

15/06

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DIOXINS AND DIOXIN-LIKE PCBs IN OFFALS

Summary

Retail samples of various types of offals consumed in the UK were analysed for dioxins and PCBs. Levels were generally low, although higher concentrations of dioxins were found in liver samples from certain species. Some of these levels exceeded the regulatory limit for dioxins in liver. The data may prompt a re-examination of the way the existing limit is expressed. Dietary exposure, estimated on a whole weight basis, indicates no significant risk to health. Existing agency advice on the consumption of liver remains unchanged.

Key Facts

- Dioxins and PCBs were analysed in 173 samples of offal and processed foods containing offal including liver, kidney, heart, tripe, pate, black pudding, tongue, haggis, sweetbread, chitterling and throatbread.
- Dioxins and PCBs were found at low concentrations in most of the samples analysed. Total TEQ concentrations were in the range 0.2 – 159 ng WHO-TEQ/kg fat, or <0.01 – 4.1 ng WHO-TEQ/kg on a whole weight basis.
- Dioxins concentrations in nine out of 21 samples of lamb liver samples exceeded the fat-based EU Maximum Limit for dioxins in liver of 6.0 pg WHO-TEQ/g fat. A further two samples of pig liver, two of lamb liver and one each of calf and ox liver exceeded the EU action level of 4.0 pg WHO-TEQ/g fat.
- Levels in all ten samples of venison liver tested were above 6 pg WHO-TEQ/g fat, although the maximum limit does not apply to liver from venison.
- Consumer exposure to dioxins and dioxin-like PCBs through the consumption of offal do not raise concerns for public health, even in the case of the higher levels found in some liver samples.
- Based on the results of this survey, the Agency's advice on the consumption of liver is unchanged. This advice, which was primarily drawn up in response to concerns about

the level of vitamin A in liver, is that regular liver consumers should eat it no more than once per week, and pregnant women should avoid liver.

Background

Background information on dioxins and PCBs can be found in the Food Standards Agency's Food Survey Information Sheet No 38/03 which also contains data for dioxins and PCBs in average diets and estimates of intakes.¹ This is the first detailed survey for dioxins and PCBs in offals to be carried out in the UK by the Food Standards Agency. Small numbers of liver and kidney samples were tested during the 2001 foot and mouth disease outbreak, liver was tested as part of a research project investigating dioxin uptake into animals and four liver samples were included in the 2003 EU monitoring programme.²⁻
⁴ Previous work carried out by the Ministry of Agriculture, Fisheries and Food and other workers has demonstrated that liver accumulates dioxins to a greater extent than would be expected from its fat content.⁵⁻¹⁰

Methodology

Sampling

The sampling plan for the survey, covering most of the offals available on the UK market, was produced by Ventress Technical Limited.¹¹ A total of 165 samples of offal including liver, kidney, heart, tripe, pate, black pudding, tongue, haggis, sweetbread, chitterling and throatbread were obtained from retail outlets throughout the UK between April and June 2005. Full details of the samples are provided in Food Survey Information Sheet 14/06 (Survey of metals and other elements in offal and offal products).¹² An additional eight samples of venison liver from different geographical locations were obtained directly by FSA Scotland from a Scottish retail outlet in March 2006 (Annex 2).

Preparation

All samples were homogenised prior to analysis.

Analysis

Analysis of the 17 dioxins and furan congeners and 12 dioxin-like PCBs assigned toxic equivalency factors by the World Health Organization¹⁴ was conducted by the Central Science Laboratory (CSL) using high resolution gas chromatography coupled with high or low resolution mass spectrometry.¹⁵ In addition, a number of non-dioxin-like PCBs were analysed. Full details of the analytical methodology can be found in the analytical

contractor's final report for the survey.¹⁶ All results met published analytical quality assurance criteria.¹⁷

Results

The concentrations of dioxins and dioxin-like PCBs (ng WHO-TEQ/kg whole weight basis), together with certain non dioxin-like PCBs, are summarised in Table 1 and the results for individual samples are shown in annex 1. Full details can be found in the contractor's final reports for the work,^{16,18} including the measurement uncertainties. The concentrations found are generally similar to those reported in other countries.¹⁹⁻²⁰ The contractor's reports also contain details of the non-dioxin-like PCBs that were measured.

