Imported Foods
Microbiological Issues and Challenges
Emerging Issues in Food Safety
Series Editor, Michael P. Doyle

Microbiology of Fresh Produce
Edited by Karl R. Matthews

Microbial Source Tracking
Edited by Jorge W. Santo Domingo and Michael J. Sadowsky

Microbial Risk Analysis of Foods
Edited by Donald W. Schaffner

Enterobacter sakazakii
Edited by Jeffrey M. Farber and Stephen J. Forsythe

Food-Borne Viruses: Progress and Challenges
Edited by Marion P. G. Koopmans, Dean O. Cliver, and Albert Bosch

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Edited by Michael P. Doyle and Marilyn C. Erickson
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The microbiological safety of foods has become a highly visible international issue of concern, with many outbreaks of food-borne illness being reported daily around the globe. In the United States alone, more than 1,200 food-borne outbreaks are reported annually, and more than 70 million cases of food-borne illness are estimated. The Emerging Issues in Food Safety series was conceived by ASM Press in 2006 to provide in-depth, state of the science information regarding current topics in the microbiological food safety arena.

Since the inception of the series, six volumes have been published addressing the issues of the day. Food attribution studies of cases associated with recent food-borne illness outbreaks have revealed vegetables and noroviruses as the leading vehicle and pathogen, respectively, responsible for these outbreaks. Microbiology of Fresh Produce, edited by Karl Matthews, and the treatise Food-Borne Viruses: Progress and Challenges, edited by Marion Koopmans, Dean Cliver, and Albert Bosch, provide timely, insightful perspectives on both of these topics.

Public health professionals, largely because of major advances in surveillance systems, have unearthed outbreaks likely to have gone unnoticed in the past. Jorge Santo Domingo and Michael Sadowsky have, in the volume Microbial Source Tracking, provided an intriguing look into the future of novel approaches to trace pathogens to their points of origin. Coupled with better surveillance systems for detecting food-borne outbreaks, this tracking technology will enable food producers and processors to better understand sources of contamination and thereby take corrective actions to prevent pathogen contamination.

New food-borne pathogens continue to emerge and sometimes reemerge, including Enterobacter sakazakii, which has recently become a major nemesis
of the infant formula industry. Two internationally recognized leaders in studying the food-associated aspects of this pathogen, Jeffrey Farber and Stephen Forsythe, have edited the book *Enterobacter sakazakii*, which provides a comprehensive treatise on the food safety aspects of this microorganism.

On the heels of food safety issues associated with emerging food-borne pathogens are food safety concerns linked to emerging markets that provide foods and food ingredients. Many of the emerging food sources are developing countries that do not employ the same level of sanitary practices in food production and processing that developed countries do. This can result in unintended and unacceptable pathogen contamination of foods imported by countries with high standards of sanitary practices for food production and preparation. Marilyn Erickson and I have organized *Imported Foods: Microbiological Issues and Challenges* to address many of the food safety issues facing the United States and many other countries that import foods from countries having less than adequate food production and preparation practices.

With the emergence of newly recognized food-borne pathogens, major sources of foods produced under unsanitary conditions, changes in eating behavior involving more consumption of higher-risk fresh, uncooked ready-to-eat food (such as fresh vegetables), and better methods for detecting and tracking food-borne disease outbreaks, microbiological food safety issues will undoubtedly be of major international concern for many years to come. One of the greatest challenges in addressing these issues is determining how best to regulate them. Most countries have limited, and often minimal, resources to ensure the safety of foods. Hence, international efforts are being directed to developing science-based decision-making tools for identifying the most effective use of resources to minimize food-borne illnesses. The concept of microbial risk analysis has been conceived and widely embraced to address this need. Donald Schaffner has brought together a cast of internationally recognized experts to draft *Microbial Risk Analysis of Foods*, which elucidates how risk analysis of food-borne agents of microbial origin can be used to provide greater public health protection to the food supply.

Collectively, these six contributions cover the gamut of today’s microbiological food safety issues and provide cutting edge information and insights that cannot be found elsewhere. I personally find them to be a treasure trove of intelligence, and they are valuable resources for food safety professionals who are at the cutting edge of food safety.

Michael P. Doyle, Series Editor

*Emerging Issues in Food Safety*
According to USDA-ERS data, in 2004 the United States began to import more food than it exported based on dollar value, and this differential continues to grow. Currently about 15% of foods consumed in the United States are imported, but differences in import percentages exist for commodity types. For example, in 2005, about 80% of fresh and frozen fish and shellfish, 44% of fresh fruits, 43% of tree nuts, and 16% of fresh vegetables consumed in the United States were imported. Unfortunately, sanitation practices for food production and preparation are not universally equivalent throughout the world. Many developing countries, including those that provide food to the United States, have high incidences of infectious diseases and large portions of their populations are asymptomatic carriers of food-borne pathogens like norovirus, *Campylobacter*, and parasites. These harmful microbes frequently contaminate human sewage that is used untreated to fertilize land for growing produce and ponds for growing fish and shrimp in many East Asian countries like China. Current estimates indicate at least two-thirds of the world production of farmed fish is grown in ponds fertilized with animal manure and/or human sewage. In Mexico City with its population of more than 25 million, less than 10% of the city’s wastewater sewage is treated, with the remainder being sent into rivers that irrigate farmland to the north.

In addition to microbiological food safety concerns, there are many chemical contaminants associated with foods produced in developing countries. For example, in China, where farmers largely grow crops or fish in one-acre parcels, excessive or inappropriate use of pesticides, antibiotics, and veterinary drugs frequently occurs to enable maximum productivity. Consequently, antibiotics like chloramphenicol that are not allowed for crop or aquaculture purposes in the United States have been detected in foods from China.
Food distributors and processors within the United States are the first line of defense to ensure safety of the foods they make available to domestic consumers. The federal government, on the other hand, is responsible for ensuring that those companies marketing foods and food ingredients from foreign sources are providing safe foods. In particular, the U.S. Food and Drug Administration (FDA) has oversight of about 80% of the U.S. food supply but visually inspects only about 1% of about 9 million food shipments annually while less than 0.5% of imported foods are sampled and tested.

FDA testing of imported foods continues to identify tainted products. For example, in August 2007 the FDA reported 187, 173, and 160 food refusal actions from China, India, and Mexico, respectively. Examples of rejected foods from China include chives (*Salmonella*), shrimp (nitrofuran), peppercorns (*Salmonella*), pear juice concentrate (pesticides), catfish (veterinary drugs), diced green bell peppers (pesticides), IQF butterfly shrimp (veterinary drugs and nitrofuran), aniseed powder (*Salmonella*), wheat gluten (poisons, filth), and soy protein (poisonous, unsafe additives), and frozen soybeans (pesticides). *Salmonella* and pesticide contamination of spices and seasonings were common causes of refusals from India. Pesticides in produce were also a major reason for rejections of food from Mexico. These statistics are evidence that there are continuing contamination problems in the food import system and provide justification for the importance of the FDA not only to continue, but also to improve its sampling and testing protocols to detect adulterated food coming into the U.S. food supply.

If the U.S. food safety system is allowed to continue unchanged, there are likely to be major increases in the occurrence and size of food-borne outbreaks as U.S. food imports increase from countries in which risky food production, harvesting, and processing practices exist. This issue is among the most serious of food safety concerns confronting Americans for the foreseeable future. This book is the first to provide a comprehensive treatment of the microbiological food safety issues facing the United States from imported foods, and provides the justification for changes in the U.S. food safety net.

Michael Doyle
Marilyn Erickson
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