

OCCURRENCE OF NDL-PCB IN FOOD AND FEED IN EUROPE

Barbara Gallani¹, Anna Boix², Alessandro Di Domenico³, Roberto Fanelli⁴

¹UK Food Standards Agency, London

²European Commission, DG JRC IRMM FSQ, Geel

³Italian National Institute of Health, Rome

⁴Mario Negri Institute for Pharmacological Research, Milano

Introduction

Polychlorinated Biphenyls (PCBs) cover a group of 209 different congeners, which can be divided into two groups according to their toxicological properties. One group consists of 12 congeners that show toxicological properties similar to dioxins and are therefore termed “dioxin-like PCBs”. The other PCBs, sometimes termed “non dioxin-like PCBs”, do not show dioxin-like toxicity but have another toxicological profile

The Scientific Committee on Food (SCF) assessed the risks for public health arising from the presence of dioxins and dioxin-like PCBs in food in November 2000¹ and May 2001². The Scientific Committee on Animal Nutrition (SCAN) adopted on 6 November 2000 an opinion on the dioxin contamination of feedingstuffs and their contribution to the contamination of food of animal origin³. These opinions provided the scientific basis for the Community measures to limit the presence of these contaminants in feed and food as part of an overall strategy to reduce the presence of dioxins, furans and PCBs in the environment, food and feed.

The Commission adopted on 24 October 2001 a Community strategy for dioxins, furans and PCBs⁴ addressing measures to limit or to eliminate the emission of dioxins into the environment through source-directed measures and addressing the way to actively decrease the presence of dioxins in feedingstuffs and in foodstuffs.

An EC Recommended Monitoring Programme for Food⁵ was also agreed 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 dioxin-like and non-dioxin-like PCBs in food and was analysed to determine whether any patterns emerge in the non-dioxin-like congener profiles and in the ratio between dioxin-like and non-dioxin-like PCBs in certain food types or in certain areas. A monitoring programme similar to the one recommended for

food was agreed for undesirable substances in animal feed⁶. Data submitted by Member states on the occurrence of dioxin-like and non-dioxin-like PCBs in feed have also been analysed.

A significant part of the human exposure to PCBs derives from food. Food of animal origin is the main contributor to dietary PCB exposure. The PCB burden in animals derives mainly from feed. This paper provides some information on background levels of non-dioxin-like PCBs in food and feed and might assist in the calculation of exposure of the EU population to these contaminants, including the identification of the main sources of dietary exposure and the relative importance of dietary and non dietary sources.

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. Because of the different amount of information provided it was necessary to screen all data for consistency and comparability.

