Food Safety Risk Analysis Programs At JIFSAN

Jianghong Meng and Juliana M. Ruzante
Joint Institute for Food Safety & Applied Nutrition
University of Maryland, USA
The Joint Institute for Food Safety and Applied Nutrition

- Established in 1996.
- A collaborative effort between the University of Maryland and the U. S. Food and Drug Administration.
- A multidisciplinary research, education and outreach program - domestic and international in scope.
A Shared Vision and Goal

Bring together resources and ideas for development of sound food safety strategies

http://www.jifsan.umd.edu
JIFSAN Core Programs

- Research
- International Training
- FoodRisk.org Online Database
- Workshops/Symposia
Why International Training?

- When food production facilities adopt GAPs/GMPs programs as well as HACCP protocols.
  - Decrease the probability of the consumer receiving contaminated food
  - With the safety of the source improved, food safety control can be focused at the contamination occurring in the distribution chain and at the consumer.

- Create a win-win situation for export and import countries
International Food Safety Training Center

- Good Agricultural Practices (GAP)
- Good Aquacultural Practices (GAqP)
- Commercially Sterile Packaged Foods (CSPF)
- World Trade Organization Sanitary/Phytosanitary (WTO/SPS) Leadership Development for China
- Food Safety Risk Analysis Professional Development Training Program
Commissioner's Special Citation Award

For leadership in fostering effective partnerships in international food safety capacity building programs to improve the safety of foods imported into the U.S. and consumed globally

JIFSAN Group

2007
Food Safety Risk Analysis
Professional Development

- Know and understand the terminology
- Understand how food safety and other health decisions are made utilizing risk analysis
- Know systematic approaches, tools and techniques to address specific food safety problems
- Have the knowledge to participate in the risk management decision process
- Understand how to communicate effectively about risk with peers, managers, and stakeholders
Training – Food Safety Risk Analysis

- Overview of Risk Analysis
- Food Safety Risk Management
- Food Safety Risk Communication
- Food Safety Risk Assessment
- Quantitative risk assessment methods: probabilistic methods
- Quantitative risk assessment methods: model building

- Face-to-face
- Online
- Customized

* 2009 Class Schedule available at: http://jifsan.umd.edu/prodev/schedule.cfm
Training – Food Safety Risk Analysis

- Quantitative risk assessment methods: probabilistic methods and model building
  - One week training course
  - New course developed to address real needs using case studies and practical exercises
  - Based on @Risk Software
  - One computer per participant
  - Participants must have basic understanding of Excel and basic statistic concepts
  - The goal is to build capacity on Quantitative Risk Assessment
Number of Participants

- JIFSAN has trained:
  - Online: 330 students from 24 countries*
  - Summer integrated program: 457, from 16 countries**
  - Customized in-country: Nicaragua, Mexico, Thailand, Croatia (online) and Norway (online 2009)
- 25% of students are from other countries than US
  - 70% of non-US participants take online courses

* Since 2004  ** Since 1997
Training – Food Safety Risk Analysis

Regions represented according to UN Statistical division* (does not include US and Customized trainings)

- Caribbean
- Central America
- Eastern Africa
- Eastern Asia
- North America
- Northern Africa
- Northern Europe
- Oceania
- South America
- South-eastern Asia
- Southern Europe
- Western Asia
- Western Europe

86% of participants

* http://unstats.un.org/unsd/methods/m49/m49regin.htm
Qualitative and Quantitative Methods in Food Safety Risk Assessment Course
Distribution Parameters

A parameter is a numerical characteristic of a population. For a given parameter, it is usually unknown and has to be estimated. There are often multiple parameters, such as mode, standard deviation, minimum, maximum, and so on. There are usually statistics that are assigned Greek letters. For an introduction to the parameter estimation, please review the attached Excel data file. This file contains a column of data (shape parameter) for each distribution. It has a random number line underneath it to illustrate the data's distribution (shape parameter).

Open the attached Excel data file. It has a column of random numbers. It would take a long time to read these numbers to me, even if you were an expert in this subject.

