DIOXINS AND DIOXIN-LIKE COMPOUNDS IN THE UK: FROM EMERGING RISK TO REGULATION

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Introduction

Within Member States of the European Union, regulation of contaminants in food is, on the face of it, carried out at the European level through processes driven by the European Commission. Nevertheless, individual Member States can play a significant role both in the shaping of the regulations and in deciding the manner in which they will be implemented at a national level. In the United Kingdom, a strong emphasis is placed on the generation and use of scientific evidence to determine policy on dioxins and dioxin-like compounds in food. Here, I provide an outline of activity at the European level and describe how the United Kingdom has contributed and will continue to contribute to the regulatory process.

Discussion

History

In 1991, almost ten years before the infamous Belgian feed incident, UK regulators faced the challenge of protecting the food chain from highly dioxin-contaminated milk. This was being produced in the area around Bolsover, England, where more than 20 years previously a 'Seveso-like' incident was suspected to have caused widespread contamination of the area. Based on the then provisional tolerable daily intake (PTDI) of 10 pg/kg bodyweight for 2,3,7,8-tetrachlorodibenzodioxin, a Maximum Tolerable Concentration of 17.5 pg/g fat was derived and this was used as the basis for discarding highly contaminated milk from individual farms. Regulators were confident at the time that blended milk from the area, containing dioxin levels of 1.8-3.1 pg/g of fat, did not present a health concern for consumers.[1] It is highly unlikely that the same conclusions would be reached now on the basis of the latest toxicological knowledge. This is just one example of the challenge faced when carrying out enforcement action on the basis of risk assessment alone. Similar difficulties were encountered, but on a much larger scale when, in June 1999, the Belgian feed crisis broke.[2] Not only Belgium was affected but also several neighbouring European countries that received contaminated feed and a much greater number that received food from affected producers. Although there was evidence of actual illness in poultry, the risk to consumers was difficult to assess, making management of the incident complex. Decisions were generally based on exceedance of tolerance levels for the sum of the seven 'marker' PCBs.

Introduction of limits

The Belgian incident highlighted the need for harmonized European limits to simplify decision-making during an incident as well as providing a level playing field for food business operators. The first such limits were introduced in 2001, coming into force in July 2002 through Council Regulation 2375/2001,[3] amending Commission Regulation (EC) No 466/2001, which sets maximum levels for certain contaminants in foodstuffs. The limits were based on a statistical analysis of existing data, recognising that food business operators have limited control over sources of environmental contamination. They applied only to dioxins and furans, insufficient data being available for dioxin-like PCBs. The new regulation also included provisions for review of the limits in the light of further data, with a consideration of introducing further limits for dioxin-like PCBs.

Negotiating process and EU framework

The dioxin limits were introduced through the Comitology process. In this, the European Commission takes the lead but receives expert advice from individual Member States through a series of Expert Committees (or Working Groups) that meet regularly to share and review information. Once draft directives or regulations have been finalised, they would pass to a Standing Committee for an opinion (in effect, a vote on adoption). One such Expert Committee was the Dioxin Working Group, which agreed the first set of dioxins limits and established the timetable for future reviews. In order to encourage a steady influx of fresh data, a series of Recommendations

for further monitoring were agreed by the Dioxin Working Group from 2002 onwards. Unlike Regulations and Directives, Recommendations are not binding but provide guidance to Member States with regard to particular courses of action. Commission Recommendation 2002/201/EC[4] established Action Levels for dioxins in food and feed, levels above which an investigation into contamination sources should be considered. It also provided a general statement on the need to monitor. Commission Recommendation 2004/705/EC was much more prescriptive in terms of the numbers and types of sample that should be tested by each Member State but, nevertheless, remained as guidance.[5] Most recently, Commission Recommendation 2006/794/EC again provided a detailed sample breakdown but this time allowed individual Member States greater scope for flexibility, including the targeting of less widely-consumed foods and foods produced in areas subject to climatic effects such as flooding. In line with the provisions of Regulation 2375/2002, the dioxin limits were revised and extended to cover dioxin-like PCBs in 2006, through Commission Regulation 199/2006 amending Regulation 466/2001, which was subsequently consolidated into Commission Regulation 1881/2006. In parallel, the Action Levels were revised and extended to dioxin-like PCBs through Recommendation 2006/88/EC.[6] Previous dioxin regulations incorporated the 1998 WHO-TEF values and it is anticipated that a further review of limits in 2011 will also include a move to the 2005 values.

Official Controls

Regulation 882/2004 of the European Parliament and of the Council, dated 29 April 2004, outlines the requirements for official controls, i.e. those carried out by the Competent Authority, to ensure the verification of compliance with feed and food law, animal health and animal welfare rules.[7] It does not set out the number or frequency with which official controls should be carried out but instead stipulates that they should be carried out 'regularly, on a risk basis and with appropriate frequency'. Other regulations may be more prescriptive about frequency of testing, depending on circumstances and known risk, but, in the case of dioxins, the only specific example is Commission Regulation 258/2010. [8] This was implemented following the contamination of guar gum from India with pentachlorophenol, which led to a widespread dioxin contamination incident. This stipulates official control of 'at least 5%' of incoming consignments.