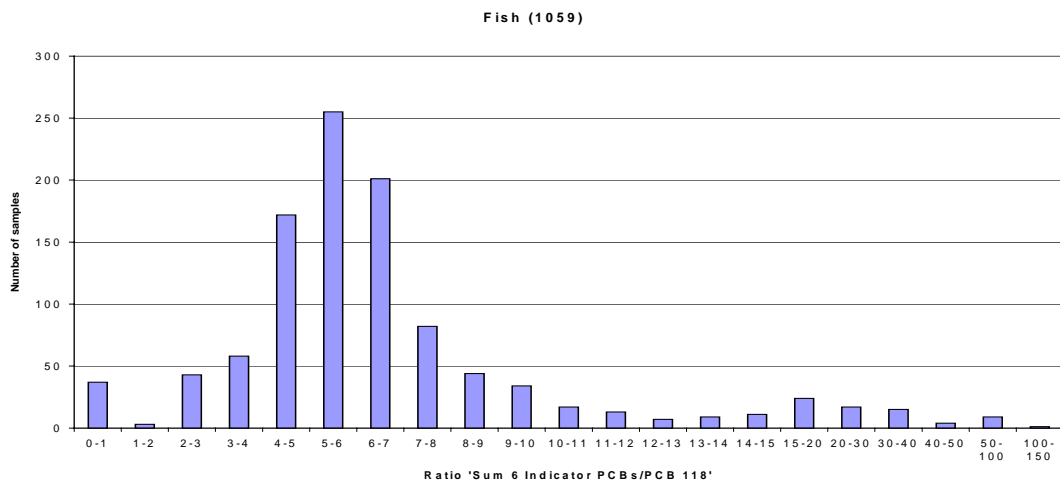
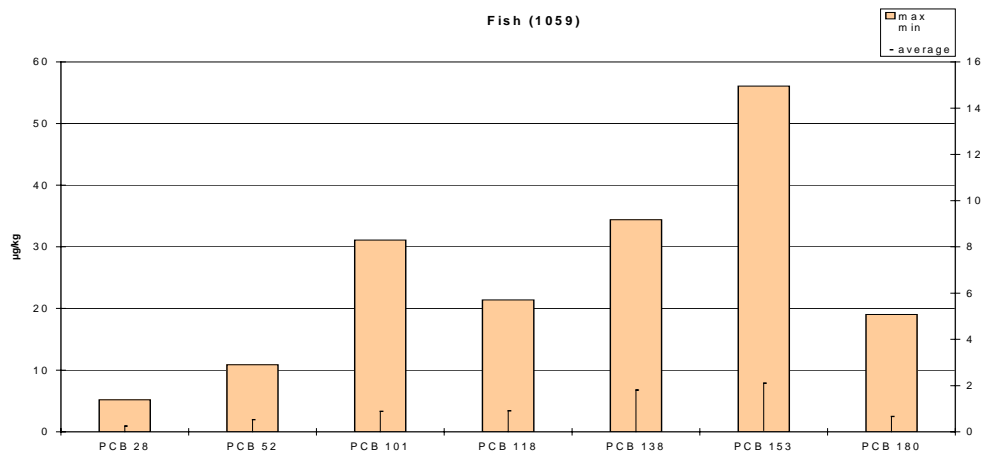
General selection criteria:

- Data relate to samples collected after 1997
- 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 the ratio between Upper Bound and Lower Bound for the sum of the 6 indicator PCBs was above three were not used.
- Data for which some congeners were below LOQ but the LOQ was not indicated were not used
- Data for which the congener profile was considered ‘anomalous’ were not used

