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Hazard characterization for pathogens in food and water

GUIDELINES

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Hazard Characterization for Pathogens in Food and Water

Guidelines

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ABBREVIATIONS USED IN THE TEXT

CAC	FAO/WHO Codex Alimentarius Commission
CFU	Colony forming unit
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration [of the United States of America]
GDWQ	Guidelines for Drinking Water Quality
JEMRA	Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment
MCMC	Markov chain Monte Carlo methods
MRA	Microbiological risk assessment
PCR	Polymerase chain reaction
USDA	United States Department of Agriculture
WHO	World Health Organization

A glossary of technical terms used in the text appears as Appendix B.

FOREWORD

The Members of the Food and Agriculture Organization of the United Nations (FAO) and of the World Health Organization (WHO) have expressed concern regarding the level of safety of food at both national and the international levels. Increasing foodborne disease incidence over the last decades seems, in many countries, to be related to an increase in disease caused by microorganisms in food. This concern has been voiced in meetings of the Governing Bodies of both Organizations and in the Codex Alimentarius Commission. It is not easy to decide whether the suggested increase is real or an artefact of changes in other areas, such as improved disease surveillance or better detection methods for microorganisms in foods. However, the important issue is whether new tools or revised and improved actions can contribute to our ability to lower the disease burden and provide safer food. Fortunately, new tools that can facilitate actions seem to be on their way.

Over the past decade, risk analysis – a process consisting of risk assessment, risk management and risk communication – has emerged as a structured model for improving our food control systems, with the objectives of producing safer food, reducing the numbers of foodborne illnesses and facilitating domestic and international trade in food. Furthermore, we are moving towards a more holistic approach to food safety, where the entire food chain needs to be considered in efforts to produce safer food.

As with any model, tools are needed for the implementation of the risk analysis paradigm. Risk assessment is the science-based component of risk analysis. Science today provides us with in-depth information on life in the world we live in. It has allowed us to accumulate a wealth of knowledge on microscopic organisms, their growth, survival and death, even their genetic make-up. It has given us an understanding of food production, processing and preservation, and the link between the microscopic and the macroscopic worlds and how we can benefit from as well as suffer from these microorganisms. Risk assessment provides us with a framework for organizing all this data and information and to better understand the interaction between microorganisms, foods and human illness. It provides us with the ability to estimate the risk to human health from specific microorganisms in foods and gives us a tool with which we can compare and evaluate different scenarios, as well as identify what types of data are necessary for estimating and optimizing mitigating interventions.

Microbiological risk assessment (MRA) can be considered a tool for use in the management of the risks posed by foodborne pathogens and in the elaboration of standards for food in international trade. However, undertaking an MRA, particularly quantitative MRA, is recognized as a resource-intensive task requiring a multidisciplinary approach. Yet