Introducing ICMSF

Background and history of ICMSF

Key roles and activities

Risk Management

New work

Today’s Agenda

Founded in 1962 through International Union of Microbiological Societies (IUMS)

Audiences:

- Intergovernmental agencies (WHO, FAO, Codex, EC, …)
- National governments
- Industry (Processors, food service and retail, from farm to fork)
- Academics
- Trade, professional and consumer organizations (ILSI, IAFP, IFT, ICD, …)
- Industry technology and service providers
- Private standard-setting bodies (ISO, CIES-GFSI, AGAC, Global GAPs)

ICMSF and its Food Safety World audiences

ICMSF and its Subcommissions

Latin America
China / NE Asia
SE Asia
SADC (S. Africa)
India

ICMSF Strategy

Annually meeting as a working party, since 1962, 41 meetings in 21 countries

Dubrovnik, Yugoslavia, 1969

About ICMSF

ICMSF membership currently consists of 18 food microbiologists from 13 countries.
- Members’ professional experience includes research, process development, public health, agriculture, food technology, quality control, and education.
- We also seek assistance from an extensive network of consultants considered to be experts in various areas of food microbiology.
- Members, as well as consultants, are selected based on their technical expertise, not as national delegates.
- All work is voluntary and without honoraria.
- Partners, ILSI, ICD, FAO, WHO, IUFoST
Raison d'etre Statement

Be a leading source for independent and impartial scientific concepts, that when adopted by governmental agencies and industry, will reduce the incidence of microbiological food-borne illness and food spoilage worldwide and facilitate global trade.

Current Membership

Dr. W. Anderson (Wayne) Ireland
Dr. L.E.M. Anelich (Lucia) South Africa
Dr. B.L. Buchanan (Bob) United States
Dr. M. Cole (Martin) United States
Dr. J.-L. Cordier (Jean-Louis) Switzerland
Dr. R. Dewanti (Ratih) Indonesia
Dr. R.S. Flowers (Russ) United States
Dr. B.D.G.M. Franco (Bernadette) Brazil
Dr. L.G.M. Gorria (Leon) United Kingdom
Dr. L. Gram (Lone) Denmark
Dr. F. Kasuga (Fumiko) Japan
Dr. A.M. Lammerding (Anna) Canada
Dr. J.M. Farber (Jeff) Canada
Dr. R. Ross (Tom) Australia
Dr. M. Potter (Morrie) United States
Dr. K.M.J. Swanson (Katie) United States
Dr. M.H. Zwietering (Marcel) The Netherlands

6 From Academia
5 From Industry
7 From Government
18 Total from 13 Countries

Can you ever get ICMSF members to go in the same direction???

About ICMSF

• To address important regional issues, the ICMSF has established three regional Subcommissions:
  - Latin American
  - South-East Asian
  - Chinese (North-East Asian).
• These Subcommissions follow the operating principles of the ICMSF while addressing microbiological problems particular to their regions.

ICMSF - Recommendations

The recommendations of ICMSF have no official status, the official promulgation of such recommendations being nationally the province of governments and internationally the province of the United Nations and its agencies such as WHO and FAO.
• Internationally advise of ICMSF has been passed to organisations such as WHO, FAO, ISO

Discussion documents for Codex Alimentarius

• Revised principles for the establishment and application of microbiological criteria for foods (1995)
• The control of L. monocytogenes in foods (1995)
• Establishment of sampling plans for microbiological safety criteria for foods in international trade (1996)
• Recommendations for the management of microbiological hazards for foods in international trade (1996)
• The role of Food Safety Objectives in the management of the microbiological safety of food according to Codex documents (2001)
• Use of Epidemiologic Data to Measure the Impact of Food Safety Control Programs (2005)
• Microbiological criteria for powdered infant formula (2005)
1: Significance and Methods of Enumeration
Concise overview of significance of microorganisms and their toxins in foods. An attempt to promote standard / equivalent methods for important foodborne microbes.


