ABSTRACT AND REFERENCES

TECHNOLOGY AND EQUIPMENT OF FOOD PRODUCTION

RESEARCH OF PROSPECTS FOR USING ZEOLITES IN THE FOOD INDUSTRY (p. 4-9)

Natalia Prytulska, Evgeniya Bondarenko

The world experience of using zeolites in the food production was investigated. It was found that zeolites are used in the food industry to decolorize various mineral and vegetable oils and animal fats; purify water, alcoholic and soft drinks, juices, tea, vinegar, beer, wine from proteins, pesticide residues, heavy metals, toxic elements, toxins, mycotoxins, radionuclides and other xenobiotics; prevent caking of shredded cheese, flavor additives and flour.

To reveal the possibility of using zeolites in developing detoxifying food products, their ability to remove xenobiotics from the human body was investigated. Given that almost all zeolites are used in medicine as highly effective sorbents, as evidenced by the positive results of their use in the treatment of poisoning, intoxication, gastrointestinal disorders, allergic reactions, etc., they can be used as raw materials in developing detoxifying food products for people who are faced with food, environmental or occupational poisoning in hazardous working conditions.

The ability of zeolites to suppress pathogenic microflora of food systems and exhibit antimicrobial properties was examined, a positive experience of their use in agriculture as a fungicide and preservative for storing corn, root crops, sunflower seeds was revealed, which gives the basis for research towards finding methods to extend the shelf life of food products.

Keywords: detoxification, sorbents, zeolite, bentonite, montmorillonite, xenobiotics, food products, storage, safety.

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INVESTIGATION OF AMINO ACID STRUCTURE OF PROTEINS OF FRESHWATER BIVALVE MUSSELS FROM THE GENUS ANODONTA OF THE NORTHERN UKRAINE (p. 10-16)

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Mussels of the genus Anodonta of the northern Ukraine are one of poorly caught, but promising objects of river fishery in food and technology terms. The reason of poor catch of freshwater mussels is the lack of industrial technologies for use in food processing. The main objective of the research of freshwater bivalve mussels of the genus Anodonta of the northern Ukraine is to make sure that they contain complete protein, all essential amino acids, and their balanced content. The data obtained were compared with the mussels of the genus Mytilus species Mytilus galloprovincialis and the ideal protein on the scale of FAO/WHO. For the first time, the physicochemical composition of freshwater bivalve mussels of the genus Anodonta of the northern Ukraine was defined. For proteins of two types of the samples, the amino acid structure of soft flesh was determined and the amino acid score of each essential amino acid, followed by their comparison was calculated. To reduce the error of the research, the methods of mathematical modeling and analysis of the results were used. The utility coefficient, potential biological value for mussels of the genus Anodonta and mussels of the genus Mytilus were determined. It was proved that the soft flesh of freshwater mussels of the genus Anodonta has a high nutritional and biological value by the content of protein and essential amino acids.

Research of the total content of the flesh after completion of growing period that is 10 months in mussels of the genus Anodonta and Mytilus showed that freshwater mussels prevail over the marine analog by 3.2 times, due to the greater growing capacity and the presence of the foot in mussels of the genus Anodonta. Therefore, they are the best raw material for cultivation and use in food technology, and further researches are highly promising.

Keywords: freshwater mussels, complete protein, amino acid score, biological value.

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CULTURE MEDIUM DEVELOPMENT FOR LACTOBACILLUS ACIDOPHILUS ENCAPSULATION (p. 17-21)

Valentina Bolshakova, Natalia Kondratjuk, Evgenij Pyvovarov

The effect of polysaccharide thickeners – xanthan and guar gum – on the colony-forming ability of probiotic microorganisms of the species Lactobacillus acidophilus (LA-5) was investigated. The spectrum of inorganic salts, which in the given media can be a source of free calcium ions for further Lactobacillus acidophilus encapsulation in shells based on sodium alginate was considered. According to the results of microbiological studies, it was found that the polysaccharide components do not reduce the activity of the probiotic microorganisms, and inorganic salts introduced in concentrations that provide an osmotic pressure on the Lactobacillus acidophilus cells, inhibit metabolism processes. Based on the data obtained, qualitative and quantitative composition of the medium, the components of which do not reduce the viability of microorganisms and contribute to the encapsulation process for increasing the shelf life of food products based on the systems considered was determined.

Keywords: encapsulation, probiotic microorganisms, Lactobacillus acidophilus, acid-base balance, food culture media.

