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Prepared by Dioxin, PCBs and Waste Working Group of the International POPs Elimination Network (IPEN) Secretariat, Friends of the Earth (Slovakia) and Arnika Association (Czech Republic)

Contamination of chicken eggs near the Koshice municipal waste incinerator in Slovakia by dioxins, PCBs and hexachlorobenzene

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“Keep the Promise, Eliminate POPs!” Campaign Report

Prepared by Dioxin, PCBs and Waste Working Group of the International POPs Elimination Network (IPEN) Secretariat, Friends of the Earth (Slovakia) and Arnika Association (Czech Republic)

Koshice - Prague (March-16-2005)

Executive Summary

Free-range chicken eggs collected from Valaliky and Kokshov-Baksha, downwind from the Koshice municipal waste incinerator, showed high levels of dioxins, PCBs, and hexaclorobenzene (HCB). Dioxin levels exceeded background levels by almost 10-fold and were almost three times higher than the European Union (EU) dioxin limit for eggs. Levels of PCBs exceeded proposed regulatory limits by more than two-fold. Finally, the eggs exceeded the newly proposed EU limit for HCB as a pesticide residue. A previous study conducted in 2001 found significant levels of dioxins in breast milk samples from women living downwind of the incinerator.

Recent monitoring data for the Koshice incinerator are not publicly available, though data from 1992 show high dioxin releases (33 ng I-TEQ/m^3). The incinerator is probably the major dioxin source in the area. Other potential sources of the substances include steel manufacturing (VSZ Koshice) and a heating station (Krasna nad Hornadom).

The toxic substances measured in this study are slated for reduction and elimination by the Stockholm Convention which holds its first Conference of the Parties in May 2005. Slovakia is a Party to Convention since it ratified the Treaty in 2002. The Convention mandates Parties to take specific actions aimed at eliminating these pollutants from the global environment. We view the Convention text as a promise to take the actions needed to protect Slovakian and global public’s health and environment from the injuries that are caused by persistent organic pollutants, a promise that was agreed by representatives of the global community: governments, interested stakeholders, and representatives of civil society. We call upon Slovakian governmental representatives and all stakeholders to honor the integrity of the Convention text and keep the promise of reduction and elimination of POPs.

Recommendations

1) More POPs monitoring in the Koshice area is needed;
2) More publicly accessible data about U-POPs releases from all potential sources in the region are needed to address them properly and;
3) Limits for U-POPs emissions should be introduced into national legislation.

Introduction

Persistent organic pollutants (POPs) harm human health and the environment. POPs are produced and released to the environment predominantly as a result of human activity. They are long lasting and can travel great distances on air and water currents. Some POPs are produced for use as pesticides, some for use as industrial chemicals, and others as unwanted byproducts of combustion or chemical processes that take place in the presence of chlorine compounds. Today, POPs are widely present as contaminants in the environment and food in all regions of the world. Humans everywhere carry a POPs body burden that contributes to disease and health problems.

The international community has responded to the POPs threat by adopting the Stockholm Convention in May 2001. The Convention entered into force in May 2004 and the first Conference of the Parties (COP1) will take place in May 2005. Slovakia ratified the Convention in 2002.

The Stockholm Convention is intended to protect human health and the environment by reducing and eliminating POPs, starting with an initial list of twelve of the most notorious, the "dirty dozen." Among this list of POPs there are four substances that are produced unintentionally (U-POPs): polychlorinated biphenyls (PCBs), hexachlorobenzene (HCB), polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) The last two groups are simply known as dioxins.

The International POPs Elimination Network (IPEN) asked whether free-range chicken eggs might contain U-POPs if collected near potential sources of U-POPs named by the Stockholm Convention. Chicken eggs were chosen for several reasons: they are a common food item; their fat content makes them appropriate for monitoring chemicals such as POPs that dissolve in fat; and eggs are a powerful symbol of new life. Free range hens can easily access and eat soil animals and therefore their eggs are a good tool for biomonitoring of environmental contamination by U-POPs. This study is part of a global monitoring of egg samples for U-POPs conducted by IPEN.

Materials and Methods

Please see Annex 1.

Results and Discussion

U-POPs in eggs sampled near the Koshice incinerator

The results of the analysis of a pooled sample of 6 eggs collected near the municipal waste incinerator in Koshice are summarized in Tables 1 and 2. Pooled sample fat content was measured at 12.2%.

Levels of dioxins found in sampled eggs from Valaliky and Kokshov-Baksha in Table 1 were almost three times higher than the EU dioxin limit for eggs. In addition, the samples exceeded the proposed limits for PCBs (in WHO-TEQs) by more than two-fold. Also, the eggs exceeded the newly proposed EU limit for HCB as a pesticide residue.

Table 1: Measured levels of POPs in the sample from Valaliky and Kokshov-Baksha near the Koshice municipal waste incinerator in Eastern Slovakia per gram of fat.

	Measured level	Limits	Action level
PCDD/Fs in WHO-TEQ (pg/g)	11.52	3.0[a]	2.0[b]
PCBs in WHO-TEQ (pg/g)	4.60	2.0[b]	1.5[b]
Total WHO-TEQ (pg/g)	16.12	5.0[b]	-
PCB (7 congeners) (ng/g)	189.0	200[c]	-
HCB (ng/g)	10.70	200 (10)[d]	-

Abbreviations: WHO, World Health Organization; TEQ, toxic equivalents; pg, pictogram; g, gram; ng, nanogram.

[a] Limit set up in The European Union (EU) Council Regulation 2375/2001 established this threshold limit value for eggs and egg products. There is even more strict limit at level of 2.0 pg WHO-TEQ/g of fat for feedingstuff according to S.I. No. 363 of 2002 European Communities (Feedingstuffs) (Tolerances of Undesirable Substances and Products) (Amendment) Regulations, 2002.

[b] These proposed new limits are discussed in the document Presence of dioxins, furans and dioxin-like PCBs in food. SANCO/0072/2004.

[c] Limit used for example in the Czech Republic according to the law No. 53/2002 as well as in Poland and/or Turkey.

[d] EU limit according to Council Directive 86/363/EEC, level in brackets is proposed new general limit for pesticides residues (under which HCB is listed) according to the Proposal for a Regulation of the European Parliament and of the Council on maximum residue levels of pesticides in products of plant and animal origin, COM/2003/0117 final - COD 2003/0052.

Table 2 shows that the level of dioxins in eggs expressed as fresh weight slightly exceeded the limit for commercial eggs in the USA. The US Food and Drug Administration estimates a lifetime excess cancer risk of one in 10,000 for eggs contaminated at 1 pg/g ITEQ. The samples collected near the municipal waste incinerator at Koshice exceeded this cancer risk level.[a]

Table 2: Measured levels of POPs in the sample from Valaliky and Kokshov-Baksha near the Koshice municipal waste incinerator in Eastern Slovakia per gram of egg fresh weight.

	Measured level	Limits	Action level
PCDD/Fs in WHO-TEQ pg/g	1.41	1[a]	-
PCBs in WHO-TEQ pg/g	0.56	-	-
Total WHO-TEQ pg/g	1.97	-	-
PCBs (7 congeners) in ng/g	23.06	-	-
HCB in ng/g	1.31	-	-

[a] U.S. Department of Agriculture Food Safety and Inspection Service [Memo 8 July 1997] Advisory to Owners and Custodians of Poultry, Livestock and Eggs. Washington, DC:U.S. Department of Agriculture, 1997. FSIS advised in this memo meat, poultry and egg product producers that products containing dioxins at levels of 1.0 ppt in I-TEQs or greater were adulterated. There is even more strict EU limit at level of 0.75 pg WHO-TEQ/g of eggs fresh weight for feeding stuff according to S.I. No. 363 of 2002 European Communities (Feedingstuffs) (Tolerances of Undesirable Substances and Products) (Amendment) Regulations, 2002.

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[a] Estimated using a cancer potency factor of 130 (mg/kg-day)-1 and rounding the risk to an order of magnitude for consumption of 3-4 eggs per week (30 g egg/day) contaminated at 1 ppt ITEQ

Comparison with other studies of eggs

The dioxin levels in this study exceed background levels by more than 10-fold (0.2 - 1.2 pg WHO-TEQ/g of fat).

