Developments and Challenges in Food Safety
International Situation, with Particular Emphasis on Asia-Pacific Region

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Objectives

Briefly look at

1. Customer expectations
2. Why so many **food safety issues**
3. New hazards / challenges
4. Some social and other issues in food safety
5. Possible solutions - ‘farm to chopsticks’
6. APEC has identified **food safety** as a priority for economic growth
What does the consumer want?  
*(Varies with social class and disposable income)*

1. **Food safety** (e.g. risk is low to very low from traditional and other hazards).

2. Use only permitted additives, pesticides

3. Compositionally correct, correctly described and labelled

4. **Price (Affordability)**

5. Convenience – variety

6. **Healthy food**

7. **Other issues** – organic food, carbon footprint (food miles), animal welfare, labour, ethical production practices
Food safety is complicated

- Food authenticity
  - GM rice as non-GM rice
  - Bird flu
    - H5NI
- Food-borne viruses
  - Norovirus
  - Hepatitis A
- Bacteria
  - Salmonella
  - E.coli
  - Clostridia
  - Campylobacter
  - Vibrio
  - Listeria
- Bio-toxins
  - Aflatoxins
  - Preservatives
  - Contaminants
- Chemicals in foods
  - Heavy metals
  - Acrylamide
- Contaminants
- Antibiotic resistant bacteria
- Antibiotics
- Food contact Materials
- Hormones
- GM Food
- Nanotechnology
- Endocrine disruptors
- Radioactive chemicals in food
- Pesticides
- POPs
- PAHs
- Vet drugs
- Food additives
- Bisphenol A
- Parasites
  - Anisakis
  - Trichinella
- Prions
- SAFE FOOD
Food safety
Risk Management
‘farm-to-table’ approach

Hazard / risk / controls / regulations

Farm / natural environment
Processor

Transport / local

Borders – air, sea and land

Importer / wholesaler

Consumer

Retailer

Processor
Development of food safety systems

- End product testing

- Good Manufacturing and Hygiene Practices – GMP, GHP - GAP, GVP, GSP, guidelines, codes of practice

- HACCP

- Farm assurance schemes – e.g. Global GAP – Private standards, due diligence by corporations

- Third party accreditation - ISO, BRC, EFSIS etc

- Self regulation
Plethora of regulations – national and international

Primary production, e.g. Bivalves (i.e. oysters)

- ‘COOL’ regulations – controversial
  (Country of origin labelling regs)

- Food packaging materials – inadequate regulations

Retailing
Regulators’ approach to **unknown** food safety risks (what is the hazard?)

- Regulators’ approach to unknown risk i.e. GM plants and animals

- **Precautionary principle vs. Libertarian principle**

- Consider risk to public health unless proven otherwise

- Consider **no / very low risk** to public health unless proven otherwise

- **GRAS** – Generally recognized as safe
Food Safety is still a major concern

1. Despite all the developments, there are still many food safety issues –
   - food alerts,
   - poisoning and
   - recalls are still a daily occurrence

2. Irrespective of individual country development status
Food Safety is still a major concern

Some of the main reasons are:

- **Larger intensive production systems supplying international consumer groups** – use of fertilizers, pesticides, vet drugs and growth promoters in animals, and new production methods, polluted farmlands

- **Urban development is not holistic** (poor food safety knowledge in urban dwellers, poor urban planning)

However, FAO says, many urban managers and planners think of their city more in terms of housing, transport, security and social facilities, rather than food marketing systems.
Gaps in Food Safety Management
Several small risks combine to form a bigger risk

Pre-requisites not properly implemented
1. Structure
2. Training
3. Water quality
4. Sanitation
5. Pest control

National and international audits done by many food authorities show this
Risk Analysis Framework – many food authorities follow this.

- **Risk Assessment**: Science based
- **Risk Management**: Policy based
- **Risk Communication**: Interactive exchange of information and opinions concerning risks
Translating risk assessment to risk management

Science (Risk Assessment)

Policy (Risk management)
There is no simple linear translation of science into policy

From risk assessment to risk management policy
Risk management and policy is influenced by many factors:

**Economic and other considerations**
- ALOP, Salmonella in Sweden and other EU member states
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- **Economic and other considerations**: ALOP, Salmonella in Sweden and other EU member states.

