Feed and Food II

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Several decades ago it was recognized that the major route of exposure of humans to dioxins and PCBs was through consumption of food particularly fatty animal foods. In order to limit or control human exposure one had to monitor the amount and types of human food available for general consumption. Subsequently in the last few years there have been a number of health incidents involving these POPs which underline the importance of controlling the levels of these contaminants in animal foods i.e. feeds. Incidents such as the Belgium dioxin crisis, dioxins in citrus feeding stock, contamination of ball clay and mineral supplements, and lipid materials of fish origin have all shown that persistent POPs in feeds are transferred to foods and ultimately to humans who consume such food. As a result the European Union (EU) has promulgated a number of current and future guidelines to limit the levels of the dioxin-like compounds (DLCs) in feeds. The DLCs include the seventeen (17) dioxins and furans with 2,3,7,8-chlorine substitution as well as the four (4) non *ortho* PCBs and eight (8) mono *ortho* PCBs for a total of twenty-nine (29) compounds. The EU guidelines vary depending on maximum or target values, the type of food, and whether the guideline is expressed on a lipid, moisture, or whole weight basis. Typical values are in the range of 1 to 6 ng TEQ dioxin/furan per kg (ppt) with provision at the end of 2004 for inclusion of the contribution to the TEQ from PCBs. A related issue is the tolerable daily intake (TDI) for DLCs for human consumption set by the World Health Organization (WHO). Efforts are in hand to further reduce the current value of 1 to 4 pg TCDD toxic equivalents (TEQ) daily per kg body weight. In the above context, the present Dioxin 2004 session deals with concentrations in food and feed and the relation of food type, country of origin and trends in relation to human intake.

This second session, Feed and Food II, comprises a total of 20 presentations in both oral and poster format. To begin the session and by way of introduction, Hermann of ERGO, Germany will present data on their analyses of hundreds of randomly recently collected fish and fish products for dioxins and PCBs. This information on the most studied component of animal foods shows that a number of fish products are still above current EU guidelines particularly when the TEQ from PCBs is included. Related presentations from fish species in the Baltic Sea in both Sweden and Russian waters attest to the continuing occurrence of relatively high levels of PCBs in much of the fish from those waters. Lower concentrations of TEQ appear to be present in a limited sampling of fish from Beijing, China in a report from that country.

Two presentations target the aquaculture industry- itself the focus of recent concern over PCBs and dioxins in farmed salmon. The first of these shows that 15 fish feeding stuffs used in Spanish turbot aquaculture are below present EU guidelines. The second involves analyses of the edible tail meat from bluefin tuna produced in Australian aquaculture which showed relatively low values for the dioxin TEQ of less than 1 ppt.

Turning to non-fish products, an interesting report from Switzerland, a non EU country, gives

information on the DLC content of more than 50 pork and beef fat samples. Overall cattle fat, particularly beef rather than dairy, was found to have a higher TEQ than pig fat mostly due to higher contribution from PCBs. However all samples were still within the EU proposals for dioxins while the PCB results in beef cattle suggested further research. A similar result was forthcoming from analyses of 29 fluid milks from Austria. Further work is also reported by the CVUA group in Freiburg, Germany on DLCs in butter samples from eight new EU member countries. Most samples are in the low range of background levels of the older EU countries except for two incidents of high PCB levels that needed additional study. In response to findings of low dioxins in cucumbers, a report from Japan could find no effect on dioxin concentration due to the variety of cucumber or cultivation practise. Finally a Finnish group describes the analyses of 18 mixed animal feeds in which the highest values, as expected, originate from fish stock and the lowest from plants.

A group from the National Tsing Hua University in Taiwan elaborates their findings in three papers on the levels, exposure intake, and fast food contribution of DLCs in the Taiwanese diet. In the levels paper, the higher contribution of dioxins than PCBs to the total TEQ is noted for mammalian species rather than fish. Then using food consumption rates for that country for both males and females, a calculation of the daily intake indicates a value of 2 pg/kg body weight in most but not all cases which is less than the WHO value TDI. A large uncertainty in the data set exists not for food concentrations of the DLCs but for food consumption rates. The contribution from fast foods to the TDI is usually less than 10% of the overall total daily intake.

A number of papers give accounts of data interrelations in the food, feed and soil framework. A study of the relationship between DLCs in cows' milk and their feeding stuffs in 197 paired samples from the Campania region of Italy showed a high correlation of DLCs between feed and milk concentration. In addition both sample types could be divided into two congener profiles indicative of the source of original exposure. An account is given by the University of Liege on soil and egg concentrations from 11 sites near an old French incinerator. The data show that the soil levels were mostly high especially for dioxins and furans which were associated with, in most cases, elevated levels in the eggs from free ranging hens. A Flemish group reports a somewhat similar study on the risk due to consumption of eggs and vegetables (but not other animal products) taken in the vicinity of Menen, Belgium where two incinerators have been in use for several decades. Generally the risk was deemed to be acceptable except in the case of high consumption of local vegetables and eggs from free ranging hens.

A final paper is an overview by the US Food and Drug Administration (FDA) of their monitoring of foods for DLCs. In contrast to the European approach, the FDA has not opted to set limits or guidelines in foods and feeds. Instead it carries out monitoring studies, both general and targeted, for dioxins and furans and, soon to be incorporated, PCBs. This is being carried out in order to identify those food items contributing highly to the overall intake. Present estimated daily exposure to dioxins and furans only in the US is a little less than 1 pg/kg body weight. It is believed that human exposure to DLCs then can be reduced by limiting consumption of a particular food item or by changing the contribution from the offending source.