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Food Microbiology

Thomas J Montville

2nd Edition

"This book is publication no.
C-101121-1-85,[and] no.

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C-10112-2-85 of the New Jersey
Agricultural Experiment
Station"--Pre
Microbiological risk assessment
(MRA) is one of the most
important recent developments in
food safety management.

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Adopted by Codex Alimentarius and many other international bodies, it provides a structured way of identifying and assessing microbiological risks in food.

Edited by two leading authorities, and with contributions by

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international experts in the field, Microbiological risk assessment provides a detailed coverage of the key steps in MRA and how it can be used to improve food safety. The book begins by placing MRA within the broader

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context of the evolution of international food safety standards. Part one introduces the key steps in MRA methodology. A series of chapters discusses each step, starting with hazard identification and

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characterisation before going on to consider exposure assessment and risk characterisation. Given its importance, risk communication is also covered. Part two then considers how MRA can be implemented in practice.

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There are chapters on implementing the results of a microbiological risk assessment and on the qualitative and quantitative tools available in carrying out a MRA. It also discusses the relationship of MRA

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to the use of microbiological criteria and another key tool in food safety management, Hazard Analysis and Critical Control Point (HACCP) systems. With its authoritative coverage of both principles and key issues in

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implementation, Microbiological risk assessment in food processing is a standard work on one of the most important aspects of food safety management.

Provides a detailed coverage of the key steps in microbiological

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risk assessment (MRA) and how it can be used to improve food safety Places MRA within the broader context of the evolution of international food safety standards Introduces the key steps in MRA methodology,

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considers exposure assessment
and risk characterisation, and
covers risk communication

This widely acclaimed text covers
the whole field of modern food
microbiology. Now in its second
edition, it has been revised and

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updated throughout and includes new sections on stress response, *Mycobacterium* spp., risk analysis and new foodborne health problems such as BSE. Food Microbiology covers the three main aspects of interaction

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between micro-organisms and food - spoilage, foodborne illness and fermentation - and the positive and negative features that result. It discusses the factors affecting the presence of micro-organisms in food and their

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capacity to survive and grow. Also included are recent developments in procedures used to assay and control the microbiological quality of food. Food Microbiology presents a thorough and accessible account of this

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increasingly topical subject, and is an ideal text for undergraduate courses in the biological sciences, biotechnology and food science. It will also be valuable as a reference for lecturers and researchers in these areas.

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The purpose of this Brief is to provide a global view of the concept of biopreservation and its potential and existing applications in the different food sectors.

Biopreservation, an approach already experimented with by our

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ancestors, has been used empirically for centuries and now the rationale behind it is becoming increasingly popular, applied singly or in combination with novel and classical food processing technologies. The growing world

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population, together with the globalization of the food market and consumer demand for foods that are ready to eat, lightly preserved, fresh-tasting, and rich in flavor, nutrients, and bioactive compounds, is forcing the food

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industry to develop less
aggressive food preservation
methods.

PCR Methods in Foods

Microbiology and Technology of
Fermented Foods

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Fundamentals and Frontiers
Simulation Models, GIS and
Nonpoint-source Pollution

*This state-of-the-art text
provides new information in the
field of food microbiology,
offering current, definitive,*

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*factual material written by
experts on each subject.*

*Emphasizing the molecular and
mechanistic aspects of food
microbiology, this advanced
text fulfills the need of research
microbiologists, graduate*

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students and instructors of food microbiology courses for an in-depth treatment of food microbiology. The text is organised into nine major sections that address each of the main areas of the field,

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*including microbial food
spoilage, foodborne pathogenic
bacteria, mycotoxigenic
moulds, viruses, foodborne and
waterborne parasites,
preservatives and preservation
methods, food fermentations,*

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advanced techniques in food microbiology.