Results¹

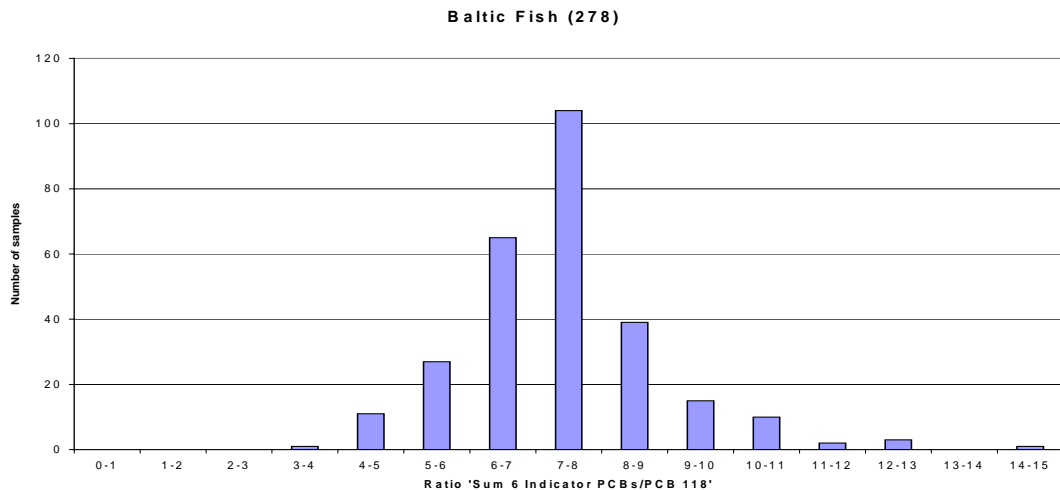
1. Food Categories

Fish



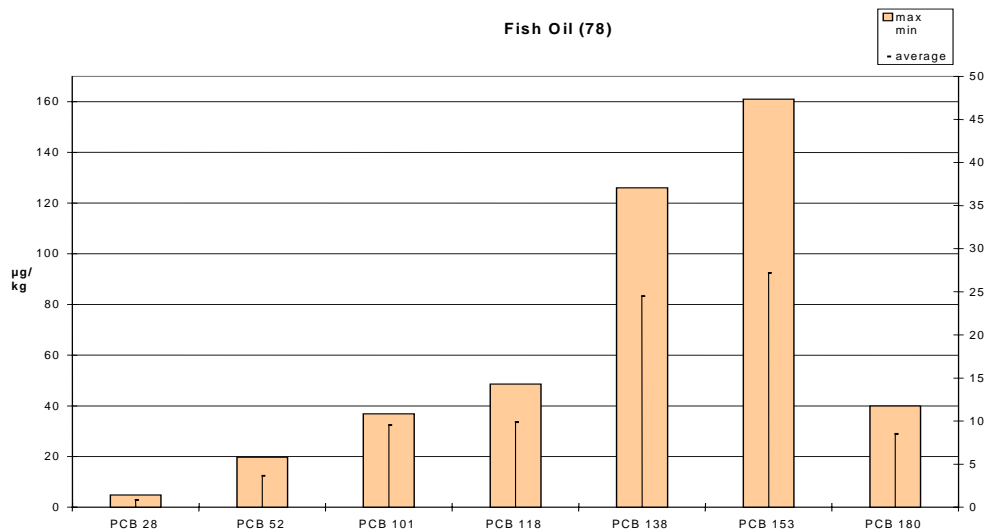
¹ Total Concentrations expressed as upperbound in µg/kg.
 Total TEQ expressed as upperbound in pgWHO-TEQ/g fat for all food types except fish expressed in pgWHO-TEQ/g fresh weight

EFSA: RISK ASSESSMENT OF NON-DIOXIN-LIKE PCB

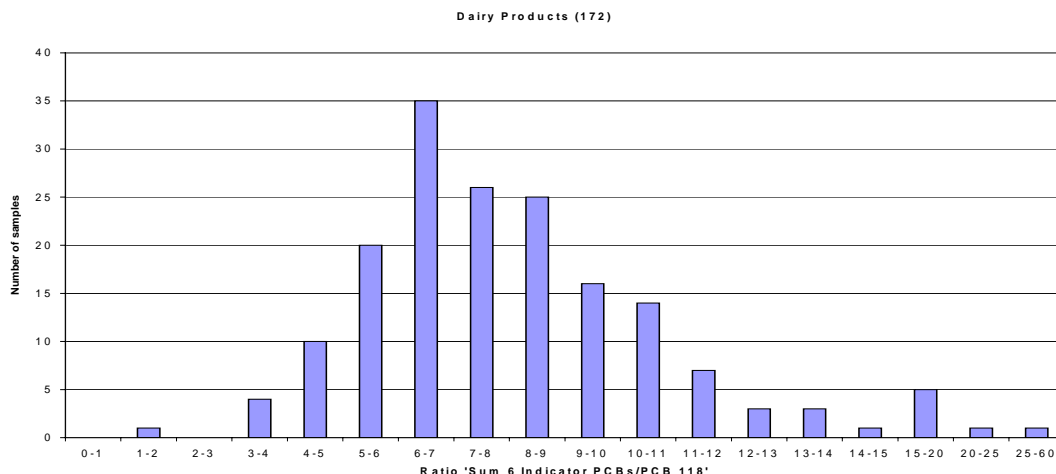


The data submitted on fish were divided between fish from the Baltic Region and fish from other parts of Europe. This decision was made because of the well documented different background levels of dioxins and PCBs in fish from the Baltic.

Fish oil



Dairy products



Data submitted for dairy products include milk collected at farm gate, milk at retailer, butter, yogurt and cheese.

