

Levels of dioxins and dioxin-like PCBs in food and feed in Europe

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1. Introduction

Regulation (EC) No 466/2001 as amended by Council Regulation (EC) No 2375/2001 of November 2001 setting maximum levels for certain contaminants in foodstuffs, *inter alia* dioxins, stipulates that foodstuffs should not, when placed on the market, contain higher contaminant levels than those specified in that Regulation.

The Regulation also states that the Commission shall review Section 5 of Annex I, which outlines the maximum levels for dioxins and furans in food, by 31 December 2004 at the latest, in the light of new data on the presence of dioxins and dioxin-like PCBs, in particular with a view to the inclusion of dioxin-like PCBs in the levels to be set. Section 5 of Annex I shall be further reviewed by 31 December 2006 at the latest with the aim of significantly reducing the maximum levels. An EC Recommended Monitoring Programme for Food (Ref 1) was discussed to provide the Commission with the necessary data to make it possible to meet these commitments. A considerable amount of data was received by the Commission on the occurrence of dioxins and dioxin-like PCBs in food and was analysed to determine whether any patterns emerge in the ratios between dioxins and dioxin-like PCBs in certain food types or in certain areas.

Directive 2002/32/EC of the European Parliament and of the Council as amended by Commission Directive 2003/57/EC of 17 June 2003 on undesirable substances in animal feed establishes maximum levels for dioxins in several feed materials and compound feeding stuffs. Similar revision clauses to the Regulation on food apply to this Directive on feeding stuffs. A monitoring programme similar to the one recommended for food was discussed for undesirable substances in animal feed (Ref 2). Data submitted by Member states on the occurrence of dioxins and dioxin-like PCBs in feed have also been analysed to determine whether any patterns emerge in the ratios between dioxins and dioxin-like PCBs in certain feedstuffs or in certain areas.

This paper describes the criteria used to screen the data received and provides some comments on the levels reported, how they comply with the current legislation and whether a pragmatic ratio between dioxins and dioxin-like PCBs could be identified.

2. Materials and Methods

Data were submitted to the European Commission by 15 Member States, Iceland and Norway in various proportions, from a minimum of 12 to a maximum of over 10000. General information on national monitoring programmes and on ranges of concentrations of dioxins and PCBs in different food types were provided by some of the Accession Countries. Most but not all Member states reported the data using the recommended template (Ref 1 and 2). Because of the different amount of information provided it was necessary to screen all data for consistency and comparability.

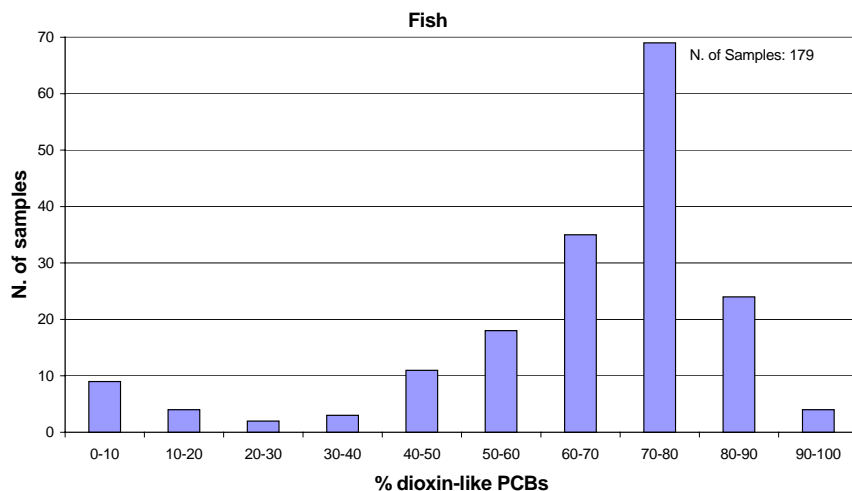
General selection criteria:

- Data for which all or most congeners were below Limit of Quantification (LOQ) were not used
- Data for which some of the congeners were below LOQ and the LOQ was indicated were reported as Upper Bound values.
- Data for which some congeners were below LOQ but the LOQ was not indicated were not used
- Data relating to samples collected before the year 1997 were discarded because they had been included in the SCOOP task 3.2.5 on dioxins and PCBs (Ref 3) and because recent publications: UK TDS 1997 (Ref 4) UK TDS 2001 (Ref 5), and RIVM Report (Ref 6), show that background levels of these contaminants in food have decreased considerably over the past years.