Fresh and fresh-cut fruits and vegetables have an excellent safety record. However, surveillance data from the U.S. Centers for Disease Control and

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*Prevention and recent
foodborne illness outbreaks
have demonstrated that the
incidence of foodborne illnesses
linked to the consumption of
contaminated fresh fruit and
vegetable products may in fact*

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be

*The new textbook Food
Microbiology: an Introduction is
an up-to-date entrée to the
inherently complex and
challenging field of food
microbiology.*

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The second edition of Basic Food Microbiology follows the same general outline as the highly successful first edition. The text has been revised and updated to include as much as possible of the large body of

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information published since the first edition appeared. Hence, foodborne illness now includes listeriosis as well as expanded information about Campylobacter jejuni. Among the suggestions for altering the

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text was to include flow sheets for food processes. The production of dairy products and beer is now depicted with flow diagrams. In 1954, Herrington made the following statement regarding a review

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article about lipase that he published in the journal of Dairy Science: "Some may feel that too much has been omitted; an equal number may feel that too much has been included. So be it." The author is grateful to his

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family for allowing him to spend the time required for composing this text. He is especially indebted to his partner, Sally, who gave assistance in typing, editing, and proofreading the

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manuscript. The author also thanks all of those people who allowed the use of their information in the text, tables, and figures. Without this aid, the book would not have been possible. 1 General Aspects of

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Food BASIC NEEDS Our basic needs include air that contains an adequate amount of oxygen, water that is potable, edible food, and shelter. Food provides us with a source of energy needed for work and for

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various chemical reactions.

Food Analysis Laboratory

Manual

*Biotechnology in Food Science
and Technology*

ASM News

Modern Food Microbiology

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*Compendium of the
Microbiological Spoilage of
Foods and Beverages*

* the book introduces a valuable computer modelling tool, available on the Internet, that is especially

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useful as a research of
teaching tool for pathogen
identification.

Food safety awareness is at
an all time high, new and
emerging threats to the food
supply are being recognized,

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and consumers are eating more and more meals prepared outside of the home. Accordingly, retail and foodservice establishments, as well as food producers at all levels of the food

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production chain, have a growing responsibility to ensure that proper food safety and sanitation practices are followed, thereby, safeguarding the health of their guests and

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customers. Achieving food safety success in this changing environment requires going beyond traditional training, testing, and inspectional approaches to managing risks. It requires

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a better understanding of organizational culture and the human dimensions of food safety. To improve the food safety performance of a retail or foodservice establishment, an

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organization with thousands of employees, or a local community, you must change the way people do things. You must change their behavior. In fact, simply put, food safety equals

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behavior. When viewed from these lenses, one of the most common contributing causes of food borne disease is unsafe behavior (such as improper hand washing, cross-contamination, or

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undercooking food). Thus, to improve food safety, we need to better integrate food science with behavioral science and use a systems-based approach to managing food safety risk. The

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importance of organizational culture, human behavior, and systems thinking is well documented in the occupational safety and health fields. However, significant contributions to

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the scientific literature on these topics are noticeably absent in the field of food safety.

This is the first book to focus entirely on viruses in foods. It collates information on the

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occurrence, detection, transmission, and epidemiology of viruses in various foods. Although methods for bacterial detection in food are available, methods for

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detection of viruses in food, with the exception of shellfish, are not available. It is important, therefore, to develop methods for direct examination of food for viruses and to explore

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alternate indicators that can accurately reflect the virological quality of food. This book addresses these issues along with strategies for the prevention and control of viral

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contamination of food. Presenting compelling and current information about some of the most important food safety issues, this book is an invaluable reference for anyone interested in

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avoiding foodborne disease or understanding how food safety standards could be improved. □ Provides an up-to-date summary of food safety issues, many of which are controversial or

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commonly discussed in the media □ Offers a breadth of perspectives about the future of food safety from a range of professionals □ Includes an excerpt from the 2011 Food Safety

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Modernization Act that
enables readers to directly
examine the key elements of
this law that affects many
aspects of the food we eat
Principles and Applications
Fennema's Food Chemistry

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Rapid Analysis Techniques in
Food Microbiology
Progress in Food
Preservation
Food Microbiology
This fourth edition of
Modern Food Microbiology is

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written primarily for use as a textbook in a second or subsequent course in microbiology. The previous editions have found usage in courses in food microbiology and applied microbiology in liberal arts, food science,

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food technology, nutritional science, and nutrition curricula. Although organic chemistry is a desirable prerequisite, those with a good grasp of biology and chemistry should not find this book difficult. In

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addition to its use as a textbook, this edition, like the previous one, contains material that goes beyond that covered in a typical microbiology course (parts of Chaps. 4, 6, and 7). This material is included for its

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reference value and for the benefit of professionals in microbiology, food science, nutrition, and related fields. This edition contains four new chapters, and with the exception of Chapter 15, which received

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only minor changes, the remaining chapters have undergone extensive revision. The new chapters are 17 (indicator organisms), 18 (quality control), 21 (listeriae and listeriosis), and 24 (animal

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parasites). Six chapters in the previous edition have been combined; they are represented in this edition by Chapters 12, 13, and 14. In the broad area of food microbiology, one of the challenges that an author

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must deal with is that of producing a work that is up to date.