With the exception of liver, for which a separate limit applies, all of the samples contained dioxins at levels well below the relevant EU regulatory limits and action limits for meat and meat products.²¹⁻²² However, the concentrations of dioxins in nine of 21 samples of lamb liver exceeded the dioxin limit of 6 pg WHO-TEQ/g fat.

In the case of venison liver, both of the original samples tested contained dioxin levels significantly above 6 pg WHO-TEQ/g fat. In view of the latter results it was decided to obtain and test further samples of venison liver. However, the limit for liver only applies to the animals for which a limit also exists for meat and meat products. In the case of ruminants, this means only bovines and sheep and does not include venison.

Where results have been found that are above the current or proposed regulatory limits, the suppliers or producers have been informed.

In addition, the concentrations of dioxin in two samples of lamb liver, two of pig liver and one each of calf and ox liver were at or above the EU action level for dioxins (4pgWHO-TEQ/g fat).²²

Other than liver and liver-based products, the highest levels of dioxins and PCBs were found in samples of lamb heart (maximum total TEQ 0.33 pg/g whole weight) and ox tongue (maximum total TEQ 0.23 pg/g whole weight).

Interpretation

For the purposes of estimating dietary intakes, results were converted to a whole weight basis. With the exception of the venison and some lamb liver samples, the highest estimated contribution to dietary exposure was 0.55 pg total WHO-TEQ/kg bodyweight based on a 100g portion of lamb heart consumed by a 60 kg adult. For an adult consuming a single weekly portion, this would contribute 0.08 pg/kg bodyweight per day, taking the average daily dietary exposure to 0.93 pg/kg bodyweight when the rest of the diet is taken into account, compared with a tolerable daily intake (TDI) of 2 pg WHO-TEQ/kg bodyweight as recommended by COT in 2001.²³ This is not a significant increase.

Liver

Estimated dietary intakes for the liver samples containing dioxins above the regulatory limit or action level are presented in Tables 3 to 5. The intake from the non-offals part of the diet was estimated from the results of the 2001 Total Diet Study.¹ The results indicate that consumption of up to four 100g portions of lamb, ox, calf or pig liver or one portion of venison liver will not lead to an exceedence of the TDI even when the rest of the diet is taken into account, although the consumption of more than one portion of venison liver per week may take a consumer over the TDI. However, the potential adverse effects of exposure to dioxins are long-term and therefore occasional exceedences of the TDI are not a cause for concern as they are likely to be offset by occasions when exposure is below the TDI. Furthermore, frequent consumption of venison liver is thought to be highly unlikely as it is not widely available.

Finally, it should be recalled that the Agency already advises limiting liver consumption. Liver is a rich source of Vitamin A (retinol). Vitamin A has a number of important functions, such as helping to maintain the health of skin and mucus linings (in the nose for example), strengthening immunity from infections and helping vision in dim light. However, too much Vitamin A may affect the bones and make them more likely to fracture in the elderly. In addition, exposure to too much vitamin A during pregnancy may harm the foetus. Accordingly, the Agency advises that regular liver consumers should not eat liver more frequently than once per week, and that pregnant women should avoid eating liver.²⁴

Conclusion

In total 173 samples of offals consumed in the UK have been tested for dioxins and PCBs. Dioxins and PCBs were detectable in all samples, with higher concentrations being found in venison liver and some lamb liver samples. Nine samples of lamb liver exceeded the regulatory limit, although this did not represent a significant risk to health. The Food Standards Agency has opened a discussion with the European Commission with regard to the appropriateness of the current limit and the possibility of expressing it on a whole weight basis.

Summary of Units

ppb	parts per billion, equivalent to one microgram per kilogram (kg)
kg	a kilogram (kg) is one thousand grams (g)
µg	microgram, one millionth of a gram
ng	a nanogram is one thousand millionth of a gram
pg/kg bw/day	picograms per kilogram of bodyweight per day; equivalent to parts per thousand million million by weight.
pg	a picogram is one million millionth of a gram

Note on nomenclature

'Dioxins' means the sum of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).

