

THE DIOXIN CONTAMINATION INCIDENT IN IRELAND 2008

Ilustros C

Food Safety Authority of Ireland, Abbey Court, Lower Abbey Street, Dublin 1, Ireland

Abstract

In December 2008 the Irish food sector faced a major food crisis that had public health, political and economic consequences. All pork products produced from animals slaughtered in Ireland between 1st September and 6th December 2008 were recalled from both the domestic and international markets; the largest recall of foods in the history of the State. The reason for this recall was the finding that some pork products were contaminated with dioxins and dioxin-like polychlorinated biphenyls at levels of toxicological concern. This resulted from the consumption, by food animals of animal feed contaminated with a specific dioxin congener profile that suggested the source was transformer oil. Swift action taken by the Irish authorities saw the removal of contaminated products from the market and within six days these were replaced with products from animals that had not received the contaminated feed. Faced with this crisis of an unprecedented scale the Irish food safety control programme worked and the country was back in business in less than one week.

Introduction

In September 2008 a feed contamination incident occurred in Ireland, which subsequently led to contamination of pig herds and cattle herds supplied with this feed. The source of contamination was identified to be due to carry over of dioxins and PCBs from contaminated fuel used in a direct drying system in feed production.

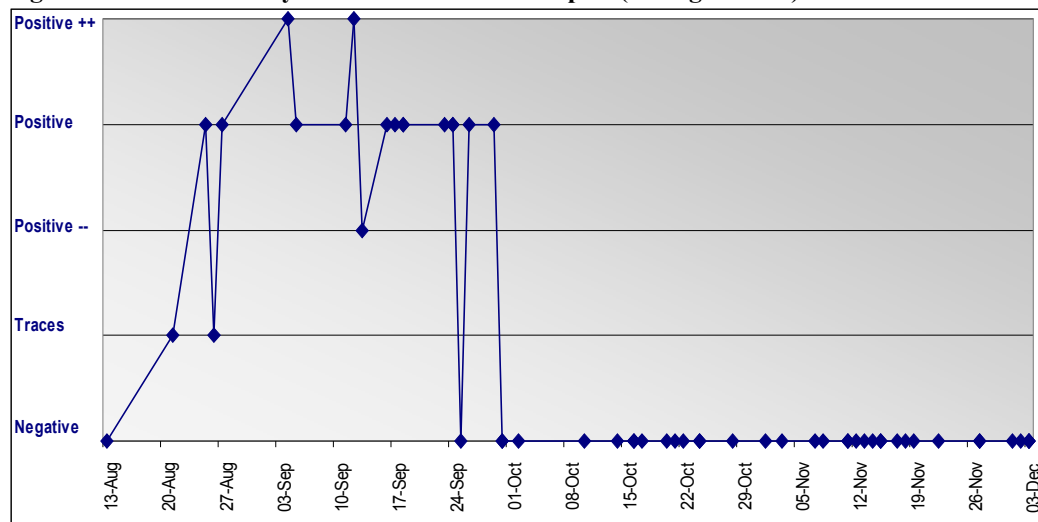
The animal feed was produced by direct (hot air) drying of raw baker's dough and left over bread products sent for recycling to a licensed feed mill. Two different types of feed material were produced, bread-crumbs which were produced as pig feed and biscuit, which was produced as cattle feed. The exhaust from the furnace used for drying, which was fired using contaminated oil, acted as transfer medium and the bread itself acted as filter, adsorbing the contaminants from the circulating hot air.

The incident was discovered in November 2008, when a pork fat sample, taken as part of a routine monitoring programme taken under Commission Directive 96/23/EC was flagged by the Pesticides Control Service of the Irish Department of Agriculture, Fisheries and Food (DAFF) as showing positive results for Marker PCBs. Following on from this discovery, feed and feed component samples from the implicated farm were analysed for Marker PCBs, PCDD/F and dioxin like PCBs.