We compared the levels of PCDD/Fs measured in this study in eggs from Kokshov-Baksha and Valaliky with data from other studies that also used pooled samples (Please see Annexes 2 and 3.) The pooled sample of eggs from this study contained dioxin levels that were almost 3.5 times higher than those found among 14 egg samples from Slovakia measured in 2002. In addition, the levels seen in this study were close to the levels found in Rheinfelden, Germany during second half of the 1990s.[1] Rheinfelden was contaminated by both pentachlorophenol and primary chlorine production.

Other studies showing high levels of dioxins include samples near an old waste incinerator in Maincy, France [2] and an area affected by a spread mixture of waste incineration residues in Newcastle, UK.[3] The mean dioxin values observed in these locations in pooled samples were 42.47 pg WHO-TEQ/g and 31 pg WHO-TEQ/g respectively.

In general, the data in Annexes 2, 3, 4 and 5 demonstrate that dioxins represent the most serious U-POPs contaminant in eggs. PCDD/Fs contribute over 70% of the TEQ value in eggs as visible from graph in Annex 5. Despite this substantial contribution of dioxins, levels of PCBs and HCB found in eggs are not negligible as shown in Annex 4 for PCBs and in Table 1 for HCB, in which the level slightly exceeds new proposed EU limit for pesticide residues in food.

Dioxins in air and breast milk

In October 1996 - July 1997 dioxins were measured in outdoor air in the city of Koshice. Levels found ranged from 30 to 690 fg I-TEQ/m^3.

Measurements of PCDD/F levels in breast milk were performed in the area surrounding the city of Koshice in 2001 by Friends of the Earth Slovakia. Pooled samples of maternal milk from 10 women living in the villages south of Koshice (downwind from the incinerator) were analysed. The results showed that the found values (20.34 pg/g in WHO-TEQ) fluctuated on the level known from other Slovak districts investigated within a project of monitoring the inhabitants exposed to POPs (19.33 - 29.39 pg/g in WHO-TEQ[a]).

Possible U-POPs sources

The high levels of U-POPs in free range chicken eggs in these samples provoke the question of possible sources. There are three major potential sources of dioxins: the municipal waste incinerator in Koshice; steelworks VSZ Koshice (southwestern from Valaliky); and the heating plant at Krasna nad Hornadom (north of the village). In addition, some local heating and possible open burning can be considered as potential U-POPs sources in both villages. Most households in the village do not use brown coal and/or wood burning for heating, but we consider them as potential sources of U-POPs.

Tracking the source of dioxins in eggs can be aided by comparing the pattern of congeners in the samples with those in the sources. Unfortunately, dioxin air emissions measurements are not available for the comparison. However, congener patterns for these sources are available from the neighboring Czech Republic. A comparison of eggs and different sources patterns in TEQ levels is shown in the graphs in Annex 6.

The congener pattern observed in this study most closely resembles the pattern observed in a municipal waste incinerator, but there is not full coincidence. Some other sources of dioxins probably contribute to dioxins found in eggs from Kokshov-Baksha and Valaliky. Most likely both the steelworks and heating plant contribute as sources.

The municipal waste incinerator is probably the major contributor to the dioxins found in Kokshov-Baksha and Valaliky eggs for the following reasons:
1) Results of the study carried out by Burcik and Hornsky,[4]
2) High PCDD/Fs emissions measured in the Koshice municipal waste incinerator in the past as well as the huge fire that occurred last year.
3) The dioxins inventory in National Implementation Plan to Stockholm Convention Proposal.[5]

This pooled six-sample supports calls for a larger monitoring study which would be focused on all U-POPs levels in homegrown food in the area.

The Koshice incinerator

The Koshice municipal waste incinerator began operating in the early 1990s. The owner was the city of Koshice. Since its beginnings, the incinerator was equipped for emission prevention with just an electrostatic precipitator of solid particles. Any other mechanisms for elimination of hazardous emissions were not installed until recently. The atmosphere pathway is therefore considered to be the main way of contamination by U-POPs (PCDD/Fs, PCBs and HCB) released by the incinerator into the environment. Approximately 70% of the prevailing winds blow southwards from Koshice, so the POPs emissions flow particularly to the villages southwards from it.

The tonnage of municipal waste produced yearly in Koshice has increased from 71,070 tons (1992) to ca 91,735.7 tons in year 2000. Majority of this waste is incinerated in the Koshice municipal waste incinerator (according to the state statistics it is 63,212 tons).

The Koshice municipal waste incinerator released PCDD/Fs into the air at levels 33 ng I-TEQ/m^3 in 1992 and at levels of 6.95 and 8.07 ng I-TEQ/m^3 respectively in 1994. More recent results of measurements are not publicly available.

A serious fire lasting for 30 hours burst out on 2 June 2004 at lunch time in the municipal waste incinerator near Koshice, owned by the Kosit Company (see also Picture 2). Fire-fighters could not get the heavy fire under control for a long time. Observing journalists said that sounds strongly resembling explosions were heard from the locality of a fire. This fire could have led to even greater amounts of releases of toxic substances.

Picture 1: Conflagration at the Koshice municipal waste incinerator in June 2004.

A pollution dispersion study focused on heavy metals was done in 1999.[a] According to this study prevailing winds flow from the North - Northwest (45%), and South (20%). Calm occurs 30% of the time. Also, the influence of steelworks VSŽ Koshice was suspected in the area according to the study, but mostly in the villages of Geča and Čaňa south of studied area. The report found Kokshov-Baksha and Valaliky as the most polluted area by mercury, thalium and cadmium. For comparison they stressed that in the area of aluminium primary production near Žiar nad Hronom, lower levels of heavy metals were found compared to the villages surrounding of Koshice municipal waste incinerator.

U-POPs and the Stockholm Convention

The U-POPs measured in this study are slated for reduction and elimination by the Stockholm Convention which holds its first Conference of the Parties in May 2005. Slovakia is a Party to Convention since it ratified the Treaty in 2002.

The Convention mandates Parties to take specific actions aimed at eliminating these pollutants from the global environment. Parties are to require the use of substitute or modified materials, products and processes to prevent the formation and release of U-POPs.[b] Parties are also required to promote the use of best available techniques (BAT) for new facilities or for substantially modified facilities in certain source categories (especially those identified in Part II of Annex C).[c] In addition, Parties are to promote both BAT and best environmental practices (BEP) for all new and existing significant source categories,[d] with special emphasis on those identified in Parts II and III. As part of its national implementation plan (NIP), each Party is required to prepare an inventory of its significant sources of U-POPs, including release estimates.[e] These NIP inventories will, in part, define activities for countries that will be eligible for international aid to implement their NIP. Therefore it is important that the inventory guidelines are accurate and not misleading.

The Stockholm Convention on POPs is historic. It is the first global, legally binding instrument whose aim is to protect human health and the environment by controlling production, use and disposal of toxic chemicals. We view the Convention text as a promise to take the actions needed to protect Slovakian and global public's health and environment from the injuries that are caused by persistent organic pollutants, a promise that was agreed by representatives of the global community: governments, interested stakeholders, and representatives of civil society. We call upon Slovakian governmental representatives and all stakeholders to honor the integrity of the Convention text and keep the promise of reduction and elimination of POPs.

