1. THE MESSAGE

Depletion of PCDD/Fs and polychlorinated biphenyls (PCBs) is ubiquitous environmental contaminants. They are very persistent to chemical degradation, and accumulate in the food chain. Eggs, in particular, contain an high fat percentage, and may accumulate persistent organic pollutants such as dioxin and PCBs. Following an eggs environmental contamination discovery, 12 contaminated hens were transferred from their free-range farming system into a lab controlled environment to monitor the eggs production and evaluate dioxin, dioxin-like PCBs (DL PCBs), and organic mercury content. The eggs were collected every day for about nine weeks (60 days). At the whole eggs from each week were homogenised, lyophilised and the fat fraction was extracted and analysed according to EPA 1613/94 rev B method. The dioxins, and sum of dioxin and DL PCBs concentrations were below the fixed European limits beginning from the third week. Figure 1 shows the depletion trend and the same depletion trend for dioxin and DL PCB concentration was observed: after a steady level for the first two weeks, there was a depletion more constant for DL PCBs than dioxins until the sixth week, where PCDD/Fs and DL PCBs showed similar concentration. Then, while a continuous depletion was seen for PCDD/Fs concentration, DL PCBs levels decreased very slowly, and reached about 2 pg TEQ/g fat. The dioxins and furans depletion seems to be uniform for all toxic congeners because the concentration ratio is almost the same throughout the trial. On the other side the depletion of DL PCBs seem to vary during the studied weeks.

Key words: Dioxins – PCBs – Eggs – Depletion

2. INTRODUCTION

PCDD/Fs and PCBs are ubiquitous environmental contaminants. The contamination of food products with these compounds is a well studied issue because food is generally considered as the major source of dioxin intake for humans. Food products from animal origin like milk, fish and dairy products are the main contributors to PCDD/Fs and PCBs intake. The contamination of animal feed, pastures and organisms at lower trophic levels leads to bioaccumulation of dioxins in animal fats. In particular eggs consist of almost 10% of fat so environmental contaminants are likely to accumulate in yolk fat. The estimated contribution of eggs to the total dioxin intake from food generally ranges from 2 to 5% in European Country. Most of them derived from battery farming eggs. Recent data on TEQ levels in eggs range from 0.6 to 4.1 pg WHO-TEQ/g fat for dioxins and DL PCBs in different European Country. In contrast to these levels, it is known that eggs from free-range and organic farms contain higher levels of dioxins. The dioxins content in eggs following the oral intake by the hen and the accumulation in fat fraction. The possible sources of high levels of environmental compounds found in home-produced eggs could be numerous, i.e. the characteristics of free-range farming system, like non-commercial feedstuffs (kitchen waste), soil contact etc.

Aim of this work was to monitor the eggs production of hens (strain derived from French labelle) and to evaluate PCDD/Fs, DL PCBs, NDL PCBs depletion trend in eggs produced after an extended exposure to environmental contamination derived from unknown cause.

3. MATERIALS AND METHODS

4. RESULTS

The initial concentrations of PCDD/Fs and sum of PCDD/Fs and DL PCBs in eggs were 14 pg TEQ/g fat and 20 pg TEq/g fat respectively. The concentrations were lower than the fixed European limits (i.e. 3 pgTEQ/g fat for dioxins and 6 pgTEQ/g fat for sum of PCDD/Fs and DL PCBs), starting from the third week of trial (Table 1). The same depletion trend for dioxins and DL PCBs concentrations was observed (Table 1): after a steady level with a little peak around the second week, there was a small depletion for lower for dioxin concentrations than DL PCBs, until the sixth week, when PCDD/Fs and DL PCBs showed similar values. Then, while a continuous depletion trend was observed for PCDD/Fs, DL PCBs levels decreased very slowly, and reached about 2 pg TEQ/g fat (Figure 1). Dioxins and furans depletion seems to be uniform for all toxic congeners, as the concentration ratio was almost the same during all the nine weeks of trial (Figure 2). DL PCBs depletion apparently had the same trend but, after six weeks, achieved a plateau, and, from that time, depletion was very slow. The depletion trend was constant for all toxic congeners during the experiment (Figure 3-6) and the ratio between non-onto and onto PCBs remained almost the same all along.

5. CONCLUSIONS

The concentration of PCDD/Fs and sum of PCDD/Fs and DL PCBs were lower than the fixed European limits (i.e. 3 pgTEQ/g fat for dioxins and 6 pgTEQ/g fat for sum of PCDD/Fs and DL PCBs), starting from the third week of trial. The depletion trend of dioxins has been lower than PCBs during the first weeks, but, after the sixth week, the trend changed and dioxin decreased faster than PCBs. The depletion trend of toxic congeners remained almost the same both for dioxins and PCBs during the nine weeks of trial. This is a preliminary and it’s necessary a further and exhaustive statistical study to confirm such data.

6. REFERENCES