3. Results

3.1. Food Categories

FISH



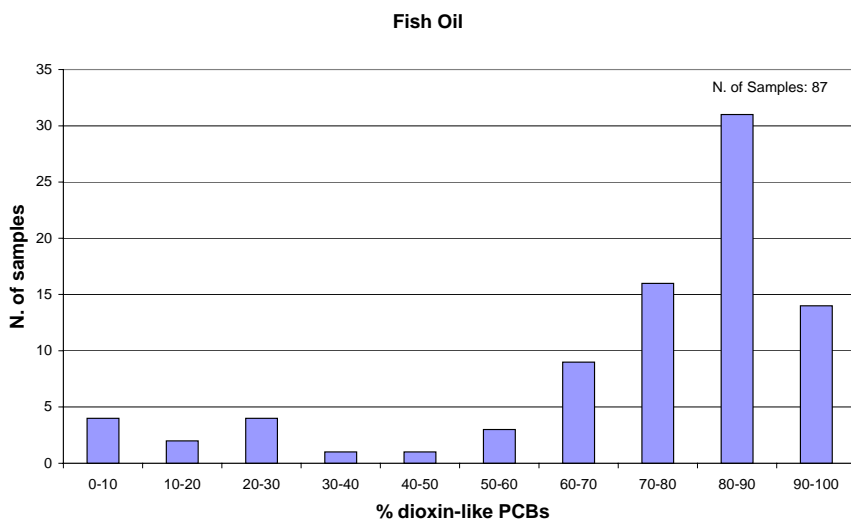
The data submitted on fish were divided between fish from the Baltic Region and fish from other parts of Europe. This decision was made because of the well documented different background

levels of dioxins in fish from the Baltic. Only data on fish caught in areas other than the Baltic Sea will be presented in this paper, data provided on fish from other contaminated waters were not included because they are not representative of background levels of contaminants.

The information provided by Member states allowed for the identification of different fish species but in most cases not enough information was available to differentiate between farmed or wild fish. Most data were submitted on salmon (47 %) and trout (15 %), other fish included herring, halibut, cod, haddock, mackerel, anchovies, sardines and 14 other species.

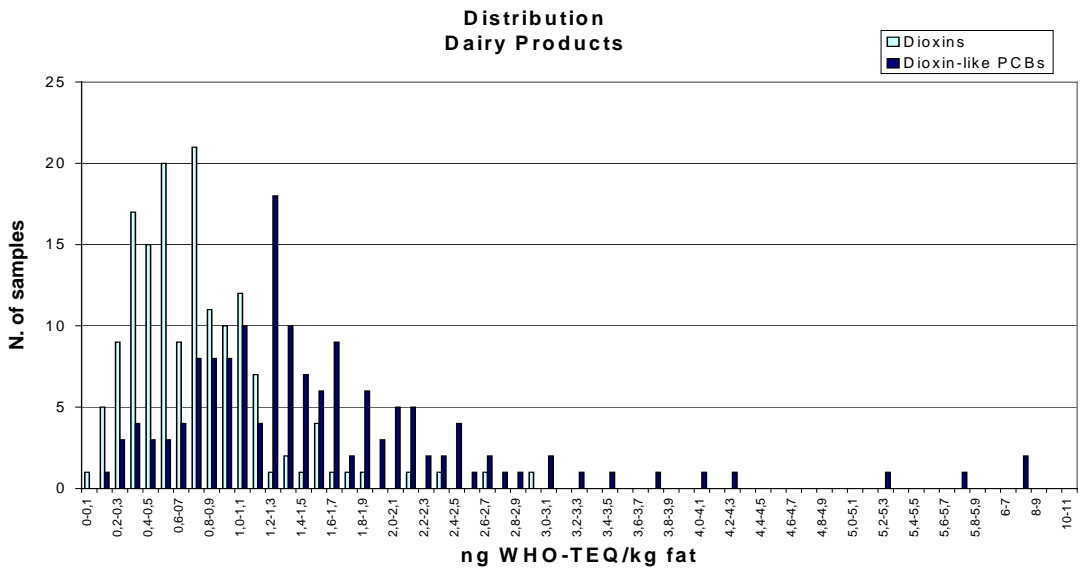
All results were obtained by analysis of the muscle meat of the fish.

