Incident in Focus

Endosulfan Detected in Eels Exported to Japan from Mainland China

Reported by Mr. Arthur YAU, Scientific Officer, Risk Communication Section, Centre for Food Safety

Summary of Incident

On 23 August 2006, the media reported that the Ministry of Health, Labour and Welfare of Japan had found that live eels imported from Guangdong Province and Shanghai, China contained the pesticide endosulfan at levels exceeding their requirement. In response to the Centre for Food Safety’s (CFS) enquiry, the Guangdong Inspection and Quarantine Bureau (GDCIQ) confirmed that the concerned farms did not export eels to Hong Kong. Following the report, samples of live eels and eel products were collected by the CFS. They showed satisfactory results of endosulfan. There was no cause for alarm.

What is endosulfan?

Endosulfan is a pesticide used in many countries worldwide. The pesticide is registered and permitted to be used in Hong Kong. It is mainly used to control insects in fruits and vegetables and the regulatory standards in the form of maximum residue limits are set for its use in certain food commodities by the Codex Alimentarius Commission (Codex) (Table 1). Endosulfan is not used in fish farming as some fish species are very sensitive to the effect of endosulfan and no international standard has been set for endosulfan residue in fish.

Table 1: Codex maximum residue limits for endosulfan in selected food commodities

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Maximum Residue Limits (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrot</td>
<td>0.2</td>
</tr>
<tr>
<td>Cucumber</td>
<td>0.5</td>
</tr>
<tr>
<td>Lettuce,</td>
<td>1</td>
</tr>
<tr>
<td>Spinach</td>
<td>2</td>
</tr>
<tr>
<td>Meat (from mammals other than marine mammals)</td>
<td>0.1 (applies to fat)</td>
</tr>
<tr>
<td>Oranges, Sweet, Sour</td>
<td>0.5</td>
</tr>
<tr>
<td>Grapes</td>
<td>1</td>
</tr>
<tr>
<td>Pineapple</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Codex

What about organochlorine (OC) pesticides?

Endosulfan is a type of organochlorine pesticide. OC pesticides contain chlorine in...
their chemical structure and tend to be persistent in the environment. Because of this property, low levels of some of these chemicals in foods might be present as a result of environmental contamination. Some, but not all, OC pesticides, such as DDT, chlordane and hexachlorobenzene, are of particular concern due to their persistence and ubiquitous nature in the environment and their tendency to bioaccumulate in animals. They are classified as persistent organic pollutants (POPs).

**Health Effect**

Symptoms of acute poisoning caused by endosulfan include hyperactivity and muscle spasm, while chronic toxicity may cause kidney damage. However, endosulfan is not known to be carcinogenic.

Risk assessment using internationally accepted methodology, the highest level of endosulfan detected in eels in Japan and the consumption pattern of local secondary school students (as collection of adult consumption data is underway) showed that consumption of the eel concerned would contribute less than 1% of the safety reference value (in terms of acceptable daily intake (ADI) for chronic toxicity) set for endosulfan by international authority. (You may read more about hazard and risk in food safety in the "Food Safety Platform" column.) The percent contribution to acute reference dose (ARfD) is similar when acute toxic effects are concerned.

**Follow-up Actions**

As a result of the incident, the CFS immediately contacted the GDCIQ in Mainland China. The Mainland authority confirmed that the concerned fish farms were not supplying live eels to Hong Kong. To further assess the situation, the CFS collected samples of eels and eel products for examination of endosulfan. Among the six eel samples tested, no endosulfan was detected in four of them and only small amounts (about 0.02 ppm) of endosulfan were detected in the remainder. There is no cause for alarm.

**Advice to the Public**

Importers of live eels from Mainland China should only source eels from farms registered for export to Hong Kong and each consignment should be accompanied with a health certificate. Retailers and consumers are advised to purchase aquatic products from reliable and reputable suppliers. Consumers are advised to maintain a balanced diet in order to avoid excessive intake of chemicals from a small range of food items.