2. Feed Categories

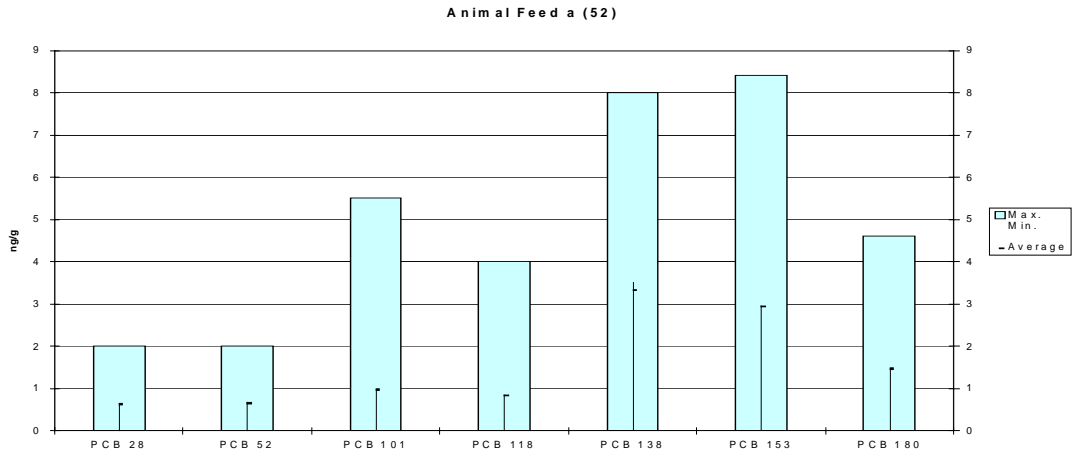
Commission Directive 2003/57/EC of 17 June 2003 amending Directive 2003/32/EC of the European Parliament and of the Council on undesirable substances in animal feed sets maximum levels for dioxins for different groups/categories of feedingstuffs. To facilitate comparison the same classification has been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

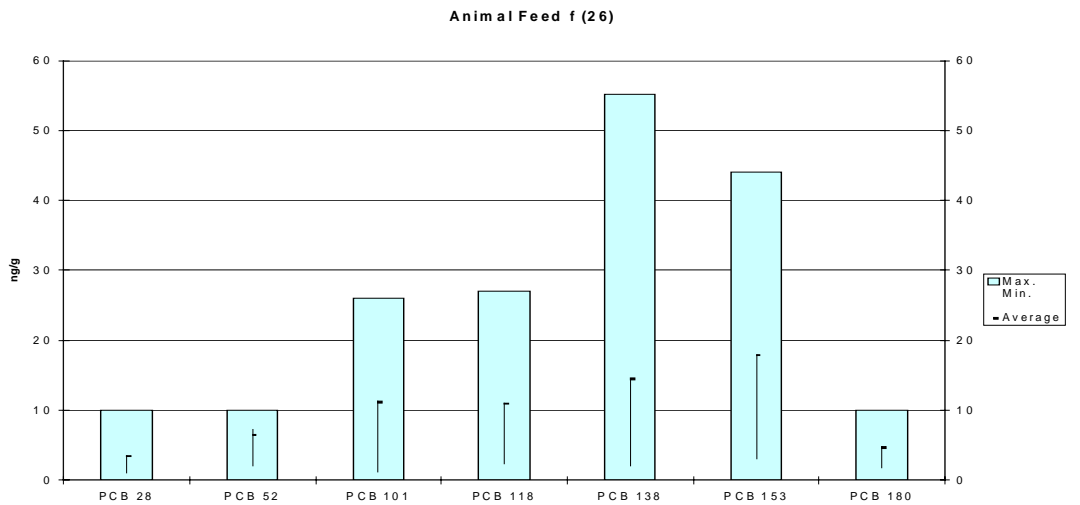
Table 1 – Classification of feedingstuffs according to Commission Directive 2003/57/EC of 17 June 2003