UK Consideration of Official Controls for Dioxins

The food law enforcement system in the United Kingdom is complex. Most enforcement activities are carried out by Local and Port Health Authorities and these must cover all aspects of food safety. Dioxin analysis is very costly and there is a low likelihood of detecting a non-compliance in a small set of randomly-selected samples. This is because the limits are based on achievability and, statistically, over 95% of samples in any food category are expected to be compliant. There are two main likely sources of dioxin contamination in food. First, contaminated feed, as has been illustrated repeatedly (citrus pulp from Brazil, Germany 1998; PCB-contaminated oil, Belgium 1999; potato peel, Netherlands 2004; zinc oxide feed additive, Chile 2008; bakery products recycled for feed, Ireland 2008; dioxin-contaminated oil in pig and poultry feed, Germany 2010). The other source is localised pollution, for example through historical industrial activities (chloralkali works, Saltmeadows, Gateshead, UK;[9] organochlorine chemicals, Coalite, UK), or illegal waste disposal (Campania, 2008[10]). Detection of a non-compliance, particularly with a typical sample turnaround time for dioxin analysis of several weeks, may be too late for appropriate action. And, in the absence of an acute risk to health, the consequences to the health of the consumer are likely to be insignificant, although damage to confidence should not be underestimated. In Ireland in 2008, the contamination was discovered several months after the actual incident that caused it, although there was still time to take some action to protect the food chain. Nevertheless, even with contamination at orders of magnitude above the limits, toxicologists concluded that there was no risk to health. Notwithstanding all of this, the Food Standards Agency does provide a limited amount of central funding to Local and Port Health Authorities for dioxin and PCB testing.

Surveys

In 2003, 2005 and 2006, the Food Standards Agency carried out monitoring programmes roughly in line with Commission Recommendations. In addition, and in preference to random official controls, the Food Standards Agency conducted targeted surveys of particular food groups considered to be higher risk. These included farmed and wild fish and shellfish[11], baby foods[12] and infant formulae[13], offal[14] and fish products.[11] All of the

data was provided to the European Food Safety Authority (EFSA) for inclusion in the dioxin database, making the UK one of the largest overall contributors.[15]

Other dioxin research

Together with surveys, the Food Standards Agency directs resource into a greater understanding of contamination sources and pathways. Between 2001 and 2004, a project was undertaken to generate information about the uptake of organic contaminants into animals. Where river sediment is contaminated, there is a potential for flooding to transfer the contamination onto flood plains that are used for animal grazing once the floods have receded. Initial research, completed in 2005, showed that repeat flooding events can lead to raised dioxin levels in food[16] and a five-year project is currently underway to improve understanding. Between 2009 and 2010, following problems identified during the offal survey, a substantial set of paired sheep meat and liver samples were tested for dioxins and the data provided to EFSA to inform an opinion on the risk to health from the consumption of sheep liver. Although outside the scope of this paper, it is of note that the Food Standards Agency has a significant programme of research into the toxicology of dioxins and dioxin-like compounds.

Investigation of Emerging Risks

In 2006, the Dioxin Working Group became the POPs Working Group. This was in acknowledgement of its widening remit, notably to cover brominated flame retardants (BFRs) and perfluorinated compounds, rather than any link with the formally-defined POPs of the Stockholm list. As part of its programme of investigation of emerging risks, the UK had been investigating BFRs since 2002. A chemical plant producing hexabromocyclododecanes had contaminated local waterways, leading to high levels of BFRs in trout and eels[17]. This led on to a first attempt at a total diet study, followed by wider investigations of levels in fish and shellfish and then other foods. Similarly, horizon scanning activities identified perfluorooctane sulphonate (PFOS) as a possible concern and a total diet study for PFOS was initiated in early 2005. This proved to be very timely because, in December 2005, attempts to extinguish the Buncefield oil depot explosion and fire using PFOS-based foam led to widespread contamination of the environment with PFOS.[18] Consumers worried about possible uptake of PFOS into the food chain were reassured that PFOS was already under investigation by the Food Standards Agency. The newly extended POPs Working Group hence provided a forum for discussion of such emerging issues at the European level. In subsequent years, on the basis of discussions in the Working Group and data supplied by Member States, the Commission has sought opinions on perfluorinated compounds and BFRs from EFSA. The UK continues to investigate emerging classes of environmental contaminants, including dioxin-like compounds, for example polychlorinated naphthalenes (PCNs)[19] and mixed halogenated dioxins and biphenyls (PXDD/Fs, PXBs).

Conclusion

At a time when resources are increasingly limited, the benefit of funding and carrying out official controls needs to be set against the risk of not carrying out such testing. It is also reasonable to question whether random testing is the optimum approach to protecting the food chain and, ultimately, the consumer from exposure to dioxins and dioxin-like compounds. Over the past decade, the Food Standards Agency has directed substantial resources and funding towards targeted surveys, supporting research and the investigation of emerging risks. The strong base of scientific evidence that this has generated has placed the UK in a strong position both for negotiating at the European level and in responding to incidents and new concerns when these arise. Being seen to take a proactive approach also gives consumers a greater confidence in the safety of the food chain. In the absence of evidence to the contrary, this risk-based approach towards dioxin-like compounds will remain UK policy.

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