In the data tables, where results are reported as 'upper bound' the calculations have assumed that any dioxins or dioxin-like PCBs that were present below the analytical limit of determination were actually present at this level. 'Lower bound' calculations assume figures below the limit of determination to be zero. Although upper bound results may lead to an overestimate, the very high sensitivity of the analytical method used means that, in this case, the differences between upper and lower bound results are negligible.

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Table 1: Concentrations (ng WHO-TEQ/kg or microgram/kg whole weight) of dioxins and dioxin-like PCBs in offals

Offal	Concentrations (upper bound, whole weight, units as shown)											
	ng WHO-TEQ/kg									microgram/kg		
	Dioxins			Dioxin-like PCBs			Total			PCBs (sum of 6 congeners)*		
	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
Pig kidney	0.008	0.006	0.004-0.02	0.004	0.003	0.002-0.007	0.01	0.009	0.007-0.02	0.03	0.03	0.01-0.05
Veal liver	0.008	0.008	-	0.006	0.006	-	0.01	0.01	-	0.03	0.03	-
Poultry liver	0.02	0.02	0.006-0.03	0.003	0.003	0.002-0.005	0.02	0.02	0.01-0.03	0.03	0.02	0.01-0.04
Pig heart	0.01	0.01	-	0.003	0.003	-	0.02	0.02	-	0.04	0.04	-
Chicken liver	0.01	0.01	0.007-0.02	0.009	0.01	0.003-0.02	0.02	0.02	0.01-0.04	0.06	0.06	0.01-0.1
Chicken heart	0.02	0.02	-	0.009	0.009	-	0.03	0.03	-	0.04	0.04	-
Tripe	0.02	0.02	0.01-0.03	0.009	0.009	0.002-0.02	0.03	0.03	0.02-0.04	0.06	0.05	0.007-0.14
Other**	0.02	0.02	0.01-0.03	0.01	0.01	0.006-0.02	0.03	0.03	0.02-0.04	0.08	0.07	0.04-0.12
Lamb kidney	0.03	0.02	0.01-0.05	0.01	0.01	0.005-0.03	0.04	0.04	0.02-0.07	0.11	0.08	0.02-0.32
Pig tongue	0.03	0.03	0.01-0.04	0.01	0.01	0.003-0.04	0.04	0.04	0.02-0.07	0.17	0.17	0.05-0.3
Ox kidney	0.04	0.04	0.02-0.05	0.03	0.03	0.02-0.05	0.07	0.07	0.04-0.1	0.18	0.17	0.05-0.33
Pig liver	0.08	0.07	0.04-0.17	0.02	0.02	0.001-0.06	0.1	0.09	0.04-0.23	0.15	0.11	0.03-0.41
Chicken pate	0.07	0.07	0.05-0.11	0.04	0.04	0.01-0.06	0.11	0.1	0.07-0.17	0.3	0.3	0.1-0.46
Pig pate	0.08	0.07	0.04-0.24	0.03	0.02	0.02-0.06	0.11	0.1	0.06-0.27	0.3	0.3	0.14-0.64
Calf liver	0.07	0.05	0.02-0.15	0.05	0.03	0.01-0.13	0.11	0.07	0.03-0.28	0.3	0.23	0.11-0.49
Haggis	0.08	0.06	0.03-0.17	0.05	0.04	0.02-0.08	0.12	0.1	0.05-0.25	0.1	0.2	0.06-0.26
Ox liver	0.08	0.08	0.03-0.16	0.05	0.05	0.01-0.11	0.13	0.13	0.04-0.27	0.3	0.3	0.1-1.0
Ox tongue	0.05	0.06	0.03-0.08	0.08	0.07	0.03-0.16	0.13	0.13	0.06-0.23	0.3	0.2	0.01-0.9
Duck pate	0.09	0.07	0.04-0.15	0.04	0.02	0.01-0.1	0.13	0.08	0.06-0.25	0.4	0.29	0.14-0.62
Lamb heart	0.1	0.14	0.04-0.21	0.07	0.07	0.02-0.12	0.2	0.21	0.06-0.33	0.5	0.4	0.13-1.23
Black pudding	0.05	0.05	0.02-0.06	0.01	0.01	0.01-0.02	0.06	0.06	0.03-0.08	0.2	0.2	0.07-0.33
Lamb liver	0.4	0.3	0.03-1.22	0.07	0.06	0.009-0.19	0.44	0.33	0.04-1.38	0.3	0.2	0.02-0.9
Venison liver	1.9	1.5	0.53-3.73	0.5	0.6	0.15-1.3	2.4	2.1	0.68-4.56	1.0	1.0	0.31-2.54

