Management of the 2008 "Buffalo Milk Crisis" in the Campania Region under the Perspective of Consumer Protection

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Introduction

In the Campania Region, the farming system comprises up to 260,000 water buffalo (*Bubalus bubalus*), a 70 % of the livestock being located within the Caserta province. This farming system is by-and-large addressed to the production of mozzarella, a semi-soft cheese, that holds a protected origin designation from the European Union (EU). Since 2002, the dairy production of the Region has been regularly subjected to official monitoring: since the early stages, reports underlined the presence of polychlorodibenzodioxins (PCDDs), polychlorodibenzofurans (PCDFs) — and later of dioxin-like polychlorobiphenyls (DL-PCBs)[1,2] — above the background levels for milk and dairy products.[3] Sometimes, concentrations exceeded the pertinent maximum levels (MLs) stated in Regulation 1881/2006/EC. The shift from monitoring to surveillance plans revealed some 19 % of non-compliance for mozzarella cheese samples collected during 2007; non-compliances were primarily confined in a limited area of the Region that is also known for an environment degraded due to an age-old industrial and agricultural waste disposal problem. The contemporaneous crisis of the household waste disposal in Naples and its worldwide broadcast and impact on public opinion, put the mozzarella cheese under a possible "dioxin" (PCDD and PCDF) concern. Thereof, the European Commission (EC) asked the Italian government to warrant the safety of the aforesaid dairy product with the adoption of an extraordinary monitoring plan, to be applied to the entire Region, capable to provide results within one month, as a preventive measure to limit a possible export ban on the product.

Materials and methods

The extraordinary plan was focused on the 240 approved processing milk plants receiving bulk milk from 959 buffalo farms, for a total of 387 official samplings to be analyzed within a 30-day time-frame (April 1 to 29, 2008). Due to the quite large number of samples expected and the tight time-frame, the analytical capabilities of the three national official laboratories directly involved were supported by an additional private laboratory chosen from a positive list provided by the EC. A consensus was reached with the EC on the following qualifying points: (a) sampling reports should guarantee the traceability from processing milk plant to each buffalo farm that had delivered the bulk milk (from one to a maximum of four farms per processing batch at any given plant); (b) when milk was a pool of two to four different farm consignments, decision limits more conservative than those provided by Regulation 1881/2006/EC were provisionally adopted to assess non-compliance by considering the presence of "dioxins" and DL-PCBs separately (Table 1); (c) results were evaluated according to Regulation 1883/2006/EC, for practical reasons by setting the measurement uncertainty at a standard ±20 % (regardless of source).

Results and discussion

The extraordinary plan tailored at processing milk plant level was completed within the scheduled time. According to the management grid reported in Table 1, 39 samples on the total 387 analyzed were classified as non-compliant (10.1 %); these were referred to 31 processing milk plants and traced back to 102 different farms

consignments, mainly located in the Caserta province. Under non-compliance conditions, the milk at both plant and farm levels was withdrawn from the alimentary chain, and the transport of buffalo from suspected farms forbidden. In Figure 1, the contamination levels detected for "dioxins", DL-PCBs, and their sum, is graphically shown; all non-compliant cases were determined by the "dioxin" concentrations exceeding the pertinent decision limit(s), DL-PCBs exhibiting a lower exceedance rate. It should be pointed out that under normal monitoring conditions — i.e. by applying the MLs provided by Regulation 1881/2006/EC — the percentage of non-compliances relative to "dioxin" levels would drop down to 4.4 % (N = 17), and below 2 % (N = 7) for the cumulative TEQ concentrations of "dioxins" and DL-PCBs. Moreover, a large portion of the samples analyzed shows contamination levels well below the average levels reported in the 2004 EU inventory for dairy products (0.77, 1.65, and 2.42 pgWHO-TEQ/g fat, respectively for "dioxins", DL-PCBs, and their sum).

Conclusion

The "buffalo milk crisis" of the Campania Region was managed by setting decision limits that, for consumer protection, were more conservative than those prescribed by Regulation 1881/2006/EC; non-compliant cases seemed to be located in a relatively well-defined in area, thus potentially allowing to trace back and remove the sources of contamination, presumably of environmental origin. By optimizing the cost-benefit analysis and without jeopardizing a preventive approach based on the identification of contamination sources at farm level, the "pool approach" allowed the Italian Ministry of Health to supply the EC and the international community in a very short time with exhaustive information about the mozzarella survey. To this purpose, an at-farm-level follow-up is in progress on an epidemiological basis: this programme will focus on the possible presence of regular emissions and/or backyard burning,[4] and their possible consequences on contamination of grasslands and other local feedingstuffs, such as hay and maize silage, harvested and administered to feedlots exclusively for internal use. Last but not least, the extraordinary plan outcome has further clarified the negligible risk of exposure for consumers represented by the consumption of mozzarella cheese (Figure 1).

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Table 1. Decision limits expressed as pgWHO-TEQ/g fat (upperbound approach, 20% uncertainty included) considered in the management of the mozzarella crisis for milk drawn at cheese factory level.