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RESEARCH OF CONSUMER PROPERTIES OF GEL-LIKE FOOD PRODUCTS FOR ATHLETES (p. 21-26)

Natalia Prytulska, Yuliia Miklashevska

In order to meet the needs of the target consumer group, gel-like food products for athletes must have a number of specific consumer properties. The paper presents a comprehensive research of consumer properties of the developed gel-like food products for athletes. Analysis of sensory profiles showed better organoleptic properties of the new product compared to the commercially available counterparts. The appearance and consistency of the developed product corresponded to a hypothetical standard. The taste and smell were pronounced, harmonious, pleasant, aftertaste of functional additives was barely perceptible. After consumption, there was a slight dryness in the mouth and tickle in the throat, causing the desire to drink more, thus preventing dehydration during prolonged physical activity.

New gel-like food product contains 17 % less water and 12 % more sugar than analogue and has a slightly acidic environment (pH 4.5), which, predictably, will ensure its long-term storage ability.

The energy value of the developed product is 1.5 times higher than the energy value of the analogue: to offset the energy expenditure per hour of intense physical activity it is necessary to consume 91 grams of the developed product. In addition, the new product contains a digestible carbohydrate complex with different transport schemes, which accelerates their absorption by the body. The high level of absorption of carbohydrate combination allows to avoid their accumulation in the digestive tract, and thus reduces the risk of problems with the digestive system during physical activity.

The new product covers the need for sodium, potassium and magnesium by 60, 80 and 100 % during physical activity and by 60, 35 and 69 % in the recovery period, respectively. Also, the developed product has a high content of vitamin C – 600 mg per 100 g of product. This allows to recommend the product for athletes to timely compensate the expenditure of energy and nutrients.

Keywords: gel-like, sports nutrition, carbohydrates, macroelements, energy value, sensory profile.

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MARKETING RESEARCH OF EXPECTATIONS OF TARGET AUDIENCE OF CONSUMERS OF PRODUCTS WITH FUNCTIONAL ORIENTATION (p. 26-30)

Andriy Nezdoliy, Dmytro Antiushko

Market expectations of the target audience of consumers who are regularly exposed to high static and physical activity were investigated.

In modern economic relations, the need for new approaches to ensuring the competitiveness of goods is fundamental to success in the market. One of the main conditions for the product success on the market is to study the specific needs, expectations and preferences of the target consumer segment, aimed at the maximum satisfaction of their interests. Marketing research plays a paramount role in the development and subsequent introduction of new products.

The research results point to a wide range of consumers with positive attitudes to products with functional orientation, particularly sweets for preventing diseases of the musculoskeletal system.

The results of focus-group interviews and their detailed analysis were taken as a basis for developing new products of functional purpose, including sweets for persons with prolonged static and physical activity and is the basis for ensuring their competitiveness in the consumer market.

Keywords: products with functional orientation, static and physical activity, organoleptic properties.

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IDENTIFICATION OF CRITICAL CONTROL POINTS FOR SAFETY MANAGEMENT OF PRODUCTION OF FROZEN FISH (p. 31-35)

Dmytro Odarchenko, Tatiana Karbivnycha, Evgenia Gasay, Diana Ilyina

The features of the introduction of the safety management system HACCP in Ukrainian fish processing enterprises were considered. A full analysis of hazards occurring in the production of frozen fish was performed and it was determined that quality control in fish industry enterprises is carried out by production-veterinary control departments (PVCD), which include veterinary service specialists, chemists, bacteriologists. PVCD allow sales of fish products only if their quality characteristics meet the requirements of GOST or TU. Before the introduction of the safety management system of food products, safety working group conducts research for each type (group) of products according to DSTU 4161-2003 and registers them in certain safety protocols.

Critical control points for safety management of production of frozen fish were developed. Hazard analysis and identification of CCP of production of frozen fish in fish processing enterprises revealed that the most serious stage is acceptance of live fish, because biological and chemical factors are significant and can lead to diseases common to fish and humans, or development or exacerbation of allergic diseases. The stage of fish storage: observance of temperature conditions and shelf life is also important.

Keywords: frozen fish, safety management system, critical control points, hazards.

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INVESTIGATION OF THE KINETICS OF EXTRACTION OF FLAVONOIDS FROM HOP CONES MEAL (p. 36-41)

Inessa Pavliuk, Nataliya Stadnytska, Vladimir Novikov

For pharmaceutical companies involved in the extraction of plant raw material, the issue of its rational use, or maximum extraction of biologically active substances from it is topical. One way to implement this task is to reuse plant raw material meal as a source of BAS and determine the kinetic parameters of the extraction process to select optimal when implementing in practice.

