

ABSTRACT AND REFERENCES

TECHNOLOGY AND EQUIPMENT OF FOOD PRODUCTION

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STUDY OF DIETARY FIBER PROPERTIES IN DAIRY MIXES CONTAINING MODIFIED FAT COMPOSITIONS (p. 6–13)**Olena Grek**National University of Food Technologies, Kyiv, Ukraine,
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This paper reports a study into the properties of dietary fiber with a varying degree of treatment in dairy mixtures with the modified fat composition to prevent the outflow of milk fat.

We have established the technological characteristics for the wheat dietary fiber Vitacel, extruded wheat flour and rosehip meal, specifically the capability to absorb humidity and fat, as well as to swell. The highest value for fat-absorbing capability was determined for the dietary fiber Vitacel at the level of (59.0±0.5 %). The optimal parameters for swelling plant-based ingredients were defined: temperature is (40±2) °C, duration is 30...40 min.

The method of IR spectroscopy was applied to identify and compare the forms that bind moisture in the mixtures of dietary fiber with water and buttermilk. It was established that the transmission spectra of infrared rays for examined samples are similar in character. This indicates the formation of H-bound water poly-associates with the hydrophilic functional groups of the dispersed system, which promote the hydration and swelling of carbohydrates of food fibers.

Based on the indicators for thermal stability and the outflow of liquid fat we have found the rational amount of dietary fiber in mixtures with a maximally possible (up to 25 %) replacement of butter with rosehip oil. For the samples containing Vitacel in the amount of 0.3 %, as well as 2.0 % of rosehip meal, the degree of outflow of fat was registered at the level of 19.1 %. A rather low value for this indicator is the result of interaction between the dietary fiber of varying degrees of treatment and the water and fat phases of milk mixtures. Replacing a part of milk fat with oils in the manufacture of products with the modified fat composition changes the consistency and reduces stability in the process of butter-formation and dispersion of moisture in a finished product. The addition of dietary fibers that act as technological ingredients ensures the required consistency of mixtures with the modified fat composition.

Keywords: mixtures, dietary fiber, rosehip oil and rosehip meal, moisture- and fat-retaining capability.

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DEVELOPMENT AND SUBSTANTIATION OF THE TECHNOLOGY FOR PRODUCING STRUCTURED OLIVES CONTAINING THE ENCAPSULATED OLIVE OIL (p. 14–21)

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The technology of the production of structured olive containing the encapsulated olive oil was developed and substantiated. The technology is based on the structuring methods with the use of ionotropic polysaccharides. The developed technology belongs to the technologies of extrusive formation of food products in the medium of sodium alginate with obtaining structured form of olive, that is, its imitated shapes. The implementation of this method implies comprehensive processing olive raw material to obtain several kinds of new products – encapsulated olive oil, structured olive and their combined form. The product is a capsule in the shell of a gel forming agent with internal content of olive puree or the products of their processing (fiber, pulp) with evenly distributed olive oil capsules (filler of structured olive). It is possible to produce the structured olive of various diameters ($d=6...18$ mm), different color at various ratios of “inner content – shell”. Regulation of structural-mechanical and organoleptic parameters is achieved through the use of the mixed gel formation of related structure-forming agents (sodium alginate and agar). The alginic shell of the structured olive modified by agar makes it possible to ensure high acid resistance and stability of products over a long period of storage. Based on the complex of research, the main indicators of quality and safety of new product, the storage terms and conditions were established.

Scientific and practical experience during the implementation of the technology can be applied to different types of fruit and vegetable raw materials. This makes it possible to obtain food products with different physical form. Involvement in technological process of inferior parts of fruit and vegetable raw material makes it possible to recycle raw materials comprehensively, increasing the profitability and efficiency of technological processes. Structuring technology as a method of technological influence makes it possible to expand the range of food products and effectively control the chemical composition and nutritional value of structured products.

Keywords: structured olive, encapsulated oil, alginates, capsule formation, olive-based puree.

