Section 1. NEW TECHNOLOGIES OF FOOD PRODUCTS

THEORETICAL AND PRACTICAL PREREQUISITES FOR THE IMPROVEMENT OF THE TECHNOLOGY OF GLUED GUTS CASINGS

V. Mykhailov, V. Onishchenko

The world market for sausage casings is dynamically developing. At the same time, despite the decline in the share of natural casings, consumer preferences, the necessity of efficient use of natural ingredients in food technology and the formation of a significant amount of spoilage in the production of guts casings determine the feasibility of scientific substantiation of new and improvement of known technologies for glued guts casings.

Physical and chemical fundamentals of gluing natural casings are the ability of adhesion (gluing in the process of drying without additional substances), which is achieved due to natural properties of the walls of guts. Their chemical composition, morphological features, and technological processing operations stipulate main physicochemical and biochemical factors of guts casings adhesion. Collagen and elastin fibers of submucosal layer play crucial role in gluing casings.

The main disadvantage of agglutinate casing by the known technology is that their preparation presupposes only cautious wetting by water as against conventional natural casings. Prolonged soaking in water is not allowed because of the stratification of sliced guts strips; the same problem may arise in case of producing sausages, the raw mincemeat of which contains sufficient amount of water. Therefore, searching for the ways for reducing the level of reversibility of agglutination-stratification process in agglutinate guts’ technology is actual.

Analysis of scientific and practical literature shows that the proposed known technical solutions concerning the improvement of the technology of agglutinate guts casings solve such tasks as achieving the required strength by increasing the amount and specificity of the location of layers of sliced strips of guts, diversity of shapes and sizes of shells, and provision of the required elasticity by moistening, and longer shelf life under mild conditions due to the use of salty mixtures with the preserving action. The problem of reducing the level of the reversibility of the agglutination-stratification process in the technology of agglutinate guts remains unsolved.

The analysis theoretically predicted the ways for the reduction of the reversibility of the agglutination-stratification process in the technology of agglutinate guts, which are concluded in limited (controlled) tanning with the use of tanning agents, introduction of additional adhesive compositions, combination of traditional gluing with stitching, application of electro physical methods of gluing – fixation.

Keywords: glued guts casings, protective properties, reversibility of the agglutination-stratification process.
NEW BISCUITS AND BAKERY GOODS ARE VITAMINIZED BY NATURAL CAROTENOID HERBAL NANOADDITIIONS FOR HEALTH FOOD

R. Pavlyuk, V. Pogarska, N. Timofeyeva, S. Loseva, T. Kotuyk

The research is devoted to scientific substantiation and development of bakery and confectionery products (including school rolls and biscuits) vitaminized by natural carotenoid plant Nano additives from traditional for Ukraine raw materials - vegetables (carrots and pumpkin) for health food.

The recipes and technologies of biscuits and buns enriched in carotenoid additives from carrots and pumpkins for healthy nutrition, which include the use of blends and mixes - natural plant fine additives in the form of puree from carotenoids-containing vegetables and lemon zest that allows both to preserve carotenoids, vitamins and other biologically active materials, and allows to obtain ready-made products with high organoleptic and structural-mechanical indicators are elaborated.

In the result of experimental studies and mathematical modeling of the data, the recipes of two vitaminized buns for students with the use of fine carotenoid additives are developed. The recipe of the bun different from usual bun with the fat content of 5% and sugar 56% was used as an analogue. The dose of additives and the stage of adding them to the technology of cooking buns is experimentally substantiated. The recipes of 2 buns (relating to common muffin) - "Karotynka", "Oranzhon", which differ in the number of carotenoid supplements from carrots and pumpkins are developed.

The quality of new kinds of buns according to their organoleptic, physical-chemical parameters and BAS content is studied. They are compared with their analogues. It is shown that vitamin buns differ in high content of β-carotene and vitamin C. For example, 100 grams of "Karotynka" biscuits contain 5.5 mg of β-carotene that covers the daily needs of a human in β-carotene, and "Oranzhon" bun contains 4.2 mg per 100 g, almost 90% of the daily needs of a human in β-carotene, while in the analogue it is not available.