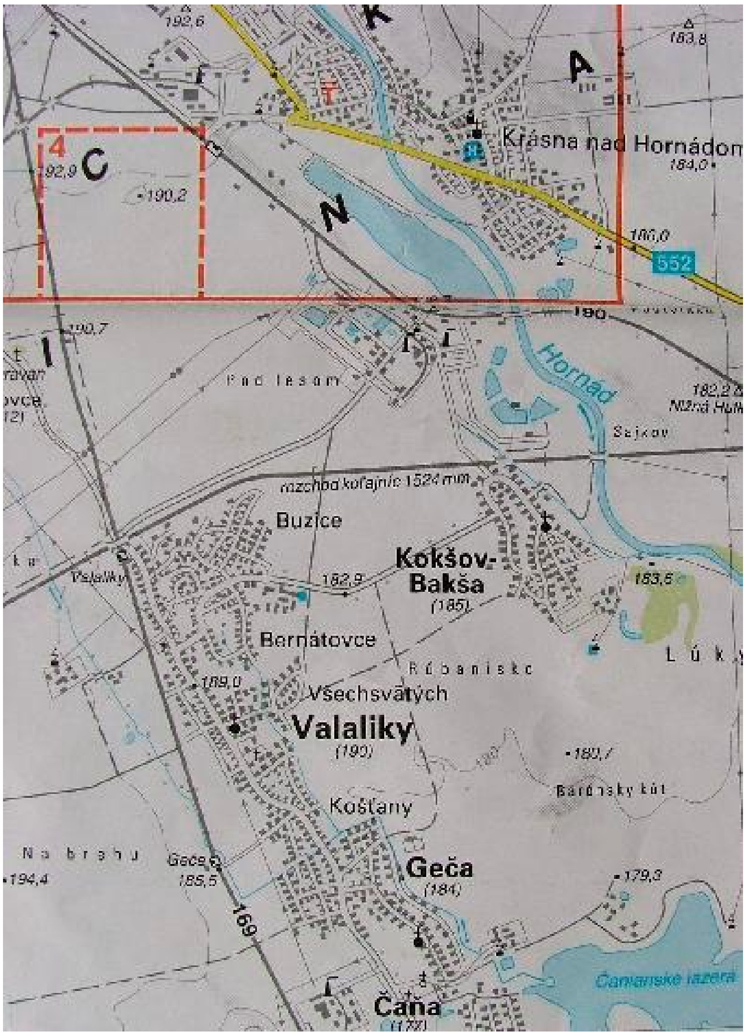
[b] Article 5, paragraph (c)
[c] Article 5, paragraph (d)
[d] Article 5, paragraphs (d) & (e)
[e] Article 5, paragraph (a), subparagraph (i)

Annex 1. Materials and Methods

Sampling

For sampling in Slovakia we have chosen an area surrounding the Koshice Municipal Waste Inicinerator in eastern Slovakia. Sampling was done by members of Friends of the Earth Slovakia at two villages Valaliky (in its parts called Bernatovce and Buzice) and Kokshov - Baksha (see map at Picture 1) at February - 4th 2005. Sampling places were 1.0 and 1.8 km from the Koshice municipal waste incinerator respectively. Five chicken fanciers supplied 12 eggs from their free range chickens. These chickens were 1.5 - 3 years old. The eggs were kept in cool conditions after sampling and then were boiled in Slovakia by Friends of the Earth Slovakia for 7 - 10 minutes in pure water and transported by express service to the laboratory at ambient temperature.

Samples were taken close to the municipal waste incinerator located in Koshice - Krásná in two villages Kokshov-Baksha and Valaliky near the Koshice City, which is the second largest city in Slovakia. It is a metropolis of Eastern Slovakia - situated near the borders with Hungary (20 km), Ukraine (80 km) and Poland (90 km). City itself has within its administrative borders area of 244 km^2; 242,000 inhabitants and residential density reaching 992people/km^2.



Map 1: Map of sampled area and location of the Koshice municipal waste incinerator

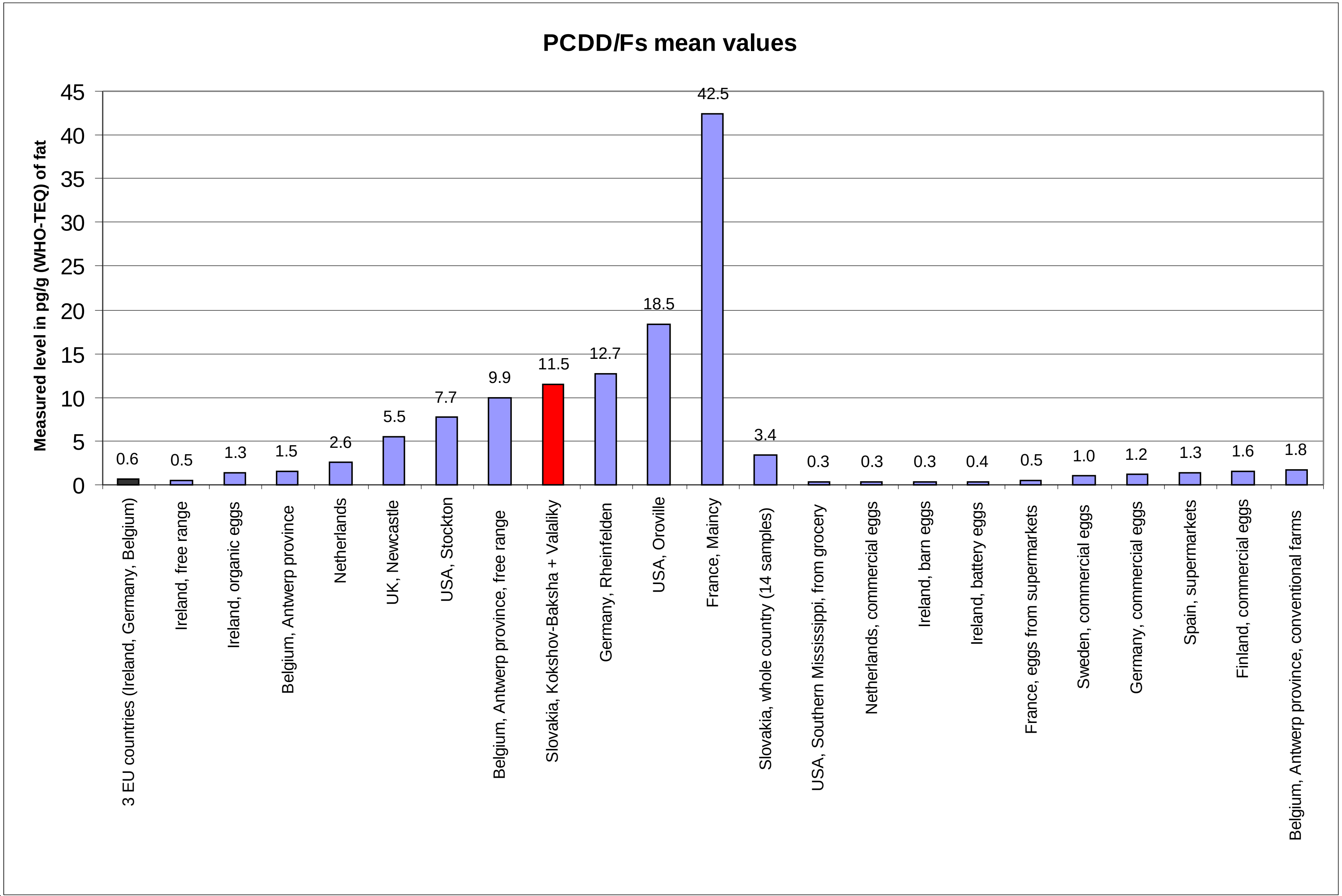
Analysis

After being received by the laboratory, the eggs were kept frozen until analysis. The egg shells were removed and the edible contents of 6 eggs were homogenised. A 30 g sub-sample was dried with anhydrous sodium sulphate, spiked by internal standards and extracted by toluene in a Soxhlet apparatus. A small portion of the extract was used for gravimetric determination of fat. The remaining portion of the extract was cleaned on a silica gel column impregnated with H_2SO4, NaOH and $AgNO_3$. The extract was further purified and fractionated on an activated carbon column. The fraction containing PCDD/Fs, PCBs and HCB was analysed by HR GC-MS on Autospec Ultima NT.

Analysis for PCDD/Fs, PCBs and HCB was done in the Czech Republic in laboratory Axys Varilab. Laboratory Axys Varilab, which provided the analysis is certified laboratory by the Institute for technical normalization, metrology and probations under Ministry of Industry and Traffic of the Czech Republic for analysis of POPs in air emissions, environmental compartments, wastes, food and biological materials.[a] Its services are widely used by industry as well as by Czech governmental institutions. In 1999, this laboratory worked out the study about POPs levels in ambient air of the Czech Republic on request of the Ministry of the Environment of the Czech Republic including also soils and blood tests.

