
Dr Wayne Anderson
Food Safety Authority of Ireland
Dioxins and early crisis events
Areas of uncertainty and exposure assessment
Risk communication
The term “dioxin” covers a group of chemically similar substances:

- 75 polychlorinated dibenzo-p-dioxins (PCDDs) and
- 135 polychlorinated dibenzofurans (PCDFs)
- 17 of toxicological concern
How Did We Find It?

Pesticide Control Service, DAFF

National Residues Monitoring Programme
## Time Line 2008

### November

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**November Events:**
- Pork fat sample taken
- Visit to index farm
- Preliminary Marker PCB result

### December

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**December Events:**
- Further pig restrictions / Press statement
- Dutch information provided
- Confirm marker PCB result
- Restriction of pig movement
- Crumb feed sample mPCB positive
- Dioxins confirmed
- High level meetings
- Full recall of Irish pork
Decision: Sat 6th December 2008

Irish Independent

HARRY SPURS
KEANE EXIT

MUNSTER’S LOSING BONUS

Gardai hunt for source in €1bn pig-meat scare
Cooperation: Pattern of dioxins (absolute)

Irish Samples

Dutch Samples
Science can help focus investigations

PCB profile for crumb and pig fat samples from Ireland compared to Aroclor 1260

% wt (Aroclor 1260) Frame et al, 1996
Data summary

- Same dioxin and PCB profiles in pork meat samples in IRL / NL / FR
- NDL-PCBs in pork 500-3000 ppb
- Ratio NDL-PCBs / dioxin-TEQ was low compared to previous incidents like Belgium
- Dioxins almost exclusively PCDFs
- Data suggests – Aroclor 1260 contamination (transformer oil)
Main Areas of Uncertainty for Exposure

- U1: Percentage of pig herd exposed to feed
- U2: Time exposure to contaminated feed and pork
- U3: Subsequent level of contamination in pork fat
- U4: Consumption of pork and pork products in Ireland
U1: Percentage of the Pig Herd

One Recycling Plant

10 Pig Production Farms

= 8% National Pork Output
Why Recall Everything?

10 Major Processing Plants

98% Pork Output
150,000 t/year
U2: Feed Exposure Period
Crumb Screening Results 13 Aug – 3 Dec, 2008

Positive ++
Positive
Positive--
Trace
Negative
U2: exposure period for Pork Dioxin levels at rendering plant in Belgium

Exposure period 1st September to 6th December

pg/g fat

31-jul 20-aug 9-sep 29-sep 19-oct 8-nov 28-nov 18-dec
U3: Dioxins Levels in Feed and Pork Fat

- Crumb Product: E.U. Limit Feed 0.75pg/g
- Levels detected in Feed: 5200pg/g
- Pig Fat: E.U. Legal Limit 1pg/g
- Levels detected: 80 – 200 pg/g
### U4: Pork Fat Consumption Data

- Database containing information for each individual and each eating occasion – split into ingredients for purposes of Total Diet Study – further manipulated for the purposes of estimating exposure to lipophilic substances (i.e. POPs)

#### Pork Casserole with Potatoes

<table>
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<th>Ingredient</th>
<th>Percentage</th>
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<tr>
<td>Pork, diced, raw, lean</td>
<td>24.4%</td>
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<tr>
<td>Carrots, old, raw</td>
<td>4.8%</td>
</tr>
<tr>
<td>Parsnip, raw</td>
<td>3.5%</td>
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<tr>
<td>Turnip, raw</td>
<td>2.2%</td>
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<tr>
<td>Stock cubes, chicken</td>
<td>0.2%</td>
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<tr>
<td>Water, distilled</td>
<td>15.3%</td>
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<tr>
<td>Old potatoes, average, raw</td>
<td>43.1%</td>
</tr>
<tr>
<td>Onions, raw</td>
<td>6.5%</td>
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</tbody>
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**Pork Fat**

- 0.98%
Exposure Assessment

- Databases uploaded into commercial probabilistic software program Crème Food

Food intake \(\times\) Presence probability \(\times\) Chemical concentration = Exposure

www.cremesoftware.com
FSAI Probabilistic modelling of exposure

- Total Population Intakes of Total WHO TEQ from all sources (including ingredients) assuming that 10% of the pork consumed contains a level of between 80-200 pg WHO TEQ/g fat and 90% of pork consumed contain usual background levels (as determined in previous surveys).

- All other intakes are calculated based on background levels determined in previous surveys. All intake calculations are based on ranges of data and the results presented are based on a run of 300 iterations.

