Food Safety Issues in International Trade

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FoRC - Food Research Center
USP - University of Sao Paulo, SP
Food Safety / Food Security

Segurança do Alimento / Segurança Alimentar

Seguridad del Alimento / Seguridad Alimentaria
Food Security (segurança alimentar): assurance that all people at all times have access to suficiente, safe, nutritious food to maintain a healthy and active life.

Food Safety (segurança do alimento): assurance that food will not cause harm to the consumer when is prepared and eaten according to its intended use.

FAO/WHO, 1997
Interrelationship of food safety and food security

Hanning et al © 2012 Nature Education.
10 Facts on Food Safety

1. More than 200 diseases are spread through food
2. Contaminated food can cause long-term health problems
3. Foodborne diseases affect vulnerable people harder than other groups
4. There are many opportunities for food contamination to take place
5. Globalization makes food safety more complex and essential
10 Facts on Food Safety

6. Food safety is multisectoral and multidisciplinary
7. Food contamination also affects the economy and society as a whole
8. Some harmful foodborne bacteria are becoming resistant to drug treatments
9. Everybody has a role to play in keeping food safe
10. Consumers must be well informed on food safety practices
Food safety/quality issues at food manufacturing level

Source: ICMSF, 2014
Food safety/quality issues at food manufacturing level

Source: ICMSF, 2014
Home canned foods induce outbreak of botulism

Kidney failure due to E. coli O157
Home canned foods induce outbreak of botulism

Kidney failure due to E. coli O157
Food Safety Concerns – Main Drivers

**Driver #1: Global demographics**

- Increasing population
  - Ease for secondary spread of hazardous agents
  - Increased demand for food

- Aging population
  - Increased susceptibility to foodborne hazards

- Population getting obese
  - Increase in obesity-related chronic diseases, leading to increased susceptibility to hazardous agents

- Increased expectation that children will reach adulthood
Food Safety Concerns – Main Drivers

*Driver #2: Global trade*

Increased demand for food in combination with rising incomes causes increases in global marketing of food
Food Safety Concerns – Main Drivers

Driver #3: Globalization of the food industry

International acquisition of raw ingredients
Worldwide distribution of products
World’s population will rise to 10 billion in 2050

How to ensure food for all?

Increase international trade

How to ensure **safe** food for all?

Set Internationally Accepted Food Safety Standards
Setting Food Safety Standards

1994

Sanitary and Phytosanitary Agreement (SPS)

Technical Barriers of Trade Agreement (TBT)

www.codexalimentarius.org
## Codex Standards

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Committee</th>
<th>Year</th>
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<tbody>
<tr>
<td>CAC/GL 21-1997</td>
<td>Principles and Guidelines for the Establishment and Application of Microbiological Criteria Related to Foods</td>
<td>CCFH</td>
<td>2013</td>
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<tr>
<td>CAC/GL 24-1997</td>
<td>General Guidelines for Use of the Term Halal</td>
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[Link to Codex Alimentarius Standards](http://www.codexalimentarius.org/standards/list-of-standards/)
Modern Food Safety Management

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The Big Challenge
Risk Assessment

Hazard Identification → Science

Hazard characterization → Science

Exposure evaluation → Modeling

Risk estimate
Risk Assessment
- Scientific

Risk Management
- Practical

Risk Communication
Risk Estimate

Risk Assessment → Risk Management

Risk Communication
Risk Management - Challenges

1. Quantitative risk assessments deal with distributions and probabilities
2. Conversely, the law is a binary system: safe or not safe
3. Can consider variability in establishing decision criteria but, at the end, a consistent “yes or no” decision must be taken
4. A risk distribution needs to be converted to a “yes or no” decision
5. Establishing the stringency of a food control system is meaningless unless it can be verified
Risk Assessment and Management