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2 The ADI of a chemical is the estimate of the amount of a substance in food or drinking water, expressed on a body-weight basis, that can be ingested daily over a lifetime without appreciable health risk to the consumer on the basis of all the known facts at the time of the evaluation.

3 The ARfD of a chemical is an estimate of the amount of a substance in food and/or drinking water, normally expressed on a body-weight basis, that can be ingested daily over a period of 24 hours or less without appreciable health risk to the consumer on the basis of all known facts at the time of the evaluation.

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<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Number of Meat Samples</th>
<th>Number of Vegetable Samples</th>
<th>Number of Unsatisfactory Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC pesticides, including endosulfan</td>
<td>30</td>
<td>47</td>
<td>0</td>
</tr>
</tbody>
</table>

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For readers who are interested to understand more about the incident, please visit the following related web pages for further information:

- Risk in Brief on "Pesticide Residues in Food";
- FAQ for pesticide residues in food.
Hazard and Risk in Food Safety (Part II)

Reported by Dr. Anna TANG, Research Officer, Risk Assessment Section, Centre for Food Safety

Introduction
As mentioned in Part I, hazards and risks are part of everyday life. For food, we are constantly exposed to various materials, natural or synthetic, that are potentially hazardous to us which may be present unintentionally due to contamination or added intentionally for reasons like improving texture and taste. With advances in modern technology, we are able to detect these materials at a lower and lower level. While achieving zero tolerance for all food hazards is not realistic, our exposure to these hazards will determine if our health is at risk.

The Effect of Dose
Too much of a good thing may be bad. A little of a bad thing may not be as bad as we may think. Dose, i.e. amount of substance we are exposed to and the duration of exposure determines whether something is a poison. Taking oxygen as an example, it is a good thing because we all need it for survival. However, oxygen concentration above 60% may cause irritation to lungs and affect respiration. High oxygen concentration over a prolonged period can lead to oxygen poisoning, causing convulsions and unconsciousness. Similarly, vitamins, which are essential to our life, can be considered as poisons when they are taken in excess because harmful effects to our bodies may occur.

Safety Reference Values
In food safety control, safety reference values are established as guidelines for a safe level of intake. They represent the amounts of a substance that can be ingested by a person over a period of time without appreciable health risk. When considering acute or immediate effects, an "acute reference dose" is used as a reference for the safe ingestion of a substance over a short period of time (e.g. 1 day). When considering chronic or long term effects, values such as "acceptable daily intake" (ADI) for food additives and "tolerable daily/weekly/monthly intake" for food contaminants over a lifetime period are usually taken as reference. Since these chronic reference values are determined based on lifetime intake, an occasional exposure above these values would not cause harm to health provided that the level is not high enough to cause immediate effects and its intake is not over in the long term.

Safety reference values generally used are those established by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR). These organizations establish safety reference values for food additives and contaminants following safety assessments that take into account results of animal studies and human data. An ample margin of safety is given to protect public health. Substances evaluated by the JECFA and the JMPR undergo a periodic review procedure to ensure that new scientific data are considered whenever available.

Mercury as an Example
Mercury is a heavy metal that may cause adverse health effects particularly to the nervous system of developing foetuses and children and the kidney. Dietary food items are the major source of mercury. The risk associated with ingestion of mercury in food by Hong Kong secondary school students can be assessed by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR). These organizations establish safety reference values for food additives and contaminants following safety assessments that take into account results of animal studies and human data. Since these chronic reference values are determined based on lifetime intake, an occasional exposure above these values would not cause harm to health provided that the level is not high enough to cause immediate effects and its intake is not over in the long term.

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Food Safety Focus

Figure 2. Dietary Exposure to Mercury among Secondary School Students Represented as a Percentage of PTWI Based on Results of Risk Assessment on "Dietary Exposure to Mercury in Secondary School Students" conducted by the Food and Environmental Hygiene Department

Dietary Exposure to Mercury

- Estimated by comparing the intake of mercury (i.e. exposure) in this group of population with the appropriate safety reference value (in this case provisional tolerable weekly intake (PTWI) established by JECFA) (Figure 1).
- In general, the risk of an adverse health effect due to ingestion of a substance is considered as acceptable when the dietary intake is lower than the safety reference value.