<table>
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<tr>
<th>FSAI Probabilistic Exposure Assessment</th>
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<tbody>
<tr>
<td></td>
<td>Background exposure</td>
<td>Background &amp; Incident Exposure</td>
</tr>
<tr>
<td>Food Group</td>
<td>Mean</td>
<td>P97.5</td>
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<tr>
<td>Total Exposure</td>
<td>0.40</td>
<td>1.62</td>
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<tr>
<td>Pork Only</td>
<td>0.03</td>
<td>0.12</td>
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### EFSA Deterministic Modelling of Exposure

#### EFSA Point Estimate Intake for Pork

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Fat Intake (g/kg bw/d)</th>
<th>TEQ Exposure (pg/day per kg.b.w.)</th>
<th>% Fat from Contaminated Pork</th>
<th>% Fat from Contaminated Pork</th>
<th>% Fat from Contaminated Pork</th>
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<tbody>
<tr>
<td></td>
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<td>50 pg TEQ/g fat</td>
<td>100%</td>
<td>10%</td>
<td>1%</td>
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<td></td>
<td></td>
<td>100 pg TEQ/g fat</td>
<td>100%</td>
<td>10%</td>
<td>1%</td>
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<td></td>
<td>200 pg/g fat</td>
<td>100%</td>
<td>10%</td>
<td>1%</td>
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<td>Ireland</td>
<td>0.25</td>
<td>12.3</td>
<td>0.1</td>
<td>24.6</td>
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© 2005
• Uncertainty in exposure estimate
  - 10% of pork contaminated
  - 90 day exposure
  - 200pg/g dioxin

• **Conclusion**
  - 10% increase in body burden
  - No concern to human health from this single exposure event
It’s About Food Safety…

Risk Assessment

Agreement

Risk Assessment

European Food Safety Authority

© 2005
Body Burden of Dioxins in Ireland

- 2002 breast milk study, which has a mean of 11.9 pg/g fat
  - Assuming 60 kg body weight and 20% fat content, this gives an estimated body burden of 2.4 ng/kg over the 4 Irish populations studied
  - Lower than the 4ng/kg European average

- 2010 breast milk study (pooled samples 109 first time mothers)
  - Dioxin levels down ~20%
  - No appreciable exposure impact of the 2008 dioxin crisis
  - Publication submitted to Chemisphere
Communicating the message

We Have Identified Contamination
We Have Recalled Product
We Are Isolating the Cause
We Will Keep You Informed
No Matter How Strong the Message...

It Can Sink in ......
Maybe Not Simple…

385 Articles in National Press
200 Articles in Regional Press
70 Radio Programmes
17 Television Programmes
200 Internet News Items

800+ Journalists Delivering the Message?
Did They Deliver The Simple Message?

Competition in the “news” media
Advice Line Calls
(3,725)

Calls to advice-line on pork recall

Website traffic: up 4,310%
Food safety body took ‘correct’ action to manage dioxin crisis

Cowen says ‘immediate and clear action’ was taken

Japan praises Irish handling of pork scare

Bord Bia
Irish Food Board

IRISH PORK & BACON
APPROVED
The Department of Agriculture, Fisheries and Food

Piggy in the Middle

You’ve Saved Our Bacon

Butchers back in business after health alert

Shoppers Joy as Pork goes back on shelves

Mr. Ishiba commended us very strongly on the action we took when we had the pork recall incident over dioxin. It was his view that the department and the companies, which pork products, mostly frozen, are worth more than €20 million. He said that following the meeting, there were many opportunities for increased agricultural exports,” Mr. Smith said.

The possibility of the Japanese market being reopened for Irish beef was also raised during meetings the Minister held with the Japanese government and the Ministry of Agriculture, Forestry and Fisheries of Japan.
A tale of two crises: the Belgian and Irish dioxin contamination incidents

Donal K. Casey and James S. Lawless
School of Law, University College Dublin, Dublin, Ireland, and
Patrick G. Wall
School of Public Health and Population Sciences, University College Dublin,
Dublin, Ireland

Government management of two media-facilitated crises involving dioxin contamination of food

Casey J. Jacob
Corie Lok
Katija Morley
Douglas A. Powell
Department of Diagnostic Medicine/Pathobiology, Kansas State University, Manhattan,
KS 66506, United States: e-mail: dpowell@ksu.edu
But in any crisis co-operation is vital…

- FERA, York
- RIKILT, NL
- VWA, NL
- Food Standards Agency (NI and London)
- European Commission
- European Food Safety Authority
Particular thanks to Christina Tlustos and Rhodri Evans for helping in the preparation of this talk.