The aim of the paper was to determine the concentration of extractant, investigate the extraction kinetics and determine basic kinetic constants such as the coefficients of mass transfer, diffusion through the cell membrane and in the intercellular environment, the washout number.

The extraction kinetics of meal of hop cones, crushed to a defined size was studied in the agitator at 20 °C. As a result of the research, it was found that particle size significantly affects the extraction rate and, ultimately, the equilibrium time. The defined mass transfer coefficient decreases with increasing size of the extracted particle. This indicates

that the main mass transfer surface is the area of crushing, which increases with decreasing particle size. In the paper, the diffusion coefficient of flavonoids through the cell membrane D_c, the order of which is 10^{-14} m^2/s was determined, and the diffusion coefficient in the intercellular environment D_m, the order of which is 10^{-11} m^2/s and does not depend on size was calculated. As a result of the experimental studies, an analytical dependence of the mass transfer coefficient k and the washout number A on the particle size of the solid phase d was derived, which allows to predict the extraction process, design equipment.

Keywords: hop cones, meal, extraction kinetics, mass transfer coefficient, diffusion coefficient, washout number.

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COMPETITIVE ABILITY RESEARCH OF EMULSION TYPE SAUCES ENRICHED WITH SELENIUM (p. 42-48)

Nicolay Golovko, Vladislav Primenko, Tatyana Golovko

Competitive ability indicators of emulsion-type sauces (ETS) with added dietary supplements (DS) «Syvoselen Plus» and «Neoselen» were investigated and identified.

Indicators of quality models of ETS enriched with organic selenium compounds were calculated, and a comprehensive quality assessment of new products with the emulsion structure was carried out.

Competitive ability, prospects for production and sales of selenium-enriched emulsion sauces were determined.

It was found that the practical implementation of the proposed method for qualimetric calculation of competitive ability indicators of new recreational ETS, which meet the requirements of time and consumers, shows the feasibility of its application for assessing the prospects for production and sales of new products. So, mayonnaise «Selenoviy» with DS «Neoselen» is a highly promising product which has the highest integrated quality indicator, cost-effective level of cost, patent protection and consumer satisfaction compared to the control sample and mayonnaise «Selenoviy» with DS «Syvoselen Plus».

The aforesaid causes particular scientific interest as one of the possible ways for obtaining recreational products is the enrichment with protein-mineral complexes that form the basis of DS. «Syvoselen Plus» and «Neoselen» contain organic selenium compounds, which are the product of chemical adsorption of selenium ions Se^{2-} by globular whey proteins. DS can be used not only as a source of the above nutrient but also as an emulsifier of dispersed systems such as mayonnaise. Their introduction to the ETS recipe does not adversely affect the organoleptic quality indicators, enhances emulsion stability, increases the amount of organic selenium. Therefore, research of competitive ability of selenium-enriched ETS is important.

Keywords: emulsion-type sauce, competitive ability, selenium, quality model, dietary supplements.

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A TECHNOLOGY OF BIOLOGICALLY VALUABLE SMOOTHIES WITH THE USE OF WALNUTS (p. 49-53)

Inna Tiurikova, Mykhailo Peresichnyi, Natalja Rogovaya

The study suggests the possibility of using walnuts of milky-wax ripeness in the technology of smoothies. We have motivated the

choice and conducted physical and chemical research of raw materials and semi-finished products based on them, as well as proved the compatibility of such ingredients as pumpkin, cherry plums and walnut additives. The organoleptic research proved the rational composition of smoothies: pumpkin – fresh/blanched or baked, cherry plums, and walnut additive – fresh walnuts/walnut extracts based on spirit or sugar.

We have devised a pumpkin-based smoothie technology that uses biologically valuable walnut raw materials and determined that such smoothies have high consumer properties. We have proved the presence of antioxidant substances – vitamin C, β-carotene, as well as phenol and pectin substances – in the smoothies' composition. The suggested technology allows obtaining new drinks with more bioactive substances that can be recommended in daily diet for people who practice healthy lifestyle. We view as promising further research in expanding the range of walnut-using beverages for recreational purposes.

Keywords: technology, smoothie, walnut, milk-wax ripeness, extracts, pumpkin, cherry plum.

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BRIEF TECHNOLOGY ASSESSMENT OF INVESTIGATED TABLE GRAPE VARIETIES OF MIDDLE AND LATE RIPENING PERIODS (p. 54-61)

Irina Tarabrina

The research of economic characteristics, chemical composition and technological characteristics of table grape varieties Asma, Italia, Karaburnu, Muscat of Alexandria, Vostok, Beauty Cegléd, Muscat Hamburg, Odessa Souvenir, Michele Palieri, Chaush Muscat in 2014 was carried out.

