The article is devoted to the problem of the analysis of the expendable diets quality by biological value criterion. The results of quality estimation of 60 expendable diets of various types (for breakfasts and lunches, dinners and suppers) by the indicator of the generalized biological value are presented.

Biological value of protein in diets was estimated by the indicator of protein approximation to the ideal, or, which is the same, a generalized indicator of biological value of protein in a diet. It is the value characterizing the level of quantitative content approximation of essential amino acids in it to reference protein. To express this value mathematically, well-known values of amino acidic scores are used. The indicator of the corrected value of amino acid score is introduced, which may take the values from 0 to 100%. Moreover, if amino acid score is more than 100%, its corrected value is taken as 100%, if it is less or equals 100%, this parameter’s value matches the amino acidic score value.

The expediency of using the indicator of the generalized biological value in the diets for using them for daily diets optimization is established. It is determined that in case of critical value of $H_6 \geq 49$ indicator it is necessary to weed 3 diets, which do not satisfy the specified requirements, out of 60 expendable diets. 43 best expendable diets can be drawn in the result of double filtration – by the indicators of the groups of nutrients balance and the indicator of the generalized biological value. It is planned to elaborate software programme for automated selection of the best daily diets from the totality of the projected and filtered expendable diets.

**Keywords:** expendable diets, daily diets, nutrition system, index of nutrient groups balancing, indicator of the generalized biological value of protein, diets filtration.
EVALUATION OF QUALITY INDICATORS OF PRODUCTS PRODUCED UNDER THE CONDITIONS OF IR-HEATING IN GAS ENVIRONMENT

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General tendency of energy consumption, which has recently developed almost worldwide, indicates a significant increase in energy costs and a continuous increase in the cost of its generation. Considering this, the problems of creating and implementing modern low-energy processes, which ensure reduction of energy consumption in combination with the preservation of raw materials and other resources, become acute.

In this regard, the staff of the Department ofProcesses, Apparatus and Automation of Food Production in KhSUFTT are conducting research on the development of technology of production under conditions of infra-red (IR) heating in the conditions of the gas environment, designed for use at food enterprises, meat processing plants and home nutrition. Technological processes of meat products manufacture in infrared devices in gas environment (with high content of carbon dioxide), which reduce the duration of heat treatment and mass loss, are developed. The products’ distinctive feature is the presence of sunflower oil and chopped potatoes, panning with a dampened mixture of breadcrumbs and wheat flour. In assessing quality indicators, it was noted that minced meat for experimental products is close to the traditional ones by their structurally mechanical properties. Some decrease in the values of marginal shear stress and effective viscosity positively affects its plasticity, which facilitates the formation of products. The products meet the requirements of sanitary safety and the content of main nutrients approach the traditional products from minced meat, and additionally contain fiber. Significant increase in the content of polyunsaturated fatty acids in experimental products is determined. Improvement of organoleptic parameters of finished products is also noted.

Keywords: IR heating, gas environment, quality, culinary products, frying, heat treatment, chemical composition, penetration.

AN APPROXIMATE METHOD FOR FINDING OF A FUNCTIONAL EXTREMUM ON THE SET OF PERMUTATIONS

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The high computational complexity of the combinatorial optimization methods, the difference of the combinatorial properties of the sets which form the ranges of admissible solutions, are the reasons for the lack of unified approach to combinatorial optimization problems solving. The basic idea of the combinatorial methods consists in the transition from complete enumeration of finite set of solutions to reduced one. The impossibility of exact solution of combinatorial optimization problems of large dimension and specific limitations cause the
development of approximate methods, but these methods also have serious disadvantages such as the obtained local extremum may not coincide with the global one, it is impossible to estimate the difference between the local and global extremum a priori. On this base, the development of optimization methods for various classes of functions on combinatorial sets is the topical problem. The unified approach to the study of geometric design problems on the base of the formalization of the concept of geometric information and the introduced information space is proposed in the research. In the research the main attention is given to the problem of locating geometric objects, constructing of the mathematical model of this problem. The solution of the discrete geometric design problem is proposed with use of the method which bases on immersing of combinatorial sets in arithmetic Euclidean space. The formulation of the practical problem of geometric design is presented.