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DETERMINING THE EFFICIENCY OF SPONTANEOUS SOURDOUGH FOR STABILIZING THE QUALITY OF BREAD PRODUCTS IN BAKERIES AND CATERING ENTERPRISES (p. 22–35)

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Old baking traditions have been analyzed from the point of view of improving the technologies, assortment, and quality of bread products in modern enterprises of bread and restaurant business. Considerable attention has been paid to the problems that impede the introduction of spontaneous sourdough technology. The expediency of forming the theoretical basis of such technologies, specifying the requirements for raw materials, semi-finished, and finished products, and harmonizing the terminology, technologies, and regulatory documents accepted throughout the world has been emphasized.

The expediency of studying the authentic Ukrainian spontaneous wheat sourdough (hop and wine yeast), as well as traditional Caucasian pea-anise sourdough, has been substantiated.

The significant effect of formulation and properties of raw materials on the quality of sourdough has been established. It has been proven that sourdough acquires the required quality within 1–3 days when using wine yeast in the dilution cycle. Hop sourdough requires 7–8 days for fermentation, and pea-anise sourdough requires 15 days. Sourdough has general and specific properties: fermentation ability and acidity, special sensory and biotechnological properties, and microbiological composition. This affects the course of the technological process and requires adjusting the parameters of fermentation and sourdough bread preparation. Good sensory characteristics are typical for bread made with spontaneous sourdough. The ability of sourdough to inhibit the staling of products and prevent microbiological damage has been shown. It has been established that hop and pea-anise sourdoughs are stable for 90 days and wine yeast sourdough for 30 days of propagation.

The obtained results give grounds for asserting the prospects of using spontaneous sourdough in bakeries and catering enterprises. This could be the basis for developing recommendations for problem solving and forming high-quality products and expanding the range of modern industrial and craft enterprises.

Keywords: spontaneous sourdough, hop sourdough, pea-anise sourdough, wine yeast, national bread.

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STUDYING CONSUMER PROPERTIES OF THE DEVELOPED CUPCAKES USING NON-TRADITIONAL RAW MATERIALS (p. 36–45)

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We have investigated the influence of non-traditional raw materials of plant origin and natural additives on the formation of consumer properties of cupcakes with improved composition. We have defined and scientifically substantiated the formulation composition, as well as proposed model samples of cupcakes, based on the performed analysis of the organoleptic, physical-chemical indicators, food and biological value. Assessment of the organoleptic indicators was carried out based on the developed estimation scale considering such indicators as taste, smell, view at fracture, color, surface, shape, consistency following the introduction of the indicator for flavor; profilograms for samples were constructed. Based on the performed organoleptic assessment, it was established that the devised cupcakes, with the introduction of alternative raw materials to the formulation, have a good taste, flavor; they were highly appreciated by a tasting board. Due to a change to the formulation, it has become possible to reduce the caloric value of products by 16–39 kcal/100 g. The new samples are characterized by a higher content of protein, by 18.9–31.8 % (cupcakes without filling) and by 1.6–1.7 times (cupcakes with filling), by a lower amount of fat, by 3.1–20.1 %, and carbohydrates – by 4.7–14.9 %. The content of essential amino acids was determined using the automated amino acid analyzer T 339. The new products demonstrated an increase in the content of amino acids, by 1.1–1.9 times compared to control sample. The fat-acid composition of cupcakes was determined by gas chromatography applying the gas chromatographer HP 6890. The ratio of proportion of unsaturated fatty acids to saturated acids in new products increased by 1.22–1.55 times. Mineral composition was determined by the method of atomic absorption spectrophotometry at the atomic-absorbing spectrophotometer C-115 PK. The content of mineral elements increased by 1.1–2.7 times, of vitamins – by 1.2–2.9 times. Based on the acquired data we have justified the feasibility of extending the range of flour-based pastry products with the new types of cupcakes

Keywords: cupcakes with organic flour, nutritional value, consumer properties, amino acids, fat-acid, mineral composition

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THE USE OF GOLDEN FLAX SEEDS AND OATS SOURBREAD IN THE PRODUCTION OF WHEAT BREAD (p. 46–55)

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In the course of development of bakery products enriched with physiologically active substances of non-traditional types of raw materials, cereal and oil-bearing crops enjoy popularity. The actual direction can be a combination of the use of oil-bearing crop in the form of crushed flax seed of light varieties and the cereal crop in the form of oats sourdough of spontaneous fermentation in the production of functional wheat bread.

