

DIOXINS MONITORING PROGRAM IN EGYPT DURING OCTOBER 1999 TO DECEMBER 2000

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Abstract

A programe for inspection and monitoring dioxins in food and feed from animal origin had been started in Egypt in 1999. Samples were collected from food and feed imported shipments as well as locally produced similar items. 882 collected samples were analyzed for dioxins. The results demonstrate that the concentration of dioxins in imported, cheese, corned beef, fish and luncheon meat found in the current survey were below the LOD. Imported butter samples showed contamination range between (0.2–0.27 pg I-TEQ/g). HpCDF (Hepta polychlorinated dibenzo furan) was the dominating congener. Only one imported powder milk and one duck liver samples (7.42 and 34.05 pg I-TEQ/g respectively) violated the maximum level proposed by the Egyptian organization for standardization. The HxCDD (Hexa polychlorinated dibenzo dioxin) and HxCDF (Hexa polychlorinated dibenzo furan) were the dominating congeners in milk powder samples. The concentration of dioxins in locally produced cheese butter and fish were less than LOD. The results of all feed samples demonstrate a low background contamination with PCDDs (poly chlorinated dibenz dioxins) and PCDFs (poly chlorinated dibenzo furans).

Introduction

During last year 1999/2000 and within the continuous monitoring program for contaminants taken by our laboratory, of several types of food and feed were analyzed for determination of PCDDs / PCDFs. Food and feed samples were collected from Egyptian ports by official veterinary quarantine officers as well as from local markets by laboratory inspectors.

We would like to present preliminary results from the food and feed study and discuss future monitoring studies that may be undertaken by the Ministry of Agriculture.

Sampling program for food and feed has been developed by veterinary quarantine officers-Ministry of Agriculture in Egypt involving random sampling at arrival in most of Egyptian ports. The program aims the analysis of samples from animal origin that include butter liver, meet, bone, milk, egg or fish and their products. This study started in October 1999 after Belgium crisis. Samples from imported shipments were monitored before relaese into the country for consumption in addition to food samples (butter, cheese, milk and fish) collected from local markets to detect dioxin contamination that might occur.

Materials and Methods

The sampling procedure was similar to that followed for pesticides and PCBs monitoring purpose applied in Egypt for food and feed products imported and internally commercialized. Basically 382 samples of 2Kg each were taken and submitted for dioxin analysis (1). The samples were classified into three groups:

- Imported food samples including milk, casein, butter, cheese, corned beef, liver, and fish.
- Imported feed samples including concentrate for broilers, fish, meat and bone meal.
- Local food samples including samples of butter, cheese, milk and fish.

In the first step the lipids were extracted from samples (Liquid extraction for milk samples). Separation of lipids using potassium silicate and reduction of PCDDs and PCDFs on active carbon followed by chromatographic clean up steps (silica gel and alumina) were based on the method described in reference (2).

A mixture containing all 2,3,7,8- chloro- substituted PCDDs and PCDFs was used as reference for quantification. The internal standard was a mixture containing all 2,3,7,8- chloro-substituted PCDDs and 13 C12 - PCDFs (Terrachem, Inc)

For each run the samples were prepared including a method blank and quality control samples, GC-MS separation was accomplished using HP 5890 plus series II with DB5 MS column (60 m, 0.25 mm id, 0.1 μ m film thickness) The oven temp. Program was 190 °C (held for 1 min. increased at 15 oC/min. to 220 oC and increase at 3 oC / min to 270 oC then held for 3 min.). Helium at a flow rate 0.8 ml/min was used as a carrier gas. Injector temperature was 225 oC; 1 μ l of the sample was injected using splitless mode. The limits of determination is mentioned in table (1)

Results and Discussion

Worldwide consideration towards contamination of food and feed with dioxins has grown up during the last years and especially since the crises in Belgium has been announced.

Dioxins are known to be a group of hazardous contaminants to public health due to adverse effects on humans.

Table (2) shows the summary of the results obtained from the analysis of 382 samples collected from different Egyptian ports and local markets. It has been shown that the continuous monitoring of the PCDDs and PCDFs content of food and feed coming from other countries for local consumption is an indispensable process.

The results provide simultaneous determination of PCDDs and PCDFs in imported food (butter, milk powder, cheese, corned beef, luncheon meat, liver and fish), feed (concentrate for broilers, concentrate for layers, fish meal and meat and bone meal) and locally produced food (butter, milk cheese and fish). The contamination levels were calculated as 1-TEQ (Toxic equivalent) values by multiplying with

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corresponding WHO-TEF (Toxic Equivalency factor) for each congener. The concentration of dioxins in imported, cheese, corned beef, fish and luncheon meat found in the current survey were less than LOD table (1), butter samples showed contamination range between (0.2–0.27 pg I-TEQ/g). HpCDF was the dominating congener in those samples. All congeners were detected in duck liver sample (34.05 pg I-TEQ/g), which violated the maximum level proposed in the Egyptian Organization for Standardization (1 pg I-TEQ/g). The concentration of dioxins in local cheese butter and fish were less than LOD table (1).

