Microbial Risk Analysis of Foods
Emerging Issues in Food Safety
Series Editor, Michael P. Doyle

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Microbial Risk Analysis of Foods

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Contents

Contributors vii
Series Editor’s Foreword ix
Preface xi

1 Qualitative Risk Assessment  1
Marion Wooldridge

2 Using Risk Assessment Principles in an Emerging Paradigm for Controlling the Microbial Safety of Foods  29
Richard C. Whiting and Robert L. Buchanan

3 Microbial Ecology in Food Safety Risk Assessment  51
Tom Ross

4 The Modular Process Risk Model (MPRM): a Structured Approach to Food Chain Exposure Assessment  99
Maarten J. Nauta

5 Using Risk Analysis for Microbial Food Safety Regulatory Decision Making  137
Sherri B. Dennis, Janell Kause, Mary Losikoff, Daniel L. Engeljohn, and Robert L. Buchanan
6 Integrating Concepts: a Case Study
Using Enterobacter sakazakii in Infant Formula  177
Martine W. Reij and Marcel H. Zwietering

7 Communicating about Microbial Risks in Foods  205
William K. Hallman

Index  263
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Series Editor’s Foreword

Risk analysis is a tool to facilitate complex problem solving and decision making in addressing mitigation of a hazard and comprises three components. These include risk assessment, risk management, and risk communication. Risk assessment involves using scientific information to describe the likelihood and magnitude of harm attributed to a specific hazard. Risk management applies to the activities undertaken to control a hazard. Risk communication is the exchange of information about a hazard among interested parties. Several monographs have been written describing the principles of these three concepts; however, few have been published regarding how these concepts apply to today’s initiatives to provide safer foods.

Microbial risk analysis has become an integral part of a science-based decision-making process to identify intervention strategies that yield the greatest impact in providing public health protection to the food supply with the limited resources available. A recent example is a risk assessment of *Listeria monocytogenes* in foods conducted by the Food and Drug Administration and the U.S. Department of Agriculture that has enabled the agencies to risk-rank foods having the greatest potential in serving as vehicles for listeriosis. These regulatory agencies have applied this information to risk management to focus their resources on foods of greatest risk, such as deli meats, and away from foods that are highly unlikely to cause illness if consumed, such as ice cream. Furthermore, this information, through risk communication, has been disseminated to food processors and consumers to enable them to apply greater interventions to high-risk foods. The net result is the prevention of more cases of listeriosis than would occur if all foods were equally targeted with the same amount of resources.
The concept of microbial risk analysis is not only used in the United States but has taken on international dimensions, with the World Health Organization and Food and Agriculture Organization of the United Nations actively engaged in conducting risk assessments and applying them to the risk analysis matrix. This information has subsequently been used by Codex Alimentarius in its deliberations for setting international food safety standards. Hence, microbial risk analysis has become a tool adopted worldwide to mitigate food contamination and related illnesses.

Written by a cast of internationally recognized authorities, this book elucidates how risk analysis of food-borne agents of microbial origin can be used to provide greater public health protection to our food supply. I commend Don Schaffner and his associates for this extraordinary contribution.

Michael P. Doyle, Series Editor
Emerging Issues in Food Safety
Preface

Microbial risk analysis is a new and emerging component of the field of microbial food safety. It is being used with increasing frequency by domestic food safety agencies as well as by international organizations to assess and manage the safety of our food supply.

There are several reasons why microbial risk analysis has emerged as such an important food safety tool at this point in time. First, the advances in computing technology have made powerful risk analysis tools accessible to a wider array of scientists and engineers than ever before. Second, our food production and distribution systems have become quite complex. So much so, in fact, that it may not be intuitively obvious exactly where the optimal food safety fixes are needed, unless a tool like risk analysis is used.

Although these two factors have made the development of microbial risk analysis possible, and even desirable, the most significant factor driving the international interest in risk analysis is one related to international policy and trade. A component of the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (called the SPS Agreement) deals with risk. Sanitary measures are those that relate to human and animal health (e.g., salmonellosis or foot-and-mouth disease) while phytosanitary measures relate to plant health (e.g., Mediterranean fruit fly). Article 5 of the SPS Agreement is entitled “Assessment of Risk and Determination of the Appropriate Level of Sanitary or Phytosanitary Protection.” The first paragraph of Article 5 states that sanitary or phytosanitary measures should be based on an assessment of the risks and should take into account risk assessment techniques developed by the relevant international organizations. Because of the SPS Agreement, many importing and exporting countries are
interested both in carrying out risk assessments of domestically produced foods and in understanding the risk posed by imported foods.

