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Lisitsyn AB, Chernukha IM, Nikitina MA. Designing multicomponent food products. Moscow, 2020

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Human life largely depends on the way nutrition affects our health. This fact explains the relevance of modeling multicomponent food products with preplanned nutritional and energy value. *Designing Multicomponent Food Products* was written by A.B. Lisitsyn, I.M. Chernukha, and M.A. Nikitina (Moscow, 2020). The book features such urgent problem of modern biotechnology as the basic aspects of multicomponent food design. The publication is intended for specialists in the field of food industry, biotechnology, food chemistry, nutritional science, and biomedicine, as well as for experts involved in design and technology of healthy, preventive, and personalized diets.

Biotechnology is currently getting extremely popular both in Russia and abroad. The authors believe that breakthrough science-intensive technologies will be able to provide the population with healthy and proper nutrition. Studies of the interaction of various nutrients and their effect on human health make it possible to determine the specifics of proper nutrition and identify the patterns of vital biophysical, biochemical, and energy mechanisms.

The book owes its scientific novelty to the comprehensive analysis of theoretical and practical aspects of multicomponent food design. The authors used advanced mathematical models that regulate the stages of functional food development. The method allowed the team to describe the changes in the chemical composition of the formulations, depending on the ingredient ratio and standards. This approach makes it possible to replace technological experiments with mathematical modeling.

The modern food industry includes thousands of raw materials, each with its own characteristics and functional, technological, physicochemical, and organoleptic profile. These parameters require systematization in order to optimize the design process.

The research has a distinct interdisciplinary character and unites biomedicine with theoretical and practical (digital) biotechnology. The textbook presents a theoretical summary of various studies in the field of food combinatorics. The material presentation is well-structured; it moves from general theory of biotechnology and food combinatorics to specific examples of formulation design for certain food products according to preplanned criteria. The chapters are arranged in such a way that they provide a clear systematic view of the functional food design.

The first chapter is entitled *Issues of International Food Regulation and Related Laws*. It features the existing nutrition strategies in the European Union, Russia, Great Britain, and the USA. It introduces the reader to the main issues of the book, its basic theoretical principles and concepts. The chapter shows how these concepts are being implemented nowadays and what they lead to.

The second chapter is *A Review of Design Methods for Multicomponent Food Products*. It examines the main findings and research results in the development of domestic food combinatorics. It traces the history of this science from its origins to the works of contemporary scientists. The authors analyzed publications that feature the principles and methods of designing the formulations of balanced food products. The initial stage included the development of theoretical foundations and specific methods of balanced food production. This stage was associated with the formalization of qualitative and quantitative ideas about the rational use of essential amino acids in the technology of adequate exotrophy. Nowadays, food product development includes not only nutritional and biological value but also medical, technological, economic, and social factors.

The third chapter, *Principles for the Development of Adequate Human Nutrition*, describes the laws of nutritional science, or nutritiology. It introduces the basics of human nutrition, depending on social factors (age, gender, workload, etc.) and various non-communicable diseases (alimentary-dependent diseases and socially significant non-communicable diseases). The authors see a need in a new scientific approach that they call digital nutrition. They believe that digital

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nutrition will deal with the digital transformation of data on physiological needs, biologically active substances, energy, and the chemical composition of basic food products. Specialists in digital nutrition will design computer programs that will develop personalized diet recommendations.

The fourth chapter, *Food Design*, outlines the main stages of multicomponent food design as a fundamentally new direction in food industry. It reveals the principles of food combinatorics and the stages of designing new formulations for multicomponent foods.

The fifth chapter is entitled *Cluster Analysis for Typology of Food and Dishes*. It introduces cluster analysis with its principles and methods.

The sixth chapter, *Examples of Computer-Aided Design of Multicomponent Food Products*, features designing a new formulation based on the optimal cost criterion, foods for anemia prevention, meat dietary products fortified with calcium, and curd products based on the energy value criterion.

The language of the book is clear, consistent, and laconic, which ensures effective comprehension. The authors use the essential terminology that shapes the scientific apparatus of future specialists. The good use of general vocabulary helps clarify the material and examples.

The information is well-structured; the main ideas and definitions are visually highlighted. The educational material includes a wide range of data visualization tools, namely diagrams, charts, tables, formulas, figures, infographics, etc.

The authors achieve their goals by analyzing theoretical material and giving specific examples of computer design of various multicomponent food products. The means and methods of material presentation correlate with the goals. The list of references and recommended sources includes relevant domestic and foreign scientific literature.

In general, *Designing Multicomponent Food Products* by A.B. Lisitsyn, I.M. Chernukha, and M.A. Nikitina provides its readers with a systematic understanding of the scientific and applied aspects of multicomponent food design. The book contributes to the fundamental training of professionally oriented specialists with deep knowledge in the field of biotechnology and nutritional science.