Except for one sample the results of milk powder analysis demonstrate a low background contamination with sum of PCDDs and PCDFs. Milk powder and casein samples results of analysis ranged between 0.011- 7.42 pg I-TEQ/g and 0.056 – 1.46 pg I-TEQ/g respectively. In general the results of the milk powder and casein samples demonstrate that the normal background contamination of imported milk is low except in only one milk powder sample (7.42 pg I-TEQ/g) violated the maximum level established by the Egyptian Organization for Standardization (5 pg I-TEQ/g). The HxCDD and HxCDF were the dominating congeners analyzed in milk powder samples.

On the other hand, local milk samples results ranged between (0.001 – 0.005 pg I-TEQ/g) which are far below the maximum level of Egyptian Organization for Standardization (5 pg I-TEQ/g) and also much lower than the concentrations detected in the imported milk samples.

In general, dioxin contamination in milk powder samples is less than the French and German levels (3, 4) or some particular sites in USA (5). So far, most of the samples analyzed presented a dioxin content below the limit of 5 pg I-TEQ/g fat established for its commercialization in the previous European countries and also below the limit of 3 pg WHO-TEQ/g proposed in EC Regulation (6).

The fishmeal and concentrate for broilers presented the highest I-TEQ values for feed samples. The PCDDs /PCDFs ranged between (0.006 - 0.757) and (0.001- 0.3) pg I-TEQ/g respectively, the values obtained for meat and bone meal and concentrate for layers samples, the PCDDs /PCDFs ranged between (0.003 - 0.153) and (0.003 - 0.008) pg I-TEQ/g respectively. The OCDD was the dominating congener in all samples.

However, this work through the light that international maximum limits for dioxins in food and feedstuffs should be established as soon as possible. Also consideration should be given in this matter to the situation of developing agricultural countries where such contamination is minimized or even absent in the locally produced food and feed.

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Table (1): The limit of determination of PCDD / PCDF method and its approximate practical limits of quantification (LOQ)
 Are equivalent to limit of determination in animal origin samples (pg I-TEQ /g)

Compound	LOQ	I-TEQ
2.3.7.8-TCDD	1.0	1.0
1.2.3.7.8-PeCDD	1.0	0.5
1.2.3.4.7.8-HxCDD	1.0	0.1
1.2.3.6.7.8- HxCDD	1.0	0.1
1.2.3.7.8.9- HxCDD	1.0	0.1
1.2.3.4.6.7.8-HpCDD	2.0	0.02
1.2.3.4.6.7.8.9-OCDD	5.0	0.005
2.3.7.8-TCDF	1.0	0.1
1.2.3.7.8-PeCDF	1.0	0.05
2.3.4.7.8-PeCDF	1.0	0.5
1.2.3.4.7.8-HxCDF	1.0	0.1
2.3.4.6.7.8-HxCDF	1.0	0.1
2.3.4.6.7.8-HxCDF	1.0	0.1
1.2.3.7.8.9-HxCDF	1.0	0.1
1.2.3.4.6.7.8-HpCDF	2.0	0.02
1.2.3.4.7.8.9-HpCDF	2.0	0.02
1.2.3.4.6.7.8.9-OCDF	1.0	0.05

Table (2): Summary of results of dioxins monitoring program in Egypt during October 1999 to December 2000

Imported Food Product	Total No. of samples	Cont..	Uncont.	Violation	Range pg I-TEQ/g
Butter	17	2	15	0	0.2 - 0.27
Cheese	30	0	30	0	< LOD
Corned beef	3	0	3	0	< LOD
Fish	17	0	17	0	< LOD
Luncheon meat	3	0	3	0	< LOD
Milk powder	55	7	48	1	0.011-7.42
Casein	4	3	1	0	0.056 - 1.46
Duck liver	1	1	0	1	34.05
Total	130	13	117	2	
Imported Feed Product					
Conc. for broilers	69	11	58	0	0.001-0.3
Conc. for layers	25	5	20	0	0.003-0.08
Fish meal	90	16	74	0	0.006-0.757
Meat and bone meal	38	15	23	0	0.003-0.153
Total	222	47	175	0	
Local Food Product					
Cheese	5	0	5	0	< LOD
Milk	10	2	8	0	0.001 - 0.005
Butter	5	0	5	0	< LOD
Fish	10	0	10	0	< LOD
Total	30	2	28	0	