Because of the advances in computing technology, the complexities of our food production and distribution systems, and the need for fair international trade, we have seen a dramatic increase in the interest in microbial risk analysis as well as in its practice, both by national governments and international bodies like the World Health Organization and the Food and Agriculture Organization. It is within this context that I was asked to edit this important book.

While many texts are available that describe the basics of microbial risk assessment, a real need exists for an “advanced” text on the subject. The basic idea of this book is to answer the question: what do you need to know after you understand the basics of microbial risk assessment? This book has been written primarily for beginning risk assessors who need to take the “next step” in their education. It will also be a valuable reference for the graduate student or university researchers engaged in risk assessment research, or serve as a text for a graduate level course in microbial risk analysis. It will be a valuable resource for industry and government risk managers who need to understand the sort of information their risk assessors will be communicating to them in the next five years.

Topics covered in this book include qualitative risk assessment; the relationship between microbial risk assessment and other important microbial food safety concepts like the Hazard Analysis and Critical Control Points (HACCP) and Food Safety Objective (FSO) approaches to food safety; and Modular Process Risk Modeling. This book also reaches beyond microbial risk assessment to cover microbial risk management and communicate about microbial risks in foods. We are also very pleased that this volume includes a case study chapter designed to integrate many of the concepts presented in the rest of the book.

Thanks to Mike Doyle, Series Editor, for asking me to edit this book, and to Eleanor Riemer, ASM Senior Consulting Editor, for shepherding me through the process.

Thanks to all of my friends and colleagues who agreed to give generously of their time in the midst of birth, death, and the responsibilities of their day jobs. This book would not have been possible without all of your efforts.

Donald W. Schaffner
Index

A
Advertisements, appealing to emotions, 247–248
beliefs about microbes and, 224
concerning germs, 220–224
Advertising claims, for cellophane, 222
for Clorox disinfecting wipes, 223
for Crest Pro-Health Oral Rinse, 222
for Dial soap, 222–223
for Drano, 221
for Electric Rat & Roach Paste, 221–222
for Kleenex Anti-Viral tissues, 223
for Lifebuoy soap, 221
for Listerine antiseptic, 220–221, 222
for Lysol wipes, 223
for Mercurochrome, 221
for Purell, 224
for Raid with GermFighter Ant & Roach Killer, 223–224
for “sneeze-proof” tissues, 221
Algae, 55–56
Antibiotic resistance, through food chain, case study of, 18–23, 24–26
Appropriate level of protection (ALOP), setting of, 35, 37–38, 43
Archaea, 60
Aspergillus spp., behavior of, 83
Audience, communicator understanding of, 211–213

B
Bacillus, 64
Bacillus cereus, 64, 88, 93, 95
in vegetable puree, 119–124
Bacteremia, as cause of neonatal death, 180–181
Bacteria, 60–64
modes of causing food-borne illness, 60–63
spoilage, in foods, 78
Bacterial pathogens, food-borne, 61–62, 63–64
Behaviors, reflexive, practice of, 248
“Best before” date, 89
Bovine spongiform encephalopathy (BSE), 54
Broccoli puree production process, 120, 121

C
Campylobacter, 133, 152
in chicken meat, 124–127
in food, 230
Campylobacter spp., 95, 114
Case study: antibiotic resistance through food chain, 18–23, 24–26
Center for Food Safety and Applied Nutrition, 146
Ciguatera toxin, 55
Clostridium, 64
Clostridium perfringens, 64
Codex Alimentarius (Codex), 1
Codex Alimentarius Commission (CAC), 95, 143
guidelines for microbial risk assessment, 65
principles for microbial risk management, 144
use of risk analysis by, 143
Codex Committee on Food Hygiene (CCFH), 143, 178
assistance for, 143
Communication. See also Risk communication
finding starting points for, 213–216
successful, keys to, 210
Communicator(s), choice for risk communication, 209–216
good, characteristics of, 209, 210
understanding of audience, 211–213
Computer software systems, in predictive microbiology, 82
Consumer preferences, food consumption practices and, 245
Contamination, extrinsic, 187
Creutzfeld-Jakob disease (CJD), 54
Creutzfeld-Jakob variant (vCJD), 54
Cross-contamination, in communal kitchens, 232
Culture, and food risks, 226–227