According to the food consumption pattern of Hong Kong secondary school students and the levels of mercury in food determined by laboratory analysis, the estimated dietary intakes of mercury for average consumers and high consumers among secondary school students were all below the PTWI (Figure 2). The risk of adverse health effects due to dietary intake of mercury is therefore low for this group within the population.

Danger of Eating Raw or Undercooked Freshwater Animals

- Adverse health effects due to consumption of raw or undercooked freshwater animals are reported from time to time. Since June of this year, over a hundred people have been infected with parasites in Beijing after eating raw snails. Investigation found that the snails were infested with a parasite known as Angiostrongylus cantonensis. In Guangzhou, cases of Clonorchis sinesis parasitic infection were also reported due to the consumption of raw freshwater fish.
- Angiostrongylus cantonensis may invade the central nervous system and lead to meningitis. Clonorchis sinesis, which stays and irritates the bile duct, is a risk factor for cancer of bile duct.
- To avoid being infected with parasites and other pathogenic microorganisms, consumers should not eat raw freshwater animals such as fish, shrimp, snail, crab and frog and should cook these food items thoroughly before consumption. Consumers should also note that wine, vinegar, wasabi, mustard and spices cannot destroy the parasites. In Hong Kong, it is against the law to sell Chinese dishes Yu Sang (i.e. freshwater fish intended for raw consumption).

What Constitutes an Incident/Food Safety Case?

- The table "Summary of Risk Communication Work" aims to reflect the work of the CFS in a number of important areas. One of the areas, namely "Incidents/Food Safety Cases" refers to the number of incidents or events with potential food safety implications, and were actively evaluated and handled by the CFS in the past month. They include reports on food safety issues by food authorities and media agencies outside Hong Kong but may have local implications, as well as local food safety issues with wide media coverage and significant public concern. The CFS monitors the reports from a wide range of sources, assesses their local significance and takes follow up actions to address any food safety risk and concern that may be identified.

<table>
<thead>
<tr>
<th>風險傳達工作一覽 (二零零六年八月)</th>
<th>数目</th>
</tr>
</thead>
<tbody>
<tr>
<td>風險傳達工作一覽 (二零零六年八月)</td>
<td>24</td>
</tr>
<tr>
<td>Incidents / Food Safety Cases</td>
<td>47</td>
</tr>
<tr>
<td>公眾查詢 Public Enquiries</td>
<td>502</td>
</tr>
<tr>
<td>食物投訴 Food Complaints</td>
<td>117</td>
</tr>
<tr>
<td>教育研討會/Lectures / Talks / Counselling</td>
<td>11</td>
</tr>
<tr>
<td>上載到食物安全中心網頁的新訊息</td>
<td>New Messages Put on the CFS Website</td>
</tr>
</tbody>
</table>

食品安全平台

Food Safety Platform

進食生或未經徹底煮熟的淡水水產的風險

- 常食生或未經徹底煮熟的淡水水產而對健康造成不良影響的食物中毒時有所聞。自今年六月起，北京已有百多人在進食生的螺類後感染寄生蟲。調查後發現這些螺類中有一種為"廣州管圓線蟲"的寄生蟲，在廣州，亦有報告市民進食生的淡水魚而感染肝吸蟲。

- 廣州管圓線蟲可侵害腸胃系統，引致腹瀉炎。至於肝吸蟲，則會寄生在膽管內，引致膽管發炎和膽管炎。

- 為免感染寄生蟲和其他病原微生物，消費者應避免進食的魚、蝦、蟹和田螺等淡水水產，同時應徹底煮熟這類食物才進食。此外，他們亦須注意，酒、醋、青芥末、黃芥末和香料均不能殺死寄生蟲。在香港售賣中國式魚生（即生吃的淡水魚）屬違法。

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