Opinions of Food Safety Agencies

London, 4 May 2012
Presentation

- Brief presentation of EDES Programme;
- Key elements about Cadmium issues;
- Discussion between JECFA / EFSA about TWI;
- EFSA scientific opinions (2009 – 2012);
- ANSES scientific opinion;
- Conclusions.
Budget 30 million Euros - 4 years (2010-2014)
Funded by EU on behalf of the ACP States Group
COLEACP EDES: Why?

- Minimize impact of regulations on food safety on ACP export to EU
- Duty of technical assistance (Cotonou Agreement, SPS Agreement, Regulation 882/2004 ...)
- Risk of loss of trust among EU distributors in ACP products

Prevent a negative socio-economic impact in ACP countries (poverty alleviation)
**COLEACP EDES : Objectives?**

- Be **European health authorities confident** on the quality of **SPS controls** in the country of origin (**principle of equivalence**);
- Help ACP countries to reinforce their «national (or regional) **Food Safety** system».

**COLEACP EDES : How ?**

- Assisting in the implementation of a Food Safety Policy;
- Setting up tailored, sustainable and economically viable systems in the ACP;
- Building a scalable system in order to adapt to new problems in the long term.
COLEACP EDES : cocoa sector of Ghana with ICCO

- Training and Technical assistance;
- Self-Assessment Guides for Professional Associations, approved by the supervising Authorities before implementation;
- Field Training Workshops: extension of Good Practices to small scale growers (Hygiene, Traceability, Crop protection, Safe use of Pesticides);
- Support on Registration of Plant Protection Products.
Cadmium: origin

Natural processes

- Volcanic origins
- Weathering of rocks

Anthropogenic activities

- Urban pollution: incineration, road dust
- Industrial emission: waste, fertiliser

CADMIUM (association with Zn)

Sources of pollution

**AIR**
- 150 – 2600 T
- 3000 T

**EROSION**
- 15 000 T

**WATER**

**SOIL**
- P2O5 / Not EU legislation
- 7500 – 29 500 T

Human exposure

**AIR**

- Food accounts: 90%

**WATER**

- Air: 10%

**SOIL**

- pH
- Soil properties
- Plant species

**FOOD**

Tolerable Weekly Intake for Cadmium

**EFSA vs JEFCA**

- Bone demineralisation
- Urine
- Renal tubular dysfunction

### Relationship between Cadmium concentration in kidneys and urine
- Urinary Cadmium - beta-2-microglobulin (biomarker of renal tubular issues)
- Urinary cadmium – Dietary Cd intake
Tolerable Weekly Intake for Cadmium

EFSA vs JEFCA

- Same database
- BUT
  - Identification of the Reference point (based on urinary cadmium and β-2-microglobulin);
  - Variability / uncertainty of urinary Cadmium concentration - β-2-microglobulin concentration;
  - Methodology urinary Cadmium concentration – Dietary intake values.
Tolerable Weekly Intake for Cadmium

EFSA vs JEFCA

- Identification of the Reference point (based on urinary cadmium and β-2-microglobulin);
  - Tubular dysfunction usually only develops after the cadmium concentration in the renal cortex reaches a critical level;
  - EFSA: 4 µg cadmium / g creatinine
  - JEFCA: 5.24 µg cadmium / g creatinine
- Creatinine measures the renal function
Tolerable Weekly Intake for Cadmium

EFSA vs JEFCA

- Consequences:
  - 140,000 data points taking into account (by EFSA)
  - Average dietary exposure close to TWI (2.5 μg/Kg bw/week)
  - Vegetarians, children, people living in highly contaminated areas: 2 * TWI;
  - JECFA: TWI: 5.8 μg/Kg bw/week
Dietary exposure

- Overall intake;
- 2 factors to be analysed:
  - Cadmium level in food;
  - Consumption pattern.
Theoretical curve of concentration

Number

Mean 95% Concentration
Sampling adjustment factors

- Applied when aggregating food subcategories to category
- Balance the relative consumption of sub-groups in the food group
- Example

