Section 3. **IMPROVEMENT OF FOOD PRODUCTS QUALITY**

**USE OF DIHYDROQUERCETINE IN ALCOHOL-FREE BEVERAGES**

V. Mykhailov, O. Mayak, A. Sardarov

In the article, the authors consider the modern market of energetic alcohol-free beverages – the products aimed at the increase in human mental and physical performance and endurance in general. The described main components are caffeine, taurine, guarana, ginseng, and others. The rules of drinking beverages with energetic components are to be carefully used. In the article the possibility to be useful or harmful for the organism depending on the application of the product is studied. It is recommended to use dihydroquercetine in the recipes of soft energetic beverages as poly-vitamin means – flavonoid received from the Siberian larch (Larix sibirica Ledeb) and Dahuric larch (Larix dahurica Turcz).

Dihydroquercetine is famous for its health-protective properties, possesses intense anti-fungal and microbicidal properties, and helps slowing down various inflammatory processes. It is natural hepatoprotector due to fixation and removal of toxins and metabolic products out of the human body. This substance is fine-crystalline amorphous powder from light-yellow to yellow color, scentless, slightly bitter and acts as an antioxidant. The experiments showed that the powder was practically insoluble in water. Results of the experiments regarding solubility of dihydroquercetine in spirit, propylene glycol and glycerin are described; the recommendations concerning the amount of this component introduced to soft drinks are given. The investigations showed that dihydroquercetine could increase the terms of drinks storage 1,5-4 times. Besides, it can slow down the development of microorganisms in the products, where the processes of contamination have already begun. Quantitative determination of dihydroquercetine in the composition of beverages results in the following: with the increase of the term of the product’s storage the amount of dihydroquercetine falls down by 10...15% for the first month, then the rate of decrease slows down and grows up by 20% to the six-months term of storage. Besides, dihydroquercetine possesses high technological qualities with low gustatory threshold in the beverage.

**Keywords:** energetic alcohol-free beverages, dihydroquercetine, antioxidant, caffeine, taurine, guarana.
THE STUDY OF THE PROPERTIES OF PROTEIN-FATTY EMULSIONS FOR MEAT-CONTAINING SEMI-FINISHED HEALTH-IMPROVING PRODUCTS

V. Pasichniy, A. Geredchuk, M. Gerasimenko, I. Nevodyuk

Today, scientists carry out active research towards the development of the market of structured products, which must comply with the balance and adequacy of supply. Improving functional and technological properties of stuff systems based on meat chickens of industrial fattening and modeling of optimal chemical composition of culinary semi-finished products, fundamentally new formulations of carotene-containing protein-fatty emulsions based on pumpkin pasta, milk, vegetable oil, chicken skin, protein-containing additive ScanPro and silica were developed. The relevance of the work proves that carotenoids are unique powerful antioxidants, which have anticarcinogenic, cardio-protective and immunomodulatory actions. They relate to the components of a biological system protection in a human organism.

The studies show that the developed emulsion was characterized by great structural-mechanical properties (viscosity, plasticity). Physical, chemical and rheological indices of finished culinary products demonstrated that the adding of carotene-containing protein-fatty emulsions improved functional and technological characteristics of products. In the research, the samples with moisture-coupling capacity (from 76 to 97%) and the output of semi-finished products were increased. Organoleptic quality assessment of the improved croquettes showed the increase of consumer properties, particular products differed by the best taste, color, texture, juiciness, appearance at the cutting. Advanced culinary semi-finished products possess high biological value and a balanced amino acid composition.

The studies confirm the feasibility of adding carotene-containing protein-fatty emulsion into the formulations of meat-containing culinary semi-finished products. It gave the opportunity both to reduce the cost of finished products and to expand the segment of prospective customers, and to create a new product, balanced on chemical composition, with excellent organoleptic properties, which has medical-and-preventive properties.

Keywords: protein-fatty emulsion, meat-containing culinary semi-finished products, carotene, rheological properties.
YIELD OF FLOUR FROM SPELT GRAIN DEPENDING ON HUMIDIFYING AND SOFTENING GRAIN

N. Osokina, V. Lubich, V. Voziyan

Flour is an important raw ingredient for the production of essential food products, especially bakery ones. In the manufacture of flour, technological properties of grain are taken to evaluate for yield, ash content and brightness. Yield and quality of finished products depend on the characteristics of the anatomical structure of caryopsis, relative content of the endosperm (kernel), shape and size of grains, features of organization and carrying out technological process. Grain moisture, ways of its preparation and final processing have a direct effect on yield and flour quality.

