични параметри на лиофилизацията, като оригинална биотехнология при криоконсервиране на биволско кисело мляко и последващото му подлагане на гама стерилизация с дози на облъчване от 2 и 4 kGy. Извършени са органолептични, физикохимични и микробиологични изследвания след лиофилизация и гама облъчване. Установен е ефекта на две дози гама-лъчи 2 kGy и 4 kGy върху наличната микрофлора в биволско кисело мляко. Резултатите показват, че комбинираното прилагане на двете технологии за консервиране, осигурява продукти с високо качество и микробиологична безопасност.

53. Иванова, С., **Начева, И.**, Митева, Д., 2010. Атерогенен индекс и превантивен липиден скор на кашкавал от биволско мляко след технологична обработка. *Сборник Научни трудове на УХТ от научна конференция с международно участие – Пловдив*, LVII (1), 55- 60.

Резюме: Окачествяването на кашкавал от биволско мляко е извършено по показателите атерогенен индекс (АИ) и превантивен липиден скор (ЛПС). Изследваната млечна мазнина от кашкавал след лиофилизация и гама стерилизация има сравнително нисък атерогенен индекс и висок превантивен липиден скор, обусловени от съдържанието на наситени мастни киселини (НМК).

54. **Начева, И.**, Митева, Д., Димов, К., Логиновска, К., Методиева, П., 2011. Изследване върху микробиологичната безопасност на агнешко месо след комбинирана технологична обработка, *Сборник Научни трудове на УХТ от научна конференция с международно участие – Пловдив*, LVIII (1), 157 -162.

Резюме: Изследвано е влиянието на два високотехнологични процеса - сублимационно сушене и гама стерилизация върху наличната микрофлора на агнешко месо, с оглед неговото дълготрайно и безопасно съхранение. Пробите са лиофилизирани и облъчени с две дози гама лъчи 4 kGy и 8 kGy. Резултатите от извършените микробиологични и органолептични изследвания показват, че при облъчване с посочените дози не се наблюдават съществени промени в сензорната характеристика на агнешкото месо и се увеличава микробиологичната му безопасност.

55. Иванова, С., **Начева, И.**, Митева, Д., Ангелов, Л., 2011. Влияние на сублимационното сушене и гама стерилизацията върху мастнокиселинния състав на агнешко месо. *Сборник Научни трудове на УХТ от научна конференция с международно участие – Пловдив*, LVIII(1), 163 – 167.

Резюме: Целта на настоящето проучване е да се установят измененията в мастнокиселинния състав на агнешко месо от бут след прилагането на сублимационно сушене и суха (гама) стерилизация (с 4 и 8 kGy) с цел удължаване на съхранение. Анализът е извършен с помощта на газов хроматограф SHIMADZU 2010. Мастнокиселинният

профил на агнешкото месо търпи изменения по отношение на наситените и ненаситените мастни киселини в следствие на технологичната обработка. Тези изменения се резултат от иницирираните свободни радикали, ускоряващи протичането на липолитични процеси в анализираните продукти.

56. Вълчков, А., **Начева, И.**, Логиновска, К., 2014. Оценка на преживяемостта на имобилизирани клетъчни системи при криогенно третиране. *Сборник доклади от XII-та Национална младежка научно-практическа конференция, ФНТС*, 52 -56.

Резюме: Авторите проучват възможностите за имобилизация на микробни клетки на шам *Bifidobacterium bifidum 1370* в природни хидроколоидни матрици от растителен и животински произход (инулин и желатин). Извършена е оценка на преживяемостта на имобилизираните клетъчни системи след два режима на замразяване. Получените резултати доказват най-висока жизнеспособност на бактериите след замразяване с течен азот - 196°C, дори и при контролата. Имобилизацията в хидроколоиден гел осигурява стабилността на клетките и повишава значително тяхната преживяемост след криогенно третиране.

57. **Начева, И.**, Вълчков, А., Донева, М., Методиева, П. Логиновска, К., 2015. Синбиотични концентрати – съвременно решение за преодоляване на дисбиозата. *Сборник доклади от XIII-та Национална младежка научно-практическа конференция, ФНТС*, 21 -26.

Резюме: Проблемът с нарушаване равновесието на микрофлората в организма (дисбиоза) е пряко свързан с физиологичния статус и състоянието на имунната система на човека. Авторите представят резултати от проведени изследвания, свързани със създаването на нови, полезни за чревното здраве синбиотични продукти. Серията нови продукти „Лактостим“ са разработени по биотехнологичен път и концентрирани чрез сублимационно сушене. Получените синбиотици съдържат активна млечнокисела микрофлора, полизахариден комплекс, витамини, минерални соли и други биологично активни вещества. Новите храни се характеризират с изразена пробиотична активност и висока биологична стойност, което ги прави подходящи за превенция и преодоляване на дисбиотични състояния от различен характер.