Annex 2: Mean values found within different groups of eggs from different parts of world

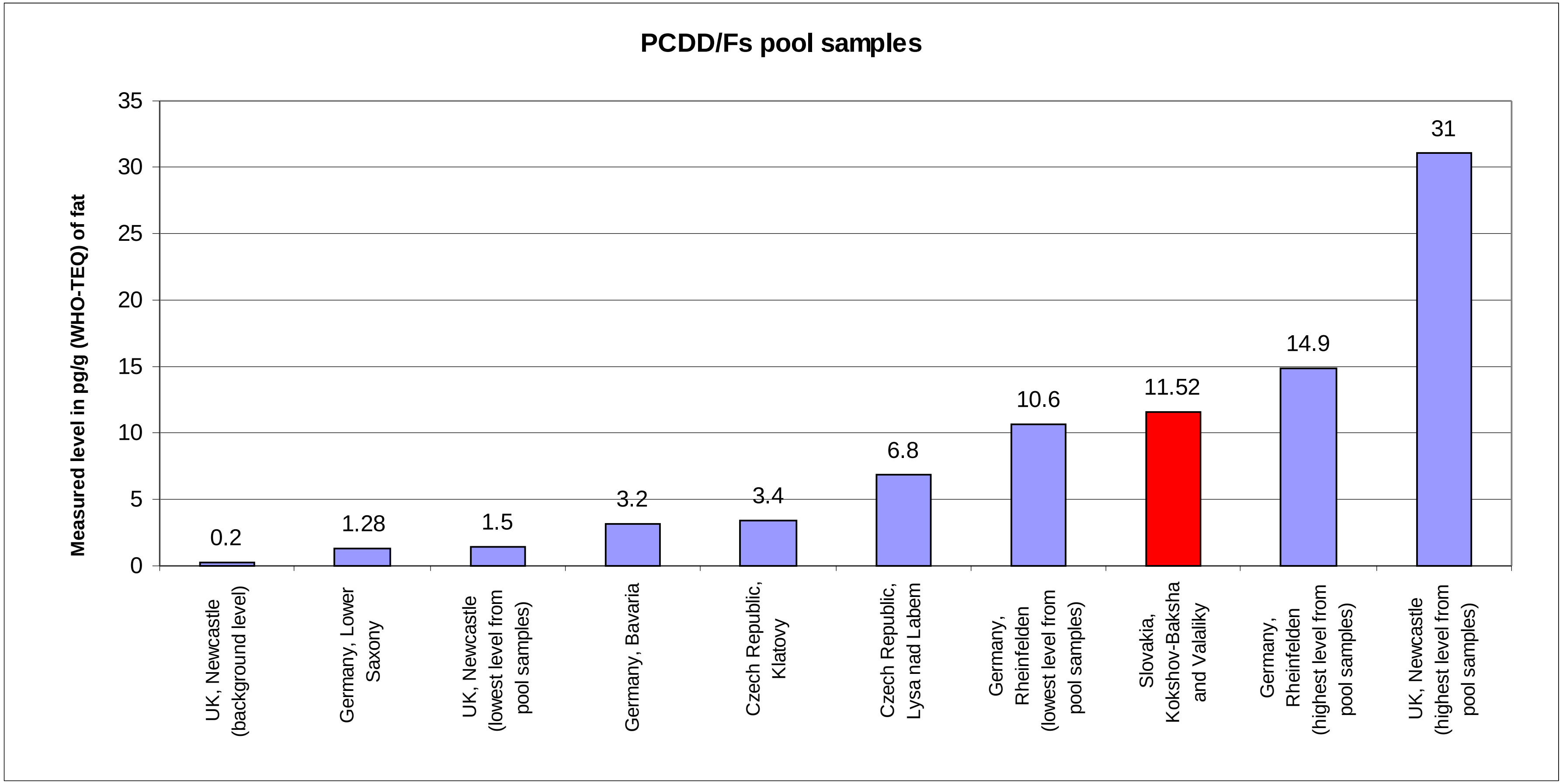
Country/locality	Year	Group	Measured level in pg/g (WHO-TEQ) of fat	Source of information
3 EU countries (Ireland, Germany, Belgium)	1997-2003	both	0.63	DG SANCO 2004
Ireland, free range	2002-2005	free range	0.47	Pratt, I. et al. 2004, FSAI 2004
Ireland, organic eggs	2002-2005	free range	1.30	Pratt, I. et al. 2004, FSAI 2004
Belgium, Antwerp province	2004	free range	1.50	Pussemeier, L. et al. 2004
Netherlands	2004	free range	2.60	SAFO 2004
UK, Newcastle	2002	free range	5.50	Pless-Mulloli, T. et al. 2003b
USA, Stockton	1994	free range	7.69	Harnly, M. E. et al. 2000
Belgium, Antwerp province, free range	2004	free range	9.90	Pussemeier, L. et al. 2004
Slovakia, Kokshov-Baksha + Valaliky	2005	free range	11.52	Axys Varilab 2005
Germany, Rheinfelden	1996	free range	12.70	Malisch, R. et al. 1996
USA, Oroville	1994	free range	18.46	Harnly, M. E. et al. 2000
France, Maincy	2004	free range	42.47	Pirard, C. et al. 2004
Slovakia, whole country (14 samples)	2002	not specified	3.44	ELICC 2004
USA, Southern Mississippi, from grocery	1994	not free range	0.29	Fiedler, H. et al. 1997
Netherlands, commercial eggs	2004	not free range	0.30	Anonymus 2004
Ireland, barn eggs	2002-2005	not free range	0.31	Pratt, I. et al. 2004, FSAI 2004
Ireland, battery eggs	2002-2005	not free range	0.36	Pratt, I. et al. 2004, FSAI 2004
France, eggs from supermarkets	1995-99	not free range	0.46	SCOOP Task 2000
Sweden, commercial eggs	1995-99	not free range	1.03	SCOOP Task 2000
Germany, commercial eggs	1995-99	not free range	1.16	SCOOP Task 2000
Spain, supermarkets	1996	not free range	1.34	Domingo et al. 1999
Finland, commercial eggs	1990-94	not free range	1.55	SCOOP Task 2000
Belgium, Antwerp province, conventional farms	2004	not free range	1.75	Pussemeier, L. et al. 2004



PCDD/Fs mean values
Measured level in pg/g (WHO-TEQ) of fat
45
40
35
30
25
20
15
10
5
0
0.6
0.5
1.3
1.5
2.6
5.5
7.7
9.9
11.5
12.7
18.5
42.5
3.4
0.3
0.3
0.3
0.4
0.5
1.0
1.2
1.3
1.6
1.8
3 EU countries (Ireland, Germany, Belgium)
Ireland, free range
Ireland, organic eggs
Belgium, Antwerp province
Netherlands
UK, Newcastle
USA, Stockton
Belgium, Antwerp province, free range
Slovakia, Kokshov-Baksha + Valaliky
Germany, Rheinfelden
USA, Oroville
France, Maincy
Slovakia, whole country (14 samples)
USA, Southern Mississippi, from grocery
Netherlands, commercial eggs
Ireland, barn eggs
Ireland, battery eggs
France, eggs from supermarkets
Sweden, commercial eggs
Germany, commercial eggs
Spain, supermarkets
Finland, commercial eggs
Belgium, Antwerp province, conventional farms

