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Kristberg Kristbergsson • Semih Ötles  
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# Functional Properties of Traditional Foods

 Springer

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ISBN 978-1-4899-7660-4      ISBN 978-1-4899-7662-8 (eBook)  
DOI 10.1007/978-1-4899-7662-8

Library of Congress Control Number: 2015959484

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Printed on acid-free paper

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## Series Preface

The ISEKI-Food series was originally planned to consist of six volumes of texts suitable for food science students and professionals interested in food safety and environmental issues related to sustainability of the food chain and the well-being of the consumer. As the work progressed, it soon became apparent that the interest and need for texts of this type exceeded the topics covered by the first six volumes published by Springer in 2006–2009. The series originate in work conducted by the European thematic network ISEKI-Food an acronym for “Integrating Safety and Environmental Knowledge In to Food Studies.” Participants in the ISEKI-Food network come from most countries in Europe and most of the institutes, and universities involved with food science education at the university level are represented. The network was expanded in 2008 with the ISEKI Mundus program with 37 partners from 23 countries outside of Europe joining the consortium, and it continues to grow with approximately 200 partner institutions from 60 countries from all over the world in 2011. Some international companies and nonteaching institutions have also participated in the program. The network was funded by the ERASMUS program of the EU from 1998 to 2014 first as FoodNet coordinated by Professor Elisabeth Dumoulin at AgroParisTech site de MASSY in France. The net then became known as ISEKI-Food and was coordinated by Professor Cristina Silva at the Catholic University of Portugal, College of Biotechnology (Escola) in Porto, from 2002 to 2011 when Professor Paola Pittia at the University of Teramo in Italy became coordinator of ISEKI-Food 4.

The main objectives of ISEKI-Food have been to improve the harmonization of studies in food science and engineering in Europe and to develop and adapt food science curricula emphasizing the inclusion of safety and environmental topics. The program has been further expanded into the ISEKI-Food Association (<https://www.iseki-food.net/>), an independent organization devoted to the objectives of the ISEKI consortium to further the safety and sustainability of the food chain through education. The motto of the association is “Integrating Food Science and Engineering Knowledge into the Food Chain.” The association will continue working on the

ISEKI-Food series with several new volumes to be published in the near future. The series continued with the publication in 2012 of *Novel Technologies in Food Science: Their Impact on Products, Consumer Trends and The Environment*, edited by Anna McElhatton and Paolo J. Sobral. The book is intended for food scientists, engineers, and readers interested in the new and emerging food processing technologies developed to produce safe foods that maintain most of their original freshness. All 13 chapters are written from a safety and environmental stand point with respect to the emerging technologies.

We now see the publication of the *Trilogy of Traditional Foods* written for food science professionals as well as for the interested general public. The trilogy is in line with the internationalization of the ISEKI consortium and will offer 74 chapters dedicated to different traditional foods from all over the world. The trilogy starts with *Traditional Foods: General and Consumer Aspects* edited by the undersigned and Jorge Oliveira. The book offers general descriptions of different traditional foods and topics related to consumers and sensory aspects. The second book in the trilogy is *Modernization of Traditional Food Processes and Products* edited by Anna McElhatton and Mustapha Missbah El Idrissi. The chapters are devoted to recent changes and modernizations of specific traditional foods with a focus on processing and engineering aspects. The third volume in the trilogy, *Functional Properties of Traditional Foods*, is devoted to functional and biochemical aspects of traditional foods and the beneficial effects of bioactive components found in some traditional foods.

The series will continue with several books including a textbook *Food Processing* intended for senior-level undergraduates and junior graduate students. This textbook, edited by the undersigned and Semih Ötles, will provide a comprehensive introduction to food processing. The book should also be useful to professionals and scientists interested in food processing both from the equipment and process approach as well as in the physicochemical aspect of food processing. The book will contain five sections starting with chapters on the basic principles and physicochemical properties of foods, followed by sections with chapters on conversion operations, preservation operations, and food processing operations with separate chapters on most common food commodities. The final section will be devoted to post-processing operations.

*Applied Statistics for Food and Biotechnology*, edited by Gerhard Schleining, Peter Ho, and Saverio Mannino, will be intended for graduate students and industry personnel who need a guide for setting up experiments so that the results will be statistically valid. The book will provide numerous samples and case studies on how to use statistics in food and biotechnology research and testing. It will contain chapters on data collection, data analysis and presentation, handling of multivariate data, statistical process control, and experimental design.

