

Appendix I Objectives and accomplishments of the ICMSF

History and purpose

The International Commission on Microbiological Specifications for Foods (ICMSF, the Commission) was formed in 1962 through the action of the International Committee on Food Microbiology and Hygiene, a committee of the International Union of Microbiological Societies (IUMS). Through the IUMS, the ICMSF is linked to the International Union of Biological Societies (IUBS) and to the World Health Organization (WHO) of the United Nations.

In the 1960s, there was growing recognition of food-borne disease and greatly increased microbiological testing of foods. This, in turn, created unforeseen problems in international trade in foods. Different analytical methods and sampling plans of doubtful statistical validity were being used. Furthermore, analytical results were interpreted using different concepts of biological significance and acceptance criteria, creating confusion and frustration for both the food industry and the regulatory agencies.

In this environment, the ICMSF was founded to (i) assemble, correlate, and evaluate evidence about the microbiological safety and quality of foods; (ii) consider whether microbiological criteria would improve and assure the microbiological safety of particular foods; (iii) propose, where appropriate, such criteria, and (iv) recommend methods of sampling and examination.

Forty years later, the primary role of the Commission remains to give guidance on: (i) appraising and controlling the microbiological safety of foods and (ii) microbiological quality, since this influences consumer acceptance and the losses due to spoilage. Meeting those objectives assists international trade, national control agencies, the food industry, international agencies concerned with humanitarian food distribution and consumer interests.

Functions and membership

The ICMSF provides basic scientific information through extensive study, and makes recommendations without prejudice on the basis of that information. Results of the studies are published as books, discussion documents, or refereed papers. Major publications of the Commission are listed in Appendix III.

The ICMSF functions as a Working Party, not as a forum reading papers. Meetings consist of discussions within subcommittees, debating to achieve consensus, editing draft materials, and planning. Most work is done between meetings by the Editorial Committee and members, sometimes with the help of non-member consultants.

Since 1962, 33 meetings have been held in 20 countries (Australia, Brazil, Canada, Chile, Denmark, Dominican Republic, Egypt, England, France, Germany, Italy, Mexico, South Africa, Spain, Switzerland, The Netherlands, USA, the former USSR, Venezuela, and the former Yugoslavia). During its meetings, Commission members frequently participate in symposia organized by microbiologists or public health officials of the host country.

Currently, the membership consists of 16 food microbiologists from 11 countries, with combined professional interests in research, public health, official food control, education, product and process development, and quality control, from government laboratories in public health, agriculture, and food technology; from universities; and from the food industry (see Appendix II). The ICMSF is also assisted by consultants, specialists in particular areas of microbiology, who are critical to the success of the

Commission (see Appendix II for lists of the consultants, contributors, and reviewers). New members and consultants are selected for their expertise, not as national delegates. All work is voluntary without fees or honoraria.

Two sub-commissions (Latin American and South-East Asian) promote activities of the ICMSF among food microbiologists in their regions and facilitate communication worldwide (see Appendix II).

The ICMSF raises its own funds to support its meetings. Support has been obtained from government agencies, WHO, IUMS, IUBS, and the food industry (over 80 food companies and agencies in 13 countries). Grants for specific projects and seminars/conferences have been provided by a variety of sources. Some funds are received from the sale of its books.

Recent projects

Microorganisms in Foods 5. Characteristics of Microbial Pathogens (1996) is a thorough, but concise, review of the literature on growth, survival, and death responses of food-borne pathogens. It is intended as a quick reference manual to assist in making decisions in support of HACCP plans and to improve food safety.

Microorganisms in Foods 6. Microbial Ecology of Food Commodities (1998) updates and extends ICMSF (1980b). For 16 commodity areas, it describes the initial microbial flora and the prevalence of pathogens, the microbiological consequences of processing, typical spoilage patterns, episodes implicating those commodities with food-borne illness, and measures to control pathogens.