D
Dating system, universal, on food packages, 243
Decision making, approaches to, 147–148
regulatory, risk assessment in, 148–155
technocratic, decisionist, and transparent models, 147–148
Disaggregation, 95
Disgust, as motivation for rejecting foods, 228
indicators of, judgments about food safety and, 228–229

E
Emotions, appealing to, 248
Emulsions, water-in-oil, microbial growth in, 85
Encephalopathies, transmissible spongiform (TSE), 54
Enterobacter sakazakii, 142
description of, 177
dose required to produce illness, 182, 183–184
ecology of, 178
growth at various temperatures, 189, 190
in infant formula, 177–204
preparation and handling scenarios, 196–201
prevention during manufacture, 193–201
quantitation risk assessment for, 178
reduction of risk of, setting of microbiological criteria and, 187, 193, 194–196
risk characterization for, 191–192
risk communication and risk management and, 201–203
invasive infections from, as rare, 179–180
exposure assessment of, 184–190
hazard characterization in, 181–184
hazard identification of, 179–181
incidence of, 177
outbreaks since 2001, 177–178
ranges of concentrations of, 187
risk analysis of, 178–179
susceptibilities of infants to, 183–184
Environment, fluctuations in, predictive microbiology and, 86–87
Environmental factors, favoring growth of pathogens, 89
microorganisms in foods and, 73
Environmental influences, on pathogen virulence, 90–93
Escherichia coli, 64, 92, 93
in food, 230
European Food Safety Authority (EFSA), 144

F
FDA Vibrio parahaemolyticus risk assessments, 158–171
“Fear appeals,” to influence behavior change, 246–247
Federal Register, 164
Food and Agriculture Organization/World Health Organization (FAO/WHO), on data needs and sources, 77–93
Food and Drug Administration (FDA), 30
surveys of perceptions of food-borne illness, 240
Food-borne bacterial pathogens, 61–62, 63–64
Food-borne illnesses, communication concerning, as general, 241–242
epidemiology of, changes in, 230–231
incidence of, underestimation of, 239
optimistic bias effects and, 239–242
perceptions of, 240
Food and Drug Administration surveys of, 240
underreporting of, 240
Food-borne microorganisms. See Microorganisms in foods
Food categories, based on “cluster analysis,” classification as “high” or “low” risk, 170
Food chain, antibiotic resistance through, case study of, 18–23, 24–26
Food consumption practices, and consumer preferences, 245
Food handling, unsafe practices in, high-risk populations for, 235 socioeconomic status and, 235–236
Food handling practices, and connection with risk, 239 home-based, 231
in home, food poisoning and, 241 knowledge of, and implementation of, 237 factors cited as barriers to practice, 238
Food hazards, health risks associated with, 51
Food hygiene training, ongoing reinforcement of, 242
Food industry, and environmental conditions in foods and during food processing, 52
Food labels, information on, 242–243
Food pathway, as chain of modules in modular process risk model (MPRM), 105–119
Food poisoning, recognition of symptoms of, 239
Food preparation, in home, investigations of, 231 unrealistic optimism and illusions concerning, 240
Food preparation hygiene, failure to practice, 236–242
Food risks, affective responses to, 227–230 culture and, 226–227
Food safety, risk assessment, microbial ecology in, 51–98 risk assessment to establish, 39–42 traditional process criteria for, 29–30
Food Safety and Inspection Service (FSIS), 30
Food safety issues, connection of actions to consequences in, 245–246 increasing complexity of, 139 messages concerning, appropriate channels for, 242–245 television reporting of, 242
Food safety objective (FSO), 31–32, 38 setting of, 43, 44–45, 47
Food Safety Objective (FSO)/Performance Objective (PO), 141 paradigm, 34–39 validation to meet, 47
Food safety problem, identification and prioritization of, 148–151
Foods, Listeria in, 225 microbial ecology of. See Microbial ecology of foods microbial risks of, communicating about, 205–262 scientific understanding for, 205 microbial safety of, risk assessment principles in paradigm for controlling, 29–50 microbiological hazards in, public perceptions about, 230–231 microorganisms in. See Microorganisms in foods Salmonella in, 225 spurned as disgusting, 228 structure of, predictive microbiology and, 85–86 undercooked, consumption of, 236
Fungi, 56