The discovery of Marker PCBs in the breadcrumb component of the feed triggered an investigation into the feed mill that had produced the feed. Samples were taken from all farms known to have received feed from the feed mill. As a precautionary measure, all farms known to have received feed from this mill were put under restriction by the DAFF. Archive feed samples from the feed mill were also tested for PCBs. This analysis indicated that the contamination incident began 25th August and ended on 26th September, which correlates with an on-farm contamination window from 1st September through to approximately the 10th of October (see Figure 1).

This window was further supported by the presence of certain congeners in the pork fat which are usually metabolised quickly and information received from the feed mill operator regarding the use of the oil.

Figure 1 Results of Analysis of Archive Feed Samples (13Aug – 3 Dec)



Shortly after DAFF released a press statement on the investigation of a feed incident, the Irish authorities received information from the Dutch authorities on an ongoing investigation into elevated Dioxin concentrations in a pork loin sample exported from the Netherlands to France. Ireland had been identified as one of six possible suppliers of this pork product and news of the feed incident in Ireland strongly supported the assumption that the contaminated pork product came from Ireland. Follow up analysis in the Netherlands confirmed that the pork had come from Ireland. Information was also received that a Belgian meat processing plant had started to detect elevated dioxin levels from September 2008 onwards, which further supported the identified time frame of contamination.

As at least 10 pig farms were implicated in the feed incident, representing 8% of total pig production in Ireland, and products from a wider range of farms were supplied to major processing plants, it was impossible to trace back final consumer products to the individual farms. As a consequence all pork products manufactured from pigs slaughtered in Ireland between 1st Sep and 6th Dec were withdrawn and a consumer recall was initiated. Cattle farms were less implicated, with only 0.02% of the total beef production affected and implicated products were traced and withdrawn from trade.

Final confirmation and full extent of the scale of contamination became apparent when full congener profile analysis for the first lot of pork fat samples became available on Dec 6th. These indicated a total TEQ ranging from 80-200 pg/g fat in the pork fat samples. Whereas PCBs were the dominant contaminants found (see Figure 2), the furans were of most toxicological concern. Table 1 provides results for a typical pork fat sample expressed on congener level basis detected and converted into TEQs.

Figure 2 Congener profile of a typical pork fat sample taken in December 2008

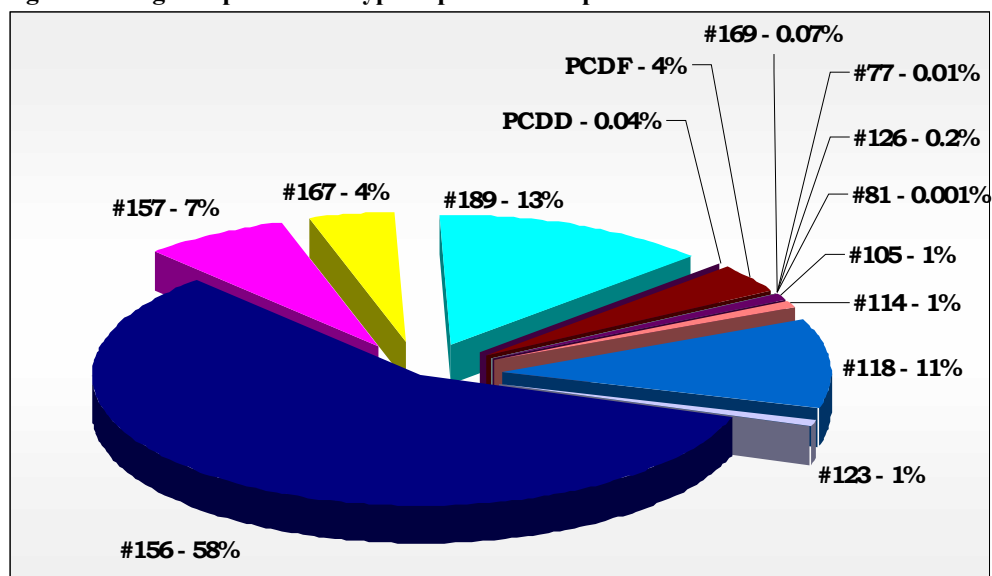


Table 1 Typical congener profile of a pork sample analysed during the crisis, expressed in congeners in ng/kg and as TEQs ng/kg fat