2: Sampling for Microbiological Analysis: Principles and Specific Applications
The statistical principles underlying attributes sampling plans and their application to foods.

- 2nd ed. (1986) University of Toronto Press.
  ISBN: 0802056938 (out of print)

3: Microbial Ecology of Foods
Health risks and spoilage brought into focus. How food processes, ingredients, and product characteristics affect the microflora of foods.

- vol. 1: Factors affecting life and death of microorganisms

4: Application of the Hazard Analysis Critical Control Point (HACCP) System to Ensure Microbiological Safety and Quality
Developing and implementing HACCP, with 37 generic HACCP plans.


5: Characteristics of Microbial Pathogens
Growth, death, and survival characteristics of bacteria, viruses, moulds, parasites in relation to HACCP. 26 overviews and easy-to-use tables.

- 1996 Aspen Publishers Inc., Gaithersburg, MD.
  ISBN: 041247350X

Caracas, Venezuela, 1974
**Microorganisms in Foods**

- 1998 Aspen Publishers Inc., Gaithersburg, MD.  
- ISBN: 0751404306

- Kluwer Publishers Inc  
- Melbourne, Australia, 1999

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**Managing the ‘Food Safety Cliff’**

- FSO = food safety objective  
- \( H_0 \) = initial level of the hazard  
- \( \Sigma R \) = total death (reduction of hazard)  
- \( \Sigma I \) = total increase in hazard, through growth or contamination

**Food Safety Objectives**

\[ H_0 - \Sigma R + \Sigma I \leq FSO \]

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- \( H_0 \) = initial level of the hazard  
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**CODEX: Control measures for Enterobacter sakazakii**

- Reducing the level of contamination through a heating step of the reconstituted powdered infant formula prior to use.

\[ H_0 - \Sigma R + \Sigma I < FSO \]

- Minimize the chance of contamination of reconstituted formula during preparation.  
- Minimize the growth of E. sakazakii following reconstitution prior to consumption.

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**Cases of food borne illness attributed to sprouts in the US**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>750</td>
</tr>
<tr>
<td>1997</td>
<td>650</td>
</tr>
<tr>
<td>1998</td>
<td>560</td>
</tr>
<tr>
<td>1999</td>
<td>450</td>
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<tr>
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<td>2007</td>
<td>5</td>
</tr>
<tr>
<td>2008</td>
<td>2</td>
</tr>
<tr>
<td>2009*</td>
<td>Preliminary data subject to change</td>
</tr>
</tbody>
</table>

* Preliminary data subject to change  
- Katherine Vierk, CFSAN

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FDA Guidance
Basis for 5 Log Reduction Performance Standard

<table>
<thead>
<tr>
<th>Log cfu/g</th>
<th>1/100,000 kg</th>
<th>1/10,000 kg</th>
<th>1/1 kg</th>
<th>1/100 kg</th>
<th>1/10 kg</th>
<th>1 kg</th>
<th>100 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8</td>
<td>-7</td>
<td>-6</td>
<td>-5</td>
<td>-4</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Worst Case (based on &lt;1-6/100g)</td>
<td>5000</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

5 Log Reduction from worst case

\[ H_0 - \Sigma R + \Sigma I \leq FSO \]

-1 -5 \leq -6

Screening Seeds Used for Sprout Production: Industry Practice

- Six-step procedure developed by ISS and Jonathan’s Sprouts
  - Seed sampling
  - 25 g subsamples from each bag. At least 3 kg per seed lot
  - Seed inspection
  - Sprout growing
  - Follow normal sprouting procedures
  - Spent irrigation water sampling
  - 48 h
  - Enrichment of sampled water
  - Pathogen testing
- Prevented at least one potential outbreak of E.coli 0157:H7 and prevented shipment of contaminated seeds to sprouters.

