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Towards a risk-based monitoring strategy: trend analysis of dioxins and dioxin-like PCBs in feed materials

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Abstract Since the Belgian dioxin incident in 1999, the EU wants to secure a better protection of human health by limiting the exposure to dioxins and dioxin-like PCBs (DL-PCBs). For this purpose the EU set maximum levels (MLs) according to the principle "strict but feasible", i.e. based on the actual background levels reported by member states. A reduction in the levels of food and feed is aimed to be achieved by eliminating the most contaminated products (95 percentile), and ideally all remaining sources are removed from the feed supply chain. In addition action levels (ALs) were set at about 2/3 of the MLs. Follow-up of samples which exceed the AL, allows an earlier detection of potential incidents and may help to achieve a reduction more quickly. Risk-based monitoring should be part of this strategy and trend analysis on monitoring data could be a suitable method to identify feed commodities with higher dioxin concentrations. The aim of the research was to gain more insight into the actual background dioxin and DL-PCB levels of feed materials in the Netherlands. Another question was whether a decreasing or increasing trend of the average dioxin and DL-PCB concentrations can be seen. Data were collected in the framework of the Dutch National Control Plan animal feed over a time period of eight years (2003 till 2010). Descriptive and statistical analysis was used to examine background concentrations of dioxins and DL-PCBs and to look into trends. All methods used will be explained and discussed in more detail. To identify "at risk" feed materials also the following information was used:

- volume of feed used in the Netherlands
- incidents found in the past
- percentage of feed materials used in animal diets

Results will be presented in the form of figures (e.g. normal distribution graphs) and tables (e.g. descriptive analysis). Factors which are of influence on the results are evaluated and the interpretation of the trend analysis will be discussed. In most feed materials, background levels were below or around the limit of quantification and the fraction of samples exceeding MLs for either dioxins or the sum of dioxins and DL-PCBs was below 1%, except for fish meal, clay minerals and vegetable oils. Relatively high levels were also found in fish oil but the MLs were not exceeded. Non-compliance with ALs was 2-3 times higher than for MLs and just above 1% in animal fat, pre-mixtures and feed materials of plant origin. In none of the feed materials a significant trend can be seen, which is primarily linked to the fact that most levels are close to the limit of quantification (LOQ) of the GC-HRMS method. A further reduction of the LOQs might be required to improve this situation. This is also important, as for certain animal species (e.g. laying hens), current MLs and ALs cannot guarantee that

levels in the end product do not exceed the MLs. The background levels observed were also compared to the EFSA dataset, which includes data of most European member states. In general, lower dioxin and DL-PCB levels were present in the samples collected in the Netherlands, especially when focussing on the upper end of the distribution (e.g. 95th percentile) which was in principle used to set the MLs.

Keywords Dioxins;DL-PCBs;trends;background concentrations