The variety of golden flax was used in the course of the study. It was found in the research that the technologically possible dosage of crushed flax seeds is up to 20 % of the weight of flour. At this dosage, the products with the developed thin-walled porosity with a pleasant light-yellow coloration of the crumb and pleasant nutty flavor are obtained.

It was found that adding crushed golden flax seeds to dough results into lengthening of the duration of its kneading, worsening elasticity and increasing its dilution. A considerable decrease in the amount of gluten and its quality was noticed in the analyzed samples. It was also established that deterioration of fermentation of sugars, their accumulation and susceptibility of starch to amylolysis are observed in the dough system with flax. Such influence of crushed flax seeds is mainly caused by the influence of water-soluble dietary fibers that form mucilage when coming into contact with water during kneading dough.

The effectiveness of applying preliminary soaking of crushed flax seeds to improve the qualitative of products was proved. Soaking of crushed seeds contributes to the formation of larger amount of mucilage in liquid phase of the dough. This causes an increase of dough viscosity, which contributes to enhancement of the shape stability of finished goods.

It was proven that the use of oats sourdough of spontaneous fermentation in the production of bread, enriched with crushed flax seed contributes to the reduction of dough fermenting up to 60 min and the enhancement of its quality.

Keywords: seeds of golden flax, baked products, sourdough of spontaneous fermentation, dough viscosity, dietary fibers, α -linolenic acid, gluten, oatmeal.

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ESTABLISHING THE EFFECT OF EGGPLANT POWDERS ON THE RHEOLOGICAL CHARACTERISTICS OF A SEMI-FINISHED PRODUCT MADE FROM LIVER PATE MASSES (p. 56–63)

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Results of the study of functional properties of partially prepared liver pate masses with partial replacement of beef liver with edible eggplant powder (3 %, 5 %, 7 %) were presented. Structural and mechanical characteristics of liver pate masses partially prepared according to the conventional technology and those with addition of edible powders at various percentage ratios were studied.

Eggplant powder is characterized by high consumer characteristics and can be used in food products as a biologically active additive. It is the most promising raw material for creation of special-purpose products. Addition of powders expands the product range, affects chemical

composition of foods, improves organoleptic, physical, chemical, structural and mechanical properties of the final product.

It was established that introduction of eggplant powders to pate masses leads to significant changes in the structural state of partially prepared pates by changing numerical values of rheological characteristics and improving structure of the mixture. It was established that introduction of eggplant powder leads to an increase in the moisture-binding and moisture-retaining capacities of the partially prepared liver pate mass which positively affects plasticity and softness of the product. This is explained by the fact that introduction of powders into partially prepared pate mass leads to an increase in the mass fraction of the high molecular weight substances capable of swelling accompanied by binding and retaining of moisture. Proceeding from the experimental data, it was found that the liver pate mass with a 5 % content of eggplant powder had optimal structural and mechanical properties.

The rational weight fraction of partial replacement of beef or chicken liver with the developed edible powder due to which the systems are characterized by the highest functional and technological parameters was substantiated.

Proceeding from the data obtained, it was proved that the use of eggplant powders for the production of partially prepared liver pates is possible. The study results can be used by food industry enterprises to expand the product range.

Keywords: eggplant powders, liver pate mass, structural and mechanical indicators, rheological properties.