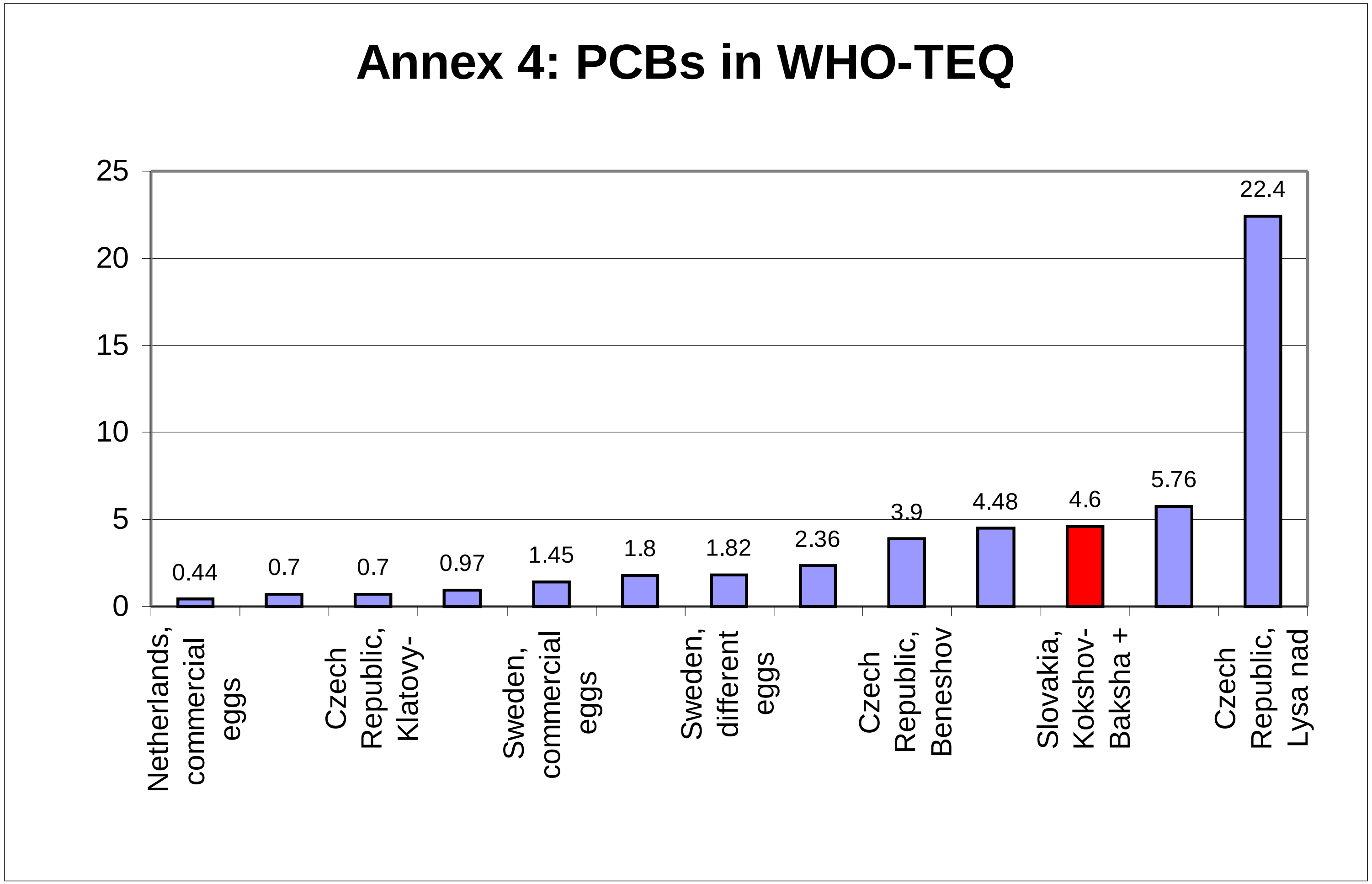
Annex 3: Levels of dioxins (PCDD/Fs) in different pool samples from different parts of world

Country/locality	Year	Group	Number of eggs/measured samples	Measured level in pg/g (WHO-TEQ) of fat	Source of information
UK, Newcastle (background level)	2000	free range	3/1 pooled	0.20	Pless-Mulloli, T. et al. 2001
Germany, Lower Saxony	1998	free range	60/6 pools	1.28	SCOOP Task 2000
UK, Newcastle (lowest level from pool samples)	2000	free range	3/1 pooled	1.50	Pless-Mulloli, T. et al. 2001
Germany, Bavaria	1992	free range	370/37 pools	3.20	SCOOP Task 2000
Czech Republic, Klatovy	2003	free range	12	3.40	Beranek, M. et al. 2003
Czech Republic, Lysa nad Labem	2004	free range	4	6.80	Petrlik, J. 2005
Germany, Rheinfelden (lowest level from pool samples)	1996	free range	-	10.60	Malisch, R. et al. 1996
Slovakia, Kokshov-Baksha and Valaliky	2005	free range	6/1 pooled	11.52	Axys Varilab 2005
Germany, Rheinfelden (highest level from pool samples)	1996	free range	-	14.90	Malisch, R. et al. 1996
UK, Newcastle (highest level from pool samples)	2000	free range	3/1 pooled	31.00	Pless-Mulloli, T. et al. 2001


PCDD/Fs pool samples
Measured level in pg/g (WHO-TEQ) of fat
0
5
10
15
20
25
30
35
0.2
1.28
1.5
3.2
3.4
6.8
10.6
11.52
14.9
31
UK, Newcastle (background level)
Germany, Lower Saxony
UK, Newcastle (lowest level from pool samples)
Germany, Bavaria
Czech Republic, Klatovy
Czech Republic, Lysa nad Labem
Germany, Rheinfelden (lowest level from pool samples)
Slovakia, Kokshov-Baksha and Valaliky
Germany, Rheinfelden (highest level from pool samples)
UK, Newcastle (highest level from pool samples)

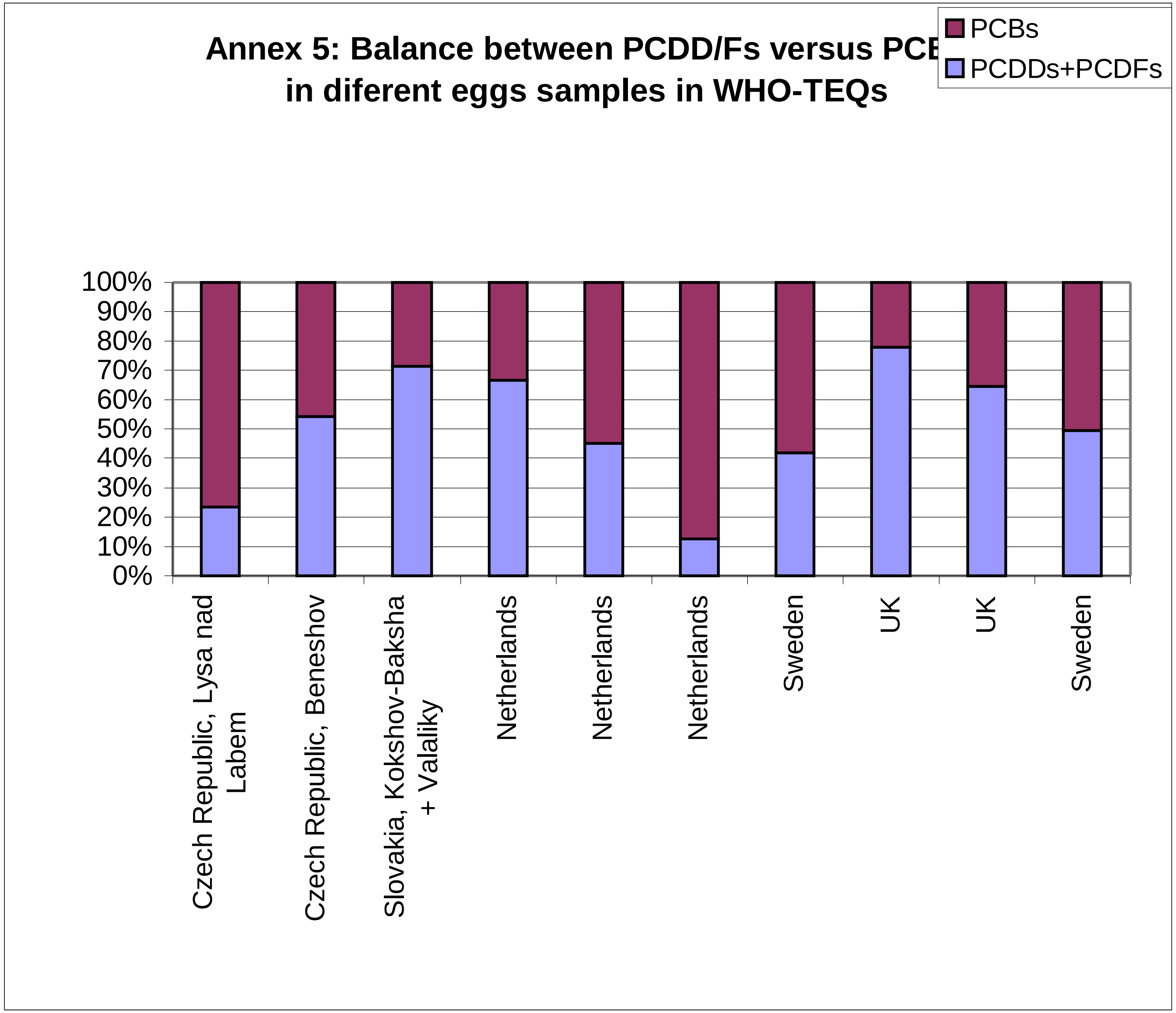
Annex 4: Levels of PCBs in WHO-TEQ in different chicken eggs samples from different parts of world