Notes:* Sum of PCBs 28, 52, 101, 138, 153 and 180.

** Chitterlings, sweetbreads and throatbreads.

Table 2: Concentrations of dioxins and dioxin-like PCBs in liver samples exceeding the Maximum Limit or Action Level

Sample Number	Sample Description	Concentrations (ng WHO-TEQ/kg fat, upper bound)		
		Dioxins	PCBs	Total
11521	Calf liver Calf Liver	5.0	4.0	9.0
11468	Ox liver Ox Liver	5.0	3.3	8.3
11520	Pig liver Sliced Pig Liver	4.1	0.5	4.5
11420	Pig liver	4.8	1.7	6.4
11385	Lamb liver Lamb Liver	4.0	0.8	4.7
11427	Lamb Liver	5.2	1.0	6.2
11389	Fresh Welsh Lamb Liver	7.0	1.8	8.8
11459	Lamb Liver	7.5	1.8	9.3
11456	Lamb Liver	9.1	2.0	11.1
11530	Fresh Lamb Liver	9.8	2.4	12.1
11372	Lamb Liver	10.5	2.2	12.7
11452	Lamb Liver	12.8	2.4	15.1
11374	Lamb Liver	13.5	2.9	16.4
11509	Lamb Liver	20.0	1.7	21.7
11443	Lamb Liver	24.8	3.2	28.0
13319	Venison liver Red deer liver	12.9	3.8	16.6
13321	Red deer liver	19.9	5.4	25.3
13315	Red deer liver	24.3	5.9	30.2
13318	Red deer liver	23.5	7.2	30.7
11506	Venison Liver	31.5	16.5	48.0
13320	Red deer liver	45.3	16.8	62.1
13316	Red deer liver	64.0	14.0	78.0
13317	Red deer liver	92.4	19.2	111.7
13314	Red deer liver	98.1	21.7	119.9
11522	Roe Venison Liver	109.4	50.0	159.4
-	EU Maximum Limit	6.0	-	12.0*
-	EU Action Level	4.0	4.0*	-

* Applies from November 2006

Table 3 *Upper bound* intakes (pg WHO-TEQ/kg bodyweight/day) of dioxins and dioxin-like PCBs from lamb liver and the rest of the diet – samples that exceed the EU Maximum Limit or Action Level

Sample number	11443	11509	11374	11452	11372	11530	11456	11459	11389	11427	11385
Intake from non-offal part of the diet (a) 0.8											
Concentration in liver (ng WHO-TEQ/kg whole weight)	1.38	0.95	0.95	0.98	0.72	1.00	0.51	0.48	0.50	0.46	0.33
Liver portion size (gram)	100	100	100	100	100	100	100	100	100	100	100
Average daily intake including one weekly portion of liver	0.3	0.2	0.2	0.2	0.17	0.24	0.12	0.11	0.12	0.11	0.08
Total (b)	1.2	1.1	1.1	1.1	1.0	1.1	1.0	1.0	1.0	1.0	0.9
Average daily intake including two weekly portions of liver	0.7	0.5	0.5	0.5	0.34	0.48	0.24	0.23	0.24	0.22	0.16
Total (b)	1.5	1.3	1.3	1.3	1.2	1.3	1.1	1.1	1.1	1.1	1.0

Notes: (a) Estimated from the results of the 2001 Total Diet Study.¹
 (b) Tolerable Daily Intake (TDI) is 2.

