

Food Science, Technology and Nutrition for Babies and Children

Tomy J. Gutiérrez

Editor

Food Science, Technology and Nutrition for Babies and Children

 Springer

Editor

Tomy J. Gutiérrez

Thermoplastic Composite Materials (CoMP) Group

Faculty of Engineering

Institute of Research in Materials Science and Technology (INTEMA)

National University of Mar del Plata (UNMdP) and National Scientific and Technical
Research Council (CONICET)

Mar del Plata, Buenos Aires, Argentina

ISBN 978-3-030-35996-6

ISBN 978-3-030-35997-3 (eBook)

<https://doi.org/10.1007/978-3-030-35997-3>

© Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

I would like to dedicate this book:



*To my God (Father, Son, and the Holy Spirit),
to the Virgin Mary, and to my Guardian Angel,
Its energy stimulates me to enjoy
the landscape we call life, and its peace
encourages me to always continue towards the
future, a place where we will all go and each
one will be under the law of the creative father.*

*To my Mother (Dr. Mirian Arminda Carmona
Rodríguez),
For forming my character and attitude
towards life.*

*To my Grandmother (Mrs. Arminda Teresa
Rodríguez Romero),
A person who unfortunately left
before this world's time, but I am
sure that she is up watching me and supporting
me in all facets of my
life. You are in my most beautiful memories.*

*To my firstborn daughter who is
about to be born (Miranda V. Gutiérrez).
I wait for you with a lot
of love!!! 🤱❤️*

*To all the anonymous persons,
Who give me their love, friendship, patience,
and support in various situations.*

*To Venezuela and Argentina,
The first for giving me my academic and
professional training, and the second for
welcoming me with love and friendship before
the dictatorship that my country (Venezuela) is
experiencing today.*

Tomy J. Gutiérrez, Ph.D.

Editor

Preface

The crucial role of good food and nutrition especially for babies and children is well known. However, this is not only linked to food quality and safety and metabolic processes within individuals, but also other factors such as access to drinking water, available food, feeding environments, food security, parental feeding, and stress-feeding conditions, among others, influence the good development and growth at the physiological and mental level of infants, which ultimately determine the performance of these individuals in adult life. In this regard, international organizations such as the United Nations International Children's Emergency Fund (UNICEF) make significant efforts to address and give suggestions and guidelines in this area to the governments of the world. The UNICEF and many nongovernmental organizations (NGOs) every day warn about the importance and costs in public health of nations by not adequately addressing the problems that are arising because of our current lifestyle and its impact on babies and children. This being independent of the levels of wealth of each country.

This book is mainly focused on the food science for babies and children and offers alternatives from the point of view of food technology for babies and children with special diet regimes associated with metabolic or enzymatic diseases such as allergy to casein, phenylalanine (phenylketonuria or commonly known as PKU), and gluten (celiac disease) or lactose intolerance. Finally, this book addresses some nutritional aspects of babies and children in terms of childhood obesity, child's appetite, and parental feeding.

National Scientific and Technical
Research Council (CONICET)
Institute of Research in Materials Science and
Technology (INTEMA)
Thermoplastic Composite Materials (CoMP) Group
Mar del Plata, Argentina

Tomy J. Gutiérrez, Ph.D.

Contents

1 Food Manufacturing for Babies and Children:	
Editor's Perspective	1
Tomy J. Gutiérrez	
2 Infant Milk Formulas	3
A. Logeshwaran, Pavidharshini Selvasekaran, and Ramalingam Chidambaram	
3 Prebiotics and Probiotics in the Formulation of Infant Foods	35
S. Kusumitha, Varad Aeron, Peerzada gh Jeelani, and Ramalingam Chidambaram	
4 Baby Foods Based on Cereals	59
Peerzada Jeelani, Anchit Ghai, Natasha Saikia, Mridul Kathed, Arundhati Mitra, Akshaya Krishnan, Aman Sharma, and Ramalingam Chidambaram	
5 Macro- and Micronutrients in the Development of Food for Babies and Children	99
Aarathi Rajesh, Nikita Sreenath, Srilekha Marmavula, Chandan Krishnamoorthy, and Ramalingam Chidambaram	
6 Potential Allergenic Ingredients in the Formulation of Infant Foods	119
Rishika Batra, Cheryl Joseph, Chandan Krishnamoorthy, and Ramalingam Chidambaram	
7 Lactose-Free Food Products for Lactose Intolerant Children	143
Rakshanya Sekar, Pavidharshini Selvasekaran, Ankita Kar, Tejaswi Varalwar, Charis Godli, and Ramalingam Chidambaram	

- 8 Formulation of Food Products for Obese Children** 169
Kevin Daniel Baskar, Aravind Baradwaaj Kanna,
Sai Sundar Madasami Swaminathan, Ram Vignesh Srinivasan,
Udhaya Nath Dhayanandhan, Chandan Krishnamoorthy,
and Ramalingam Chidambaram
- 9 Child Appetite** 189
Rhea Sarma, Chandan Krishnamoorthy,
and Ramalingam Chidambaram
- 10 Food Parenting and Children's Diet and Weight Outcome** 211
Junilla K. Larsen, Desi Beckers, Levie T. Karssen,
and Jennifer O. Fisher

About the Editor

Tomy J. Gutiérrez has a degree in chemistry (Geochemical option) and a degree in education (Chemical mention) from the Central University of Venezuela (UCV) (December 2007 and July 2008, respectively) and has a specialization in International Negotiation of Hydrocarbons from the National Polytechnic Experimental University of the National Armed Forces (UNEFA), Venezuela (July 2011). He also has a Master's and PhD degree in Food Science and Technology obtained in October 2013 and April 2015, respectively, and PhD studies in Metallurgy and Materials Science from the UCV, and postdoctoral studies at the Research Institute in Materials Science and Technology (INTEMA). He has been a professor and researcher at the UCV both at the Institute of Food Science and Technology (ICTA) and the School of Pharmacy. He is currently an adjunct researcher in the INTEMA, National Scientific and Technical Research Council (CONICET), Argentina. He has at least 20 book chapters, 40 publications in international journals of high-impact factor, and 5 published books. He has been a guest editor of several international journals, such as *Journal of Food Quality*, *Advances in Polymer Technology*, and *Current Pharmaceutical Design*. He is also an editorial board member of different international journals, such as *Food and Bioprocess Technology* (April 2019–present; 2018 Impact Factor 3.032), *Current Nutraceuticals* (May 2019–present; 2018 Impact Factor), and *Journal of Renewable Materials* (June 2019–present; 2018 Impact Factor 1.429). He, today, is developing a line of research in nanostructured materials based on polymers (composite materials), which are obtained on a pilot scale to be transferred to the agricultural, food, pharmaceutical, and polymer industries. He is also a collaborator of international projects between Argentina and Brazil, Colombia, France, Poland, Spain, Italy, Sweden, and Venezuela.