Based on experimental studies, a brief technology assessment of the given varieties was defined, basic criteria such as organoleptic characteristics, chemical and mechanical composition were investigated. The paper presents the characteristics of the varieties, the comparative economic-commodity assessment of middle-ripening table grape varieties, which are grown in Ukraine, qualitative characteristics of berries of middle-ripening table grape varieties, the interval of economic-commodity, chemical and physical parameters of table grapes of different ripening groups, comparative economic-commodity assessment of table grapes of middle and late ripening periods. The results allow to assess table grape varieties of middle and late ripening periods, which are the most favorable for the cultivation and supply to the consumer market. Based on the research results, competitiveness index for the investigated table grape varieties was calculated.

Keywords: grapes, chemical composition, table grape variety, technological characteristics.

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THE CHANGE IN THE CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES OF BLACK ELDERBERRY IN THE PRODUCTION OF JUICE (p. 62-67)

Galina Khomych, Lyudmila Polozhyshnikova

The berries of the black elderberry are a source of biologically active substances, among which phenolic compounds that have the main value. Most of the phenolic compounds are natural antioxidants and are widely used in the food industry. Using black elderberry will allow to enrich foods with biologically active complex contained in it.

The purpose of the research is to study the chemical composition of black elderberry and the impact of processing technology on the quality of juice from these raw materials.

Analysis of the chemical composition of berries of the black elderberry has confirmed the presence of a large number of biologically active substances in its composition. The impact of processing technology on the quality of the black elderberry juice was investigated. It was found that using enzymatic catalysis for squash pre-treatment has a positive effect on the quality indicators of black elderberry juice.

Analysis of the fractional composition of phenolic compounds at different ways of squash pre-treatment was performed and it was determined that the maximum transition of phenolic compounds is achieved in enzymatic catalysis of squash, which has been pre-heated to inactivate endoenzymes of raw materials.

Keywords: black elderberry, juice, biologically active substances, enzymic preparations, phenolic compounds.

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IMPACT OF MALT EXTRACTS ON LACTOBACILLUS AND BIFIDOBACTERIUM IN PROBIOTIC FERMENTED BEVERAGES (p. 67-76)

Natalia Chepel, Valentina Koshova

The research of the impact of barley and oat malt extracts as prebiotic complex on the viability and biochemical activity of Lactobacillus spp. and Bifidobacterium spp. was presented in the paper. The intensive growth of bacteria Lactobacillus spp. and Bifidobacterium spp. 1 hour after fermenting the milk-malt mix with BME and OME in the ratio 95:5 based on the starter "Bifivit" compared with based on the starter "Symbilakt" was proved. The number of CFU of bacteria Lactobacillus spp. and Bifidobacterium spp. in 1sm^3 of this fermented beverage was 1,59±0,04*10^8 at the end of shelf life, which corresponded to the recommended number of CFU of probiotic lactic acid cultures in foods according to FAO/WHO. The optimum mass fraction of solids for administering malt extracts to a dairy base was 14 %, which allowed to reach the greatest numbers of CFU of bacteria Lactobacillus spp. and Bifidobacterium spp. The concentrations of lactic acid in fermented beverages with 95 % BME and 5 % OME based on the starter "Bifivit" were twice higher than based on the starter "Symbilakt", which was shown by accelerated acid coagulation and reduced duration of the biotechnological processing of the milk-malt mix. The combination of bacteria Lactobacillus spp. and Bifidobacterium spp. of two starters provided lactic acid extraction in probiotic fermented beverages with BME and OME at a level that does not exceed the maximum allowed, and prevented the accumulation of significant concentrations of D(-)-lactic acid. The best aromatic composition of secondary fermentation metabolites was in the fermented beverage with 95 % BME and 5 % OME based on the starter "Bifivit", which corresponded to low concentrations of acetaldehyde (27.00 mg/cm^3), n-propane (11.84 mg/cm^3), isobutane (29.30 mg/cm^3), acetaldehyde (27.00 mg/cm^3) and high concentrations of 2-methyl-1-butanol (77.37 mg/cm^3) and 3-methyl-1-butanol (211.11 mg/cm^3), and the concentrations of methyl acetate (10.61 mg/cm^3) and ethyl acetate (85.11 mg/cm^3) were optimal for forming harmonious aroma of the fermented beverage.

Keywords: malt extracts, probiotic bacteria, probiotic complexes, fermented beverages, viability, biochemical activity.

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