Keywords: carotenoid herbal Nano supplements, healthy food, β-carotene.

THE NEW WORD IN THE TECHNOLOGY OF MANUFACTURING PRODUCTS WITH THE USE OF MODERN EQUIPMENT AT CATERING ENTERPRISES


The new method of deep processing of fruit and vegetable raw materials without the use of low temperatures is proposed and developed. It is alternative to cryogenic processing and based on complex effect of steam treatment and fine-dispersed grinding. The authors applied the new generation of modern highly effective equipment (steam-convective oven (Italy), activator – disintegrator (France) which are used at catering enterprises that
allows to use biological potential of raw materials more completely (2…3 times higher than in start raw materials).

It is found that during the deep processing of carotene-containing vegetables (carrot and pumpkin) with the use of modern steam-convective equipment the fermentative processes occurred with less intensity than during traditional method of heat treatment – blanching by dipping into the boiling water. Quantitative value of maximal fermentative activity is 2–4,5 times less for polyphenol oxidase and 3 times less for peroxidase during the steam-convective processing of carotene-containing vegetables than during the blanching. It is shown that full inactivation of oxidative ferments during heat treatment of carotene-containing vegetables in steam-convective oven appeared earlier than during blanching. It occurs in 20 minutes, which 10–15 minutes earlier than during blanching. Full inactivation of oxidative ferments during blanching of carotene-containing vegetables appeared in 30–35 minutes. It is specified that the complex use of steam-thermal processing gives possibility to obtain pureed, the quality of which achieves the quality of puree obtained according to the concentration of β-carotene: it is 2,5…3 times higher during steam thermal processing and 2,8…3 times during cryogenic processing.

**Key words:** deep processing, herbal raw materials, steam-treatment, fine-dispersed grinding, steam-convective oven.

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**THE TECHNOLOGY OF NANOSTRUCTURED HERBAL ADDITIVES WITH THE USE OF NON-ENZYMATIC BIOCATALYSIS – MECHANOLYSIS OF BIOPOLYMERS (HETEROPOLYSACCHARIDES AND PROTEIN)**

R. Pavlyuk, V. Pogarska, T. Kotuyk, A. Pogarskiy, S. Loseva

Nanotechnology of herbal protein additives in the form puree from peas based on the deep processing of raw materials is developed. Fine-dispersed grinding and steam treatment of raw materials are used as innovation in this research work. When using traditional methods of processing herbal raw materials not all biological potential is used. Significant loss biologically active substance (20…80%) occur when use of traditional methods processing.

It is found that during the deep processing of herbal raw materials (dry peas), which is based on complex effect of steam treatment and fine-dispersed grinding to raw materials during the reception of nano-structured puree, the processes of mechanical destruction and mechanical chemistry occur. These processes are accompanied with non-enzymatic biocatalysis – mechanolysis (destruction) of sparingly soluble biopolymers and their nanocomplexes (protein and heteropolysaccharides, particularly, pectin substances cellulose and starch), which are transformed into monomers (35…55%) in the soluble easily-digestible form (almost 2 times more than in raw materials in hidden form). The mechanism of mechanical destruction of protein and its nanocomplexes connected with mechanical cracking is revealed. It is found that steam treatment and fine-dispersed grinding of peas during the reception of fine-dispersed puree results in the destruction of polysaccharides due to non-enzymatic catalysis, particularly, cellulose and starch.
(30…35%), protopectin (55%) into separated monomers. It is shown that at that time, glucose increases in nano-puree from peas (1.0 g…10.0 g/100 g in other words 10 times).

The complex use of these processes is accompanied by mechanical destruction, mechanical activation and mechanolysis of biopolymer nano-complexes (protein, heteropolysaccharides, etc.) to α-amino-acids, glucose, etc. (48…52%).