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PREPARATION OF TRITICALE FLOUR BY ION-OZONE TREATMENT FOR PASTA QUALITY IMPROVEMENT
(p. 64–73)

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Currently, much attention is paid to the production of organic food. The scientific concept of nanoscience examines the synthesis of an ion-ozone mixture without harmful impurities of nitrogen and carbon oxides in the processing and preservation of food products based on different polarities of electrical current. The negative polarity of the ion-ozone mixture and the positive polarity of the product being processed using cavitation in the electromagnetic field increase the biological and ecological value of the products. Expanding the range of pasta for various categories and segments

of the population requires the use of advanced raw materials, which include triticale grain.

The method of improving the quality of triticale grain with cavitation and without cavitation on ion-ozone equipment and further processing into flour is proposed. On the basis of full-factor experiments 2³ and 2⁴, regression equations have been developed that allow comparing the results of ion-ozone treatment with each other and revealing the basic technological properties of triticale of the “Taza” variety. The input variables are parameters of ion-ozone treatment (ion-ozone concentration, humidity before processing and processing time) and ion-ozone-cavitation processing (overpressure, ion-ozone concentration, humidity before processing and processing time). Output variables are: from the indicators of physical properties – density, mass of 1,000 grains; from biochemical properties – mass fraction of protein and content of raw gluten, and macaroni properties – grain hardness and specific work of deformation. This allows evaluating the effectiveness of using it in pasta production.

It is proved by experiments that the technological properties of the control and ion-ozone treated samples are significantly different. The proposed technology of ion-ozone cavitation processing of triticale grain at grain-receiving enterprises allows improving physical, biochemical, and pasta properties of flour, which increases the efficiency of pasta production by more than 15 %.

Keywords: triticale, ion-ozone cavitation, ion-ozone equipment, full-factor experiment (FFE), pasta production.

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STUDY OF QUALITY INDICATORS FOR MEAT RAW MATERIALS AND THE EFFECTIVENESS OF A PROTECTIVE TECHNOLOGICAL METHOD UNDER CONDITIONS OF DIFFERENT CONTENT OF HEAVY METALS IN A PIG DIET (p. 74–81)

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The paper report results of research related to studying a change in the qualitative indicators and technological properties of meat and lard of swine under conditions of different diet compositions, specifically, with the addition of lead and cadmium (combined and separately) at the dose of 20 maximum permissible concentrations. The evaluation of effectiveness of the protective technological method (feeding experimental plant additive) at the simultaneous arrival of heavy metals with feed was given in order to restore the quality of swine production. It was found that lead and cadmium, both at combined and at separate arrival with feed to the organisms of young pigs had a negative impact on the nutritional and biological value of pork and its technological properties. Their influence led to a decrease in the calorificity of meat, retaining protein, fat, dry substances in it, while the most sufficient changes were observed in the animals of group IV, where lead and cadmium arrived at the same time. Active acidity of meat and its moisture-retaining capability of animals of all groups were within the norm. However, in animals that received elevated doses of heavy metals with feed, the pH of meat changed slightly toward the neutral medium (pH is 5.3–5.5, while control value of pH is 5.1), the moisture-retaining ability of the meat of the studied animals ranged from 55.1 % to 56.5 % (control was 55.1 %). The influence of diets with different composition resulted in a change of the qualitative indicators of lard of the studied animals, at this, there was a reliable increase in the percentage of dry matter (up to 2.84 %) and fat (up to 2.79 %) compared with the control. Feeding animals with the experimental plant additive along with the feed that contained heavy metals contributed to the enhancement of the calorie content of meat (up to 19.4 %), dry matter (up to 9.4 %), the protein-quality indicator (up to 5.9 %) compared with the animals that received heavy metals with the feed, but without the application of this technological method. This technological method also contributed to the technological improvement of the qualitative indicators of lard of the animal. Specifically, we noted an increase in the percentage of dry matter (from 0.4 % to 2.5 %), fat (from 0.7 % to 3.2 %) and a decrease of cell membranes in lard (from 8.6 % to 25 %) in comparison with the indicators of animals of groups I–IV and their approaching the control indicators.

Keywords: pork, lard, quality, heavy metals, moisture retaining ability, experimental plant additive.

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