Illustrative Example

120 x 25g samples (=3kg)
Sprouted and tested
Would be able to reject a lot with -3.66 log cfu/g
Or 1 cell in 4.57kg (SD=0.8)

Testing plus reduced reduction

\[ H_0 - \Sigma R + \Sigma I \leq FSO \]

-3.66 -2.34 \leq -6
**Basis for 5 Log reduction performance**

**Standard**

<table>
<thead>
<tr>
<th>Log cfu/g</th>
<th>-8</th>
<th>-7</th>
<th>-6</th>
<th>-5</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10,000Kg</td>
<td>1/1,000Kg</td>
<td>1/100Kg</td>
<td>1/kg</td>
<td>10/g</td>
<td>100/g</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-8 log</td>
<td>0.0005</td>
<td>0.05</td>
<td>5</td>
<td>50</td>
<td>500</td>
<td></td>
<td></td>
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</tbody>
</table>

5 log

Worst Case (based on <1-6/100g)

Per 50kg batch

**Illustrative Example: Effect of Testing on Required Reduction**

<table>
<thead>
<tr>
<th>Log cfu/g</th>
<th>-8</th>
<th>-7</th>
<th>-6</th>
<th>-5</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10,000Kg</td>
<td>1/1,000Kg</td>
<td>1/100Kg</td>
<td>1/kg</td>
<td>10/g</td>
<td>100/g</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2.24 log Reduction</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Testing Rejects Lots with -3.66

Performance Standard

**FDA: Framework for Setting and Validation of Novel Sterilization Processes**

**Risk-based Process Development:**

- The Food Safety Objective (FSO) Approach

**Impact of New Risk Management**

- Increased flexibility….innovation
- Science based & increased transparency
- Will impact
  - Shared responsibility across chain
  - Stringency of HACCP
  - Micro Criteria more science based
  - Equivalency of new processes
Use of data for assessing process control and product acceptance

- **Part 1 – Principles of Using Data in Microbial Control**
- **Utility of Microbiological Testing for Safety & Quality**
- **Food safety management principles**
- **Validation of control measures**
- **Verification of Process Control**
- **Verification of Environmental Control**
- **Corrective Action to Re-establish Control**
- **Microbiological Testing in Customer-Supplier Relations**
  - Methods and Laboratory Performance
  - **Part 2 – Specific Applications to Commodities**

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**New Work: Microorganisms in Foods, Book 8**

8. Use of data for assessing process control and product acceptance

- Chair Editorial Committee: Katie Swanson
- Scope: Provide guidance on appropriate and inappropriate testing of food processing environments, during processing, and finished product testing. Expand on the use of trend analysis and across lot data.

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4. A Food Safety Objective (FSO)

When a government expresses public health goals relative to the incidence of disease, this data is provided to public health agencies, individual handlers, retailers, or trade partners with information about what they need to do to reach this lower level of illness.

To be meaningful, the targets for food safety set by government need to be converted into parameters that can be assessed by government agencies and used to establish priorities to protect foods. The concept of food safety objectives (FSOs) and performance objectives (POs) have been proposed to serve this purpose. The position of these concepts appearing in the food chain can be seen in Figure 1.

**Illustrations by Mr. Minamoto, Japan**

5. A Performance Objective (PO)

For some food hazards, the FSO is likely to be very low, sometimes referred to as an "absent in a serving of food at the time of consumption". For a poison that requires ingredients of foods that require cooking prior to consumption, this level may be very difficult to use in guidance in the facility.

Therefore, it is often required to set a level that can be reached at an earlier stage in the food chain. This level is called a performance objective (PO).

**Illustrations by Mr. Minamoto, Japan**

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**Wrap Up**

- Long history and important contribution to food safety
- Book series, timely advances in principles, Methods, Sampling Plans, HACCP, Microbial ecology, FSOs
- New work, full circle role of criteria
- New look, but same ideals

**Gorris et al, In Press**