The mean of these numbers is 100. This tells me the numbers tend to be centered around the mean. In general, the mean is a measure of central tendency. In a normal distribution, we can find the mean (population mean) of a variable X by adding up all the values in the distribution divided by the number of values. This is a very important distribution. It can be used for conveying information about data. This is just one more reason to understand a little something about distributions. For an example of how the location and scale parameters work for the normal distribution, see the video (AVI | HTML).

Individual Exercise: Parameter Play

This is quite a simple exercise. All you have to do is play. To see what you are supposed to do, click the video file (AVI | HTML). When you have finished playing and have some basic understanding of the effects of parameters on distributions, you may, at your option, record any observations or comments in the Parameter Play discussion topic. Entries are not required but you are encouraged to share what you have learned with your colleagues in class.
JIFSAN manages two information management resources on food safety.
A comprehensive online resource for food safety risk analysis

Started in 2000 as the ‘Food Safety Risk Analysis Clearinghouse’

Goal is to assist professionals in the area of food safety risk analysis by providing resources, research tools, models and relevant links

Host the Interagency of Risk Assessment Consortium (IRAC)

- Number of visitors: ~6,500/month
- Number pages per visit: 3
- About 75% get to FoodRisk.org through search engines and 13% direct traffic
- Keyword search: wide range most of them associated with type of hazards and aspects of risk analysis
FoodRisk.org reaches about 100 countries worldwide

- **US**: 44% of the visits
- **Canada**: 5%
- **UK**: 6%
- **India**: 4%
- **China**: 1%
- **Philippines**: 3%
- **Malaysia**: 2%
- **Australia**: 3%
www.FoodRisk.org Outreach

Visits by city
Welcome to FoodRisk.org

The aim of FoodRisk.org is to assist professionals involved with the many aspects of risk analysis and provide an information source on food safety risk analysis.

For people new to the field, we have a brief introduction to the field of food safety risk analysis.

Exclusives

Food Handling Practices Model version 1.5

Update to the quantitative simulation model developed by the FDA under contract with ERG. Incorporated of the effects of contributing factors on the incidence of foodborne illness. read more

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Australian Risk Assessment model for Listeria monocytogenes in ready-to-eat meats

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Federal Register
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Database
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Australian Risk Assessment model for Listeria monocytogenes in ready-to-eat meats

Tom Ross¹, Sven Rasmussen¹, John Sumner¹, Aamir Fazil² and Greg Paoli³

¹ Tasmanian Institute of Agricultural Research, School of Agricultural Science, University of Tasmania
² Public Health Agency of Canada, Guelph, Ontario, Canada
³ Decisionalysis Risk Consultants, Inc., Ottawa, Ontario, Canada

The present risk assessment was created as part of a study to assess the public health risk due to Listeria monocytogenes in Australian made processed meat products, more specifically lunch meats, pâtés/liverwursts and cooked sausages. The model predicts the concentrations of L. monocytogenes on products at the time of consumption using industry and other survey data augmented by predictive microbiology models. The model performs calculations in seven stages: 1. Storage at the processing plant; 2. Transport: Processor to Retail Distribution Centre; 3. Storage at Retail Distribution Centre; 4. Retail Display; 5. Transport: Retail – Consumer. 6. Storage by Consumer (Package unopened) and; 7. Consumer by Consumer after Package opened.

Report [PDF, 89 KB]

The stochastic model was developed using @Risk. To view the complete model you must have the @Risk software installed in your computer. For a free trial or to purchase this program go to http://www.palisade.com/risk/

@Risk Version [Excel, 107 KB]

If you do not have @Risk installed in your computer you can still view the model; however you will not be able to see the @Risk functions used by the model.