Safety Standards

International Trade

The FSO Concept
The FSO Concept

FSO > $H_o - \Sigma R + \Sigma I$

FSO (Food Safety Objective) $\Rightarrow$ Hazard limit at consumption

Set by the health authorities

$H_o = \text{initial level of the hazard}$

$\Sigma R = \text{reduction in the level of the hazard}$

$\Sigma I = \text{increase in the level of the hazard}$
The FSO Concept

FSO

ΣR

ΣI = ΣG + ΣC

Food chain

FSO

ΣR

ΣI = ΣG + ΣC

Food chain
A farm to fork approach

$H_0$

$\Sigma R$ and $\Sigma I$

$FSO$

Primary Production  $ightarrow$ Processing  $ightarrow$ Storage  $ightarrow$ Distribution  $ightarrow$ Retail  $ightarrow$ Consumption

May 12 and 13, 2015 – São Paulo
Managing the ‘Food Safety Cliff’

Thanks to Dr. Martin Cole
CSIRO, Australia

PROCESS VARIABILITY

FSO

FOODBORNE ILLNESS/DEATH
A Research, Innovation and Dissemination Center (RIDC) supported by FAPESP
RESEARCH

Systems Biology in Foods

Food, Nutrition and Health

Food Quality and Safety

New Technologies and Innovation

May 12 and 13, 2015 – São Paulo
Systems Biology in Foods

Food, Nutrition and Health

Food Quality and Safety

New Technologies and Innovation
Pillar 3: Food Quality and Safety

1. Risk Assessments
   a. Microbial hazards identification and characterization (emerging pathogens)
   b. Exposure evaluations and risk estimates

2. Strategies to keep $H_0$ low, at primary production level

3. Dynamics of microbial populations in food systems as tools to reduce risks and extend shelf-life

4. Innovative technologies for food quality and safety

5. Interventions to control post-processing contamination and recontamination

6. Exploring technological applications of foodborne lactic acid bacteria (probiotics, bacteriocins, production of bioactive compounds)
Pillar 3: Food Quality and Safety

1. Assistance to the food industry
Translation of ICMSF Book 8 into Portuguese (Editora Edgard Blucher Ltda) and review of the Spanish version (Editorial Acribia), 2015, 536p

**Pillar 3: Food Quality and Safety**

Scientific support to the Brazilian Ministry of Health (ANVISA) in the update of the Brazilian Food Safety Standards (RDC 12), in progress

Participation in Codex Alimentarius Committees (Brazil)

a. Codex Committee on Fresh Fruits and Vegetables
b. Codex Committee on Methods of Analysis and Sampling
c. Codex Committee on Contaminants in Foods

Participation in internationally recognized scientific organizations that foster food safety around the globe (ICMSF, ICFMH, IAFP and IAFP-Brazil)
Participants

ESALQ
FCF
FMVZ
FSP
EP
USP
MAUÁ
ITAL
UNICAMP
unesp

May 12 and 13, 2015 – São Paulo
## Who we are: Executive Committee

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
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<tbody>
<tr>
<td>Director</td>
<td>Bernadette Franco, Ph.D.</td>
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<tr>
<td>Vice-director</td>
<td>Carmen Tadini, Ph.D.</td>
</tr>
<tr>
<td>Executive Director</td>
<td>Beatriz Cordenunsi, Ph.D.</td>
</tr>
<tr>
<td>Knowledge Dissemination Directors</td>
<td>Eduardo Purgatto, Ph.D.</td>
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<td>Mariza Landgraf, Ph.D.</td>
</tr>
<tr>
<td>Technology Transfer Director</td>
<td>Carmen Tadini, Ph.D.</td>
</tr>
<tr>
<td>Researchers</td>
<td>35</td>
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<tr>
<td>MSc, PhD and post-docs</td>
<td>App. 100</td>
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<tr>
<td>Staff</td>
<td>App.20</td>
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May 12 and 13, 2015 – São Paulo
# Who we are: Scientific Committee

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<th>PILLAR</th>
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<tr>
<td>1</td>
<td>Prof. Dr. João Roberto Nascimento - USP</td>
<td>Prof. Dr. Adriana Mercadante - UNICAMP</td>
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<td>2</td>
<td>Prof. Dr. Franco Lajolo - USP</td>
<td>Prof. Dr. Thomas P. Ong - USP</td>
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Acknowledgements
Thanks!