Wet-heat treatment is an integral component in graded grinding of grain. Its use is caused by that fact that complex influence on grain with water followed by grain softening leads to changes in its physical and chemical properties. Because of WHT, there is a decrease of grain density that means lost the original dense structure of endosperm. Endosperm destruction results in micro cracks generated during water penetration into caryopsis, changes of supramolecular structure of grain biopolymers and conformation of their macromolecules due to the flow of hydrolytic biochemical processes.

The degree of transformations of structural and mechanical properties of grain and density changes depend on the modes of processing – the duration of humidification/softening, degree of hydration, processing time and individual properties of a grain sample – from the initial density and strength of its internal starch part that means the endosperm microstructure.

The study was carried out in the laboratory of the Department of Technology of Storage and Processing of Grain of Uman NUH. For the experiment spelt grain of Zoria of Ukraine variety was used (grain unit 720 g/l, vitrescence 75%) grown in Right-Bank Forest Steppe.

In the result of studies, it is found that flour yield of spelt grain and its brightness varies significantly depending on the level and duration of softening. With the increasing grain humidity during softening, flour quality of spelt grain significantly improves. The best variant of flour production of spelt grain is grain humidification to the moisture content of 15% lasting 15 hours of softening as the highest yield of flour (83.2%) with brightness of 56.3% is obtained.
DIRECTIONS OF REFORMING FISHING SECTOR IN UKRAINE

O. Sydorenko, V. Korotetskyy, N. Bolila

For the last decades in domestic fishery we can observe deep structural deformation, lag from world rates of dynamic development, reduction of fish production indicators of the predicted level of quality and level of its consumption by the population of Ukraine, with an excessive share in domestic market of the imported fish and fish production. At the same time one of the main indicators of a country’s food security rate - average per capita consumption of fish - decreased from 20 kg/year (1991) to 9,5 kg/year (2014). Imported fish production is potentially dangerous in the absence of effective professional state control.

The aim of the article consists in systematization of analytical and practical results of researches and definition of the strategic reforming directions of fishery industry in Ukraine.

It is defined that ensuring food security of the state on condition of a sustainable development of fishery industry by legislative, financial and institutional transformations and introduction of a number of strategic actions for development of real sector of economy, social and ecological stabilization have to be the main strategic objectives of reforming in fishery industry.

The main directions of Ukrainian fishing industry reforming are:
- modernization of public administration system and restructuring of government bodies of executive power in the field of fishery;
- accumulation of Ukrainian aqua-cultural capacity and its realization;
- fight the strengthening of illegal, not accountable and unregulated fishery;
- study and introduction of experience of the European Community countries in Ukraine in questions regarding recreational fishery and the sphere of fishing tourism;
- realization and development of the sea and oceanic fishery direction with the involvement of the investor;
- attraction of financial and technical assistance and leading international experts for studying and assessment of the conditions of sea and fresh-water fish species for the increase of accuracy and representativeness of the results of research concerning fish population;
- legislative initiatives which will give incentives for the development and accumulation of fishery capacity in Ukraine based on the responsibility,
– industrialization and efficiency of the use of natural resources. The following indicators of successful realization of reforms can be proposed:

– the level of general production of fish;
– the share of the domestic fish market production and the level of average consumption;
– stock rate of water bio-resources of fishery reservoirs;
– ecological and biological indicators of the state of fishery reservoirs according to the requirements of WFD 60/2000/EU and increase in a fish productivity;
– the increase in the level of employees’ salaries of the sector and increase in the number of workplaces.

Keywords: food security, stable development, fishing industry.

INVESTIGATION OF SAFETY OF BOILED SAUSAGES WITH BLOOD COLOURING AGENT ACCORDING TO SANITARY AND BACTERIOLOGICAL INDICES

T. Kolesnyk, A. Kolesnyk

The formation of color of boiled sausages on the base of nitrites increases their toxicity and makes possible the accumulation of carcinogenic nitrosamines as a result of residual nitrite reacts with amino groups of meat proteins.