- **Sociological aspects**: Bird flu in Southeast Asia, and liver parasites in Thailand, etc.
Risk management and policy is influenced by many factors:

- **Media influence** (Recent international incidents)
- **Economic and other considerations**: ALOP, Salmonella in Sweden, and other EU member states
- **Sociological aspects**: Bird flu in Southeast Asia, and liver parasites in Thailand, etc.

**Policy**
Risk management policy is influenced by many factors:

- Media influence (Recent international incidents)
  - Ractopamine to enhance lean growth in pigs and cattle
  - Diphenylamine (DPA) in apples (0.1 vs. 10 ppm)
  - Many others

- Economic and other considerations
  - ALOP, Salmonella in Sweden and other EU member states

- Sociological aspects
  - Bird flu in Southeast Asia
  - Liver parasites in Thailand etc.

- Risk assessments
  - Scientific disagreements at CODEX etc.

- Policy

- Fonterra
Food Safety and some sociological issues

• ‘COOL’ Regulations - Country of Origin Labelling – right to know
  (Lot of issues – recently with WTO (USA vs. Canada)

• Consumer attitudes - who is the consumer? Housewife vs. Housemaid

• Sociologists have highlighted food authorities’ communication strategies

• Urban planning / development is not holistic

• Today sociology is an area in many food authorities
Food Safety and some sociological issues in bird flu control
‘live bird markets / wet markets are part of the ‘social fabric’
Media influence
A new challenge for food authorities and industry

How many deaths create a news story? (Harrabin et al. 2003)

<table>
<thead>
<tr>
<th>Public health issue</th>
<th>Deaths per story</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>8571</td>
</tr>
<tr>
<td>Obesity</td>
<td>7500</td>
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<tr>
<td>Alcohol abuse</td>
<td>4724</td>
</tr>
<tr>
<td>Mental health</td>
<td>1222</td>
</tr>
<tr>
<td>vCJD (Human form of mad cow disease)</td>
<td>0.33</td>
</tr>
</tbody>
</table>
A Current problem — In the US Fresh produce now accounts for a high level of food poisoning

- Salad leaves in small packages - Lettuce (iceberg etc.), Spinach, Tomatoes
  - Cantaloupe melon
  - Peppers
  - Herbs / spices (e.g. salmonella in pepper)
  - Green onions
  - Fruits; soft (Strawberries and raspberries) and other fruits
    - Sprouts and sprouting seeds
- Fruits - Mangos – Salmonella
  - Apples – Listeria
  - Salmonella braenderup
One unsafe food item can lead to food poisoning.

Globalisation of food supply amplify the problem.
Urbanization is affecting food safety – view of FAO etc. and sociological evidence

- **By 2015, >26 cities are expected to have populations of >10 million**

- Most new cities are in developing countries; new migrants in cities consume a lot of high risk food
Urbanization and food safety
(from 2010 more people live in cities)

By 2015, 26 cities in the world are expected to have populations of 10 million or more. To feed a city of this size today - for example, Tokyo, São Paolo or Mexico City - at least 6,000 tonnes of food must be imported each day.
Global food demand

Need to produce more food in next 50 years than what we have produced in the last 1000 years!

A Petacal is $10^{15}$
An Exacal $10^{18}$ calories

Food consumption
3000 kcal per capita per day

World population
6.9 billion in 2010,
8.0 billion in 2050

Milk production has lagged behind compared with meat, fish, eggs etc.

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Green revolution

Source: Brian Keating, CSIRO
FAO says that world food production will need to rise by 70%, and food production in the developing world will need to double. **Question is how?**

### The global food crisis

The challenge to produce enough food will be greater over the next 50 years than in all human history.

- Intensification
- Pesticides
- Vet drugs
- GM plants and animals?
- Hormones
- Improved genotypes (genetic correlations)
- Food miles
- Food security
- Carbon footprint
- Other issues

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How to fill the gap in food demand in next 50 years?

- Intensification of farming; is it sustainable?

- Wild type vs. Improved genotypes – negative genetic correlations

- GM – crops, animals (salmon?)

