VOLUME 2

ADVANCES IN FOOD SCIENCE AND NUTRITION

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Advances in Food Science and Nutrition

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Preface

Advances in Food Science and Nutrition summarizes many of the recent technical research accomplishments in the areas of potato production, composition and starch processing; milk and different types of milk products; processing and preservation of meat, poultry and seafood; food ingredients; fruits and fruit processing; antioxidant activity of phytochemicals and their method of analysis; indispensable tools in food science and nutrition; transformations of food flavor due to elaboration of industrial processing; new trends in sensory characterization of food products, and; ultrasound applications in food technology. As the title indicates, the book emphasizes various aspects of the advances in food science and nutrition and their different applications for the food sciences and scientific community. It is written in a systematic and comprehensive manner and all recent advances are discussed in detail. It is very important to mention that till now, there have not been many books published on this topic.

In this sense, the content of this book is unique. It presents up-to-date records on major findings and observations in the field, and is intended to serve as a "one stop" reference resource for related important research accomplishments. The various chapters of the book are contributed by prominent researchers from industry, academia and government/private research laboratories around the world. Therefore, it will be a very valuable reference source for university and college faculties, professionals, post-doctoral research fellows, senior graduate students, food science technologists and researchers from R&D laboratories working in the area of food science and nutrition.

The first chapter on food chemistry and technology is an overview of the contents of the book. This chapter is essential for beginners since it provides a thorough understanding of the basics of food science.

Chapter 2 discusses potatoes and their production, composition and starch processing. The chemical composition of potatoes is explained along with the effects that cultivar, location, growth, fertilizer applications, maturity at harvest, and storage conditions have on them. A survey on milk and different types of milk products, their processing and preservation are covered in Chapter 3. Among the other topics discussed by the authors are milk production and quality.

Chapter 4 discusses processing and preservation of meat, poultry and seafood. Numerous topics are explored by the authors such as food quality characteristics; deterioration and microbial contamination; physical and chemical methods of preservation; preliminary processes; control of moisture and temperature; radiation and other technologies; various methods and compounds; microbiological contributions to meat; hurdle combinations of methods, and; atmosphere inside packaging.

Useful terminology and definitions are found in Chapter 5 on food ingredients. Also covered are food additives, novel and natural plant-based ingredients, and properties and applications of plant-derived ingredients. Chapter 6 discusses fruits and fruit processing. Included in the many subtopics are the effects of low temperature on fruits; modified and controlled atmosphere storage; modified atmosphere packaging; edible coatings; factors affecting fruit conservation methods; traditional preservation methods, and; modern preservation methods with minimal processing.

The authors of Chapter 7 on antioxidant activity of phytochemicals and their method of analysis address the importance of antioxidants in human health. Also addressed are natural antioxidants; methods used to measure total antioxidant activity; problems in comparing various methods of antioxidant activity and discrepancies over their measurement, and; methods for antioxidant phytochemical analysis.

Chapter 8 on indispensable tools in food science and nutrition is a thorough discussion enhanced by many reviews in recent research works. Topics are presented on food safety from farm to plate; foodborne pathogens; probiotics in food; the pros and cons of genetically modified (GM) foods; bioavailability of nutrients, and; food safety regulations.

The important topic of transformations of food flavor due to elaboration of industrial processing is covered in Chapter 9. Topics discussed are aroma compounds; chemical reactions that contribute

food flavor; the Maillard reaction; formation of flavor compounds in the Maillard reaction and kinetics and factors influencing it; flavor from lipids; flavors formed via fermentation, and; special processes used in the industrial production of flavor. Chapter 10 discusses new trends in sensory characterization of food products. Explained in the various topics are descriptive analysis; methodologies based on specific attributes; methodologies that provide a verbal description of the products; methods based on the comparison with references, and; comparison of the methodologies.

The effect of food processing on bioactive compounds is presented in Chapter 11. The author includes many of the recent advances related to the topics of bioactive compounds; reactive oxygen species; antioxidant defenses against reactive oxygen (RO); bioactive compounds and natural antioxidants; processing of foods containing bioactive components; effect of postharvest handling methods and shelf life determination; methods for the determination of antioxidants; methods for measuring the oxidation of an oil or food sample; techniques involving bioactive compound determination, and; high performance liquid chromatography (HPLC).

Advancements in storage technologies for fresh fruits are presented in Chapter 12. Different techniques for food storage are discussed such as methylcyclopropene (1-MCP) based storage technology; palladium-based ethylene adsorbers; ultra low oxygen (ULO) storage technology; dynamic controlled atmosphere (DCA) storage technology; microcontrolled atmosphere (MCA) and bulk modified atmosphere packaging (MAP) technologies; nitric oxide based technology, and; biosensors.

The final chapter is on ultrasound applications in food technology. The equipment used in the applications, combined processes and effects on safety and quality parameters are discussed. Some of the specific topics are ultrasound application in equipment design for improving processing efficiency; food preservation applications; enzymes and microorganisms, and; ultrasound effects on food quality attributes.

Finally, the editors would like to express their sincere gratitude to all the contributors of this book, who were an excellent support throughout the successful completion of this venture. We are grateful to them for the commitment and the sincerity they have shown towards their contribution to the book. Without their enthusiasm and support, the compilation of a book series could not have been possible. We would like to thank all the reviewers who have taken

their valuable time to make critical comments on each chapter. We also thank the publisher Wiley-Scrivener for recognizing the demand for such a book, for realizing the increasing importance of the area of food science and nutrition, and for starting a new project in which not many other publishers are yet involved.

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Recent Advances in Food Science and Nutrition: State of Art, New Challenges and Opportunities

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Abstract

This chapter presents a brief account on various topics concerning food science and nutrition. Also presented are different parameters within food science and nutrition such as potato production, composition and starch processing; milk and different types of milk products; processing and preservation of meat, poultry and seafood; food ingredients; fruits and fruit processing; antioxidant acivity of phytochemicals and their method of analysis; indispensable tools in food science and nutrition; transformations of food flavour due to elaborative industrial processing; trends in sensory characterization of food products; effects of food processing on bioactive compounds; recent advances in storage technologies for fresh fruits and; ultrasound applications in food technology, etc. Also discussed are recent technical research accomplishments in the area that have immense structural possibilities for chemical and mechanical

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