‘a’ Feed materials of plant origin

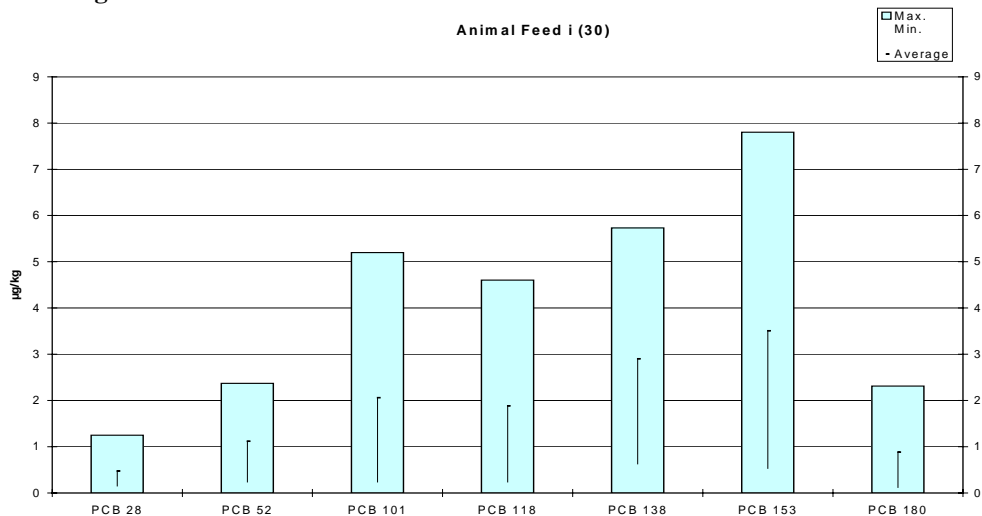
EFSA: RISK ASSESSMENT OF NON-DIOXIN-LIKE PCB



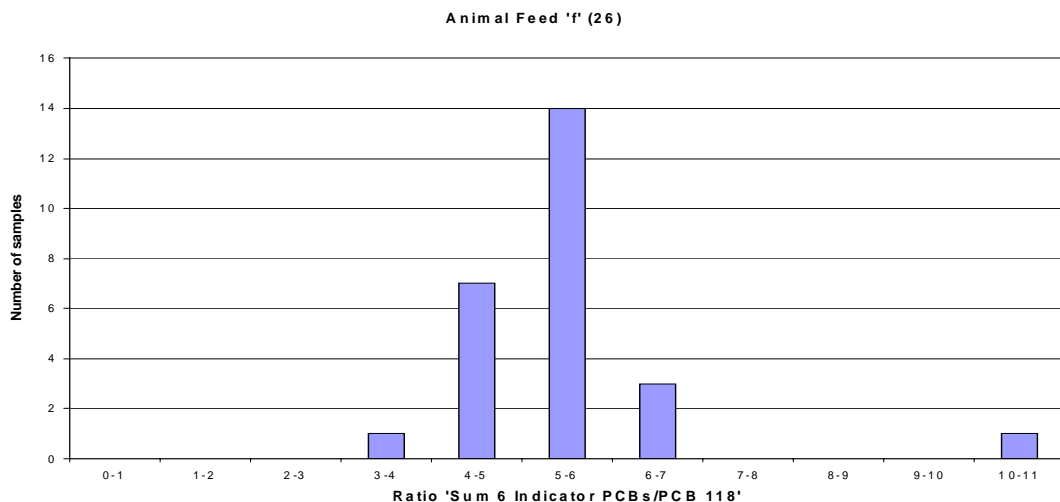
'f' Fish oil



'i' Feedingstuffs for fish



'f' Fish oil



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. the typical congener profile or the ratio between dioxin-like and non-dioxin-like PCBs) for other food types the data available are too few to be used to draw any conclusion.

EFSA: RISK ASSESSMENT OF NON-DIOXIN-LIKE PCB

It is possible that the data presented in this paper will assist in understanding:

The relevance of the current monitoring of the 7 (or 6) indicator PCBs in food as an indicator for the presence of total non-dioxin like PCBs and for the toxicity of the non-dioxin-like PCBs

The quantitative ratio in food and feed between the presence of non-dioxin-like PCBs and dioxin-like PCBs

Whether an approach of protecting humans against WHO-TEQ exposure (dioxins/furans, dioxin-like PCBs) is regarded as sufficient for protection against exposure to non-dioxin-like PCBs or if a separate approach for the protection of humans against exposure to non-dioxin-like PCBs is appropriate.