<table>
<thead>
<tr>
<th>Food</th>
<th>N</th>
<th>SAF</th>
<th>Mean (mg/kg)</th>
<th>Adjusted mean (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate</td>
<td>1022</td>
<td>21%</td>
<td>0.0896</td>
<td>0.0188</td>
</tr>
<tr>
<td>Chocolate based products</td>
<td>462</td>
<td>12%</td>
<td>0.0234</td>
<td>0.0028</td>
</tr>
<tr>
<td>Other sugar and sugar products</td>
<td>2326</td>
<td>67%</td>
<td>0.0071</td>
<td>0.0048</td>
</tr>
<tr>
<td>Total sugar and sugar products including chocolate</td>
<td>2326</td>
<td>67%</td>
<td>0.0312</td>
<td>0.0264</td>
</tr>
</tbody>
</table>

## Cd occurrence mean / adjusted occurrence mean

<table>
<thead>
<tr>
<th>Food</th>
<th>Occurrence mean (mg/kg)</th>
<th>Adjusted Occurrence mean (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edible offal and offal products</td>
<td>0.2057</td>
<td>0.1263</td>
</tr>
<tr>
<td>Meat and meat products</td>
<td>0.0974</td>
<td>0.0165</td>
</tr>
<tr>
<td>Fish and seafood</td>
<td>0.0923</td>
<td>0.0268</td>
</tr>
<tr>
<td>Vegetables, nuts and pulses</td>
<td>0.0670</td>
<td>0.0189</td>
</tr>
<tr>
<td>Sugar and sugar prod. (chocolate)</td>
<td>0.0312</td>
<td>0.0264</td>
</tr>
<tr>
<td>Cereal and cereal products</td>
<td>0.0231</td>
<td>0.0163</td>
</tr>
<tr>
<td>Coffee, tea, cocoa (expres. liquid)</td>
<td>0.0041</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

## Concentration of Cadmium for some sub-categories of food (mg/Kg)

<table>
<thead>
<tr>
<th>Food</th>
<th>P5</th>
<th>Median</th>
<th>Mean</th>
<th>P95</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bivalve molluscs</td>
<td>0.0280</td>
<td>0.1630</td>
<td>0.3797</td>
<td>1.4000</td>
<td>4.5250</td>
</tr>
<tr>
<td>Oil seeds</td>
<td>0.0050</td>
<td>0.1520</td>
<td>0.2268</td>
<td>0.7050</td>
<td>1.1050</td>
</tr>
<tr>
<td>Seafood seafood products</td>
<td>0.0025</td>
<td>0.0835</td>
<td>0.2152</td>
<td>0.9600</td>
<td>4.5200</td>
</tr>
<tr>
<td>Fungi</td>
<td>0.0020</td>
<td>0.0250</td>
<td>0.2087</td>
<td>1.2000</td>
<td>2.7090</td>
</tr>
<tr>
<td>Edible offal</td>
<td>0.0050</td>
<td>0.0620</td>
<td>0.2057</td>
<td>0.6000</td>
<td>34.500</td>
</tr>
<tr>
<td>Cocoa (powder - bean)</td>
<td>0.0080</td>
<td>0.1328</td>
<td>0.1776</td>
<td>0.5000</td>
<td>2.0750</td>
</tr>
<tr>
<td>Chocolate</td>
<td>0.0030</td>
<td>0.0420</td>
<td>0.0896</td>
<td>0.3000</td>
<td>0.4700</td>
</tr>
<tr>
<td>Bran and germ</td>
<td>0.0130</td>
<td>0.0615</td>
<td>0.0647</td>
<td>0.1300</td>
<td>0.2200</td>
</tr>
<tr>
<td>Chocolate based products</td>
<td>0.0005</td>
<td>0.0090</td>
<td>0.0234</td>
<td>0.0919</td>
<td>0.3700</td>
</tr>
</tbody>
</table>