FISH OIL



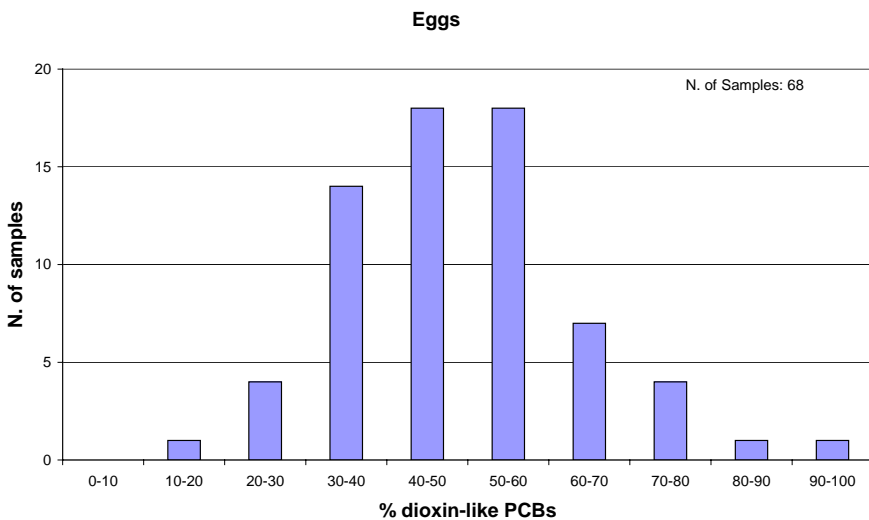
The information provided did not always allow for the identification of the fish species from which the oil was derived.

DAIRY PRODUCTS



Data submitted for dairy products include milk collected at farm gate, milk at retailer, butter, yogurt and cheese and they have been presented in chronological order.

EGGS



This category includes both battery and free range eggs but the information provided by Member states did not always allow for this difference to be identified.

ANIMAL FAT and LIVER

Ten animal fat samples were submitted and included beef, pig, chicken and mixed fats. All samples were well below the current limits for dioxins.

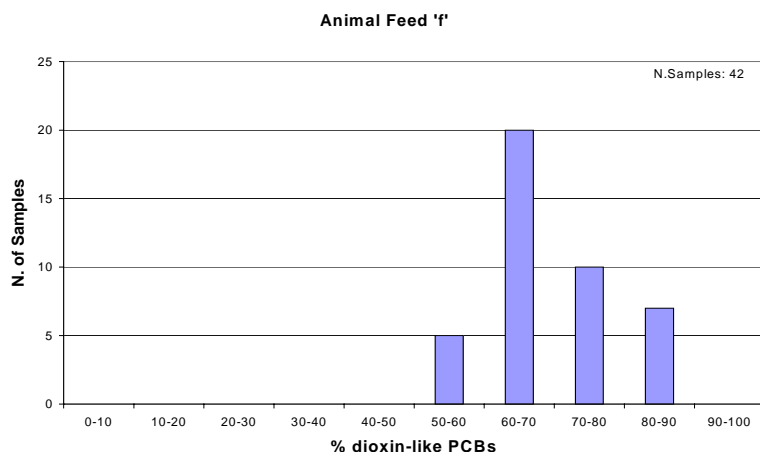
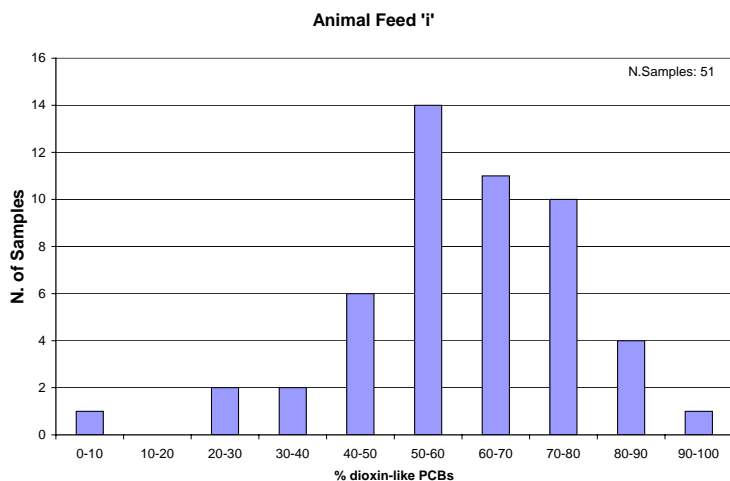
Only five liver samples were submitted and included pig, sheep and cow's liver. The very few samples available indicate a higher contribution of dioxins than dioxins-like PCBs to the total TEQ.

3.2. Feed Categories

Commission Directive 2003/57/EC of 17 June 2003 amending Directive 2003/32/EC of the European Parliament and of the Council on undesirable substances in animal feed sets maximum levels for dioxins for different groups/categories of feedingstuffs. To facilitate comparison the same classification has been used throughout this paper and is summarised in Table 1.