58. Донева, М., **Начева, И.**, Вълчков, А., Методиева, П., Логиновска, К., 2015. Влияние на скоростта на замразяване върху преживяемостта на млечнокисели бактерии. *Сборник Научни трудове на VXT от научна конференция с международно участие – Пловдив, LXII* 114-117.

Резюме: The effect of the 5-speed freezing - 0.3, 1.5, 15.0, 30.0 and 400°C/min on survival of *Lactobacillus delbrueckii ssp. bulgaricus strain 1381* and *Streptococcus thermophilus strain 1374* was investigated. As a cryoprotectant medium were used solutions of sucrose and chitosan. Experimental data obtained show that the tested strains had the highest survival rate for freezing by immersion in liquid nitrogen. In the samples without the protective environment it is in the range from 35 to 53%. In variants including cryoprotectants survival of *Lactobacillus bulgaricus 1381* reaches 72%, and of *Streptococcus thermophilus 1374* - 80%.

59. Митева, Д., **Начева, И.**, Цветкова, В., Петрунов, П., Вълчков, А., Логиновска, К., 2015. Създаване на иновативни месни храни с повишено съдържание на полиненаситени мастни киселини. *Сборник Научни трудове на УХТ от научна конференция с международно участие – Пловдив, LXII* 145 -148.

Резюме: Through application of contemporary technological approaches, based on turkey meat enriched with plant oils and plant components are developed foods with optimal for human nutrition fatty acid composition. The results demonstrate a high content of ω -3 and ω -6 fatty acids in the novel foods, which help increase their nutritional and functional properties. Creating of innovative meat foods with high content of polyunsaturated fatty acids is a sustainable trend in recent years due to the ever increasing demands of consumers for eating quality and safe food.

60. **Nacheva, I.**, Valchkov, A., Loginovska, K. and Miteva, D., 2016. Tracking resistance of combinations of probiotic bacteria in model conditions of digestion included in gel of chitosan. *Proceedings of the XI-th Workshop with international participation "Biological Activity of Metals, Synthetic Compounds and Natural Products" - IEMPAM-BAS*, 51-56.

Abstract: The survival rate of three combinations (variants 1, 2 and 3) of probiotic bacteria in model conditions of digestion has been examined. The strains *L.bulgaricus* 1381, *Str.thermophilus* 1374 participate in all three combinations, the ratio being 1: 3, in the capacity of a classic yeast for Bulgarian yoghurt with proven synergy in between. In order to increase the sustainability and probiotic effects of the combinations, *L.acidophilus* 1379, *B.bifidum* 1370 and *L.casei* 1014 have been added into this association. As a result of the experiment it was found that variants 2 and 3 demonstrate resistance and close values of viable cells in model conditions of the gastrointestinal tract, however, they proved to be of a lower survival rate in comparison with the microorganisms in variant 1. The survival of the chosen combination of variant 1 model in terms of gastric and intestinal fluid as a free suspension has been traced and included in polysaccharide gel matrix (chitosan). Studies show that the inclusion of lactic acid bacteria in chitosan gel results in stabilization of their resistance in model digestion conditions and provides for a high concentration of viable cells.

61. **Nacheva, I.**, Valchkov, A. and Loginovska, K., 2017. Lactic acid microflora viability and survivability in new synbiotic lyophilized foods from sheep and cow milk. *Proceedings of the XII-th Workshop with international participation "Biological Activity of Metals, Synthetic Compounds and Natural Products" - IEMPAM-BAS*, (in press).

Abstract: New synbiotic lyophilized foods of high percentage viability and activity of cells of *L.bulgaricus* 1381, *Str.thermophilus* 1374 and *L.acidophilus* 1379 have been developed. The Lactic acid strains combination has been experimentally selected in conformity with physiological and biochemical characteristics, to result in resistance according to the conditions in the gastrointestinal tract of humans. The raw materials used are sheep milk of the Rhodope tzigay breed and cow milk from Bulgarian Rhodope cattle. Lactic acid bacteria have been incorporated into chitosan gel to increase their stability under model digestion conditions and to provide for effective cryo-protection during their cryogenic

treatment. The composition of the newly created foods has been supplemented with natural ingredients - cereals (quinoa, chia), fruits (black elder, mango), nuts, ground baked sesame seed, vegetable oils (flaxseed oil) and sweeteners (fructose and stevia). Applying extensive determination it has been found that the new synbiotic foods which have undergone a freeze drying process contain a wide range of biologically active substances. Studies have been carried out on the viability of lactic acid microflora in synbiotic products before and after lyophilisation. As a control sample, fresh milk is sourced with the selected starter culture. The microbiological studies carried out demonstrate that lactobacilli and lactobacilli strains in synbiotic products after lyophilization have a higher survivability rate (77,3% and 73% for *Str. thermophilus* in sheep and cow milk and 72,1% and 65% lactobacilli in the same foods), compared to lactic acid bacteria from control samples after lyophilisation. This is an indication that the new lyophilized functional foods have a higher titer of beneficial microflora of *L.bulgaricus* 1381, *Str.thermophilus* 1374 and *L.acidophilus* 1379 strains if compared to lyophilized milk control samples.