PCDD/F Congener	ng/kg	TEF (1998)	TEQ	PCB Congener	ng/kg	TEF (1998)	TEQ
2,3,7,8-TCDD	0.10	1.00000	0.10	PCB77	1.38	0.00010	0.00
1,2,3,7,8-PeCDD	0.28	1.00000	0.28	PCB81	0.14	0.00010	0.00
1,2,3,4,7,8-HxCDD	1.43	0.10000	0.14	PCB126	2.02	0.10000	0.20
1,2,3,6,7,8-HxCDD	0.38	0.10000	0.04	PCB169	8.88	0.01000	0.09
1,2,3,7,8,9-HxCDD	0.09	0.10000	0.01	PCB105	90	0.00010	0.01
1,2,3,4,6,7,8-HpCDD	1.33	0.01000	0.01	PCB114	130	0.00050	0.07
OCDD	1.30	0.00010	0.00	PCB118	1470	0.00010	0.15
2,3,7,8-TCDF	1.38	0.10000	0.14	PCB123	110	0.00010	0.01
1,2,3,7,8-PeCDF	0.59	0.05000	0.03	PCB156	7640	0.00050	3.82
2,3,4,7,8-PeCDF	292.64	0.50000	146.32	PCB157	960	0.00050	0.48
1,2,3,4,7,8-HxCDF	105.96	0.10000	10.60	PCB167	560	0.00001	0.01
1,2,3,6,7,8-HxCDF	35.79	0.10000	3.58	PCB189	1780	0.00010	0.18
1,2,3,7,8,9-HxCDF	0.31	0.10000	0.03				
2,3,4,6,7,8-HxCDF	25.71	0.10000	2.57				
1,2,3,4,6,7,8-HpCDF	17.87	0.01000	0.18				
1,2,3,4,7,8,9-HpCDF	2.02	0.01000	0.02				
OCDF	0.24	0.00010	0.00				
WHO TEQ (ng/kg fat)			164.05	WHO TEQ (ng/kg fat)			5.01
Total TEQ (ng/kg fat) UB 169.05							

The dominant congeners of toxicological concern found in the pork and beef samples was 2,3,4,7,8-PeCDF followed by the Hexa-Furans. Results for Beef samples (Figure 3) and Feed samples (Figure 4) are in good agreement. Samples analysed in France and in the Netherlands also showed the same congener pattern which confirmed that the contamination could be pinpointed to one single source, namely the feed mill in Ireland.

Figure 3 PCDD/F Congener pattern in pork and beef fat samples (ng/kg fat)