**Keywords:** nanotechnology, fine-dispersed grinding, mechanical destruction, activation, mechanolys, nano-complexes, biopolymers, heteropolysaccharides.

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**ORGANOLEPTIC CHARACTERISTICS AND TASTING ASSESSMENT OF FRUIT BARS ENRICHED IN DRIED THALLI OF LAMINARIA AND WAKAME**

V. Yevlash, V. Gorban, S. Nikitin

Today, the question concerning the lack of iodine in the diet of humans arises sharply. Iodine is necessary for the synthesis of thyroid hormones responsible for human development and rate of metabolism. Seaweed is a rich source of iodine. Seaweeds contain nutritional elements such as proteins, carbohydrates, vitamins and minerals. Laminaria and wakame are the most popular seaweed in human nutrition. Laminaria and wakame are rich in sodium, potassium, calcium, magnesium, phosphorus. These seaweeds are an excellent source of iodine amino acids. Algae have become a major ingredient in different food products in many countries (in particular Japan, Korea, China, Norway, Sweden, Iceland, Denmark, Belgium, France, United Kingdom of Great Britain and Northern Ireland). Nowadays seaweeds (especially it concerns laminaria and wakame) are becoming increasingly popular in the diet of Ukrainians.

Snacks (fruit bars) are gaining popularity around the world due to natural ingredients, absence of heat treatment, that allows maintain high content of vitamins and minerals. Therefore, it was decided to enrich fruit bars in dried thalli laminaria and wakame. Organoleptic quality parameters and tasting assessment of the received fruit bars are studied. The optimum mass fraction of dried shredded laminaria and wakame thalli in fruit bars by the organoleptic characteristics is determined.

Adding 0,7% dried thalli of laminaria and 2% wakame, optimum organoleptic properties are specified. To assess organoleptic tasting parameters, a special sensory analysis was held. It confirmed the percentage of the introduction of ground thalli dried laminaria and wakame. Studies change of the chemical composition of fruit bars containing algae.

**Keywords:** thalli, iodine, laminaria, wakame.
PERFECTION OF TECHNOLOGY OF SAUSAGES WITH QUAIL MEAT

V. Yevlash, D. Hrynova

The market of products with poultry meat is poor. Lately the breeding of quails is developing though the using of these kinds of meat is rare in producing of meat products. The quail meat is rich in valuable enzymes and vitamins E and A. It is a dietetic product and the use of this meat in formulation of meat products can enrich them in valuable enzymes and vitamins. The goal of researches is the perfection of the technology of sausages with quail meat. The chicken meat was replaced for quail meat in forcemeat system at used for producing sausages. There were two samples: control with chicken meat and experiment with quail meat. The sensory properties of experimental sample did not differae from the control sample. But structural properties of experimental sample became better than control sample and improved the structure of forcemeat system. It became much more softer. Functional and technological properties of experimental sample were improved thanks to quail meat. The forcemeat system of experimental sample had better moisture binding and holding properties that made the structure of forcemeat softere and more fluid. The property to increased emulsion in experimental sample in comparison with control one. The technology of sausages was perfected due to introducing of quail meat. The parameters of technological process did not change. Microbiological qualities were also determined after the sausages production and in 72 days of storage. They conform to the standards.

Key words: technology, perfection, composition, meat, quail, sausage, chicken, forcemeat system, properties.

CREATING NEW THERMOTEHNOLOGI OBTAINING QUALITY FOLATE CONTAINING FUNCTIONAL POWDERS

Y. Snegkin, Z. Petrova, V. Pazyuk, V. Dub

The use of new technological approaches to solving problems associated with obtaining high quality powders containing folate. The result is a energy-efficient technologies to reduce the cost of heat in the processes of preparation and drying of raw materials. The proposed measures to stabilize folate containing raw materials by introducing a raw material compositions high in vitamin C, folate can reduce the loss of raw materials without pretreatment. Selection of compositions improves the organoleptic and physical-chemical properties of food powders and products from them.