PCBs	RUMINANTS (65)				POULTRY (46)				PIGS (21)			
	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile
PCB 28	0.49	0.59	0.50	0.85	0.54	0.50	1.00	1.00	0.45	0.25	0.97	1.54
PCB 52	0.88	0.50	0.50	2.78	0.74	0.50	1.00	1.45	0.66	0.24	1.48	2.67
PCB 101	0.46	0.50	0.50	0.50	0.54	0.50	1.00	1.00	0.58	0.31	0.99	1.72
PCB 118	0.26	0.10	0.86	1.19	0.93	0.31	2.90	3.44	0.75	0.48	0.97	1.10
PCB 138	3.75	3.40	6.72	7.11	2.71	1.67	7.22	8.43	1.54	1.50	2.29	4.00
PCB 153	2.50	3.00	5.00	5.85	2.63	1.14	7.46	8.90	2.34	2.34	4.55	6.14
PCB 180	1.00	1.10	1.88	2.24	1.83	0.36	5.80	6.80	1.23	0.92	1.66	3.77
PCBs	FISH (1057)				DAIRY PRODUCTS (2147)				EGGS (72)			
	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile
PCB 28	0.25	0.09	0.50	0.76	1.60	1.50	2.38	2.75	0.78	0.36	0.78	1.46
PCB 52	0.52	0.14	1.7	2.06	0.98	1.00	1.00	1.00	0.55	0.10	0.37	0.60
PCB 101	0.88	0.21	2.47	3.30	1.30	1.10	1.94	2.32	0.98	0.10	5.42	5.90
PCB 118	0.91	0.25	2.50	3.85	1.40	1.00	2.40	3.90	0.89	0.24	1.50	2.40
PCB 138	1.80	0.47	4.69	8.20	2.70	2.60	4.15	4.68	1.67	0.65	3.70	5.80
PCB 153	2.10	0.53	5.12	8.74	3.30	3.10	4.93	5.50	2.12	0.88	5.20	7.40
PCB 180	0.12	0.66	1.69	3.13	1.60	1.50	2.40	2.80	1.21	0.66	1.45	4.70
PCBs	VEGETABLE OIL (11)				FISH OIL (75)				ANIMAL FAT (12)			
	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile	Average	Median	90 th %ile	95 th %ile
PCB 28	0.70	0.30	2.40	2.40	0.85	0.27	2.10	2.70	0.13	0.12	0.16	0.26
PCB 52	0.30	0.10	0.81	0.81	3.60	1.00	9.57	15.0	0.10	0.12	0.12	0.12
PCB 101	0.60	0.20	1.63	2.27	9.54	4.80	24.0	27.7	0.15	0.12	0.15	0.20
PCB 118	0.90	0.20	2.77	3.98	9.90	6.70	23.4	26.0	0.37	0.14	0.87	1.00
PCB 138	1.40	0.20	5.22	6.13	24.5	17.0	51.3	59.2	0.73	0.54	1.44	1.70
PCB 153	1.50	0.30	4.13	6.04	27.2	15.9	61.7	66.7	1.15	0.79	2.96	3.14
PCB 180	0.60	0.10	1.84	1.97	8.50	6.30	17.0	20.0	0.48	0.33	1.10	1.30

Table 2. Average, Median, 90th percentile and 95th percentile (µg/kg) for different food types sampled across Europe between 1997 and 2003

Acknowledgements

We would like to thank EU Member states for submitting data and all experts in the EFSA Working Group on non-dioxin-like PCBs for their suggestions and comments on how best to use and present these data.

References

1. SCF (Scientific Committee on Food) (2000). Opinion on the Risk Assessment of Dioxins and Dioxin-like PCBs in Food (Adopted on 22 November 2000)
http://europa.eu.int/comm/food/fs/sc/scf/out78_en.pdf
2. SCF (Scientific Committee on Food) (2001). Opinion on the risk assessment of dioxins and dioxins-like PCBs in food (update based on the new scientific information available since the adoption of the SCF opinion of 22 November 2000) (adopted by the SCF on 30 May 2001)
http://europa.eu.int/comm/food/fs/sc/scf/out90_en.pdf
3. SCAN (Scientific Committee on Animal Nutrition) (2000). Opinion on the Dioxin Contamination of feedingstuffs and their contribution to the contamination of food of animal origin” (Adopted on 06 November 2000).
http://europa.eu.int/comm/food/fs/sc/scan/out55_en.pdf
4. European Commission (2001). Communication from the Commission to the Council, Parliament and the Economic and Social Committee. Community strategy for dioxins, furans and polychlorinated biphenyls (2001/C 322/02) (COM (2001) 593 final). Official Journal of the European Communities, C322/2-18, 17.11.2001
5. SANCO/4546/01-rev.3 recommended monitoring for food
6. SANCO/4545/01-rev.3 recommended monitoring for feed