This volume presents a wide range of new approaches aimed at improving the safety and quality of food products and agricultural

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commodities. Each chapter provides in-depth information on new and emerging food preservation techniques including those relating to decontamination, drying and dehydration, packaging innovations and

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the use of botanicals as natural preservatives for fresh animal and plant products. The 28 chapters, contributed by an international team of experienced researchers, are presented in five sections,

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covering: Novel
decontamination techniques
Novel preservation
techniques Active and
atmospheric packaging Food
packaging Mathematical
modelling of food
preservation processes

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Natural preservatives This title will be of great interest to food scientists and engineers based in food manufacturing and in research establishments. It will also be useful to advanced students of food

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science and technology.
Presents a survey of food
safety issues, ranging from
mad cow disease to
genetically modified corn.
Through a combination of
statistics and substantive
information, this book

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delineates the nature and scope of the issues. It also introduces readers to the activists and government agencies that play a role in the battle for food safety. First multi-year cumulation covers six years: 1965-70.

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Quick Bibliography Series
The ASQ Certified Food
Safety and Quality Auditor
Handbook, Fourth Edition
Fundamental Food
Microbiology
Food Safety Culture
Fundamental Food

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Microbiology, Fifth Edition

This book examines the two major parasite groups that are transmitted via water or foods: the single-celled protozoa, and the

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helminths: cestodes
(tapeworms), nematodes
(round worms), and
trematodes (flukes).
Each chapter covers the
biology, mechanisms of
pathogenesis,

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epidemiology, treatment,
and inactivation of
these parasites. This
important new text
offers a better
understanding of the
biology and control of

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parasitic infections
necessary to reduce or
eliminate future
outbreaks in the U.S.
and elsewhere.

The food industry, with
its diverse range of

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products (e.g. short shelf-life foods, modified atmosphere packaged products and minimally processed products) is governed by strict food legislation,

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and microbiological safety has become a key issue. Legally required to demonstrate 'due diligence', food manufacturers are demanding analytical

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techniques that are simple to use, cost effective, robust, reliable and can provide results in 'real time'. The majority of current microbiological

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techniques (classical or rapid), particularly for the analysis of foodborne pathogens, give results that are only of retrospective value and do not allow

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proactive or reactive
measures to be imple
mented during modern food
production. Rapid
methods for microbial
analysis need to be
considered in the

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context of modern Quality Assurance (QA) systems. This book addresses microbiologists, biochemists and immunologists in the food industry, the

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public health sector,
academic and research
institutes, and
manufacturers of kits
and instruments. This
volume is an up-to-date
account of recent

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developments in rapid
food microbiological
analysis, current
approaches and problems,
rapid methods in
relation to QA systems,
and future perspectives

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in an intensely active
field. P.D.P.

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**Microbiology and Food
Safety, Kraft General
Foods, 801 Waukegan
Road, Glenview, Illinois
60025, USA.**

**This book will introduce
non-molecular biologists**

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to diagnostic PCR-based
technologies for the
detection of pathogens
in foods. By the
conclusion of this book,
the reader should be
able to: 1) understand

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the principles behind
PCR including real-time;
2) know the basics
involved in the design,
optimization, and im-
plementation of PCR in food
microbiology lab

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setting; 3) interpret results; 4) know limitations and strengths of PCR; and 5) understand the basic principles behind a new fledgling technology,

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microarrays and its
potential applications
in food microbiology.
This book will provide
readers with the latest
information on PCR and
microarray based tests

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and their application
towards the detection of
bacterial, protozoal and
viral pathogens in
foods. Figures, charts,
and tables will be used,
where appropriate, to

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help illustrate concepts
or provide the reader
with useful information
or resources as an
important starting point
in bringing molecular
diagnostics into the

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food microbiology lab.
This book is not
designed to be a
“cookbook” PCR manual
with recipes and step-by-
step instructions but
rather serve as a primer

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or resource book for
students, faculty, and
other professionals
interested in molecular
biology and its
integration into food
safety. v Table of

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Contents Preface

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. v **Chapter 1. PCR**

Basics Amanda Fairchild,

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M. S. , Margie D. Lee

DVM, Ph. D. , and John

J. Maurer, Ph. D. . . .

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. 1 Chapter 2.