The base of folate containing is a green pea, an asparagus bean, a spinach with adding a zucchini, an apple and onion. The green pea clicks at the special machines and cut the asparagus bean, the spinach, the apples and the zucchini 0,5×0,5 centimeters. According to literature date, the green pea, the asparagus bean and the spinach always blanch before drying. The reason of blanching is to increase the flexible of fruit tissue, to
inactivate enzymes, to improve the penetration of the fruits outer and to delete the air from the tissue.

Based on the features of folate contains, the green pea and the asparagus bean was blanching for 2 minutes at the temperatures of 85…90 °C in soft modes. The spinach was soaking for 5 minutes at the temperature of 20…25 °C in the water. There are minimum loss of vitamins and other bioactive substances in such modes. We are adding raw ascorbic acid to folate contains in proportion 2:1 in order to stabilize folates.

By using suggested technology of previous processing (3, 4) the researching of folate contains showed the level of folate among the others modes.

It was created a composition for stabilizing folate in folate contains called “asparagus been-onion”. The researching of drying “asparagus been-onion” was carried out at convective drying stend with temperature changes of heating medium from 60…100 °C.

The temperature rise of heating medium significantly intensifies the process of drying folate contains material. So increasing temperature degrees from 60 till 70 °C reduce the period of drying at 21% in folate contains composition “asparagus been – onion” (picture 2.a).

The maximum speed of drying with temperature in 100°C in the mix “asparagus-onion” is 28%/hour, what is in 1,75 more than drying mode with 60 °C (picture 2, b).

A choice of drying mode first of all connected with quality value of conservation on folates after drying. The researching of temperature influence of heating medium during drying on contents of folates in the asparagus been and in composition “asparagus been – onion” is showed at picture 3. The increasing temperature of heating medium also makes negative influence on the asparagus been because 72% is lost with 80 °C, and further temperature increasing till 100 °C makes 91% of losses.

Designed composition of folate contain and drying modes help to save the contents of folates to 31% after drying. The contents of folates is 71% when temperature of heating medium is 60°C in dried composition, with the temperature increasing from 80 °C till 100°C this degree decreases till 48% and 18%.

In comparison with mono raw materials the folate containing save in composition even when the temperature of heating medium rises. The conducted researches have shown that the temperature and components of the composition influence on stability of the folates during the drying.

Keywords: folate, heat technologies, drying, energy efficiency, powders, quality.

THE USE OF TAGATOSE AND MALTITOL FOR THE MANUFACTURE OF MASTICATORY CARAMEL FOR SPECIAL PURPOSES

A. Dorokhovych, O. Bogok, L. Mazur

The authors consider worldwide studies aimed at finding alternative to white crystalline sugar in foods for people with diabetes. Among a number of mono - and disaccharides, monosaccharides a significant advantage belongs to tagatose, which has low glycemic index (GI = 3.0%), low calorie 6.28 kJ (1.5 kcal / g) and prebiotic
properties. In Ukraine, such innovative food product has never been used in the manufacture of confectionery products. At National University of Food Technologies for the first time, the investigations on using tagatose for the manufacture of different groups of confectionery products were carried out. The use of tagatose in the manufacture of chewing caramel has at least three advantages: it is low-caloric structure-forming agent, creates prebiotic effect and improves taste. Owing to similarity of the physicochemical (viscosity of water solutions, hygroscopic property, water-retaining power, etc.) and organoleptic (sweetness, taste) properties of tagatose with the properties of saccharose, it is a convenient sugar analogue in the technology of confectionery products.

