

Development of Recipes by Mathematical Modeling

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Key aspects in the creation of functional food products is scientifically based selection of food ingredients with necessary medical and biological parameters, as well as developing new technologies that can significantly affect the organoleptic physico-chemical properties of raw materials and finished products, enhancing their nutritional value. Varying the composition of the recipe mixture one can achieve a certain physiological effects. The advantages of automatic recipe design in functional food products' creation is the ability to control their chemical composition by changing the proportion of certain components based on their properties. The optimal solution of these problems of food products design can be obtained through their mathematical descriptions, i. e. mathematical models that represent the analytical form of numerous functional relationships between technological, economic and other parameters of raw materials, desired characteristics of finished products (objective function) and the number of restrictions that are required by regulatory documents. Thus, mathematical and simulation modeling becomes one of the essential tools of solving optimization problems of food products' properties complex.

Among the different models of technological processes linear models occupy a special place. The essence of such objectives is to choose under the given criteria the optimal option through the directed variation of quantitative proportions of raw materials.

The solution of the problem is carried out in several stages: 1) formation of an information database that includes the chemical composition of ingredients, 2) creation of balance linear equation for the chemical composition of the final product (for fat, water, carbohydrates) 3) determination of technological limitations of the use of certain types of ingredients (salt, spices, etc.) according to technical standards, 4) selection of an optimization criterion for energy value of the product, 5) task solution by a computer math system, 6) analyze of the options of the developed multicomponent food products from technological and economic points of view, and choose the option that best meets the objective.

According to the authors, development of the abilities of optimization software will deliver a new level of development of new food products with a given chemical composition, consumer and technological characteristics. Design optimal composition food products' with the means of mathematical modeling methods will reduce the financial and time costs for food products developing. That will also enable to respond to the changing needs of the human organism in a technological society and expand the product range of functional and health-care aimed products focused on nutrition of certain population groups.