No. of consign-ments	Evaluation	Decision limits for milk pools and single consignments		
		PCDD+PCDF	DL-PCB	Total TEQs
1	Non-compliant	>3.75	—	>7.50
2–4	Non-compliant	>2.50	>2.50	—
1	Compliant/suspect at farm	>2.50 – ≤3.75	>2.50	≤7.50
2	Compliant/suspect at farms	>1.25 – ≤2.50	>1.25 – ≤2.50	—
3	Compliant/suspect at farms	>0.83 – ≤2.50	>0.83 – ≤2.50	—
4	Compliant/suspect at farms	>0.63 – ≤2.50	>0.63 – ≤2.50	—
1	Compliant/free at farm	≤2.50	≤2.50	(≤7.50)
2	Compliant/free at farms	≤1.25	≤1.25	—
3	Compliant/free at farms	≤0.83	≤0.83	—
4	Compliant/free at farms	≤0.63	≤0.63	—

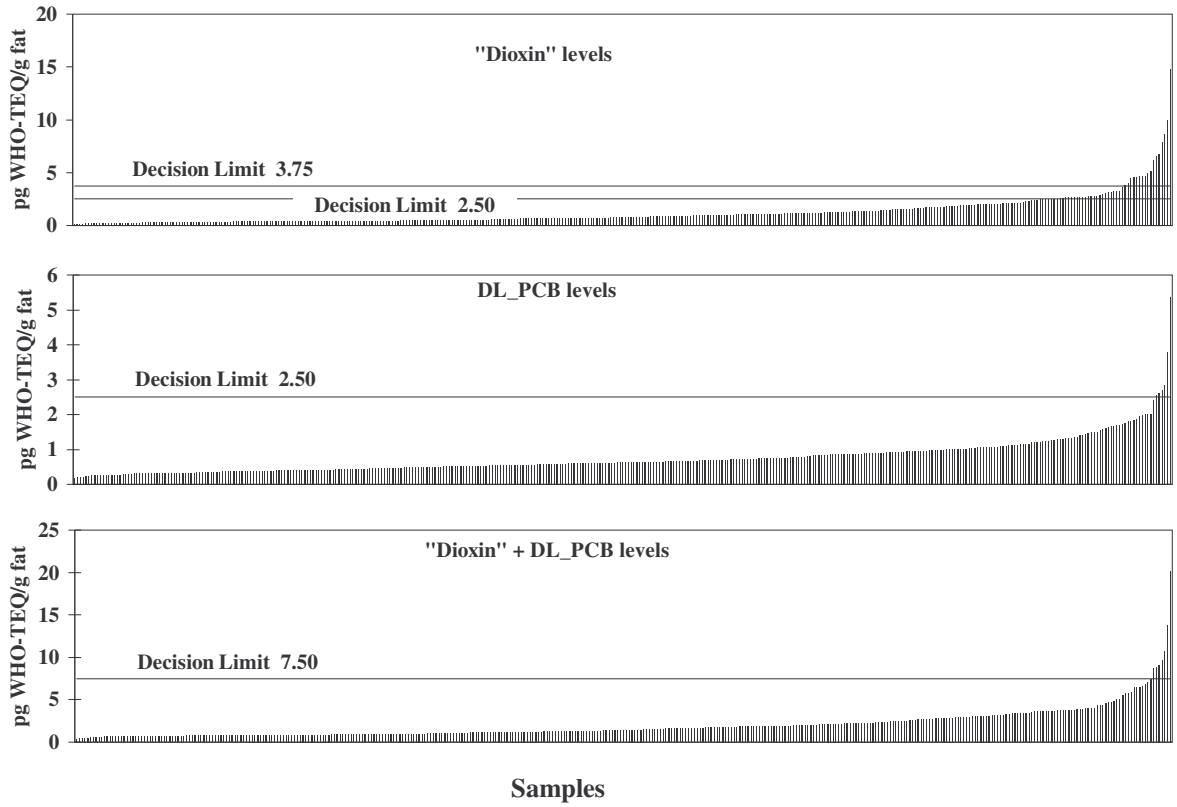

Figure 1. From top down, distributions of contamination levels for "dioxins", DL-PCBs, and cumulative TEQs in the 387 milk samples drawn from 240 approved processing plants of the Campania Region. Concentrations are ordered according to crescent values. Each box exhibits the pertinent decision limit: the conservative approach adopted in the extraordinary monitoring plan is clearly visible in the top box ("Dioxin" levels).

References

1. Diletti G., Scortichini G., Conte A., Migliorati G., Caporale V. *Organohalogen Compounds* 2004; 66: 2148–2153.
2. Fochi I., Brambilla G., De Filippis S.P., De Luca S., Diletti G., Fulgenzi A., Gallo P., Iacovella N., Scortichini G., Serpe L., Vinci F., di Domenico A. *Regulatory Toxicology and Pharmacology* 2008; 50: 366–375.
3. Gallani B. and Boix A. Joint Report DG-SANCO/DG-JRC-IRMM 2004. Available at: http://www.mvo.nl/voedselveiligheid/ download/JRC%20rapport%20feb% 202004.pdf.
4. Brambilla G., Cherubini G., De Filippis S., Magliuolo M., di Domenico A. *Analytica Chimica Acta* 2004; 514: 1–8.