The feasibility of using tagatose with anti-crystallizer polyol maltitol was established, and to prevent staling as water-retaining materials, glycerin should be used. By using mathematical 4-factorial, experiment method was established, the optimal ratio of raw ingredients tagatose, maltitol, gelatin, glycerin 70: 30: 8.0: 2.0, which is the basis of candy recipes "Magic of taste". The authors developed well-maintained chewing effect for 6 months by means of this method. By means of DRON UM-1 diffractometer it was established that during 6 months of storage, substantial crystalline structure of caramel increases. Calculations of energy value, glycemic showed that caramel "Magic of taste" deserves the label "Product with reduced calorie", "Product with the reduced glycemic", Chewing caramel "Magic of taste" has dietetic functionality and can be consumed by all groups, including people with diabetes. At the XVI tasting "Sweet triumph 2015” competition chewing candy "Magic of taste” received the diploma "Triumph of innovation.”

Keywords: masticatory caramel, monosaccharide tagatose, polyol maltitol, glycerin.

TECHNOLOGY OF DIETARY SUPPLEMENTS FROM AGARICUS BISPORUS

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The aim of the existing technological schemes of mushrooms processing is getting only one specific component. They do not allow using the potential of other valuable physiologically active substances of raw materials. From the viewpoint of resource management, this approach is impractical. It is necessary to develop the technology of regional mushroom processing for producing a number of products with different chemical composition and action. The proposed technology involves obtaining specific complexes of biologically active components from the cultivated Agaricus bisporus. The scheme consists of the extraction of alcohol-, water-, acid- and alkali-soluble substances. The product No. 1 – alcohol-soluble substances – contains mannitol, low molecular weight carbohydrates, protein and phenolic substances. It is shown that this product can be used as a dietary supplement with antioxidant and prebiotic properties. Therefore, food supplements intensify the process of dairy products manufacture. No. 2 product – water-soluble substances – includes protein, carbohydrates and phenolic substances. It is determined that this
product can be used as a food supplement with high foaming properties in the biscuit production. By varying the alkali treatment conditions, such products as insoluble biopolymer complexes with different chemical composition and physiological properties can be obtained. The components of these complexes are chitin, glucan, protein and melanin. No. 3 product (dietary supplement with adaptogenic activity) shows high levels of antioxidant and prebiotic properties. It showed its adaptogenic activity in vivo test. The possibility to add this supplement to the waffles without the finished product quality disruption is determined. The reasonability of adding it to the chopped meat half-finished goods is shown. No. 4 product is a dietary supplement possessing high sorption and immune-modulating properties. It is determined in vivo test that it helps to stabilize the activity of liver enzymes and the amount of immune response mediators when laboratory animals are exposed to the xenobiotic.

Keywords: Agaricus bisporus, dietary supplement, food supplement, technology, chemical composition, properties.

PEQUILARRITIES OF RETENTAT USAGE WITH THE PURPOSE OF RECEIVING HIGH-QUALITY BEVERAGE OF HEALTH-IMPROVING CHARACTER

I. Ukhanova

Whey is a secondary raw material and biologically valuable dairy product and that is why beverages produced on its basis can be affordable in price for the majority of population. The main part of whey solids is lactose – "optimal" carbohydrate. Full-value protein of whey contains balanced composition of essential amino acids biological value of which is very high – 112% relative to the standard.

Assessing the forecasts for the nearest future and taking into consideration the fact that the potential of this innovative material is not exhausted we offered drink technology with the usage of retentat as the basis. The retentant appears to be concentrate in the processing of whey by nano-filtration. All useful whey components transfer in it except for water (permeate) and natural carrot juice.

Carrot juice is one of the richest sources of microelements and nutrients. Besides beta-karotin it includes in its components vitamins A, C, B, E, D, K. It also contains proteins, potassium, calcium, phosphorus, zinc, aluminum, sodium, manganese, iron, copper, selenium, chlorine, sulfur. All these components of carrot juice are very necessary to human organism. That is why, thanks to successful combination of vegetable filler and retentat and we got food product which has a good taste, smell, color and high-quality wellness properties, providing organism with essential micro-elements and nutrients. Received beverage was investigated for microbiological parameters. We have fulfilled a number of inoculations to determine KMAFAnM, enterobacteria, BGKP, mold and yeast. As a result of experiment series the absence of colonies number excess was found in 1 gram of
product. It proves that received drink may be used in daily human diet and provide a favorable effect on organism.

