

### LIME AS SOURCE FOR PCDD/F-CONTAMINATION OF BRAZILIAN CITRUS PULP PELLETS (CPPs)

Rainer Malisch<sup>1)</sup>, Bernhard Berger<sup>2)</sup> and Frans Verstraete<sup>3)</sup>

- <sup>1)</sup> Chemische Landesuntersuchungsanstalt Freiburg, Bissierstr. 5, D-79114 Freiburg, Germany
- <sup>2)</sup> European Commission, Directorate-General XXIV (Consumer Policy and Consumer Health Protection), Food and Veterinary Office, Trident House, Rock Hill, Blackrock, Co. Dublin, Ireland
- <sup>3)</sup> European Commission, Directorate-General VI (Agriculture), Public, animal and plant health, Rue de la Loi 200, B-1049 Bruxelles, Belgium

#### Introduction

In the official food control of the German state of Baden-Württemberg (south-western Germany), a new source for PCDD/F contamination of milk and meat samples was detected in 1998: the use of contaminated citrus pulp pellets (CPP) from Brazil as ingredient for feedingstuff for cattle [1]. CPP is a by-product from the orange juice production.

It turned out that an important market was concerned: CPP is said to be produced at about 1.5 million tons/year worth about 100 to 150 million US-\$. The world market is dominated by Brazil: About 60 % of the EU import comes from there. In the European Community, about 92,000 t of CPP was blocked after detection of the dioxin contamination (up to 32,000 pg I-TEQ/kg) and had to be discarded or destroyed. 12 member states were affected.

The Standing Committee Animal Nutrition has taken an urgent measure to prevent further import of contaminated CPPs. A provisional maximum level for dioxin in CPPs has been set (500 pg I-TEQ/kg, including upper bound detection limits) [2]. The Brazilian authorities were asked to explain the source of the contamination and to establish a control programme to prevent any further dioxin contamination. After implementing these measures, levels of dioxins found in milk and meat fell back to the previous level.

In January 1999, a mission took place to evaluate the control system and to collect information on the progress of the Brazilian competent authorities regarding the investigation on the source of the contamination.

### Results and discussion

The reason for the contamination of the CPP was unknown for a long time. The particular PCDD/F pattern did not match the classical contamination patterns. The production process for CPP restricted the cause of contamination to three possibilities:

1. pesticides in the orange peel,
2. fuel oil containing perchloroethylene as additive,
3. ingredients such as lime.

Research work on peel containing chlorinated pesticides presented by the Brazilian industry and authorities showed that no PCDD/F could be generated during the drying process with detection limits far below the range of the highly contaminated CPP.

As first explanation, it was found that the addition of perchloroethylene to fuel oil which is burnt for drying of the pulp could have caused the dioxin contamination. The particular company involved stopped the use of this additive since the discovery as possible source of the dioxin contamination. However, later investigations showed that this case could not have caused the whole extent of the contamination. Anyhow, as a result Brazil decided that no fuel containing a perchloroethylene-based additive should be used for drying food for animal and/or human consumption.

In July 1998, the main source was detected: the use of lime [3]. Lime is added to wet peels, seeds and pulps of oranges in order to facilitate the drying process and to raise the pH from between 2 and 3 up to between 6 and 7. Lime constitutes about 2 % of the dried CPP. The lime was very high contaminated: up to 2.5 million pg I-TEQ/kg. The dioxin pattern of the lime and of the contaminated CPP was very similar.

There are three different groups of lime:

1. quicklime (CaO),
2. hydrated lime (Ca(OH)<sub>2</sub>) and
3. lime milk (Ca(OH)<sub>2</sub> saturated in water, a by-product of an industrial process).

The total production of lime in Brazil is about 5,750,000 tons a year (figures 1997). The lime manufacturers can be classified into three classes:

1. the integrated manufacturers, which mine the limestone and produce the lime,
2. the non-integrated manufacturer, which acquires the limestone and produces the lime,
3. the converters, which use lime and/or chemical products as raw material to produce hydrated lime.

In the past, the CPP producing industry purchased quicklime or hydrated lime either from suppliers of mined „virgin“ lime or from lime converters, who had different sources for their ingredients. Analytical results comparing the PCDD/F pattern demonstrated that the contaminations of CPP originated from lime coming from a specific converter. This lime converter purchased, at that time, one of the main ingredients, lime milk, from a specific lime milk supplier who generated the lime milk as a by-product from a production process.

The fingerprint of the lime-milk samples taken at the site of that supplier is closely related to the fingerprint of CPP, but some clarification is still needed from the Brazilian authorities regarding the source of 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD which were found in the CPP and the samples of the lime converter, but not in the samples from the lime milk supplier.

As a result, it was recommended to make sure that only „virgin“ lime can be used in the production of citrus pulp pellets and to control this provision.

Brazil adapted the EU tolerance for dioxins in CPP [4] and established a comprehensive control programme. All CPP and lime producers must be registered by the Ministry of Agriculture and Food Supply (MAA). The lime producers must, in order to be registered by the Ministry, submit a descriptive report of the production process, identifying the fuel used in the calcination process, which must not constitute a risk of contamination, as well as a quality monitoring programme. The lime used in processing the CPPs and other products intended for animal feed must be registered as well and must meet the specific maximum level for PCDD/Fs which is the same as for CPP: 500 pg I-TEQ/kg [4]. A specific quality monitoring programme for CPP and lime has been drawn up by the MAA. Lime and CPP will be sampled in all steps: production, storage and transportation. Representative samples will be prepared and stored for a period of twelve months. Representative subsamples will be sent to a laboratory for analyses. The inspection companies and the laboratories are obliged to submit to the MAA a monthly report of their activities under the programme.

### References

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2. Commission Directive 98/60/EC of 24 July 1998 amending Council Directive 74/63/EEC on the fixing of maximum permitted levels for undesirable substances and products in feedingstuffs, *Official Journal of the European Communities* L 209/50
3. Louis Dreyfus Citrus, press release 06/25/98 „Cause behind Dioxin in Brazilian CPP identified“, published in the internet (<http://www.idcitrus.com/us/news/98003.html>)
4. Secretary for Rural Development at the Ministry of Agriculture and Food Supply, Instruction No. 006, 6<sup>th</sup> January 1999