Model View (swap version) [Excel, 117 KB]
### Listeria

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<th>Stage</th>
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</tr>
<tr>
<td>Consumer (Phytophagous)</td>
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### Consumer (Phytophagous) Details

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<th>Log Concentration</th>
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<th>Log Dose</th>
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<th>pH 3</th>
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<td>2</td>
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</table>

### RISK Output

- RiskOutput = % Upper Limit Engaged + IF(B40/Other Info B44/2 = 1, 1, 0)

### RISK Course Version

Univ of Maryland

- % Upper Limit Engaged
- Minimum: 5.0000
- Maximum: 25.0000
- Mean: 2.5000
- Std Dev: 1.0000
- Values: 1.0000
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EcoSure 2007 Cold Temperature Database

EcoSure, the food safety & quality assurance division of Ecolab, has updated the 1999 Audits International cold temperature data base (found at http://foodrisk.org/exclusives/audits/index.cfm). In addition to an updated data set, the new data help determine whether changes have occurred in cold temperature storage practices of food both in retail establishments and in consumer homes.

Data were collected on cold temperature storage of products in the following areas of retail stores: Ice Cream, Frozen Food, Dairy, Lunch Meat, Deli Counter, Fresh Fish, Fresh Meat, and Prepackaged Deli. Additionally, data were collected on product temperatures during transportation to the consumer home and 24 hours after being placed in consumer home refrigerators/freezers.

These data include: demographic information for each respondent, location (state, city) of retail facility, specifics of each product sampled, details of transportation from retail to consumer home, and temperature of specific products 24 hours after being placed in consumer home refrigerator/freezer.

EcoSure 2007 Cold Temperature Data [Microsoft Excel, 1 MB]
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<th>Weight in</th>
<th>Time that preceded</th>
<th>Temperature</th>
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<th>Temperature</th>
<th>Type of Place</th>
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<tr>
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</table>
Interagency Risk Assessment Consortium (IRAC)

The Interagency Risk Assessment Consortium (IRAC) consists of representatives from US government agencies, institutes and centers with food safety responsibilities. Through the IRAC, the agencies will collectively work to enhance communication and coordination among the member agencies and promote the conduct of scientific research that will facilitate risk assessments. Such research will assist the regulatory agencies in fulfilling their responsibilities.

Plants, reports and meeting minutes

Representatives and member agencies

Work Groups
Welcome to FoodRisk.org

The aim of FoodRisk.org is to assist professionals involved with the many aspects of risk analysis as it pertains to the safety of our food. Thus, we provide data, tutorials, tools, and links to numerous sources of information. In addition to providing resources for the food safety risk analysis professional, we also provide several consumer-oriented links.

For people new to the field, we have a brief introduction to the field of food safety risk analysis.

Exclusives

Food Handling Practices Model version 1.5

Update to the quantitative simulation model developed by the FDA under contract with ERG Incorporated of the effects of contributing factors on the incidence of foodborne illness. read more

Risk Assessment Model

Australian Risk Assessment model for Listeria monocytogenes in ready-to-eat meats

The @Risk model developed by Tom Ross from the Tasmanian Institute of Agricultural Research and colleagues is available here. read more

Federal Register

56 FR No. 229 (1991) (Proposed NLEA)

This is the PDF version of the Proposed Federal Register Part III released on November 27, 1991 and preceded the final Federal Register Part IV released on January 6, 1993. This document pertains specifically to the Department of Health and Human Services: Food and Drug Administration. All pages were scanned from the original, including text, charts, images and bibliographical references. read more

Database

EcoSure 2007 Cold Temperature Database

EcoSure, the food safety & quality assurance division of Ecolab, has updated the 1999 Audits International cold temperature data base. In addition to an updated data set, the new data help determine whether changes have occurred in cold temperature storage practices of food both in retail establishments and in consumer homes. read more
Risk Assessment

About Risk Assessment

As defined by the Codex Alimentarius Commission (CAC) risk assessment is "a scientifically based process consisting of the following steps:..."

Hazard Identification

The identification of biological, chemical, and physical agents capable of causing adverse health effects and which may be present in a particular food or group of foods.