The technology of boiled sausage with the colouring agent from the blood of slaughtered animals – carboxyhemoglobin (NbSO) is elaborated. Use of the colouring agent allows reducing in the recipe of boiled sausage of sodium nitrite to 1.5 g per 100 kg of raw material. The minimum amount of sodium nitrite in sausage forcemeat stimulates the production of the finished product without residual sodium nitrite, which leads to the formation of nitrosoamines as a result of the nitrosing reaction in sausages, which are produced by traditional technology.

The problem of replacement of sodium nitrite by colouring agent is complicated by multifunctional role of nitrite in the production of sausages. Sodium nitrite addition to fixing of color specifically affects on the oxidation and microbiological stability, taste and smell of meat products.

Many researchers prove the ability of nitrites have an inhibitory effect on the development of different types of microorganisms (Salmonella,
Staphylococcus aureus, fungi) and toxin production, in particular, the accumulation of aphpolotoxin.

At present it is impossible completely eliminate use of nitrites in the technology of boiled sausages because of their inhibitory effect on microbial growth. There is necessity for researches to reduce the dosage of nitrites in sausages to the level which provides antibacterial activity of nitrites.

Bacteriological indices of boiled sausages of highest and first-rate quality were investigated. Sodium nitrite (1...1,5 mg%) in combination with the colouring agent from the blood of slaughtered animals – carboxyn in an amount of 1,5...3% by weight of minced meat was used as color maintenance component. It allows reducing the traditional dose of nitrites in 3,5...4,5 times.

The level of sodium nitrite replacement by colouring agent from the blood of slaughtered animals is established, it allows producing of boiled sausages which meet sanitary requirements according to bacteriological indices.

**Keywords:** boiled sausages, carboxyn, bacteriological indices, sodium nitrite, microbial number, colibacillus, Proteus, microflora.

**DYNAMICS OF QUALITATIVE CHARACTERISTICS OF FRIED SAUSAGES IN THE MODIFIED COVERS AT STORAGE**

L. Shubina, E. Domanova, V. Dzygar

Ukrainian market sells a wide range of sausages from domestic and foreign producers. Imported meat products are manufactured for long-term storage. Domestic producers submit perishable meat products, including fried sausages. Grilled sausages are produced only in natural membranes. The authors post the dynamics of qualitative characteristics of fried sausages in modified membranes during storage. The data for the determination of organoleptic and physical-chemical indicators of quality by organoleptic characteristics include appearance, color stuffing of the cut, the smell and taste, consistency. The scientists modified main physical and chemical indicators of fried sausages in natural membranes, their moisture content, pH, and mass fraction of salt. To improve protective properties and extend fried sausages’ shelf life, the processing of natural casings in extracts of yarrow and sage was performed. The content of the main components of yarrow and sage indicates the presence of tannins,
Some of them have natural shell, thus increasing the barrier properties of natural shells. Organoleptic and physical-chemical properties of fried sausage during storage in modified membranes are compared with grilled sausage. The shell with processed water extracts of herbs has better results. This suggests that the effect of extracts of yarrow and sage improve consumer qualities of the product, its appearance, increase of its shelf life. Based on the obtained results it was determined that dynamics of qualitative and quantitative characteristics of fried sausage in modified membranes storage makes it possible to speak about the lengthening of the shelf life of these products to 8 days, which is almost 2 times higher than the one specified in ISO 4433: 2005.

**Keywords:** fried sausages, storage, production, modified membranes.

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**THE RESEARCH OF QUALITATIVE CHARACTERISTICS OF FRIED SAUSAGE MODIFIED MEMBRANE**

O. Domanova, A. Il'chenko

Sausage products are the type of food that have relatively short term of storage. One of factors influencing on an expiration date and consumer properties of sausage products is a shell. Natural shells are universal in relation to their use for all types of sausage products. However, barrier properties of intestinal tapes are predetermined by the morphological features of the structure and the absence of effective methods of after-treatment of shells are the reason of their high permeability. Products’ mass carries considerable losses in the process of preparation and during storage. To Tom, with the aim of maintaining products’ quality at a production and during their life cycle, it is necessary to create natural shells with the increased barrier properties.

