The determination of HBCDDs, a range of bromophenols, tetrabromobisphenol-A and tetrabromobisphenol S in foodstuffs from Ireland

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Introduction

It is generally accepted that the major proportion of human exposure to brominated pollutants, such as brominated flame retardants (BFRs), is likely to be through the diet, as has been shown for other halogenated compounds including chlorinated dioxins and polychlorinated biphenyls [1-2]. However, there is relatively little data published on the levels of BFRs such as bromophenols, hexabromocyclododecanes (HBCDs) and tetrabromobisphenol derivatives [3-4]. A recent European Commission recommendation (2014/118/EU) recognised these compounds as potential food contaminants and requested EU member states to investigate their occurrence in food [5].

Experimental

In this study fifty-three samples (eggs, animal fat, fish tissue, milk and liver samples) from Ireland have been analysed for the presence of a range of BFRs: 4-bromophenol, 2,4-dibromophenol, 2,6-dibromophenol, 2,4,6-tribromophenol, tetrabromobisphenol S (TBBPS), HBCDD (α-, β- and γ-isomers) and tetrabromobisphenol A (TBBPA).

Methods for extraction, purification and analysis, using liquid chromatography tandem mass spectrometry (LC-MS/MS), were developed and validated and will be described fully in the poster.

Results

Residues of 4-bromophenol were detected in all egg samples with concentrations ranging from 0.28 to 0.63 µg/kg of whole weight. Residues of 4-bromophenol and 2,4-dibromophenol were detected in two fish samples at concentrations ranging from 0.47 to 0.98 µg/kg, and TBBPA was detected in one fish sample at 0.01 µg/kg. HBCDD isomers were detected in two egg samples, five fat samples, six fish samples and one liver sample with background levels ranging from 0.01 to 0.54 µg/kg. One porcine fat sample showed elevated levels of HBCDD and was subject to a follow up investigation. TBBPS, 2,4,6-tribromophenol and 2,6-dibromophenol were not detected in any of the food samples investigated.

The results of this preliminary investigation confirm the occurrence of a wider range of BFRs in food than the polybrominated diphenylethers (PBDEs) which have been widely measured over the last decade or so. Although the sample numbers are small, they may provide an initial indication of dietary exposure to these chemicals.

Acknowledgements

The authors would like to thank the Food Safety Authority of Ireland for funding this work.

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