**Keywords:** discrete tasks, optimization, set of permutations, functional.

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**STUDY OF INTERACTION OF GELATINE AND VITAMIN C IN MODEL SYSTEMS**

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The necessity of taking into account the possible interactions between the vitamin and hydrocolloids which are parts of jelly or marmalade arises under enriching with vitamin C of such popular products among the population as jelly products. Gelatin is one of the structure-forming agents; it is widely used in food technologies. Gelatine is characterized by thermal reversibility, low viscosity and melting temperature and by the ability of protein structure forming. That is why this hydrocolloid was chosen for studying vitamin C nature and mechanism of its binding.

The objects of the study were model systems which contained 2% of gelatin and different amount of vitamin C. In this work the determining the amount of vitamin C content in different concentrations in gelatin solutions with use of the HPLC method for establishing the amount of bound vitamin C in these systems was carried out. The results of the study show that the difference in the amounts of the introduced amount of vitamin and amount determined by the HPLC method may be caused by the ability of gelatin to bind vitamin C.

IR spectra of dry membranes of model gelatin systems with the addition of vitamin C in different concentrations were studied for understanding the nature and mechanism of binding vitamin C by gelatin. The presence of large amount of water leads to the overlapping of virtually all characteristic bands of macromolecules under studying of systems which contain hydrocolloids. That is why in the IR spectroscopy of such systems the obtaining spectra samples in the form of membranes are preferred. The polymers aren’t destroyed during membranes producing. Disturbances because of unevenness arrangement of the compounds, as a rule, aren’t observed in the spectra under the homogeneity of the samples.
Comparison of the IR-spectra absorption of dry membranes samples of 2% gelatin and 2% gelatin with the addition of vitamin C showed the presence of vitamin effect on the state of gelatin. It is suggested that hydroxyl groups of gelatin for intermolecular interaction release. It leads to dilution of the system and the formation of molecular associates between gelatin and vitamin C.

**Keywords:** vitamin C, gelatin, model systems, HPLC method, IR spectra.

ANALYSIS OF DISADVANTAGES OF THE EXISTING METHODS OF DETERMINING FOOD PRODUCTS QUALITY BY COLOR

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On the basis of vegetable raw materials high-quality products of daily and long-term consumption are produced in the food industry. The main disadvantages of the storage and processing of natural vegetable raw materials are their sensitivity to the influence of environmental factors (oxygen, sunlight, etc.) and to the implementation of final technological operations during products manufacturing.

Determining the change and preservation of one of the main organoleptic, quality and application properties of food products made of vegetable raw material, namely color, is an important task. Determining the color of raw materials after any thermal, mechanical and other types of technological treatments, and even during storage of raw materials is a rather complex and technically expensive task and cannot always be used at the right moment of the technological process. According to many standards of Ukraine and the European Union the color is one of the most important organoleptic properties of food products made of vegetable raw materials. Various methods are used to determine the color properties of natural raw materials and their changes.

Currently colorimetric and spectrometric methods of research are increasingly used, which are in some degree more complicated on further processing of experimentally obtained research results. The analysis of existing methods has confirmed the advantage of the method of determining the color changes, in particular during the technological process, namely: a computer and digital research method based on the use of RGB mode and has advantages over existing methods used today. The advantages of the computer and digital method of researching the uniformity of changing the colored background of development prototypes during the technological processes are: ease of use, calculations, low cost of necessary equipment and the speed of the process under study. This causes
the expediency of further studies of this method for the determination of changes in color properties of food products based on vegetable raw material as one of the organoleptic factors.

**Keywords:** color, natural raw material, method, simplicity, computer and digital, quality.