- Fish farming – better feed efficiency

- Integrated farming systems

- Unconventional food and farming – e.g. insects (entomophagy)
2001-2013 : Trade disruptions due to food safety hazards

- WTO SPS related -

- **Pesticide residues** in vegetables

- **Antibiotic residues** in seafood & poultry, mainly **Nitrofurans** and Chloramphenicol

- **Mycotoxins** in plant products

- **Unauthorized GM plant products**, mainly in cereals (Rice Bt63),

- **Human Pathogens** in seafood

- **Animal health related issues** – bird flu, swine flu, BSE etc.
New hazards and challenges for the region

• **GM food** –
  lack of capacity to do testing and premarket safety assessment
  Can we trust assessment done by other authorities? Why not?

• **Antibiotic resistant bacteria in food** –
  unrestricted / uncontrolled use in animal production in some countries (food safety standard?)

• **Nanotechnology** –
  move faster that risk assessments can take place / Research
  TiO\(_2\) - E171.

• **New packaging materials** –
  active and intelligent materials – Many alerts and recalls (RASFF)
New hazards and challenges for the region

- Food fraud / authenticity –

  recent ‘gutter oil’, wrong labeling of fish exported to USA, horse meat in beef products in the EU

- Inadequate food safety knowledge –

  particularly in new migrant urban populations

- Uncontrolled use of pesticides, veterinary drugs, growth promoters etc.

  small vs. big farmers and farmer education
  (e.g. India vs. Japan and Taiwan for pesticide use
  ( 0.31 vs. 17 and 13.1 KG per hectare – 30-40 times more)
New Challenges to food safety – in Asia-Pacific region

Producer capacity building and consumer education

Regulations and Enforcement

Food safety

Holistic approach to Food safety

APEC identified

Economic development - trade and market access and poverty alleviation. **Food exports are a major part of the economy**
New Challenges to food safety – in Asia-Pacific region

- Population growth
- Migration to cities
- Growth of middle classes

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Sustainability?

Fertilizers, GM plants and animals, vet drugs, hormones, pesticides, polluted farm lands etc.

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Economic development - trade and market access and poverty alleviation
Food security

- Food security exists when all people, at all times, have physical, social and economic access to sufficient, **safe** and nutritious food to meet their dietary needs and food preferences for active and healthy life.

- **Food safety is absolutely fundamental for food security**

World Food Summit 2009
Short- and long-term solutions

- Collaborative approach to food safety –
  - Food standards etc. (e.g. Australia/New Zealand, EU)
  - Avoid duplication of risk assessments – use regional / global networks of scientists

- Producer capacity building and consumer education

- NGOs and professional bodies may have an important part to play (i.e. training, including laboratory methods)
Short- and long-term solutions

• Food safety regulations and policy;
  - look into fragmented food safety laws (ministries and departments),
  - policy imbalance – output (yield) vs. safety

• Combat food fraud -

  EU experience
  regulators need to be cleverer than fraudsters!

• Include sociological aspects in future planning
Use new scientific developments – some examples

1. Diagnosis and identification –
   Molecular biological methods – (PCR, PFGE etc.)

2. New food safety technologies –
   non-thermal methods:
   high pressure, ultrasound

3. New Biological bactericidal agents for food pathogens –
   Bacteriophages to specific pathogens, spray for *Listeria monocytogenes* (i.e. fresh produce, cheese)
Weakest links in food safety risk management
Holistic Risk Management

Food safety is the final outcome of controls applied from farm to ‘chopsticks’

Government structure of the country (import and export)

Farmer education

Research

Consumer education

Retailing and Supermarkets

Transport and wholesale

Food processing industry

Food safety management systems

Government will check for compliance with law

Farm → processor → distributor → wholesaler → retailer → consumer
Conclusions

• Food safety risk management has to take all relevant areas into consideration (holistic risk management) and sociological and other aspects play an important role.

• APEC can continue to play a major role in the region to improve food safety and foster collaborations.

• Many things to be looked into during the next 50 years in terms of food safety issues.
Thank you
• **Bottom line.** However, FAO says, many urban managers and planners think of their city more in terms of housing, transport, security and social facilities, rather than food marketing systems. As a result, market infrastructure in developing countries is often poorly planned, municipal regulations lag behind changes in the food economy and commercial practices, and - here's the bottom line -