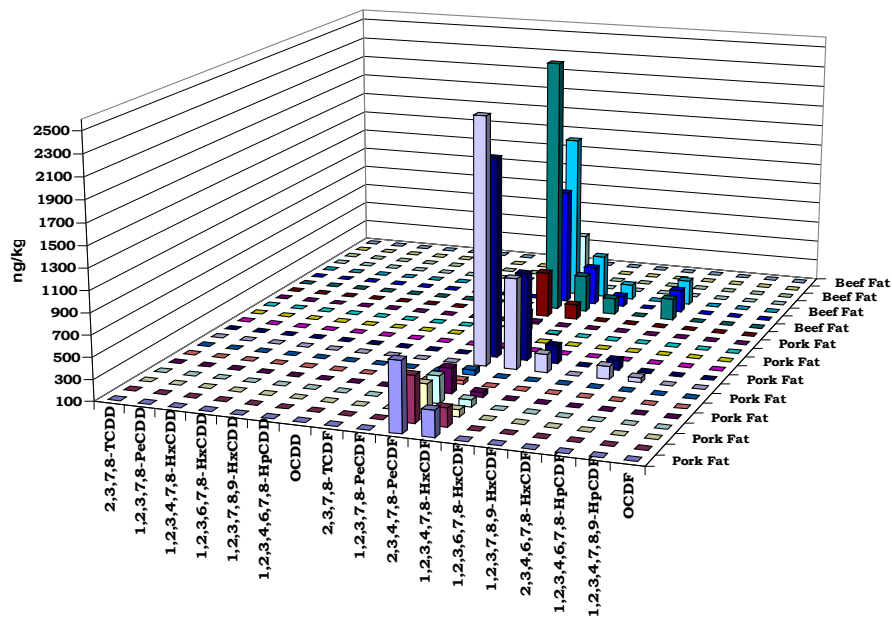
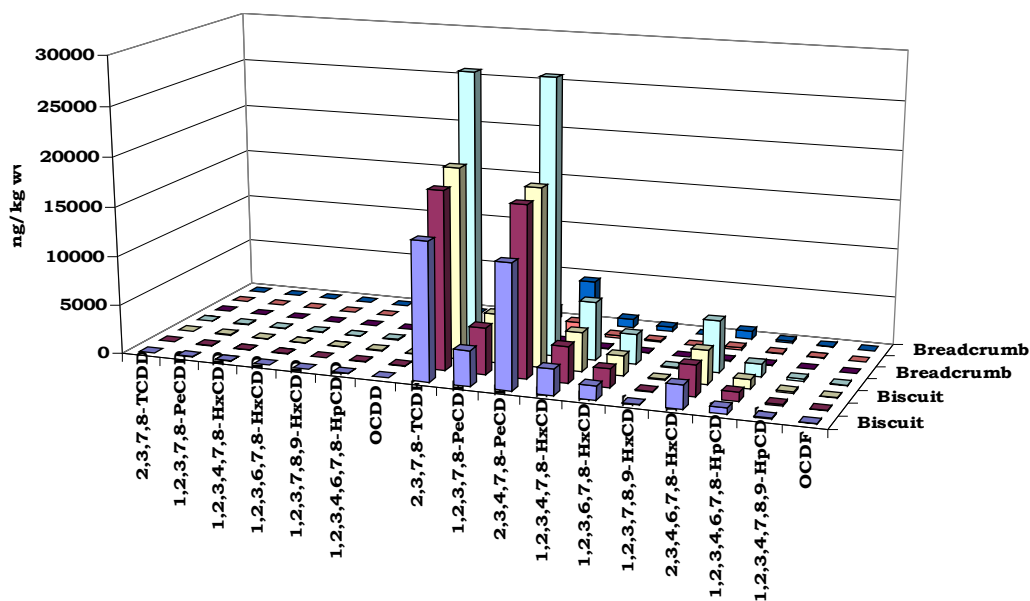


Figure 4 PCDD/F Congener pattern in breadcrumb and biscuit samples (ng/kg ww)



The congener profile of the samples indicated that likely source of contamination was a highly chlorinated transformer oil, such as Aroclor 1260. This suspicion was later confirmed when oil samples taken by the Irish Environmental Protection Agency showed a high correlation with the fingerprint of Aroclor 1260 or equivalent products, commonly used in transformer dielectric fluids¹.

Conclusion

From all the information available it was possible to determine that consumers were exposed to contaminated pork and beef products for a period of approximately 3 months, starting September 1st and ending December 5th when the recall of pork produce was issued. All pork products manufactured from pigs slaughtered in Ireland between 1st Sep and 6th December were withdrawn and a consumer recall was initiated. Cattle farms were less implicated, with only 0.02% of the total beef production affected and implicated products were traced and withdrawn from trade.

The initial calculated additional body burden to Irish consumers from the incident was estimated at 10% from pork products and 0.035% from beef products. EFSA² considered this increase in body burden of no concern for this single event. However, the actual span of contamination levels was found to be wider after the initial risk assessments were performed. The actual impact on body burden should become clearer when results from a breast milk study, which is currently being planned, become available and can be compared to data available from 2004.

References

- 1 Environmental Protection Agency (2009) DRAFT Report on the assessment of PCB and dioxin/furan analytical data of oil/feed/animal fats.
- 2 European Food Safety Authority (2008) Statement of EFSA on the risks for public health due to the presence of dioxins in pork from Ireland. http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902210863.htm