The Mythology of PCR: A

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Warning to the Wise John

J. Maurer, Ph. D. . . .

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. **27**

Chapter 3.

Maintaining the high

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standard set by the
previous bestselling
editions, *Fundamental
Food Microbiology,
Fourth Edition* presents
the most up-to-date
information in this

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rapidly growing and highly dynamic field. Revised and expanded to reflect recent advances, this edition broadens coverage of foodborne diseases to include many

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new and emerging
pathogens, as well as
descriptions of the
mechanism of
pathogenesis. An
entirely new chapter on
detection methods

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appears with evaluations
of advanced rapid
detection techniques
using biosensors and
nanotechnology. With the
inclusion of many more
easy-to-follow figures

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and illustrations, this text provides a comprehensive introductory source for undergraduates, as well as a valuable reference for graduate level and

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working professionals in food microbiology or food safety. Each chapter within the text's seven sections contains an introduction as well as a conclusion,

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references, and questions. Beginning with the history and development of the field, Part I discusses the characteristics and sources of predominant

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food microorganisms and
their significance. Part
II introduces microbial
foodborne diseases,
their growth and
influencing factors,
metabolism, and

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sporulation. The third Part explains the beneficial uses of microorganisms in starter cultures, biopreservation, bioprocessing, and

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probiotics. Part IV
deals with food spoilage
and methods of
detection, followed by a
discussion in Part V of
foodborne pathogens
associated with

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intoxication,
infections, and
toxicoinfections. Part
VI reviews control
methods with chapters on
control of microbial
access and removal by

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heat, organic acids,
physical means, and
combinations of methods.
The final section is an
in-depth look at
advanced and traditional
methods of microbial

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detection and food
safety. Four appendices
provide additional
details on food
equipment and surfaces,
predictive modeling,
regulatory agencies, and

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hazard analysis critical
control points.

Proteomics in Foods

January 1987 - March
1991

Food Safety: Theory and
Practice

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Foodborne Parasites

Basic Food Microbiology

Food Microbiology An

Introduction Amer Society for

Microbiology

This latest edition of the most

internationally respected reference

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in food chemistry for more than 30 years, Fennema ' s Food Chemistry, 5th Edition once again meets and surpasses the standards of quality and comprehensive information set by its predecessors. All chapters reflect recent scientific advances and, where appropriate, have

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expanded and evolved their focus to provide readers with the current state-of-the-science of chemistry for the food industry. This edition introduces new editors and contributors who are recognized experts in their fields. The fifth edition presents a completely

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rewritten chapter on Water and Ice, written in an easy-to-understand manner suitable for professionals as well as undergraduates. In addition, ten former chapters have been completely revised and updated, two of which receive extensive

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attention in the new edition including Carbohydrates (Chapter 3), which has been expanded to include a section on Maillard reaction; and Dispersed Systems: Basic considerations (Chapter 7), which includes thermodynamic incompatibility/phase separation

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concepts. Retaining the straightforward organization and accessibility of the original, this edition begins with an examination of major food components such as water, carbohydrates, lipids, proteins, and enzymes. The second section looks at minor food

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components including vitamins and minerals, colorants, flavors, and additives. The final section considers food systems by reviewing basic considerations as well as specific information on the characteristics of milk, the postmortem physiology of edible

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muscle, and postharvest physiology of plant tissues. Written for graduate students or college seniors, Food Safety: Theory and Practice emphasizes a comprehensive and multidisciplinary approach to food safety. It covers important topics

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related to the prevention of foodborne illnesses and diseases with a “ farm-to-fork ” perspective. Each chapter starts with a set of learning objectives for the student and ends with a list of important references and websites for further study and research.

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Scientific principles that underpin food safety are introduced, and terminology is explained to facilitate comprehension by the student. In keeping with current trends, risk analysis and food safety management are stressed throughout the textbook. The

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writing style is concise and to the point, and the book contains hundreds of references, figures, and tables. Extremely well organized, this book can serve as the primary text for a food safety course, or it can serve as a background text for more

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specialized courses in food safety. Key topics include: Risk and hazard analysis of goods - covers risk assessment and hazard analysis and critical control point (HACCP) evaluations of food safety. Safety management of the food supply - provides a farm-to-

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fork overview of food safety, emphasizing the risks associated with each step in the food supply. Food safety laws, regulations, enforcement, and responsibilities - describes the major provisions, relationship, and hierarchy of laws and guidelines designed to ensure

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a safe food supply. The pivotal role of food sanitation/safety inspectors - including the interpretation of standards, problem solving and decision making, education of the food handling staff, and participation in foodborne illness outbreak

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investigations.