Theoretical curve of consumption

Number

5%  Mean  75%  95%

Consumption g/day/kg bw
Sub-population

- Country;
- Adults vs Children;
- Vegetarians vs Non Vegetarians;
- Biggest consumers (P95).
Example: P95 food consumption (g/day)

<table>
<thead>
<tr>
<th>Food</th>
<th>BE</th>
<th>FR</th>
<th>DE</th>
<th>NL</th>
<th>GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit and vegetables juices, soft drink</td>
<td>2250</td>
<td>1234</td>
<td>2150</td>
<td>1050</td>
<td>1053</td>
</tr>
<tr>
<td>Coffee, tea, chocolate (liquid)</td>
<td>1313</td>
<td>850</td>
<td>1686</td>
<td>1757</td>
<td>1636</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>1156</td>
<td>764</td>
<td>986</td>
<td>1313</td>
<td>1549</td>
</tr>
<tr>
<td>Vegetables, nuts and pulses</td>
<td>581</td>
<td>461</td>
<td>504</td>
<td>407</td>
<td>357</td>
</tr>
<tr>
<td>Milk and dairy based products</td>
<td>539</td>
<td>570</td>
<td>870</td>
<td>868</td>
<td>553</td>
</tr>
<tr>
<td>Cereal and cereal products</td>
<td>503</td>
<td>546</td>
<td>490</td>
<td>393</td>
<td>466</td>
</tr>
</tbody>
</table>

## Consumption (g/day)

<table>
<thead>
<tr>
<th>Food</th>
<th>General population</th>
<th>P95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee</td>
<td>201</td>
<td>600</td>
</tr>
<tr>
<td>Bread, rusk</td>
<td>123</td>
<td>281</td>
</tr>
<tr>
<td>Milk</td>
<td>119</td>
<td>352</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td>87</td>
<td>402</td>
</tr>
<tr>
<td>Ultra fresh dairy products</td>
<td>70</td>
<td>214</td>
</tr>
<tr>
<td>Chocolate</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: 1st French Total Diet Study (Leblanc 2004)
## Consumer exposure to Cadmium

<table>
<thead>
<tr>
<th>Food</th>
<th>Occurrence mean (mg/Kg)</th>
<th>Consumption Median (g/day)</th>
<th>Exposure Cadmium (µg/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal and cereal products</td>
<td>0.0163</td>
<td>257</td>
<td>4.189</td>
</tr>
<tr>
<td>Vegetables, nuts and pulses</td>
<td>0.0189</td>
<td>194</td>
<td>3.667</td>
</tr>
<tr>
<td>Edible offal and offal products</td>
<td>0.1263</td>
<td>24</td>
<td>3.031</td>
</tr>
<tr>
<td>Starchy roots and potatoes</td>
<td>0.0209</td>
<td>129</td>
<td>2.696</td>
</tr>
<tr>
<td>Meat and meat products, offal</td>
<td>0.0165</td>
<td>151</td>
<td>2.492</td>
</tr>
<tr>
<td>Fish and seafood</td>
<td>0.0268</td>
<td>62</td>
<td>1.662</td>
</tr>
<tr>
<td>Coffee, tea, cocoa (expressed liquid)</td>
<td>0.0018</td>
<td>601</td>
<td>1.082</td>
</tr>
</tbody>
</table>

**Chocolate**

- Occurrence mean (mg/Kg): 0.0896
- Consumption Median (g/day): 2.7
- Exposure Cadmium (µg/day): 0.2419

*Source: Scientific Opinion of the Panel on Contaminants in the Food Chain EFSA-Q-2007-138. 30/01/2009*
CONCLUSIONS - EFSA

- **Food** major source of exposure for **non-smoking** population

- **Occurrence**
  - Highest Cd concentration:
    - Seaweed, fish, seafood;
    - Chocolate;
    - Fungi;
    - Oilseed;
    - Edible offal.
CONCLUSIONS - EFSA

- **Exposure**
  - Food groups:
    - Cereal products;
    - Vegetables, nuts, pulses;
    - Starchy roots and potatoes;
    - Meat and meat products.
CONCLUSIONS - EFSA

