Risk Assessment Support for Food Incident Management

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Content

- Overview on Risk Assessment
- Food Incident Monitoring
- Illustration with Examples
  - Bonsoy soy milk with very high levels of iodine
  - Risk assessment support on melamine incident
Risk Assessment

Risk Analysis

Risk Assessment

Risk management

Risk Communication
Risk Assessment (2)

- Provide scientific support to risk managers for formulating risk management options and making risk management decisions

4 steps

- Hazard identification
- Hazard characterisation
- Exposure assessment
- Risk characterisation
Risk Assessment (3)

- Risk Assessment Team
  - Consultant
  - Senior Medical and Health Officers
  - Food Safety Officers
  - Scientific Officers

Multi-discipline subject officers
- Contaminant
- Food Additive
- Microbiology
- Pesticide Residue
- Veterinary Drug
- Biotechnology
- Chemical
- Nutrition
Food Incident Monitoring

- Hong Kong has a world of exquisite, mouth-watering dining options
- Over 90% of our food are imported
- HK received food produce from all over the world
- Mainland China as the major source

Figures for 2006, in tonnes

Big challenge on monitoring of food incidents worldwide
Effective food incident management demands timely responses

Close monitoring of food incidents occurred locally and overseas is vital

**Purpose**

- Identify food incidents occurred locally or overseas
- Timely assess the local impact of the food incidents, if any
- Provide timely response to minimise the adverse impact on public health
1. Identify Local/Overseas Food Incidents

- Screening for food incidents from a defined list of internet websites
  - *Food Safety Authorities* (33 websites)
  - *Local and overseas media agencies* (5 websites)
  - *Other non-government organisations* (2 websites)
Food Safety Authorities (Examples)

**USA**

Food and Drug Administration (FDA)

Food Safety Inspection Service of USDA

**Canada**

Canadian Food Inspection Agency (CFIA)

**European Union**

European Commission

**United Kingdom/Ireland**

Food Standards Agency
- [http://www.food.gov.uk/news/](http://www.food.gov.uk/news/)
- [http://www.foodstandards.gov.uk/enforcement/alerts/](http://www.foodstandards.gov.uk/enforcement/alerts/)

Food Safety Authority of Ireland
2. Summarise the Food Incidents

- Preparing summary report on food incidents
  - Summary of the incident
  - Sources of information
  - Details of the affected product
  - Distribution of the affected products
  - Hazards involved
  - Local and international regulations
3. Conduct Preliminary Risk Assessment

**Hazard Identification and Characterisation**

- **Nature** (e.g. chemical, microbiological etc.)
- **Application** (e.g. food additive, pesticides etc.)

- **Health effects**
  - Acute toxicity
  - Chronic toxicity
  - Genotoxicity and carcinogenicity
  - Safety reference values

JECFA, JMPR, IARC, IPCS, national food safety authorities etc.
3. Conduct Preliminary Risk Assessment

**Exposure Assessment**

- Food Consumption Data
- Substance Concentration in Food

**Exposure**
3. Conduct Preliminary Risk Assessment

**Food Consumption Data**

- Hong Kong Population-Based Food Consumption Survey (FCS 2005-2007)
  - Surveyed 5008 Hong Kong people aged 20 - 84
  - Two non-consecutive days of 24-hour dietary intake records (24-hr recall)
- Over 1400 different food items
3. Conduct Preliminary Risk Assessment

**Exposure Assessment & Risk Characterisation**

- **Estimate dietary exposure**
  - Substance Level X Food Consumption Amount
  - Average & high consumers of the HK population
  - Various population subgroups, if appropriate

- **Assess the associated health risk**
  - Compare the exposure estimated with the relevant safety reference values
4. Disseminate Food Incident Report

- Disseminate food incident surveillance reports timely to relevant officers in Risk Management and Risk Communication Teams for follow-up actions and formulation of risk management options
Follow-up Actions

- Formulate any risk management and risk communication measures
- Conduct detailed risk assessment for major food incidents
  - Preparing technical brief:
    - Background information
    - Occurrence of the hazardous substance
    - Detailed toxicological information
    - Safety reference values
    - Local situation
    - Local and international regulations
Example of Food Incident Monitoring:

Bonsoy soy milk with very high levels of iodine
Bonsoy Soy Milk with High Iodine Levels

- Identified on 24 Dec 2009
- Source: Food Standards Australia New Zealand (FSANZ)

**Hazard Identification:**

- Iodine in Bonsoy soy milk: about 31,250 µg/L
  - Soy milk enriched with “Kombu” (a seaweed product)
  - A cup (240 ml) contributes >7,500 µg iodine
Bonsoy Soy Milk with High Iodine Levels (2)

**Hazard Characterisation:** Iodine (from WHO/FAO)

- An essential micronutrient required for thyroid hormones synthesis
  - Inadequate intake
    - Iodine Deficiency Disorders (IDD)
  - Excessive intake
    - May cause adverse effects to the thyroid gland

- Safety reference value
  - WHO/FAO recommends an Upper Limit (UL) of 30 μg/kg bw/day for dietary intake of iodine for adults
Exposure Assessment:

Estimate exposure with the aid of an in-house developed web-based computer system called “EASY” (Exposure Assessment System)
Individual Chemical Hazard Assessment Module
Individual Chemical Hazard Assessment Module (2)
## Individual Chemical Hazard Assessment Module (3)

<table>
<thead>
<tr>
<th>Estimation Criteria</th>
<th>Details</th>
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<tbody>
<tr>
<td>Substance Code</td>
<td>Iodine</td>
</tr>
<tr>
<td>Substance Description</td>
<td>Iodine</td>
</tr>
<tr>
<td>Food items with Recipe Breakdown</td>
<td>Nil</td>
</tr>
<tr>
<td>Food Consumption Data Source (2)</td>
<td>Nil</td>
</tr>
<tr>
<td>Weighted / Unweighted Data</td>
<td>Weighted</td>
</tr>
<tr>
<td>Unit for exposure data</td>
<td>ug/kg bw/day</td>
</tr>
<tr>
<td>Population Groups</td>
<td></td>
</tr>
<tr>
<td>Age Group</td>
<td>All</td>
</tr>
<tr>
<td>Gender</td>
<td>All</td>
</tr>
<tr>
<td>Consumers</td>
<td>Consumer Only</td>
</tr>
<tr>
<td>Safety Reference Value (Chronic)</td>
<td>30</td>
</tr>
<tr>
<td>Unit for Safety Reference Value</td>
<td>ug/kg bw/day</td>
</tr>
<tr>
<td>Source of information</td>
<td>WHO/FAO</td>
</tr>
</tbody>
</table>

### Summary of Exposure Data

From Food Consumption Data Source (1):

| Average Body Weight | 60.12 kg |
| No. of Respondents | 608,312 (Unweighted: 488) |

<table>
<thead>
<tr>
<th>Exposure</th>
<th>% contributed to safety reference value (chronic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Exposure</td>
<td>94.4700</td>
</tr>
<tr>
<td>High Exposure (95th percentile)</td>
<td>187.5000</td>
</tr>
</tbody>
</table>
**Exposure Assessment:**

**Soy milk**

- **Local consumption data:**
  (including soybean milk and soymilk drink)
  - Average consumers: 3.02 g/kg bw/day
  - High consumers: 6.00 g/kg bw/day

- **Estimate dietary exposure:**
  \[ \text{Substance Level (31,250 µg/L) X Food Consumption Amount} \]
  - Average consumers: 94.5 µg/kg bw/day
    - 3.1 times of UL
  - High consumers: 187.5 µg/kg bw/day
    - 6.3 times of UL
Bonsoy Soy Milk with High Iodine Levels (5)

**Risk Characterisation:**

Cannot rule out adverse effects due to consumption of *Bonsoy soy milk* with 31,250 µg/L of iodine for average and high consumers.
Bonsoy Soy Milk with High Iodine Levels (6)

Follow-up Actions:

- Bonsoy soy milk with very high levels of iodine

Risk Management

- Contacted the Australian authorities for further information
- Press release

Risk Assessment

Risk Communication

- Food Alert for public
- Rapid Alert for subscribed food trade
<table>
<thead>
<tr>
<th>Issue Date</th>
<th>24 December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of Information</td>
<td>Food Standards Australia New Zealand (FSANZ)</td>
</tr>
<tr>
<td>Food Product</td>
<td>Soy Milk</td>
</tr>
<tr>
<td>Name of Product</td>
<td>Bonsoy Soy Milk</td>
</tr>
<tr>
<td>Name of Company</td>
<td>Spiral Foods Pty Ltd</td>
</tr>
</tbody>
</table>
| Product Description     | Product Volume: 1 Litre  
                          | Best before: all dates up to and including 3.11.2011 |
| Reason for Recall       | The product may contain unusually high levels of iodine. |
| Action Taken by the Centre for Food Safety | The Centre for Food Safety (CFS) has contacted the Australian authorities for further information. The CFS has learnt that the concerned product has been imported into Hong Kong and also alerted the trade to stop selling the affected product and is monitoring the situation. |
| Advice to the Trade     | Stop selling the affected products. |
| Advice to Consumers     | Stop consuming the affected products. Seek medical advice if doubt. |
| Further Information     | Website of Food Standards Australia New Zealand (FSANZ)  
                          | The CFS press release |
Example of Food Incident Monitoring:

RA Support in Melamine Incident
Melamine in Milk Incident in China

- Identified through food incident monitoring in Sept 2008
  - Cases of renal stone in infants in mainland China
  - Infant formula products were contaminated with melamine
  - Melamine was added to milk to cause a false increase in the measurement of protein for dairy products
Risk Assessment

Hazard Identification:

- An industrial chemical
- Infant formula contained especially high level of melamine (up to 2563 mg/kg) in the Mainland
- Also found in other milk and animal products (e.g. ice pops, chocolates, eggs, etc) in local market
Risk Assessment (2)

**Hazard Characterisation:**
- Not metabolised and rapidly eliminated via urine
- Low acute toxicity
- Give rise to stone problem
- Not carcinogenic, genotoxic, or teratogenic
- NOAEL: 63 mg/kg bw/day
- Temporary safety reference doses for adult and young children
  - 0.63 mg/kg bw/day for adult
  - 0.32 mg/kg bw/day for children under three
Risk Assessment (3)

**Exposure Assessment & Risk Characterisation**

- Used two sets of limits as examples for exposure assessment as the susceptibility to melamine differs between young children and adults
  - A 10kg three-year-old child
  - A 60 kg adult

- Reach safety reference with following daily consumption of melamine:
  - 37.8 mg for adult
  - 3.2 mg for children

- Provided scientific basis to regulate melamine in food
Regulation of Melamine in Food

■ “Zero Tolerance” is not applicable
  □ Other sources of melamine and its analogues:
    ■ Migration into food from melamine-ware
    ■ A metabolite of pesticide cyromazine in plants and animals
    ■ Addition of cyanuric acid as a byproduct in feed grade biuret
    ■ Chlorine disinfectants in food production & processing
“Harmful Substances in Food Regulation”

- Amendment Regulation came into operation on 23 Sept 2008
- Set maximum melamine concentrations:
  1) Milk: **1 mg/kg**
  2) Any food intended to be consumed principally by children under 36 months and any food intended to be consumed principally by pregnant or lactating women: **1 mg/kg**
  3) Any other food: **2.5 mg/kg**
- Other food authorities also adopted similar limits for melamine
- WHO in Dec 2008
  - Established the Tolerable Daily Intake (TDI) of 0.2 mg/kg bw/day
  - Opined that such melamine limits provide a **sufficient margin of safety** for dietary exposure relative to the TDI
Determining Factors of Food Incident Monitoring

- Monitoring and reporting timely
- Accuracy of the source of information
- Development of database on food hazards
  - Technical information provided by different subject officers in risk assessment team
Conclusion

- Effective food incident management demands timely responses
- Close monitoring of food incidents occurred locally and overseas is vital
- Thank You -