Hazard Characterization

The qualitative and/or quantitative evaluation of the nature of the adverse health effects associated with biological, chemical and physical agents which may be present in food. For chemical agents, a dose-response assessment should be performed. For biological or physical agents, a dose-response assessment should be performed if the data are obtainable.

Exposure Assessment

The qualitative and/or quantitative evaluation of the likely intake of biological, chemical, and physical agents via food as well as exposures from other sources if relevant.

Risk Characterization

The qualitative and/or quantitative estimation, including attendant uncertainties, of the probability of occurrence and severity of known or potential adverse health effects in a given population based on hazard identification, hazard characterization and exposure assessment.
Risk Assessments

The following self-described risk assessments can serve as useful examples of the range of the application of the risk assessment process worldwide. Not all of these risk assessments follow the guidelines of the Codex Alimentarius Commission, nor does their presence here indicate endorsement by the Food Safety Risk Analysis Clearinghouse.

Please select the area(s) of Risk Assessment which you would like to display.

Risk Assessments by hazard:

1. All Hazards

AND

Risk Assessments by commodity:

2. All Commodities

3. Submit
## Risk Assessments (for Campylobacter and Poultry)

The following self-described risk assessments can serve as useful examples of the range of the application of the risk assessment process worldwide. Not all of these risk assessments follow the guidelines of the Codex Alimentarius Commission, nor does their presence here indicate endorsement by the Food Safety Risk Analysis Clearinghouse.

Please select the area(s) of Risk Assessment which you would like to display.

### Risk Assessments by hazard:

- Campylobacter

### Risk Assessments by commodity:

- Poultry

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<td><strong>Pre-harvest risk assessment - an inventory of European studies</strong>&lt;br&gt;This report is a collection of pre-harvest microbial risk assessments. Models for all the major food-animal <strong>[more]</strong>&lt;br&gt;Pubication Date: Tuesday, February 28, 2006</td>
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<td>Christensen, Bjørke; Sommer, Helle; Rosenkrant, Hanne; Nielsen, Niels</td>
<td><strong>Risk Assessment on Campylobacter jejuni in Chicken Products: First Edition</strong>&lt;br&gt;Draft quantitative risk assessment of Campylobacter jejuni in chicken in Denmark. Includes discussion of the hazard <strong>[more]</strong>&lt;br&gt;Publication Month: January 2001</td>
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<td><strong>Risk Assessment: Use of Composting and Biogas Treatment to Dispose of Catering Waste Containing Meat</strong>&lt;br&gt;Assessment of risks to humans and livestock from pathogens in compost associated with uncooked meat in catering <strong>[more]</strong></td>
<td>Apr 28, 2004</td>
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Food Safety Alerts

- Calls for data
- Upcoming events
- Hot topics
Acrylamide Infonet

This FAO/WHO Acrylamide in Food Network was established as a result of the June 2002 FAO/WHO Consultation on the health Risks of Acrylamide in Food. The consultation recommended that an international network on acrylamide in food should be established inviting all interested parties to share relevant data as well as ongoing investigations.

Network Purpose

This network functions as a global resource and inventory of ongoing research on acrylamide in food. It includes formal research, surveillance/monitoring and industry investigations, etc. Any interested party may submit information, and it is hoped that government agencies, research institutions, industry and others will share information via the network.

Description of Network Content

This network website currently comprises:

- An interactive database of researchers/data providers
- References for research published elsewhere

In future the following will be included:

- Information update about the current status of research efforts; and
- FAO/WHO updates on information relevant to the health risk of acrylamide in food

Click here to view the research database page
Potential tools for FoodRisk.org

- ‘iRisk’: on-line tool for comparing food safety risks
- Analytic web publisher: allow user to see models developed in Analytica
- CRAF: *Campylobacter* risk assessment Framework
Summary

- JIFSAN is uniquely positioned to provide research, education and outreach in the area of food safety
- JIFSAN has a history of successful training programs worldwide
- JIFSAN is always interested in opportunities to work with academia, industry, government, international and national organizations to fulfill its mission and improve food safety globally