Microorganisms in Foods 7. Microbiological Testing in Food Safety Management (2002) introduces the concept of food safety objectives (FSO) and their use for the establishment of HACCP plans and microbiological criteria. The book gives an update of the statistical aspects of sampling and the choice of the “cases” which determine the stringency of sampling plans. It replaces as such the first part of *Microorganisms in Foods 2: Sampling for Microbiological analysis: Principles and Specific Applications* (1986). It illustrates how systems such as HACCP and GHP provide greater assurance of safety than microbiological testing, but also identifies circumstances in which microbiological testing still plays a useful role.

Microorganisms in Foods 6. Microbial Ecology of Food Commodities 2nd edition (2005) keeps the overall structure of each chapter, brings up-to-date consideration of the pathogens of concern and, particularly, treats the means by which those pathogens can be controlled systematically.

Discussion documents prepared for the Joint Food and Agriculture Organization (FAO) and World Health Organization (WHO) Food Standards Program, and Codex Alimentarius Commission.

1. Establishment of sampling plans for microbiological safety criteria for foods in international trade.
2. Discussion of sampling plans for *L. monocytogenes*, *Salmonella*, *Campylobacter*, and verocytotoxin-producing *E. coli* in foods in international trade.
3. Recommendations for the future management of microbiological hazards for foods in international trade.
4. Principles for the establishment of FSO and related control measures.

The recommendations of ICMSF for sampling foods and acceptance criteria for *Listeria monocytogenes* were subsequently published as “Sampling plans for *L. monocytogenes*” (*Int. J. Food Microbiol.*, 1994, **22**, 89–96), as was “Establishment of microbiological safety criteria for foods in international trade” (*World Health Stat. Q.*, 1997, **50**, 119–23).

At the request of the Secretariat of Codex, the ICMSF developed recommendations for revision of Principles for the Establishment and Application of Microbiological Criteria for Foods, published in the Procedural Manual of Codex.

Addressing the need for a scientific basis in risk assessment, a Working Group of the ICMSF published "Potential application of risk assessment techniques to microbiological issues related to international trade in food and food products" (*J. Food Protect.*, 1998, **61** (8), 1075–86).

Past and future

For almost 25 years, the major efforts of the ICMSF were devoted to methodology. This resulted in improved comparisons of microbiological methods and better standardization (17 refereed publications). Among many significant findings it was established that, when analyzing for salmonellae, analytical samples could be bulked (composited) into a single test with no loss of sensitivity. This made practical the collection and analysis of the large number of samples recommended in some sampling plans.

With the rapid development of alternative methods and rapid test kits, and the ever expanding list of biological agents involved in food-borne illness, the Commission reluctantly discontinued its program of comparison and evaluation of methods, recognizing that issues of methodology were being addressed effectively by other organizations.

A long-term objective of the Commission has been to enhance the microbiological safety of foods in international commerce. This was initially addressed through two books that recommended uniform analytical methods (ICMSF, 1978), and sound sampling plans and criteria (ICMSF, 1974, 1978, 2nd edn, 1986). The Commission then developed a book on the microbial ecology of foods (ICMSF 1980a,b) intended to familiarize analysts with processes used in the food industry and microbiological aspects of foods submitted to the laboratory. Knowledge of the microbiology of the major food commodities, and the factors affecting the microbial content of these foods, helps the analyst to interpret analytical results.

At an early stage, the Commission recognized that no sampling plan can ensure the absence of a pathogen in food. Testing foods at ports of entry, or elsewhere in the food chain, cannot guarantee food safety. This led the Commission to explore the potential value of HACCP for enhancing food safety. A meeting in 1980 with the WHO led to a report on the use of HACCP for controlling microbiological hazards in food, particularly in developing countries (ICMSF, 1982). The Commission then developed a book on the principles of HACCP and procedures for developing HACCP plans (ICMSF, 1988), covering the importance of controlling the conditions of producing/harvesting, preparing, and handling foods. Recommendations are given for the application of HACCP from production/harvest to consumption, together with examples of how HACCP can be applied at each step in the food chain.

