PCDD/F DETERMINATION IN MILK AND MILK PRODUCTS IN RIO DE JANEIRO, BRAZIL

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Introduction

After several contamination problems in Europe, in 1997 and 1999, and also after the success of a monitoring program for animal feed in Brazil, the scientific comunity and the Brazilian government have pointed to the need of a wider PCDD/F monitoring program for food. The aim of this program, that already includes other contaminants such as pesticides and steroids, would be to control the quality of dairy products and also to register possible contaminations and levels detected, so proper legislation and inventories could be stablished [1].

To obtain preliminary Brazilian levels and patterns for PCDD/F in food, 15 samples of milk and milk products were taken at supermarkets in Rio de Janeiro. Samples were selected according to a local research in which the more used trade marks were chosen.

Materials and Methods

All samples were analysed according to the standard isotope dilution technique. Milk and yogurt samples were freeze dried and extracted using toluene/ethanol mixture. The same extraction mixture was used for cheese samples. Butter samples were weighted and then all the extracts followed same clean up procedures. The final extracts were analysed by high resolution GC/MS using a Micromass Ultima at 10,000 resolution.

Results and Discussion

Fat content for all samples are shown at table 1 and were considered compatible to the expected values. PCDD/F amount are also presented.

Table 1. Fat content and PCDD/F levels for milk and milk products in Rio de Janeiro.

Samples	PCDD/F i-TEQ (pg/g FAT)	% FAT
Butter	0.01 – 0.30	———
Cheese	0.40 – 1.30	4.75 – 18.88
Yogurt	0.32 – 2.80	0.17 – 3.30
Milk	0.04 – 0.13	1.27 – 1.54

The following pictures show some of the samples analysed and the distribution of dioxin and furan congeners. It can be noticed that butter samples showed different PCDD/F distribution. A more

detailed work for the evaluation of process type and raw material sampling regions was not performed. All other samples studied during this work showed similar patterns.

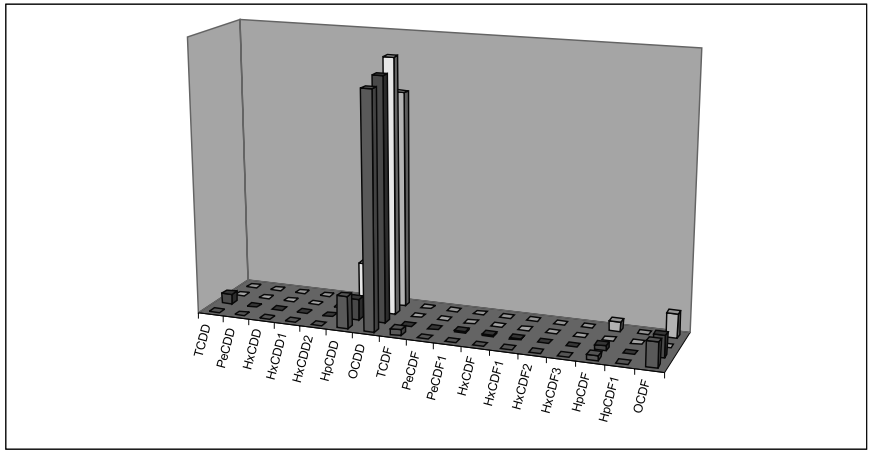

Figure 1. Congener distribution for PCDD/F detected in yogurt samples.

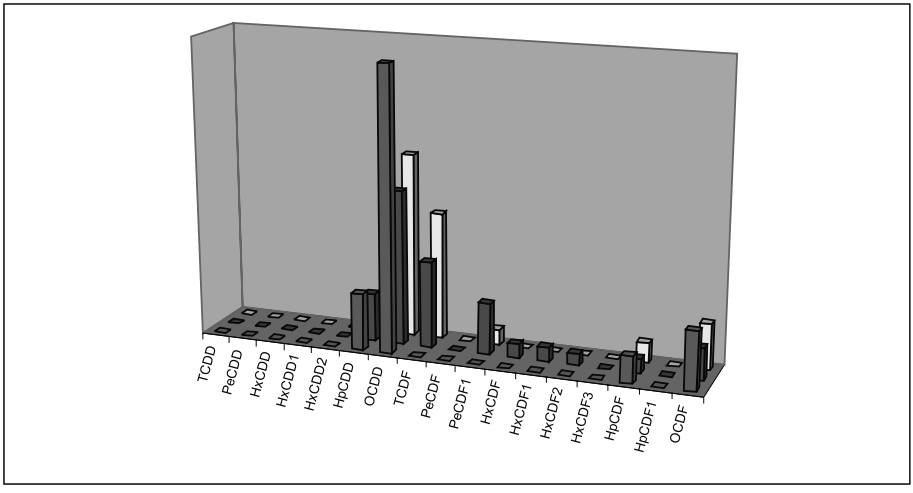

Figure 2. Congener distribution for PCDD/F detected in butter samples.