	Products intended for animal feed	Max content relative to a feeding stuff with a moisture content of 12% (ng WHO-TEQ/kg)
a	Feed materials of plant origin	0.75
b	Minerals	1.0
c	Binders, anti-caking agents	0.75
d	Animal fat, incl. milk and egg fat	2.0
e	Milk, eggs and their products	0.75
f	Fish oil	6.0
g	Fish and other aquatic animals and their products (fish meal)	1.25
h	Compound feedingstuffs	0.75
i	Feedingstuffs for fish	2.25
j	Fish protein, more than 20% fat	2.25

Table 1 – Classification of feedingstuffs according to Commission Directive 2003/57/EC of 17 June 2003

'f' Fish oil**'i' Feedingstuffs for fish****4. Discussion**

The Health and Consumer protection DG of the European Commission received a considerable amount of data which were screened and used according to the criteria already outlined. For some food categories the number of data available allows for general considerations to be made (e.g. a marked decrease was noted in levels of dioxins and dioxin-like PCBs between fish oil samples collected in 2000/1 and 2002/3), for other food types the data available are too few to be used to draw any conclusion.

Current EU limits only apply to the sum of dioxins and furans TEQs. The following tables provide information on the average, 90th and 95th percentile of dioxins, dioxin-like PCBs and total TEQ of the submitted results.

FOOD TYPES	N SAMPLES	DIOXINS			DIOXIN-LIKE PCBs			TOTAL TEQ		
		Average	90 th %ile	95 th %ile	Average	90 th %ile	95 th %ile	Average	90 th %ile	95 th %ile
RUMINANTS	25	0.46	0.83	1.11	0.80	1.48	1.66	1.27	2.12	2.32
POULTRY	12	0.65	1.08	1.16	1.22	1.95	3.80	1.87	2.64	4.72
PIGS	17	0.21	0.34	0.40	0.23	0.41	0.56	0.44	0.69	0.75
FISH	157	0.49	0.97	1.22	1.30	2.23	3.66	1.79	4.10	4.63
MILK & MILK PRODUCTS	152	0.77	1.20	1.60	1.65	2.60	3.62	2.42	3.69	5.14
EGGS	68	0.63	0.81	1.16	0.56	1.08	1.77	1.20	1.95	2.77
VEG OIL	12	0.21	0.27	0.32	0.24	0.27	0.61	0.45	0.51	0.84
FISH OIL 2000-1	35	2.31	6.25	7.03	9.07	23.5	25.7	11.4	31.7	33.2
FISH OIL 2002-3	52	0.63	1.19	1.91	2.34	6.00	7.03	2.98	6.43	8.81

Table 2 – Average, 90th percentile and 95th percentile (ng WHO-TEQ/kg fat except fish reported on fresh weight) for different food types sampled across Europe between 1997 and 2003

	FEEDINGSTUFFS	N SAMPLES	DIOXINS			DIOXIN-LIKE PCBs			TOTAL TEQ		
			Average	90 th %ile	95 th %ile	Average	90 th %ile	95 th %ile	Average	90 th %ile	95 th %ile
A	Feed materials of plant origin	50	0.19	0.38	0.44	0.13	0.30	0.35	0.32	0.62	0.78
B	Minerals	60	0.21	0.43	0.63	0.13	0.26	0.47	0.34	0.78	1.04
C	Binders, anti-caking agents	13	0.14	0.28	0.33	0.26	0.69	0.82	0.40	1.0	1.07
D	Animal fat, incl. milk and egg fat	27	0.27	0.80	0.81	0.24	0.80	0.81	0.51	1.60	1.62
F	Fish oil	43	3.77	6.65	7.69	8.38	16.2	18.9	12.1	22.9	30.1
G	Fish and other aquatic animals and their products (fish meal)	36	0.46	0.97	1.14	0.74	1.45	1.62	1.33	2.47	2.56
H	Compound feedingstuffs	67	0.22	0.55	0.69	0.25	0.84	1.14	0.47	1.43	1.86
I	Feedingstuffs for fish	51	0.93	1.74	2.29	1.58	3.33	4.75	2.51	5.01	6.35

Table 3 – Average, 90th percentile and 95th percentile (ng WHO-TEQ/kg 12% moisture content) for different feedingstuffs sampled across Europe between 1997 and 2003

Acknowledgements

We would like to thank EU Member states for submitting data and all experts in the Working Group on Dioxins and PCBs and in the Working Group on Undesirable Substances in Feed for their suggestions and comments on how best to use and present these data.

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