G
Gambierdiscus toxicus, 55–56
Gene, “expression” of, 92 “Germ theory,” 219–220
Germs, advertising concerning, 220–224 legacy of, 220–222 and illness, beliefs about, 219 educating consumers about, 221 killing of, beliefs about, 219 locations, beliefs about, 218 messages about, in advertising, 224 rare, concern about exposure to, 224

H
Hand sanitizers, waterless, 224
Hand washing, among health professionals, 235 campaigns to encourage, 233 food preparation and, 231 reasons given for not, 233–234 surveys in United States, 234–235
Hazard Analysis, Critical Control Points (HACCP), 30–31, 35 adoption of, 140 business/agencies using, 140 data on explicit factors and, 78 establishment of performance standards by, 140 risk analysis by, 140 uses of, 140
Hazard Analysis, Critical Control Points (HACCP) (continued)
verification of process operation according to, 47
Hazards, definition of, 139
Helminths, 57–58, 59
HHS/FDA and USDA/FSIS Listeria monocytogenes risk assessments, 158–171
HIV, maternal, infant feeding in, 182
Human health and safety assessments, 7
“Hurdle technology,” 70

I
Import risk assessments, 7
Infant formula, powdered, cases of infection associated with, number of, 192
contamination of, modes of, 187
Enterobacter sakazakii in, case study using, 177–204
handling, storing and usage methods for, 186, 187, 188
microbial quality distribution of, 191–192
microbiological criteria for, 187
prevention of contamination during manufacture, 193–201
production of, 185, 186–187
reconstitution of, temperature of water for, 198–200
refrigeration of, 200–201
Infections, invasive, due to Enterobacter sakazakii. See Enterobacter sakazakii, invasive infections from
International Commission on Microbiological Specifications for Foods (ICMSF), 81
Interstate Shellfish Sanitation Conference (ISSC), 169

J
Jameson effect, 89–90

K
Knowledge deficit model, 215
Kuru, 54

L
Lactic acid, and pH, growth of microbes and, 74
Lactic acid bacteria, Jameson effect and, 90
Lag time(s), in small cell populations, 80
information on, 79–81
relative, frequency distributions of, 80–81
variability of, 79
Lettuce, fresh-cut, food safety parameters for, 37
Level of protection (LOP), 35
appropriate (ALOP), 35, 37–38
setting of, 43
Listeria, 225
in food, 230
Listeria Action Plan, 170
Listeria monocytogenes, 64, 74–75, 90, 93, 152
food storage time and, 158
HHS/FDA and USDA/FSIS risk assessments of, 158–171
in foods at retail level, 164
in ready-to-eat foods risk assessment, 157
Jameson effect and, 90, 91
Listeriosis, 142
Literature review, and qualitative risk assessment, compared, 8