- Mean dietary exposure:
  - Adults: 1.9 – 3.0 µg/Kg body weight/Week;
  - High consumers: 2.5 – 3.9 µg/Kg body weight/Week;
  - Toddlers / children > Adult;
  - Provisional Tolerable Weekly Intake (PTWI): 7 µg/Kg body weight/Week (FAO/WHO 2004);
  - 2.5 µg/Kg body weight/Week (EFSA 2009)
RECOMMENDATIONS - EFSA

- More detailed on food consumption needed;
- Need for representative occurrence data in food commodities.
New EFSA report about Cadmium 2012

- Categories:
  - Infant (< 1 year);
  - Toddlers (1 - < 3 years);
  - Other children (3 - < 10 years);
  - Adolescents (10 - < 18 years);
  - Adults (18 - < 65 years);
  - Elderly (65 - < 75 years)
  - Very elderly (>= 75 years)
New EFSA report about Cadmium 2012

- For each category:
  - Mean
    - Lower bound;
    - Middle bound;
    - Upper bound;
  - P95
    - Lower bound;
    - Middle bound;
    - Upper bound.
New EFSA report about Cadmium 2012

- Classification of food:
  - 20 categories (Level 1);
  - 144 sub categories (Level 2);
- Examples:
  - Potatoes and potato products;
  - Bread and rolls;
  - Chocolate (cocoa) products.
## Contribution to dietary Cd exposure

<table>
<thead>
<tr>
<th>Food</th>
<th>Toddler</th>
<th>Other ch.</th>
<th>Adolesc.</th>
<th>Adults</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>18.00%</td>
<td>13.60%</td>
<td>12.80%</td>
<td>12.30%</td>
<td>14.10%</td>
</tr>
<tr>
<td>Bread</td>
<td>9.33%</td>
<td>9.90%</td>
<td>11.70%</td>
<td>12.30%</td>
<td>13.00%</td>
</tr>
<tr>
<td>Fine bakery</td>
<td>4.38%</td>
<td>6.04%</td>
<td>6.09%</td>
<td>4.74%</td>
<td>4.83%</td>
</tr>
<tr>
<td>Grain milling products</td>
<td>7.54%</td>
<td>3.22%</td>
<td>1.84%</td>
<td>2.82%</td>
<td>3.39%</td>
</tr>
<tr>
<td>Grain for human cons.</td>
<td>2.78%</td>
<td>3.30%</td>
<td>4.23%</td>
<td>3.06%</td>
<td>2.19%</td>
</tr>
<tr>
<td>Root vegetables</td>
<td>5.73%</td>
<td>2.67%</td>
<td>1.74%</td>
<td>2.65%</td>
<td>3.06%</td>
</tr>
<tr>
<td>Leaf vegetables</td>
<td>1.41%</td>
<td>1.86%</td>
<td>2.74%</td>
<td>4.84%</td>
<td>5.55%</td>
</tr>
<tr>
<td>Water molluscs</td>
<td>0.00%</td>
<td>1.76%</td>
<td>4.27%</td>
<td>3.91%</td>
<td>2.53%</td>
</tr>
<tr>
<td>Chocolate</td>
<td>3.68%</td>
<td>6.39%</td>
<td>5.88%</td>
<td>3.88%</td>
<td>2.25%</td>
</tr>
<tr>
<td>Cocoa products</td>
<td>0.00%</td>
<td>3.00%</td>
<td>3.30%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Scientific Opinion of the Panel on Cadmium dietary exposure. 2012
Conclusions

- Greatest impact on Cadmium exposure:
  - Consumption in larger quantities;
  - Not only highest cadmium level concentration in the food.

- Major contributors to Cd dietary exposure (all age groups):
  - Potatoes: 13.1%
  - Bread and rolls: 11.7%
  - Fine bakery wares: 5.1%
  - Chocolate products: 4.3%
  - Leafy vegetables: 3.9%
  - Water molluscs: 3.2%
Conclusions

- Middle bound mean exposure:
  - Toddlers: 4.80 µg/Kg bw / week;
  - Other children: 3.92 µg/Kg bw / week;
- Middle bound P95 exposure:
  - Toddlers: 6.50 µg/Kg bw / week;
  - Other children: 6.21 µg/Kg bw / week.