Food proteomics is one of the most dynamic and fast-developing areas in food science. The goal of this book is to be a reference guide on the principles and the current and future potential applications of proteomics in food

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science and technology. More specifically, the book will discuss recent developments and the expected trends of the near future in food proteomics. The book will be divided into two parts. The first part (7 chapters) will focus on the basic principles for proteomics,

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e.g., sample preparation, such as extraction and separation techniques, analytical instrumentation currently in use, and available databases for peptide and protein identification. The second part of the book (26 chapters) will focus on

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applications in foods. It will deal with quality issues related to post-mortem processes in animal foods and quality traits for all foods in general, as well as the identification of bioactive peptides and proteins, which are very important from the nutritional point

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of view. Furthermore, consumers are now extremely susceptible to food safety issues, and proteomics can provide reassurance with different safety aspects, such as food authenticity, detection of animal species in the food, and identification of food allergens. All

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of these issues will be covered in this book. It is also worth noting that both editors are internationally recognized experts in the field of food science, and both have edited numerous food science books and handbooks.

January 1988 - June 1992

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Food Safety

Cumulative listing

Food Preservatives

Creating a Behavior-Based Food
Safety Management System

The golden era of food
microbiology has begun. All
three areas of food

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microbiology—beneficial, spoilage, and pathogenic microbiology—are expanding and progressing at an incredible pace. What was once a simple process of counting colonies has become a sophisticated process

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of sequencing complete genomes of starter cultures and use of biosensors to detect foodborne pathogens. Capturing these developments, Fundamental Food Microbiology, Fifth Edition broadens coverage

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of foodborne diseases to include new and emerging pathogens as well as descriptions of the mechanism of pathogenesis. Written by experts with approximately fifty years of combined experience, the book

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provides an in-depth understanding of how to reduce microbial food spoilage, improve intervention technologies, and develop effective control methods for different types of foods. See What's New in the

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Fifth Edition: New chapter on microbial attachment and biofilm formation Bacterial quorum sensing during bacterial growth in food Novel application of bacteriophage in pathogen control and detection Substantial

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update on intestinal beneficial
microbiota and probiotics to
control pathogens, chronic
diseases, and obesity
Nanotechnology in food
preservation Description of new
pathogens such as Cronobacter

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sakazaki, E. coli O104:H4,
Clostridium difficile, and Nipah
Virus Comprehensive list of
seafood-related toxins Updates
on several new anti-microbial
compounds such as polylysine,
lactoferrin, lactoperoxidase,

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ovotransferrin, defensins, herbs, and spices Updates on modern processing technologies such as infrared heating and plasma technology Maintaining the high standard set by the previous bestselling editions, based

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feedback from students and professors, the new edition includes many more easy-to-follow figures and illustrations. The chapters are presented in a logical sequence that connects the information and allow

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students to easily understand and retain the concepts presented. These features and more make this a comprehensive introductory text for undergraduates as well as a valuable reference for graduate

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level and working professionals in food microbiology or food safety.

For centuries man has treated food to prolong its edible life, and nowadays both traditional and modern preservatives are

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used widely to ensure the satisfactory maintenance of quality and safety of foods. There continues to be increased public concern about the use of food additives, including preservatives, resulting from a

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perception that some of them may have deleterious effects on health. However, as eating habits have changed with an emphasis on what has been popularly termed a `healthy diet', there is at the same time a concern that

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reduction in preservative usage could lead to loss of safety and protection from food poisoning. While some preservatives are coming under increasing regulatory pressure others, particularly more natural ones,

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are receiving increased attention and gaining in importance and acceptability. This book supports the continued safe and effective use of preservatives within these current constraints. It therefore gives detailed information on the

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practical use of the major antimicrobial preservatives. Uniquely, it couples this with current understanding of their modes of action, at the levels of cellular physiology and biochemistry, in such a way as to

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provide a sound scientific basis for their efficacy. Such an approach also encourages the future logical development and use of preservatives.