Country/locality	Year	Group	Number of measured samples	Specification	Measured level in pg/g (WHO-TEQ) of fat	Source of information
Netherlands, commercial eggs	1999	not free range	100/2 pools	pool, nonortho-PCBs	0.44	SCOOP Task 2000
Netherlands, organic farms (lowest level)	2002	free range	6	pool	0.70	Traag, W. et al. 2002
Czech Republic, Klatovy-Luby	2003	free range	free range	individual	0.70	Beranek, M. et al. 2003
UK, commercial eggs	1992	not free range	24/1 pool	pool	0.97	SCOOP Task 2000
Sweden, commercial eggs	1999	not free range	32/4 pools	pool	1.45	SCOOP Task 2000
Netherlands	1990	mixed	8/2 pools	pool, nonortho-PCBs	1.80	SCOOP Task 2000
Sweden, different eggs	1993	mixed	84/7 pools	pool	1.82	SCOOP Task 2000
UK, commercial eggs	1982	not free range	24/1 pool	pool	2.36	SCOOP Task 2000
Czech Republic, Beneshov	2004	free range	4	pool	3.90	Axys Varilab 2004
Uzbekistan, Kanlikul	2001	free range	-	individual	4.50	Muntean, N. et al. 2003
Slovakia, Kokshov-Baksha + Valaliky	2005	free range	-	pool	4.60	Axys Varilab 2005
Netherlands, organic farms (highest level)	2002	free range	6	pool	5.76	Traag, W. et al. 2002
Czech Republic, Lysa nad Labem	2004	free range	4	pool	22.40	Petrlik, J. 2005


Annex 4: PCBs in WHO-TEQ
25
20
15
10
5
0
0.44
0.7
0.7
0.97
1.45
1.8
1.82
2.36
3.9
4.48
4.6
5.76
22.4
Netherlands, commercial eggs
Czech Republic, Klatovy-
Sweden, commercial eggs
Sweden, different eggs
Czech Republic, Beneshov
Slovakia, Kokshov-Baksha +
Czech Republic, Lysa nad

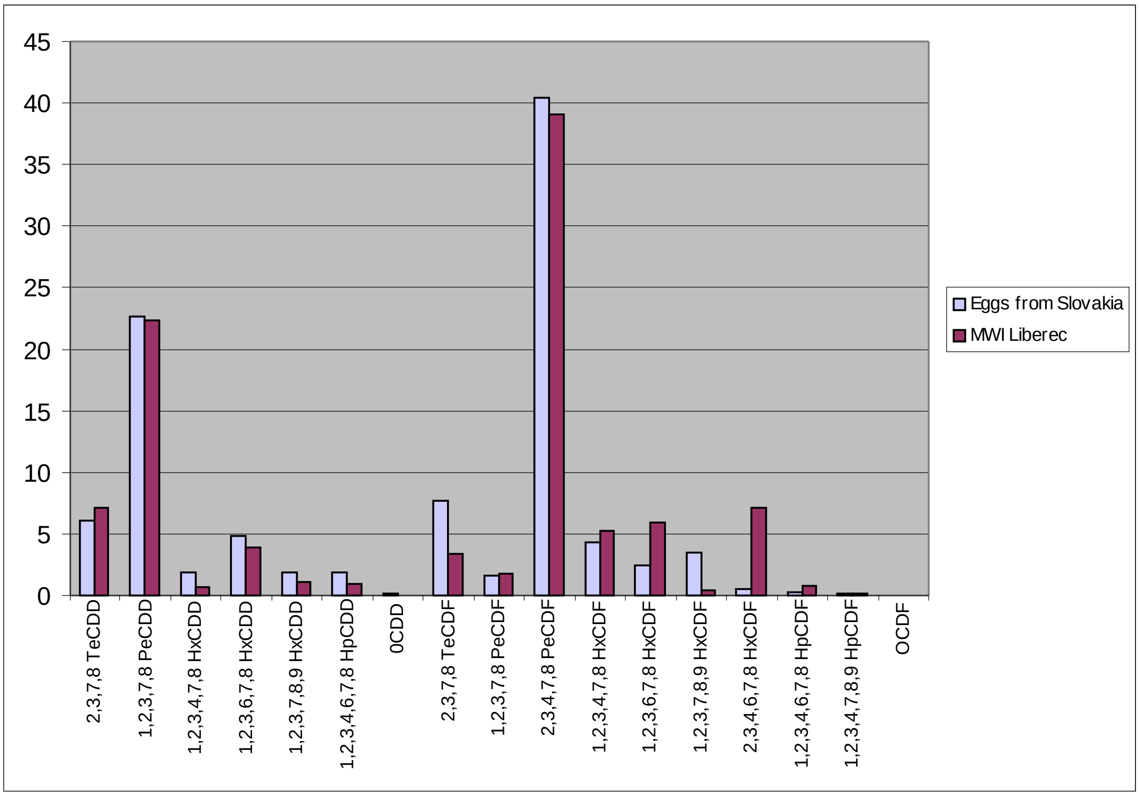
Annex 5: Balance between PCDD/Fs versus PCBs in diferent eggs samples in WHO-TEQs

Country/locality	Year	Group	PCDD/Fs	PCBs	Total WHO-TEQ	Source of information
Czech Republic, Lysa nad Labem	2004	free range	6.80	22.40	29.20	Petrlik, J. 2005
Czech Republic, Beneshov	2004	free range	4.60	3.90	8.50	Axys Varilab 2004
Slovakia, Kokshov-Baksha + Valaliky	2005	free range	11.52	4.60	16.12	Axys Varilab 2004
Netherlands	2002	free range	3.01	1.52	4.53	Traag, W. et al. 2002
Netherlands	2002	free range	4.74	5.76	10.50	Traag, W. et al. 2002
Netherlands	2002	free range	0.70	4.89	5.59	Traag, W. et al. 2002
Sweden	1993	mixed	1.31	1.82	3.13	SCOOP Task 2000
UK	1982	not free range	8.25	2.36	10.61	SCOOP Task 2000
UK	1992	not free range	1.77	0.97	2.74	SCOOP Task 2000
Sweden	1999	not free range	1.43	1.45	2.48	SCOOP Task 2000