M
Mad cow disease, 54
Meningitis, as cause of neonatal death, 180–181
Mibrobes, ecology of, beliefs about, 217–218
knowledge of, sources of, 219–224
Microalgae, 55
Microbes, beliefs about, advertising and, 224
decline in population and, patterns of, 66
differences in lethality and, 65
growth and death of, boundary between, 70–71
growth of, lactic acid and pH and, 74
growth rate of, effects of temperature on, 71, 72–73
effects of water activity on, 71, 72–73
population growth, patterns of, 69–70
population inactivation kinetics, patterns of, 66, 67–68
Microbial contamination, in home kitchens, 231
knowledge of, 238
Microbial ecology of foods, 64–77
changing patterns of microbial population and, 65–71
deterministic aspects of, 53
extrinsic factors in, 75–76
factors affecting, categories of, 74
implicit factors in, 76, 81
in risk assessment of food safety, 51–98
interactions and correlations and, 88–93
intrinsic factors in, 74–75
processing factors in, 76–77
“rules governing,” 81
safety risk assessments and, 93–96
Microbial food safety, regulatory decision making, using risk analysis for, 137–175
Microbial food safety issues, risk analysis for, reasons for, 139–143
Microbial food safety management systems, steps to improve, 139–140
Microbial growth, modeling of, 53
rate of population increase and, 65
Microbial interactions, predictive microbiology and, 86
Microbial loads, initial, estimation of, 78–79
Microbial pathogens, overview of, 54–64
virulence of, 92
Microbial risk assessment, Codex (Alimentarius Commission) guidelines for, 65
Microbial risk assessment model, 34–39
Microbiological criterion, 39
Microbiological hazards, in foods, public perceptions about, 230–231
Microbiological modeling, and risk assessment, 32–34
Microbiology, knowledge of people about, 216–217
predictive. See Predictive microbiology
Microorganisms, effect of, and populations of microbes, growth, 52
in foods, responses of, 53
main groups of, 54–64
opportunistic, 33
pathogenicity of, determination of, 33
self-amplification of, 53
toxin production by, 33
virulence factors, and dose-response relationship, 34
and pre-consumption environment, 33–34
Microorganisms in foods, “biotic” environment and, 73
ecology of, predictive microbiology and, 81
environmental factors and, 73
lag time of, quantification of, 78–79
moving long chain, processes affecting number of, 73–74
1939 Milk Ordinance and Code, 29
Modular process risk model (MPRM), 94
and other risk assessment approaches, 127–129
basic processes in, 108–118
“black boxes” as steps in food chain, 116–118
building structure of, 104
collect necessary data and expert opinion, 104
cross-contamination in food safety and, 113–116, 117
define model to use for each module in, 104
description of food pathway in, 102–104
effects of growth, mixing, and cross-contamination in, 130, 132–133
experience with, 119–127
food-handling processes as removal in, 112–113
food pathway as chain of modules and, 105–119
growth of microorganisms and, 109
implement available data into model, 105
input and output of food chain model and, 118–119
methodology of, 102–105
microbial inactivation in, 109–110
mixing in, 111–112
model structure of food pathway processes, 120, 122
partitioning in, 110–111
perform exposure assessment in, 105
statement of purpose in, 102
steps to conducting QMRA with, 102
structured approach to food chain exposure assessment, 99–135
use for simpler food chain QMRA, 129–134
variability and uncertainty and, 106–108
Molds, 56–57
Mycotoxins, 56–57

N
National Research Council (NRC), and goals for risk communication, 206–207
“Negligible,” to describe risk, 7

O
Organisms, specific spoilage organisms (SSOs), 78
Oysters, in risk assessments, 162, 163
P
Pathogens, environmental factors favoring growth of, 89
virulence of, environmental influences on, 90–93
Pathogens in foods. See Microorganisms in foods
Performance criterion, 38–39
Performance objective (PO), 38
setting of, 45
pH, and lactic acid, growth of microbes and, 74
Predictive microbiology, 81–83
application of models to risk assessment, 83–88
environmental fluctuations and, 86–87
food structure and, 85–86
microbial interactions and, 86
model complexity and, 87–88
strain variability and, 84–85
Prions, 54
Prokaryotes, 60
Proteins, required by cell, 92
Protozoans, 57–58, 59
Public perceptions, on microbiological hazards in foods, 230–231

Q
Qualitative risk assessment, 1–28
and literature review, compared, 8
and quantitative risk assessment, complementary, 4–5
approaches to, 8–18
case study from, 18–23, 24–26
computation of final risk estimate in, 16
conclusions of, 23, 24–26
data needs for, 20, 21
data presentation in, order of, 13–14
data requirements for, 9–10
defined risk question in, 8–9
definition of, 1
expert opinion and, 12
identification of risk elements in, 14–16
in food safety, 7–8
main principles of, 2
minimum requirements of, 3
multiple data sets for, approaches to, 10–11
numerical inputs into, 10
omitting of irrelevant data from, 13
reaching risk conclusions in, transparency in, 14–16
reasons for specifying, 2
risk assessment process in, 20–22
risk pathway for, 19
risk question for, 19
steps in, 16
tabular format for presenting data in, 14–16
textual conclusions in, subjective nature of, 5–7
uncertainty and variability and, 11–12
use of, 2–4
Qualitative risk characteristics, 224–225
Quantitative microbial risk assessment (QMRA), 99
conduction with modular process risk model, 102
of food chain, 100
Quantitative risk assessment, as complementary, 4–5
computation of final risk estimate in, 16
knowledge necessary for, 9–10