The Commission next recognized that a major weakness in the development of HACCP plans is the process of hazard analysis. It has become more difficult to be knowledgeable about the many biological agents recognized as responsible for food-borne illness. ICMSF (1996) summarizes important information about the properties of biological agents commonly involved in food-borne illness, and serves as a quick reference manual when making judgments on the growth, survival, or death of pathogens.

Subsequently, the Commission updated its volume on the microbial ecology of food commodities (ICMSF, 1998).

Microorganisms in Foods 7. The Role of Microbiological Testing in Systems Managing Food Safety (2002) illustrated how systems such as HACCP and GHP provide greater assurance of safety than microbiological testing, but also identified circumstances where microbiological testing still plays a useful role. It also introduced the concept of FSO as a public health goal to be met to provide the appropriate level of health protection.

We believe that the original objectives of the Commission are still relevant today. The European Union, the many other political changes occurring throughout the world, the growth of developing countries seeking export markets, and the increased trade in foods worldwide, as evidenced by the passage of GATT and NAFTA, all point to the continuing need for the independent recommendations, such as those of the Commission. It is essential that import/export policies be established as uniformly as possible and on a sound scientific basis. The overall goal of the Commission will continue to be to enhance the safety of foods moving in international commerce. The Commission will continue to strive to meet this goal through a combination of educational materials, promoting the use of food safety management systems using microbiological FSO, HACCP and GHP, and recommending sampling plans and microbiological criteria where they have been developed according to Codex principles and offer increased assurance of microbiological safety. The future success of the ICMSF will continue to depend upon the efforts of members, support from consultants who generously volunteer their time, and those who provide the financial support so essential to the activities of the Commission.

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Appendix III Publications of the ICMSF

Books

- Food and Agriculture Organization and International Atomic Energy Agency/ICMSF (1970) Microbiological specifications and testing methods for irradiated foods. Technical Report Series No. 104, Vienna: Atomic Energy Commission.
- ICMSF. (1978) *Microorganisms in Foods 1. Their Significance and Methods of Enumeration*, 2nd edn, University of Toronto Press, Toronto (ISBN 0-8020-2293-6, reprinted 1982, 1988 with revisions).
- ICMSF. (1980a) *Microbial Ecology of Foods. Volume 1. Factors Affecting Life and Death of Microorganisms*, Academic Press, New York (ISBN 0-12-363501-2).
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- ICMSF (1998) *Microorganisms in Foods 6. Microbial Ecology of Food Commodities*, Blackie Academic & Professional: London (ISBN 0 412 47350 X).*
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*Available from Springer at <http://www.springeronline.com>.

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2. ICMSF (Authors: Simonsen, B., Bryan, F.L., Christian, J.H.B., Roberts, T.A., Silliker, J.H. and Tompkin, R.B.). (1986) Prevention and control of foodborne salmonellosis through application of the hazard analysis critical control point system. Report, International Commission on Microbiological Specifications for Foods (ICMSF), WHO/CDS/VPH/86.65, World Health Organization, Geneva.
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3. International Commission on Microbiological Specifications for Foods (ICMSF). (1994) Choice of sampling plan and criteria for *Listeria monocytogenes*. *Int. J. Food Microbiol.*, **22**, 89–96.
4. International Commission on Microbiological Specifications for Foods (ICMSF). (1997) Establishment of microbiological safety criteria for foods in international trade. *World Health Stat. Q.*, **50**, 119–23.
5. International Commission on Microbiological Specifications for Foods (ICMSF). (1998) Potential application of risk assessment techniques to microbiological issues related to international trade in food and food products. *J. Food Protect.*, **61** (8): 1075–86.
6. International Commission on Microbiological Specifications for Foods (ICMSF) [M van Schothorst, Secretary]. (1998) Principles for the establishment of microbiological food safety objectives and related control measures. *Food Control*, **9** (6), 379–84.

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- Thatcher, F.S. and Clark, D.S. (1973) *Microorganisms in Foods 1. Their Significance and Methods of Enumeration* [in Spanish: Garcia, B. (translator)], Editorial Acribia, Zaragoza, Spain.
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