Figure 3 shows the similar pattern found for the different cheese samples studied. Despite the wide range detected for PCDD/F levels, it can be expected that the contamination source is the same. Again, a more detailed work is necessary to complement these preliminary data.

Table 2 shows similar works where PCDD/F levels for milk and milk products in different parts of the world were detected.

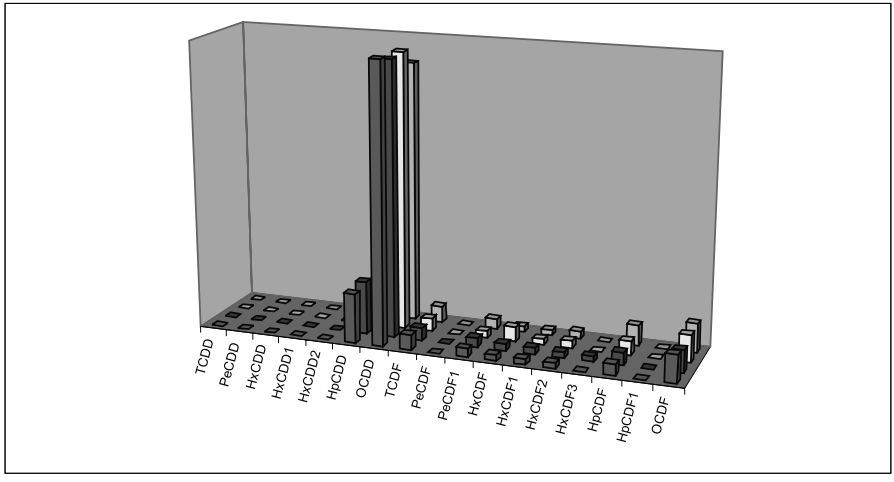

Figure 3. Congener distribution for PCDD/F detected in cheese samples.

Table 2. PCDD/F levels for milk and milk products in different regions.

Sample	Region	PCDD/F i-TEQ (pg/g FAT)
Butter	Europe	0.20 – 4.80
	Russia	0.28 – 1.34
	Mediteranean	0.50 – 0.91
	Americas	0.27 – 0.54
	Oceania	0.01 – 1.01
	Africa	0.18
General (milk and milk products)[3]	Germany	0.01 – 2.67
Milk	Taiwan	0.33 – 1.83
General (milk and milk products)[4]	Belgium	0.34 – 0.80

As expected for the different cheese types, it was found a wide range for fat content in these matrices. What is interesting to notice is that the less fatty chese was the one where higher dioxin content was detected. These results reflect the real need for the raw material control, not excluding each individual industrial process. It is important to mention that, despite the fact that all samples were collected in the same region, they were not necessarily manufactured in the same state.

Comparing the results found at this work and the ones reported by national scientists around the world, it can be concluded that the levels in Brazil are not higher than other parts of the world. They are, however, higher than the ones previously reported for other Brazilian regions[2]. That reinforces the need for a more detailed work, where several items could be controlled, such as type of process, raw material monitoring, sampling and production areas, etc. Also, it was very difficult to include in this

paper data from other countries under development, showing the importance of more studies related to POPs monitoring in those areas.

Therefore, the implementation of a wider monitoring program for food, replacing the ones already controlled by the Ministry of Health and also the ones controlled by the Ministry of Agriculture is of extreme importance. This would contribute not only for a national food inventory for PCDD/F content but also for a more complete control of different types of consumables and industrial processes, as a complement of the succesful dioxin monitoring program for animal feed.

Conclusions

This preliminary study showed that PCDD/F levels and fat content found for milk and milk products analysed in Rio de Janeiro, Brazil, were similar to those reported in different areas of the world. Cheese samples, however, showed high PCDD/F levels.

It has also pointed to the need of a more complete monitoring program for milk and milk products, adding the PCDD/F determination to the already existing programs. Therefore, a random control of food in general for dioxin and furan contamination is extremelly necessary in Brazil, considering more productive areas and their main markets. This would certainly help national authorities to extend sucessfull monitoring programs for PCDD/F contamination not only for animal feed, but also for food in general.

References

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