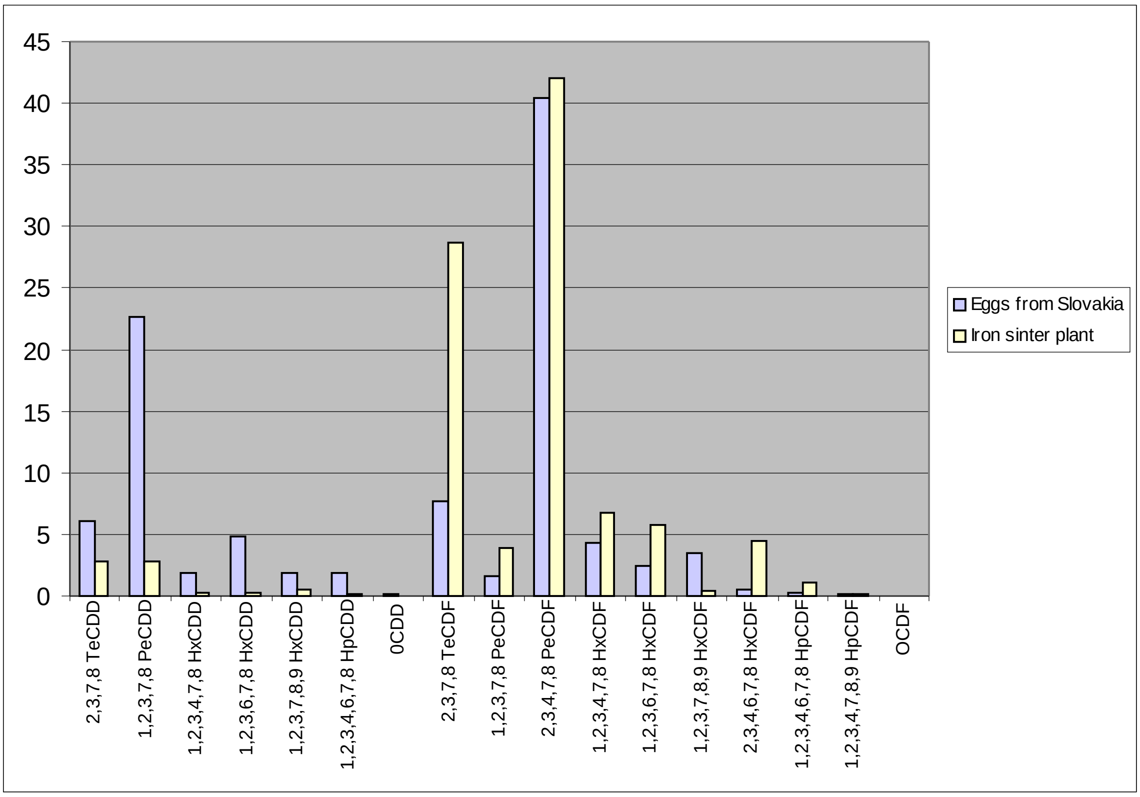

Annex 5: Balance between PCDD/Fs versus PCBs
in diferent eggs samples in WHO-TEQs
PCBs
PCDDs+PCDFs
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Czech Republic, Lysa nad Labem
Czech Republic, Beneshov
Slovakia, Kokshov-Baksha + Valaliky
Netherlands
Netherlands
Netherlands
Sweden
UK
UK
Sweden

Annex 6: Comparison of PCDD/Fs congeners patterns for different types of sources of air releases in WHO-TEQs

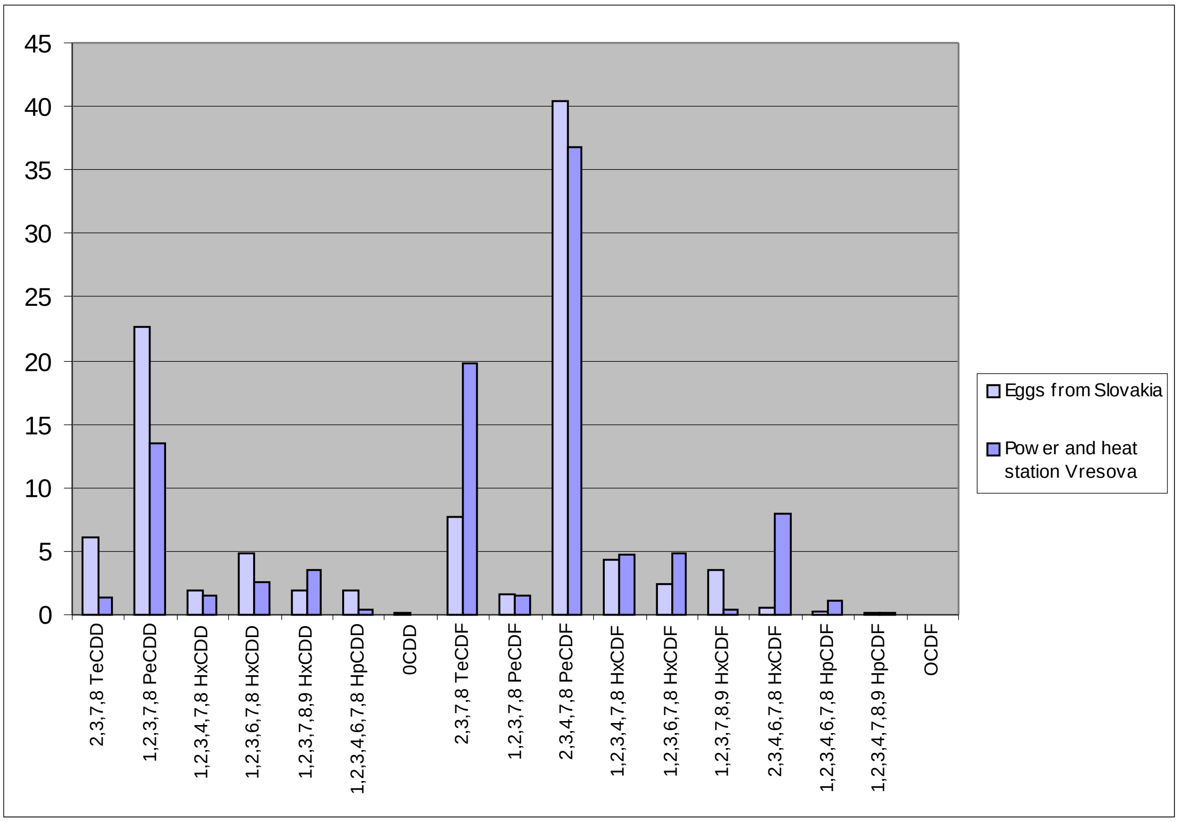
1) Eggs x MWI pattern (data for MWI Libere used to express this pattern)



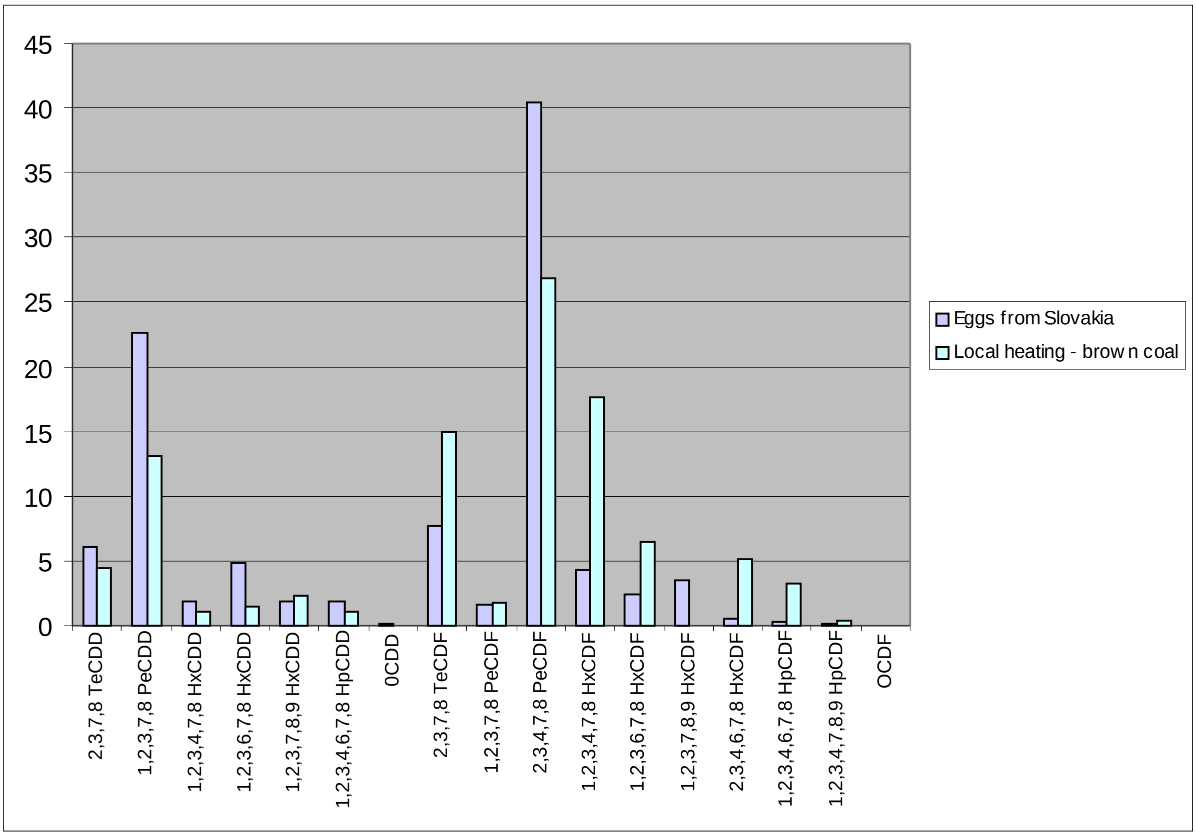
2) Eggs x Iron Sinter Facility (data from research project No VaV/520/1/97 measured by Axys Varilab in 1997 used)



3) Eggs x Heating Plant (data measured from Heating Plant Vresova in the Czech Republic in 1998)



4) Eggs x brown coal burning domestic heating (data from research project No VaV/520/1/97 measured by Axys Varilab in 1997 used)



Annex 7: Photos

Picture 1: Sampling in Kokshov-Baksha

Picture 2: Chickens breeding in one of villages

Pictures 3 and 4: Sampling in Kokshov-Baksha

Picture 5: Sampling with Municipal Waste Incinerator Koshice behind

References

[1] Malisch, R., Schmid, P., Frommberger, R., Fuerst, P. 1996: Results of a Quality Control Study of Different Analytical Methods for Determination of PCDD/PCDF in Eggs Samples. Chemosphere Vol. 32, No. 1, pp. 31-44.