62. **Nacheva, I.**, Miteva, D., Dimov, K., Tsvetkova, V. and Valchkov, A., 2017. Dietary lyophilized foods based on buffalo meat. *Proceedings of the XII-th Workshop with international participation "Biological Activity of Metals, Synthetic Compounds and Natural Products" - IEMPAM-BAS*, (in press).

Abstract: The aim of this scientific research is to create freeze-dried buffalo meat products with oil and vegetable supplements. Prescriptions and technological schemes have been developed to produce innovative meat foods of higher polyunsaturated fatty acid content to comply with the higher consumer demands for healthy and safe food. What is new about those foods is the high content of ω -3 and ω -6 fatty acids as well as the optimal ratio between them, which contributes for nutrition and health improvement. They are fit for daily consumption and specialized nutrition - dietary, recovery and healing nutrition as well.

В. МОНОГРАФИЧЕН ТРУД

63. **Начева, И.**, 2017. *Лиофилизирани концентрати за специализирано хранене*. София: Велес Консулт ЕООД.

Резюме: Комплексът от съвременни знания за функционалното хранене, неговото място и роля в борбата с болестите на съвремието и намаляване на риска от тях, както и постиженията и на модерните биотехнологии представляват солидна база за създаване на хранителни биопродукти, отговарящи на изискванията за високо качество, безопасност и дългосрочно съхранение. Функционалните продукти са храни, които надхвърлят възможностите на обикновеното хранене и имат конкретна, целева насоченост върху състоянието на организма с цел подобряване качеството на живота и /или намаляване риска от заболяване. Този подход е определящ при създаване на нови функционални храни, както по отношение на техния вид, състав, форма на приложение, физиологичен ефект, така и по отношение технологични принципи на производството им.

В книгата са представени основните теоретични принципи на процеса сублимационно сушене (лиофилизация) и неговата роля като основен технологичен метод за производство на функционални храни. Изтъкнати са предимствата на метода за запазване жизнеспособността на полезната микрофлора в тези биопродукти в процеса на тяхната технологична обработка и продължително съхранение. Подчертано е, че повишеният интерес към лиофилизираните храни се дължи на високото качество на крайния продукт със съхранени хранителни, биологично-активни вещества и вкусово-ароматен комплекс, които доставят в усвоима форма необходимите за организма нутриенти.

Представена е етиологията на някои от зачестилите през последните години т.н. „болести на цивилизацията” – дисбактериоза, остеопороза, заболявания свързани със снижаване на имунната компетентност на организма, вследствие нездравословния начин на живот и произтичащите нездравословни хранителни навици.

Разгледана е ролята и е обоснована необходимостта от клиничното, в частност – сондово и възстановително хранене за подпомагане на репаративните процеси в организма и ускоряване на оздравителния процес при тежки травми, следоперативни и други клинични състояния.

Създаден е богат набор от функционални храни на базата на пълноценни природни компоненти, богати на биологично активни вещества, вкл. и на полезни микроорганизми - млечнокисели бактерии, дрожди, олиго- и полизахариди, антиоксиданти, витамини, минерали и др. Представени са експериментални резултати от проведените изследвания върху качествения им състав, енергийна стойност, биологична и микробиологична активност, които доказват, че новите лиофилизиранни функционални продукти отговарят на изискванията на профилактичното, лечебно и клинично хранене и на стремежа на съвременния човек към здравословен начин на живот.

64. **Начева, И.,** Донева, М., & Методиева, П., 2017. *Хидроколоидите като криоконсерванти*. София: Велес Консулт ЕООД.

Резюме: Разгледани са основни теоретични принципи за дълготрайно нискотемпературно и сублимационно консервиране (лиофилизация) на различни щамове млечнокисели бактерии и ензими. Посочени са основните фактори и механизми, влияещи върху криорезистентността на изследваните биологични обекти, както и въздействието и ролята на криопротекторите при криоконсервиране. Обобщени са досегашните знания за криопротекторите и механизма на тяхното действие в биологични системи. Представени са резултати от експериментални изследвания върху различни по строеж и структурни особености хидроколоиди, в качеството им на криопротектори при замразяване и лиофилизация на различни щамове млечнокисели бактерии, смесени бактериални култури, протеазни и амилазни ензими. Установено е, че проучваните хидроколоиди, приложени в качеството им на матрици, оказват стабилизиращо действие на биологичните молекули и допринасят за запазване на тяхната структурна и каталитична стабилност.