The book *Process Energy in Food Production*, edited by Winfried Russ, Barbara Sturm, and the undersigned, is being prepared for publication. The book will offer an introduction section on basic thermodynamics and an overview of energy as a global element. It will also cover environmental effects of energy provision and usage. This will be followed by chapters on the use of energy in various food processes such

as flour production, bakery, fish processing, meat processing, brewery and beverage production, direct and indirect heat integration in breweries, fruit juice, spray drying systems (milk powder), and chilling and storage of fresh horticultural products. There will also be chapters related to energy supply, thermal, solar, hydroelectric, energy distribution, insulation for energy saving, storage systems for heat and coldness, waste heat recovery, and energy management systems.

Three more books are being prepared. The textbook *Physical Chemistry for Food Scientists*, edited by Stephan Drusch and Kirsi Jouppila, will provide senior undergraduate and beginning graduate-level students an overview of the basic principles of physical chemistry of foods. The first part of the book will be devoted to fundamental principles of physical chemistry. The second part of the book will be devoted to the physical chemistry of food systems. The book *Consumer-Driven Development of Food for Health and Well-Being*, edited by the undersigned, Paola Pittia, Margarida Vieira, and Howard R. Moskowitz, is in preparation with chapters on general aspects of food development, the house of quality and Stage-Gate<sup>®</sup> process, consumer aspects of food development, mind genomics, conceptualization of well-being in the framework of food consumption, formulation of foods in the development of food for health and well-being, ingredients contribution for health and well-being, new trends on the extension of shelf life, nutritional aspects of the development of foods focusing on health and well-being, regulatory and policy aspects, and several case studies on product development with special emphasis on health and well-being. Finally, there is a *Book on Ethics in Food Production and Science* that will be edited by Rui Costa and Paola Pittia.

The ISEKI-Food series draws on expertise from universities and research institutions all over the world, and we sincerely hope that it may offer interesting topics to students, researchers, professionals, as well as the general public.

Reykjavík, Iceland

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## Series Preface Volumes 1–6

The single most important task of food scientists and the food industry as a whole is to ensure the safety of foods supplied to consumers. Recent trends in global food production, distribution, and preparation call for increased emphasis on hygienic practices at all levels and for increased research in food safety in order to ensure a safer global food supply. The ISEKI-Food book series is a collection of books where various aspects of food safety and environmental issues are introduced and reviewed by scientists specializing in the field. In all of the books, a special emphasis was placed on including case studies applicable to each specific topic. The books are intended for graduate students and senior-level undergraduate students as well as professionals and researchers interested in food safety and environmental issues applicable to food safety.

The idea and planning of the books originates from two working groups in the European thematic network ISEKI-Food an acronym for “Integrating Safety and Environmental Knowledge In to Food Studies.” Participants in the ISEKI-Food network come from 29 countries in Europe, and most of the institutes and universities involved with food science education at the university level are represented. Some international companies and nonteaching institutions have also participated in the program. The ISEKI-Food network is coordinated by Professor Cristina Silva at the Catholic University of Portugal, College of Biotechnology (Escola) in Porto. The program has a web site: <http://www.esb.ucp.pt/iseki/>. The main objectives of ISEKI-Food have been to improve the harmonization of studies in food science and engineering in Europe and to develop and adapt food science curricula emphasizing the inclusion of safety and environmental topics. The ISEKI-Food network started on October 1 in 2002 and has recently been approved for funding by the EU for renewal as ISEKI-Food 2 for another 3 years. ISEKI has its roots in an EU-funded network formed in 1998 called FoodNet where the emphasis was on casting a light on the different food science programs available at various universities and technical institutions throughout Europe. The work of the ISEKI-Food network was organized into five different working groups with specific task, all aiming to fulfill the main objectives of the network.

The first four volumes in the ISEKI-Food book series come from WG2 coordinated by Gerhard Schleining at Boku University in Austria and the undersigned. The main task of the WG2 was to develop and collect materials and methods for teaching of safety and environmental topics in the food science and engineering curricula. The first volume is devoted to food safety in general with a practical and a case study approach. The book is composed of 14 chapters which were organized into three sections on preservation and protection, benefits and risk of microorganisms, and process safety. All of these issues have received high public interest in recent years and will continue to be in the focus of consumers and regulatory personnel for years to come. The second volume in the series is devoted to the control of air pollution and treatment of odors in the food industry. The book is divided into eight chapters devoted to defining the problem, recent advances in analysis, and methods for prevention and treatment of odors. The topic should be of special interest to industry personnel and researchers due to recent and upcoming regulations by the European Union on air pollution from food processes. Other countries will likely follow suit with more strict regulations on the level of odors permitted to enter the environment from food processing operations. The third volume in the series is devoted to utilization and treatment of waste in the food industry. Emphasis is placed on sustainability of food sources and how waste can be turned into by-products rather than pollution or landfills. The book is composed of 15 chapters starting off with an introduction of problems related to the treatment of waste and an introduction to the ISO 14001 standard used for improving and maintaining environmental management systems. The book then continues to describe the treatment and utilization of both liquid and solid wastes with case studies from many different food processes. The last book from WG2 is on predictive modeling and risk assessment in food products and processes. Mathematical modeling of heat and mass transfer as well as reaction kinetics is introduced. This is followed by a discussion of the stoichiometry of migration in food packaging, as well as the fate of antibiotics and environmental pollutants in the food chain using mathematical modeling and case study samples for clarification.