For today scientists offer various components for coverage of the fried sausages in natural shells. Nevertheless, chemicals that is not settled for the use in food treat these products. Moreover, protective composition of shells should promote barrier properties and be safe and ecological. Becoming familiar with scientific and technical literature and leaning on previous research it was suggested to use water extracts of hypericum and brier for the modification of shells. It was proved that tannic substances are contained in the water extracts of brier and hypericum at modification link albuminous connections that enter in the complement of natural shells.
Porosity of shells diminishes. It was confirmed, that using the water extracts of plants it is possible to get modified shells with the improved barrier properties. This, in its turn, will allow to use such shells for the improvement of quality of the prepared fried sausages. The results of using the modified natural shells with the aim of improvement organoleptic, physical and chemical indexes of the fried sausages “Ukrains'ka» are considered in this article.

Keywords: membrane extracts, brier, hypericum, sausage, organoleptic, characteristics.

USE OF MILK WHEY FOR OBTAINING EXTRACTS BASED ON STEVIA LEAVES

N. Yushchenko, T. Belemets

According to the analysis of literary sources it was suggested the use the herb of Stevia rebaudiana Bertoni to replace sugar in the composition of dairy products. It is proposed to use of distilled water and fresh milk whey as extractant. Stevia grows in Ukraine and it is a cost-effective raw material, which is 250-300 times sweeter than sugar. Production of stevia leaves extract with using fresh whey will further enrich it in valuable whey proteins, microelements, vitamins, etc. The rational conditions for the production of stevia leaves extract with distilled water as extragent are identified: duty of water – 10...15, temperature 70...80˚C for 20...30 min. Mass fraction of solids extract was 2,7...3% extractives matters. It is found that the optimum conditions for producing stevia leaves extract with the use of fresh milk whey as extragent: duty of water – 10...15, temperature 70...80˚C for 40...50 min. Mass fraction of solids extract was 3 ... 4, 5% of extractive matters. The extract obtained from dried leaves of Stevia used as extractant - fresh whey, has good organoleptic properties: moderately sweet taste without strange flavor, a pleasant milky, slightly grassy smell, brown, uniform color throughout the mass, and liquid, homogeneous throughout the mass, without extraneous impurities and sediment consistency. It is determined that the resulting organic extract is organically combined with the dairy foundation and can be used for the development of new technology of dairy products for full or partial replacement of sugar. Eating dairy desserts, which completely replaced sugar to Stevia extract, will not be denied to obese people and diabetics, because this extract will not provoke an increase sugar levels in blood.

Keywords: stevia, stevioside, extract, extragent, distilled water, fresh milk whey.
TWO STAGE BREAD BAKING WITH INTERIM VACUUM EVAPORATION COOLING

O. Kovalev, I. Mykoliv, E. Babko, R. Yakobchuk

Technology of bread production is time consuming and quite a long process. Due to the fact that this process includes many manufacturing operations, changes in length which leads to deterioration of product quality, traditional technology remained unchanged for a long time. This led to the limitation of range of bakery products; and the absence of fresh hot bread in the early hours; the creation of night shift and increase the burden on bakers working the night shift; and the lack of fresh bread at remote points of supply and trade. These problems caused by the continuity and long-term process of bakery products division helped to decide on the bread baking process steps for the increase or decrease of the length of intermediate processes that would allow the technology to make more flexible simultaneously reducing the quality of baked bread.

"Two-stage" baking with the help of intermediate vacuum evaporative cooling is a technical solution of these problems. A positive feature of vacuum evaporation cooling is simple speed control process. When vacuum-evaporating cooling structure damages ice crystals, it is impossible to get porous products because of positive temperatures for the entire period of cooling.

Technical implementation of new technology in bakery is the need to use the existing equipment with the addition of the mechanized complex for vacuum-evaporative cooling.

The conducted researches are aimed at identifying kinetic patterns and the development of physical models of heat and mass transfer processes in the interconnected dehydration, cooling, humidity transfer to vacuum evaporating cooling.

In this work, the "two-stage" baking by means of intermediate vacuum evaporative cooling, which allows baking bread directly on-site is elaborated. To enable implementation of this technology physical and mathematical model of the process are developed as demonstrated in this paper.

**Keywords:** baking, drying, convection, vacuum evaporation, cooling.