Need to reduce exposure to Cadmium at population level
Request from French Min Agri to ANSES

- Typology of overexposed consumers;
- To decrease the exposure, what are the foods to be regulated?
- Interest to regulate only highest contributors (Cadmium contamination) or highly contaminated (by Cadmium) food
Typology of overexposed consumers

- Small proportion of French population overexposed
- High fish and seafood consumers more exposed than the mean of the French population
- Overexposition remains moderate
- For P95 (adult population) (more exposed):
  - Molluscs and crustaceans (18.5 g/day – 3.8 g/day);
  - Bread (201 g/day – 111 g/day);
  - Vegetables (173 g/day – 138 g/day);
  - Potatoes (87 g/day – 57 g/day);
  - NO offals, chocolate (9 g/day – 5 g/day).

Source: Anses. Saisine n°2011-SA-0194
Typology of overexposed consumers

- For children population:
  - Exposure to Cadmium:
    - Potatoes;
    - Bread;
    - Vegetables;
    - Pasta;
  - NO offals, chocolate.

Source: Anses. Saisine n°2011-SA-0194
Typology of overexposed consumers

- For children population:
  - Higher exposure than adult population due to low weight;
  - 15% of children overexposed;
  - Not due to a specific diet but due to a low weight;
  - No long term consequences (adult period).

Source: Anses. Saisine n°2011-SA-0194
### Average content of Cd (µg / Kg fresh weight)

<table>
<thead>
<tr>
<th>Food</th>
<th>ANSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crustacean, mollusc</td>
<td>166,6</td>
</tr>
<tr>
<td>Offal</td>
<td>52,6</td>
</tr>
<tr>
<td>Biscuit</td>
<td>29,9</td>
</tr>
<tr>
<td><strong>Chocolate</strong></td>
<td><strong>28,6</strong></td>
</tr>
<tr>
<td>Potatoes</td>
<td>21,5</td>
</tr>
<tr>
<td>Bread</td>
<td>19,3</td>
</tr>
</tbody>
</table>

Source: Anses. Saisine n°2011-SA-0194
Food to be regulated

- Proposals for regulation:
  - Bread;
  - Potatoes;
  - Vegetables;
  - Mollusc and crustacean;
- Regulation not very efficient (Exposure: 10%. Consumption: 1%)
  - Offals;
  - Chocolate;
  - Biscuits.

Source: Anses. Saisine n°2011-SA-0194
Proposals by ANSES

- Enforcement of new ML proposed by DG Sanco: no significant impact to consumers exposure;
- Make effort to reduce environmental sources (fertilizer, sewage…)
- Awareness raising for overexposed population to change their diet.
Conclusions

- Several European Health authorities (specifically Germany) are concerned by children exposure to Cadmium:
  - Cocoa: one of food with higher Cadmium concentration;
  - Cadmium is a very harmful contaminant for human;
  - Low body weight;
  - Children are big consumers of chocolate.

- DG Sanco has the role to protect consumers specially children.
As reminder

- Technical proposal from DG Sanco
  - ML only for chocolate not for raw material
  - ML proposed by DG Sanco

<table>
<thead>
<tr>
<th></th>
<th>ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk chocolate</td>
<td>&lt; 30% total dry cocoa solids</td>
</tr>
<tr>
<td>Milk chocolate</td>
<td>&gt;= 30% total dry cocoa solids</td>
</tr>
<tr>
<td>Chocolate</td>
<td>&lt; 50% total dry cocoa solids</td>
</tr>
<tr>
<td>Chocolate</td>
<td>&gt;= 50% total dry cocoa solids</td>
</tr>
<tr>
<td>Cocoa powder</td>
<td></td>
</tr>
</tbody>
</table>

- Question: why 50% instead of 43%?
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