Volumes five and six come from work in WG5 coordinated by Margarida Vieira at the University of Algarve in Portugal and Roland Verhé at Gent University in Belgium. The main objective of the group was to collect and develop materials for teaching food safety-related topics at the laboratory and pilot plant level using practical experimentation. Volume five is a practical guide to experiments in unit operations and processing of foods. It is composed of 20 concise chapters each describing different food processing experiments outlining theory, equipment, procedures, applicable calculations, and questions for the students or trainees followed by references. The book is intended to be a practical guide for the teaching of food processing and engineering principles. The final volume in the ISEKI-Food book series is a collection of case studies in food safety and environmental health. It is intended to be a reference for introducing case studies into traditional lecture-based safety courses as well as being a basis for problem-based learning. The book consists of 13 chapters containing case studies that may be used, individually or in a series, to discuss a range of food safety issues. For convenience the book was divided into

three main sections with the first devoted to case studies, in a more general framework with a number of specific issues in safety and health ranging from acrylamide and nitrates to botulism and listeriosis. The second section is devoted to some well-known outbreaks related to food intake in different countries. The final section of the book takes on food safety from the perspective of the researcher. Cases are based around experimental data and examine the importance of experimental planning, design, and analysis.

The ISEKI-Food books series draws on expertise from close to a hundred universities and research institutions all over Europe. It is the hope of the authors, editors, coordinators, and participants in the ISEKI network that the books will be useful to students and colleagues to further their understanding of food safety and environmental issues.

Reykjavík, Iceland

Kristberg Kristbergsson



# Acknowledgments

ISEKI\_Food 3 and ISEKI\_Mundus 2 were thematic networks on food studies, funded by the European Union through the Lifelong Learning and Erasmus Mundus programs as projects N° 142822-LLP-1-2008-PT-ERASMUS-ENW and 145585-PT-2008-ERA MUNDUS—EM4EATN, respectively. The ISEKI\_Mundus 2 project was established to contribute for the internationalization and enhancement of the quality of the European higher education in food studies and work toward the network sustainability, by extending the developments undergoing through the Erasmus Academic Network ISEKI Food 3 to other countries and developing new activities toward the promotion of good communication and understanding between European countries and the rest of the world.



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# Preface

*Functional Properties of Traditional Foods* is the third book in the *Trilogy of Traditional Foods*, part of the ISEKI-Food series. The three books in the trilogy are devoted to different characteristics of traditional foods. The trilogy covers general and consumer aspects, modernization of traditional foods, and functional properties of traditional foods in a total of 74 chapters written by authors from all over the world.

*Functional Properties of Traditional Foods* is divided into four parts. The first is “General Functional Properties of Foods,” with chapters on functional aspects of antioxidants and probiotics in traditional food. This part also includes chapters on the potential health benefits of Thai, Slovak, and Turkish traditional foods. The second part covers functional properties of some cereal-based foods in eight chapters by contributors from Europe, Mexico, and South America. Topics addressed in Part II include carob flour, products from Mexican chia, and the ancient grain cañahua, to name a few. The third part is devoted to fruits and other plant-based foods. The eight chapters in this part provide information on antioxidant properties of dates from Israel, medical properties of cactus products from Mexico, beneficial properties of mastic gum from the Greek island Chios, and the properties of argan oil from Morocco. The final part, “Honey and Beverages with Functional Properties,” includes chapters on functional and nutritional properties of honey from Slovenia and Portugal. Other chapters in the part cover the functional properties of camellia tea, as well as the Spanish drink horchata de chufa. Some of the chapters, such as “The Potential Health Benefits of Traditional Thai Fermented Foods and Beverages” and “Boza a Traditional Cereal-Based Fermented Beverage,” could fit in more than one part, and the editors hope that such trivial matters will not distract the reader from learning about and enjoying the functional properties of some of the traditional foods discussed in the book. All the chapters are written by practicing food scientists or engineers but are written with the interested general public in mind. The book should cater to the practicing food professional as well as the interested reader.

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