R
Recipes, ingredients in, checking food safety hazards, 244–245
Refrigeration, need for, food labels and, 242–243
Refrigerator, temperature inside, 232
Regulon, 92
Review process, in risk assessment, 152–154
Risk, acceptable, 225–226
as function of probability, 139
comparative judgments of, 225–226
dread, 225
levels of, assessment of, 225
words to describe, 6
perceived, psychometric bases of, 224–225
perceptions of, 224–226
qualitative characteristics of, 224–225
unacceptable, 225–226
unknown, 225
Risk analysis, 39–40
activities of, and responsible parties, 146
benefits of, 141
conditions for smooth operation of, 145–146
expertise required for, 142
financial resources for, 142–143
for microbial food safety, using regulatory decision making, 137–175
for microbial food safety issues, reasons for, 139–143
framework for implementation of, 143–145
limitations of, 141–143
process of, 138
requirements of, 145
U.S. Federal Government in, 144–145
Risk assessment(s), 40–43
abstract scenarios for, 157–158
and risk characterization, 4
approaches for, 160–161
“cluster analysis” technique in, 168
data for, 165–166
data needs and sources for, 77–93
deciding whether to conduct, 151–155
decisions for, examples of, 155
definition of, 138
FDA *Vibrio parahaemolyticus*, 158–171
food safety, microbial ecology in, 51–98
foods of concern in, 162
future of, 171–172
faster and better assessment in,
171–172
improved communication in, 172
improved transparency in, 172
heuristic scenarios for, 157
HHS/FDA and USDA/FSIS *Listeria monocytogenes*, 158–171
in regulatory decision making, 148–155
key results of, 166–169
microbiological modeling and, 32–34
organisms evaluated in, 161–162
plan for, 151
populations of concern in, 162–163
pragmatic scenarios for, 156
procedures for, 164–165
putting to work, 155–156
qualitative. See Qualitative risk assessment
questions to be answered by, 152, 153
refrigerator temperature scenario for,
157–158
review process in, 152–154
risk management options in, 169–171
stakeholder assessments and, 163–164
stakeholder involvement in, 154
storage times scenario for, 158
to analyze and improve food process,
44–47
to establish food safety, 39–42
trigger for, 159
two-dimensional, outcomes of, cumulative
plots of, 45, 46
output of, 43
“weighted” data in, 165
Risk assessor, 6
Risk characterization, combining steps to
form conclusions, 16–18
for *Enterobacter sakazakii* in infant for-
mula, 191–192
“matrix” approach to, 18
risk assessment and, 4
Risk communication, and *Enterobacter sakaza-
kii* in infant formula, 201–203
choosing communicator for, 209–216
common goals for, 206–209
definition of, 138
failure to clarify goals in, risks of, 207–208
“two-way” communications for, 208
understanding of science and, 214
Risk communicators, use “fear appeal” mes-
sages by, 247
Risk management, and *Enterobacter sakaza-
kii* in infant formula, 201–203
definition of, 138
options in, identification and selection of,
154–155
quantitative microbial, activities associ-
ated with, 148, 150
seven components of, 148, 149
Risk manager, 6
CAC definition of, 143

S
*Salmonella*, 92, 133, 225
concerns about health and death associ-
ated with, 240–241
in food, 230
*Salmonella enterica* serovar Typhimurium, 93
*Salmonella enteritidis*, 152
Scrapie, 54
Seals, on food packages, explanation of, 243
Shelf life and storage conditions, 88–89
Shellfish, in risk assessments, 162, 163
Sigma (σ) factors, 92
Specific spoilage organisms (SSOs), 78
*Staphylococcus aureus*, 93
*Staphylococcus xylosus*, 71

T
Television, as potential source of food safety
information, 244
Transmissible spongiform encephalopathies
(TSE), 54

U
U.S. Federal Government, in risk analysis,
144–145
U.S. OMB Peer Review Bulletin, 152
USDA/FSIS and DHHS/FDA, regulatory responsibilities of, 144–145
“Use by” date, 89

V
Validation, to meet Food Safety Objective (FSO)/Performance Objective (PO), 47
Verification, of process operation according to Hazard Analysis, Critical Control Points (HACCP), 47
Vibrio, 64
Vibrio parahaemolyticus, 152
FDA risk assessments of, 158–171

W
Waterless hand sanitizers, 224
World Organisation for Animal Health (OIE), 1
World Trade Organization, Sanitary and Phytosanitary Agreement of, 35–36

Y
Yeasts, 56
Yersinia enterocolitica, 93