
INTRODUCTION

Focus on food system challenges

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In today's world, food systems are facing unprecedented challenges. The fragility of these systems is becoming increasingly evident as they are continuously strained by numerous factors, including climate change, population growth, resource shortages, and economic instability. One of the most pressing issues is the increase in food resource loss and waste, which not only exacerbates environmental degradation but also undermines food security. The monograph «Progressive Solutions in Food Technologies» addresses these critical challenges, presenting innovative technological solutions aimed at enhancing the resilience and sustainability of food systems.

Focusing on reducing food resource losses, promoting the rational use of secondary resources, enhancing the biological value of food products, and implementing advanced technologies in the food industry, this monograph highlights technological solutions designed to strengthen global food systems. Covering all aspects of food systems, from solutions for growing raw food materials, post-harvest handling, processing raw materials into final products to consumption, these technologies offer comprehensive solutions to current and future problems.

Food losses and waste are serious issues for global food systems. Post-harvest losses, inefficient processing methods, and improper storage are primary factors in the degradation of food quality and depletion of valuable resources. The monograph emphasizes strategies to mitigate these problems, including the use of advanced storage methods for fruit, vegetable, and mushroom products that account for the potential of the raw materials. For example, assessing the antioxidant status of vegetables and applying edible coatings with antioxidant properties can significantly extend shelf life and maintain quality, thereby reducing waste. Modern methods of optimizing post-harvest procedures and storing mushrooms have identified critical storage periods based on processing directions.

Another important aspect discussed in the monograph is the use of secondary resources in food production. The food industry generates a significant amount of

by-products, which, if not properly managed, can contribute to environmental pollution. However, these secondary resources have enormous potential for reuse in various applications. The monograph explores innovative uses of condensed low-lactose whey and fermented pumpkin pulp puree in dairy and sauce products. These ingredients not only enhance the nutritional profile of the final products but also represent a sustainable approach to managing food by-products. This approach allows for the efficient use of secondary resources while meeting diverse dietary needs, including lactose intolerance. Such innovations highlight the potential for creating high-quality, nutritious food products through the rational use of food by-products.

Focusing on improving the energy efficiency of the milk homogenization process, the monograph proposes homogenizer designs with the greatest potential for reducing energy consumption.

Enhancing the biological value of food raw materials is crucial for ensuring that food products are both nutritious and beneficial for health. The monograph presents several technological solutions aimed at increasing the nutritional value of food products. One study address feeding geese with extracts from oats and alfalfa to increase the biological value of meat and its stability during storage. Adding these extracts to the diet not only increased meat yield but also boosted protein content by 5.0 %, which is particularly important in the context of growing protein deficiency. The importance of mushrooms in the modern diet is also highlighted due to their functional properties. The monograph examines the expansion of the assortment and quality of cultivated mushrooms, establishing parameters for comprehensive quality assessment, as well as methods for evaluating and preserving their nutritional value.

Preserving the nutritional and biologically active compounds in food products is essential for maintaining their health benefits. For example, developing multilayer and glazed fruit and vegetable chips demonstrates how combining traditional ingredients with innovative processing technologies can create snacks rich in vitamins and minerals. Adding freeze-dried plant powders to these chips further enriches their nutritional value, providing consumers with healthier snack options. The monograph discusses advanced preservation methods, such as freeze-drying, which has proven effective in maintaining the antioxidant properties of cranberries. It also analyzes the technologies and biological value of new sauce products based on fermented hot peppers.

Improving the texture and stability of food products is another focus of the monograph. The use of *Phyllophora carrageenan*, a phycocolloid derived from Black Sea red algae, as a food consistency regulator exemplifies this approach. By utilizing the unique properties of natural ingredients, food technologists can enhance

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the texture and stability of food products, meeting consumer expectations while promoting sustainability.

We hope that the theoretical and practical aspects of technological approaches to process and system improvements proposed in this monograph will be useful for food industry professionals. Additionally, we aim to inspire researchers to address the complex challenges facing modern food systems, ensuring a more stable, nutritious, and sustainable food supply for future generations.