[2] Pirard, C., Focant, J.-F., Massart, A.-C., De Pauw, E., 2004: Assessment of the impact of an old MSWI. Part 1: Level of PCDD/Fs and PCBs in surrounding soils and eggs. Organohalogen Compounds 66: 2085-2090.

[3] Pless-Mulloli, T., Edwards, R., Schilling, B., Paepke, O. 2001b: Executive Summary. PCCD/PCDF and Heavy Metals in Soil and Egg Samples from Newcastle Allotments: Assessment of the role of ash from the Byker incinerator. (Includes comments from Food Standards Agency, Environment Agency). 12 February 2001. University of Newcastle.

[4] Burcik, I., Hronsky, J. 1999: Biomonitorovanie znecistenia ovzdusia v okoli spalovne komunalneho odpadu Kosice - Krasna. (Bimonitoring of Air Pollution in the Surrounding of Waste Incinerating Plant Koshice - Krasna). Zivotne prostredie, Vol. 33, No 6, 320 - 322, 1999.

[5] Chrastiel, R., Murín, M., Gavora, J., Magulova, K. 2004: Technicka sprava V. - Navrh narodneho realizacneho planu pre implementaciu Stokholmskeho dohovoru o POPs v SR, April 2004, SHMU SR, MZP SR.

References for Tables in Annexes

Anonymus 2004: Analytical results eggs from both free range chickens and not free range chickens from Netherlands. Information provided by Netherlands to other EU member states. November 2004.

Axys Varilab CZ 2004: Protokoly č. 537/1-4 o stanovení PCDD/F, PCB vyjádřených ve WHO-TEQ, kongenerových PCB a HCB vydané zkušební laboratoří firmy Axys Vailab. Protocols No. 537/1-4. Vrane nad Vltavou, 2004.

Beranek, M., Havel, M., Petrlik, J. 2003: Lindane - pesticide for the black list. Czech Ecological Society Report, Prague, Nov 2003.

DG SANCO 2004: Analysis of the data contained in the report ”Dioxins and PCBs in Food and Feed : Data available to DG SANCO - Joint Report DG SANCO/DG-JRC-IRMM in the ight of the proposed maximum levels in document SANCO/0072/2004.

Domingo, J.L., Schuhmacher, M., Granero, S., Llobet, J.M. 1999: PCDDs and PCDFs in food samples from Catalonia, Spain. An assessment of dietary intake. Chemosphere. 38(15):3517-3528. In US EPA 2000.

Fiedler, H.; Cooper, K.R.; Bergek, S.; Hjelt, M.; Rappe, C. (1997) Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF) in food samples collected in southern Mississippi, USA. Chemosphere. 34:1411-1419. In US EPA 2000.

Harnly, M. E., Petreas, M. X., Flattery, J., Goldman, L. R. 2000: Polychlorinated Dibenzo-p-dioxin and Polychlorinated Dibenzofuran Contamination in Soil and Home-Produced Chicken Eggs Near Pentachlorophenol Sources. Environ. Sci. Technol.2000, 34,1143-1149

Kočan, A., Jursa, S., Petrík, J., Drobná, B., Chovancová, J., Suchánek, P. 1999: Stav kontaminácie poživatín polychlórovanými bifenylmi v zaťaženej oblasti okresu Michalovce a porovnávacej oblasti okresu Stropkov. In: Cudzorodé látky v poživatinách, 10. - 12. máj 1999, Tatranská Štrba, pp. 31 - 32.

Malisch, R. 1998: Update of PCDD/PCDF-intake from food in Germany. Chemosphere. 37 (9 -12):1687-1698. In US EPA 2000.

Malisch, R., Schmid, P., Frommberger, R., Fuerst, P. 1996: Results of a Quality Control Study of Different Analytical Methods for Determination of PCDD/PCDF in Eggs Samples. Chemosphere Vol. 32, No. 1, pp. 31-44.

Muntean, N., Jermini, M., Small, I., Falzon, D., Peter Fuerst, P., Migliorati, G., Scortichini,G., Forti, A. F., Anklam, E., von Holst, C., Niyazmatov, B., Bahkridinov, S., Aertgeerts, R., Bertollini, R., Tirado, C., Kolb, A. 2003: Assessment of Dietary Exposure to Some Persistent Organic Pollutants in the Republic of Karakalpakstan of Uzbekistan. Vol. 111, No 10, August 2003, Environmental Health Perspectives, 1306-1311.

Petrlik, J. 2005: Hazardous waste incinerator in Lysa nad Labem and POPs waste stockpile in Milovice. International POPs Elimination Project (IPEP) Hot Spot Report. Arnika, Prague 2005.

Pirard, C., Focant, J.-F., Massart, A.-C., De Pauw, E., 2004: Assessment of the impact of an old MSWI. Part 1: Level of PCDD/Fs and PCBs in surrounding soils and eggs. Organohalogen Compounds 66: 2085-2090.

Pless-Mulloli, T., Edwards, R., Schilling, B., Paepke, O. 2001b: Executive Summary. PCCD/PCDF and Heavy Metals in Soil and Egg Samples from Newcastle Allotments: Assessment of the role of ash from the Byker incinerator. (Includes comments from Food Standards Agency, Environment Agency). 12 February 2001. University of Newcastle.

Pless-Mulloli, T., Air, V., Schilling, B., Paepke, O., Foster, K. 2003b: Follow-up Assessment of PCDD/F in Eggs from Newcastle Allotments. University of Newcastle, Ergo, Newcastle City Council, July 2003.

Pratt, I., Tlustos, Ch., Moylan, R., Neilan, R., White, S., Fernandes, A., Rose, M. 2004: Investigation into levels of dioxins, furans and PCBs in battery, free range, barn and organic eggs. Organohalogen Compounds – Volume 66 (2004) 1925-31.

Pussemier, L., Mohimont, L., Huyghebaert, A., Goeyens, L., 2004. Enhanced levels of dioxins in eggs from free range hens: a fast evaluation approach. Talenta 63: 1273-1276.

SAFO (Sustaining Animal Health and Food Safety in Organic Farming) 2004: Onderzoek naar dioxine in eieren van leghennen met vrije uitloop. SAFO, September 2004. Published at: http://www.agriholland.nl/nieuws/home.html. 12/10/2004.

SCOOP Task 2000: Assessment of dietary intake of dioxins and related PCBs by the population of EU Member States. Reports on tasks for scientific cooperation Report of experts participating in Task 3.2.5 (7 June 2000) and Annexes to Report SCOOP Task 3.2.5 (Dioxins). Final Report, 7 June, 2000. European Commission, Health & Consumer Protection Directorate-General, Brussels 2000.

SVA CR (State Veterinary Administration of the Czech Republic) 2004: Chart with results of regular monitoring in Middle Bohemian region. Document reached by Arnika upon request for information.

Traag, W., Portier, L., Bovee, T., van der Weg, G., Onstenk, C., Elghouch, N., Coors, R., v.d. Kraats, C., Hoogenboom, R. 2002: Residues of Dioxins and Coplanar PCBs in Eggs of Free Range Chickens. Organohalogen Compounds Vol. 57 (2002). 245-248.