For substantiation of preservation duration and investigation of carrot juice influence on the retentat quality in the process of storage the dynamics of organoleptic (color, taste and smell, texture, appearance), physical and chemical (volumetric and active acidity) indicators were studied. Counted by commonly known technology the shelf life of readymade product which is set within 2/3 of product preservation period and which does not change the quality and safety of the readymade product in the result of study showed that microbial count and the number of pathogens within 120 hours do not exceed requirements of regulatory documentation but within 180 hours – they exceed.

Improvement of beverage production technology from retentat concentrate and natural carrot juice proved that the whey beverage production can be carried out without additional investment in equipment and energy saving.

Keywords: whey concentrate, retentat, carrot juice, nanofiltration, drink, study.

THE PECULIARITIES OF USING WHEY AND RETENTATE, OBTAINING OF HIGH-QUALITY HEALTH BEVERAGE

J. Nazarenko, S. Yashchenko

The article compares characteristics and chemical composition of different types of vitamin serum, highlights the state of manufacture, product range in Ukraine and abroad, the ways of domestic sales of milk and dairy products.

The current level of membrane technology enhances the processing of whey in dairy industry. Among modern membrane technology in Ukraine, Nano filtration acquired practical application, through which the concentration of whey ensure a mass fraction of solids of 20–22%. The product with the improved technological properties, easier to further processing may be subjected to transportation, can be implemented to other companies in the form of liquid and dry concentrates, or used in the production technology of dairy products. Therefore, using Nano filtration is appropriate for the concentration of whey during the production of drinks based on retentate.

The article presents the results of the research of whey (obtained in the production of hard cheese) and retentate obtained by concentrating whey through Nano filtration using physical-chemical, microbiological and organoleptic characteristics. Taking into account good technological properties and high biological value of whey and retentate, and in order to expand the products’ range, to meet consumers' needs, drinks with balanced protein and carbohydrate composition for health food were created. Fruit and berry fillings (juice "apple-pear" and "strawberry-cherry") were taken; their qualitative composition and compounding were calculated, after which experimental samples of drinks were prepared. The next stage of research was to determine organoleptic, physical,
After a series of studies, we can draw the conclusion that due to the peculiarities of composition and properties of whey and retentate, and their successful combination with vegetable filling, we have high-quality health food drinks with good physical, chemical, microbiological and organoleptic characteristics.

**Keywords:** whey, Nano filtration, retentate, lactose, mineral composition, solids.

**FOUNDATIONS OF BALANCED DIET MODELING IN THE DISORDERED ECOLOGICAL SITUATION**

N. Dzyuba, E. Zemlyakova, E. Pedak

Scientific and technical foundations for mass food production, child preventive, therapeutic and special food products developed by scientists on sufficient theoretical and applied levels point to adjust the basics of good nutrition. The article analyzes the factors influencing human health, among which heredity – 10%; environment – 10%; level of health care – 10%; lifestyle – 40%; quality of food – 30% dominate. Analysis of modern human food shows the lack of essential nutrients. Detailed recommendations on nutrition use are suggested. The article analyzes the flow of nutrients and dietary fibers, considers the ratio between primary nutrients and bacterial metabolites in physiological and pathological conditions.

An important requirement to rational nutrition is its compliance losses of body energy, so ratio of proteins, fats and carbohydrates in the diet for different population groups are reviewed. A definite correlation on macro-value components, which occurs due to their better assimilation and provision of necessary body substances such as amino acids, fatty acids, simple sugars is analyzed and recommended.

In terms of physiological and hygienic food basics, it is necessary for a human to have all essential ingredients in his diet. Food rations should be balanced in protein, fats, and carbohydrates. The possibility of nutrition development for people is reviewed. Recommendations for composing nutritive menus in terms of damaged ecological condition are proposed.

**Key words:** nutrients, quality of products, energy value, complex nutrition.