Приложеният съвременен подход на криоконсервиране е подходящ за формулиране и разработване на нова генерация функционални продукти на млечнокисела основа и стабилни ензимни препарати и има потенциала да отговори на новите предизвикателството на пазара на биопродукти.

65. **Начева, И.,** Митева, Д., 2018. *Лиофилизирани функционални храни на месна основа.* София: Велес Консулт ЕООД.

Резюме: Представените експериментални данни в книгата са резултат от дългогодишния труд на авторите и научен колектив от Институт по криобиология и хранителни технологии и Военно Медицинска Академия в областта на функционалното и диетично хранене. В отговор на нарастващия интерес към качествени и безопасни хранителни продукти, съвременната месна индустрия е насочила усилията си към разработване на нови стратегии в технологичната преработка на месото, оптимизиране на хранителния състав на съществуващите и получаване на нови асортименти месни продукти, отговарящи на потребителското търсене.

Авторите представят обзор на съвременните технологични подходи, прилагани в месната индустрия, които са свързани с намаляване на обработката на месото и месните продукти при високи температури, включване на биологично активни вещества с висока антиоксидантна активност и получаване на нови месни продукти с подобрени хранителни качества, както и използване на природни ензими за безвредно окрежкотяване на месо.

Представени са основните етапи на процеса сублимационно сушене и са посочени предимствата на лиофилизацията пред други традиционни методи на консервиране на месо и месни продукти. Описани са формите на свързване на водата в храните и са отбелязани основните закономерности при отделяне на кристализиралата влага в процеса на сушене. Установени са параметрите за постигане на оптимален режим на сублимационно сушене, при което се отчитат особеностите в състава и свойствата на отделните компоненти на продукта и характера на изменението им в процеса на обезводняване. Подробно е представена техниката на възстановяване (рехидратация) на месото и месните продукти, както и факторите влияещи върху скоростта и степента ѝ за постигане на продукт с добра консистенция и органолептични показатели.

В процеса на разработване на новите функционални храни са използвани пуешко и биволско месо, които се отличават с висока биологична ценност и същевременно добри диетични качества. За увеличаване усвояемостта на избраните меса, те предварително са третираны с растителни ензими – протеази (папаин и бромелаин). Установено е, че при окрежкотяването с папаин в по-висока степен се съхраняват консистенцията, свежият цвят и влага на месото, като същевременно се редуцира неговата жилавост с умерена хидролиза на съединителната тъкан.

Като резултат от предварителните проучвания и проведените експерименти са създадени рецептури с оптимално съотношение между основните хранителни съставки и технологии за получаване на нови функционални храни от пуешко месо

с включени зърнено-зеленчукови и зърнено-плодови компоненти и от биволско месо в два варианта – на зърнено-зеленчукова и на зърнено-плодова основа.

Чрез прилагането на съвременни и модерни технологични подходи с добавка на масла и храни от растителен произход към пуешко и биволско месо са получени обогатени месни храни, с подобрен мастнокиселинен състав. Новосъздадените лиофилизирани храни от биволско месо се характеризират с високо съдържание на ω -6 и ω -3 мастни киселини, което способства за повишаване на неговите хранителни, вкусови и функционални качества. Технологичната обработка на биволското и пуешкото месо не предизвиква образуване на свободни радикали, не се наблюдава загуба на незаменимите мастни киселини и на хранителната стойност.

Обработени по метода на сублимационно сушене, новите функционални храни се отличават с фина структура и консистенция, със съхранени хранителни свойства и вкусово-ароматен комплекс и доставят в усвоима форма необходимите за организма нутриенти и биологично активни вещества.

Авторите представят експериментални данни от извършеното пълно изследване и охарактеризиране на новите храни по физикохимични, биохимични и микробиологични показатели, с което се доказва тяхната висока биологична ценност, лесна усвояемост, висока микробиална чистота и удължен срок на съхранение.

Проведен е и биологичен експеримент с опитни животни. Получените данни и приложения математически модел за статистическата им обработка, доказват положителния ефект от храненето с разработените функционални храни на месна основа върху общия жизнен статус на мишки, подложени на радиационен стрес с ниски дози на радиация.

Благоприятният ефект на тези храни върху организъм, подложен на радиационен стрес ще спомогне за установяване на закономерностите на процеса на облъчване и приемането на храна от пациента.

Получените експериментални резултати от проведените изследвания ни дават основание да приемем разработените лиофилизирани функционални храни на месна основа за една добра възможност за диетично, възстановително и общо здравословно хранене.

София,
25.06.2018 г.

Изготвил:
/доц. д-р Илшана Начева/