Authoritative coverage presented in a format designed to facilitate

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This work is a historical, multidisciplinary explanation of the complexities of the food system in the United States and around the world, spanning the beginning of the modern era to

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today's globalized,
interconnected market. *
Contains chapters on food
security, trade policy, and
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serves as a baseline of knowledge for auditors of food safety and quality systems that covers other aspects of food production, including preventive controls. This handbook assists certification candidates in preparing for the ASQ Certified

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Food Safety and Quality Auditor (CFSQA) examination. Its chapters cover the HACCP audit and auditor, preventive principles, and quality assurance analytical tools. The updated fourth edition also includes: •
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modern food preservation methods, including the introduction of HACCP methods • The evolution of prerequisite programs, such as chemical and microbiological controls • The importance of other food system support programs, such as

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*product traceability and recall,
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environmental control and
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for developing a HACCP plan
Rapid automated methods; the
development and use of immuno-
reagents; the utility of microbial*

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genetics and recombinant DNA; and the theory and applications of continuous culture techniques. Extensive illustrations are presented throughout the 2-volume set, and literature citations are appended to each of the reviews.

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The increased emphasis on food safety during the past two decades has decreased the emphasis on the loss of food through spoilage, particularly in developed countries where food is more abundant. In these countries spoilage is a

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commercial issue that affects the profit or loss of producers and manufacturers. In lesser developed countries spoilage continues to be a major concern. The amount of food lost to spoilage is not known. As will be evident in this text, stability and

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the type of spoilage are influenced by the inherent properties of the food and many other factors. During the Second World War a major effort was given to developing the technologies needed to ship foods to different regions of the world

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without spoilage. The food was essential to the military and to populations in countries that could not provide for themselves. Since then, progress has been made in improved product formulations, processing, packaging, and distribution

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systems. New products have continued to evolve, but for many new perishable foods product stability continues to be a limiting factor. Many new products have failed to reach the marketplace because of spoilage issues.

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*Principles of Microbiological
Troubleshooting in the Industrial
Food Processing Environment
provides proven approaches and
suggestions for finding sources of
microbiological contamination of
industrially produced products.
Industrial food safety*

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professionals find themselves responsible for locating and eliminating the source(s) of food contamination. These are often complex situations for which they have not been adequately prepared. This book is written with them, the in-plant food

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safety/quality assurance professional, in mind. However, other professionals will also benefit including plant managers, regulatory field investigators, technical food safety policy makers, college instructors, and students of food science and

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microbiology. A survey of the personal and societal costs of microbial contamination of food is followed by a wide range of respected authors who describe selected bacterial pathogens, emerging pathogens, spoilage organisms and their significance

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to the industry and consumer. Dr. Kornacki then provides real life examples of in-plant risk areas / practices (depicted with photographs taken from a wide variety of food processing facilities). Factors influencing microbial growth, survival and

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death area also described. The reader will find herein a practical framework for troubleshooting and for assessing the potential for product contamination in their own facilities, as well as suggestions for conducting their own in-plant investigations.

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Selected tools for testing the environment and statistical approaches to testing ingredients and finished product are also described. The book provides suggestions for starting up after a processing line (or lines) have been shut down due to a

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contamination risk. The authors conclude with an overview of molecular subtyping and its value with regard to in-plant investigations. Numerous nationally recognized authors in the field have contributed to the book. The editor, Dr. Jeffery L.

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Kornacki, is President and Senior Technical Director of the consulting firm, Kornacki Microbiology Solutions in Madison, Wisconsin. He is also Adjunct Faculty with the Department of Food Science at the University of Georgia and

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*also with the National Food
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**component of characteristic.
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include the following:
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assignment, objective, principle
of method, chemicals, reagents,
precautions and waste disposal,**

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supplies, equipment, procedure, data and calculations, questions, and references. This laboratory manual is ideal for the laboratory portion of undergraduate courses in food analysis. While many food science

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programs offer courses in the microbiology and processing of fermented foods, no recently published texts exist that fully address the subject. Food fermentation professionals and researchers also have lacked a

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foods, an overview of microorganisms involved in food fermentations, and their physiological and metabolic properties provide a foundation for the reader. How microorganisms are used to

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produce fermented foods and the development of a modern starter culture industry are also described. Successive chapters are devoted to the major fermented foods produced around the world with coverage

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