Table 4 Upper bound intakes (pg WHO-TEQ/kg bodyweight/day) of dioxins and dioxin-like PCBs from calf, ox and pig liver and the rest of the diet – samples that exceed the EU Action Level

Sample number Offal type	11521 Calf	11468 Ox	11420 Pig	11520 Pig
Intake from non-offal part of the diet (a) 0.8				
Concentration in liver (ng WHO-TEQ/kg whole weight)	0.28	0.27	0.23	0.10
Liver portion size (gram)	100	100	100	100
Average daily intake including one weekly portion of liver	0.07	0.06	0.05	0.02
Total (b)	0.9	0.9	0.9	0.9
Average daily intake including two weekly portions of liver	0.13	0.13	0.11	0.05
Total (b)	1.0	1.0	1.0	0.9

Notes: (a) Estimated from the results of the 2001 Total Diet Study.¹
(b) Tolerable Daily Intake (TDI) is 2.

Table 5 Upper bound intakes (pg WHO-TEQ/kg bodyweight/day) of dioxins and dioxin-like PCBs from venison liver (2005-06) and the rest of the diet – all samples

Sample number	11506	11522	13314	13315	13316	13317	13318	13319	13320	13321
Offal type	Venison	Venison	Red deer	Red deer	Red deer	Red deer	Red deer	Red deer	Red deer	Red deer
Intake from non-offal part of the diet (a)	0.8									
Concentration in liver (ng WHO-TEQ/kg whole weight)	1.58	4.14	4.56	1.02	3.12	4.13	1.38	0.68	2.55	0.93
Liver portion size (gram)	100	100	100	100	100	100	100	100	100	100
Average daily intake including one weekly portion of liver	0.38	1.0	1.1	0.2	0.7	1.0	0.3	0.2	0.6	0.2
Total (b)	1.2	1.8	1.9	1.1	1.6	1.8	1.2	1.0	1.5	1.1
Average daily intake including two weekly portions of liver	0.75	2.0	2.2	0.5	1.5	2.0	0.7	0.3	1.2	0.4
Total (b)	1.6	2.8	3.0	1.3	2.3	2.8	1.5	1.2	2.1	1.3

Notes: (a) Estimated from the results of the 2001 Total Diet Study.¹
(b) Tolerable Daily Intake (TDI) is 2.

		Concentrations (ng WHO-TEQ/kg fat basis)					
		<i>Upper bound</i>			<i>Lower bound</i>		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Lamb kidney							
11376	Lamb Kidney	0.46 ± 0.09	0.29 ± 0.02	0.75 ± 0.11	0.43 ± 0.11	0.27 ± 0.01	0.70 ± 0.12
11409	Lamb Kidney	0.57 ± 0.11	0.27 ± 0.06	0.84 ± 0.18	0.56 ± 0.13	0.14 ± 0.002	0.70 ± 0.13
11411	Lamb Kidney	0.52 ± 0.09	0.38 ± 0.13	0.90 ± 0.23	0.50 ± 0.11	0.13 ± 0.004	0.63 ± 0.12
11416	Lamb Kidney	0.71 ± 0.16	0.75 ± 0.28	1.46 ± 0.44	0.63 ± 0.29	0.24 ± 0.01	0.87 ± 0.30
11444	Lamb Kidney (Halal)	1.53 ± 0.39	0.34 ± 0.03	1.87 ± 0.42	1.27 ± 0.18	0.32 ± 0.01	1.59 ± 0.19
11476	New Zealand Lamb Whole Kidneys	0.47 ± 0.19	0.09 ± 0.02	0.56 ± 0.21	0 ± -	0 ± -	0 ± -
11512	Lamb kidneys	0.50 ± 0.09	0.32 ± 0.12	0.82 ± 0.22	0.49 ± 0.10	0.06 ± 0.002	0.55 ± 0.10
11533	Lamb Kidney	1.13 ± 0.23	0.57 ± 0.15	1.70 ± 0.38	1.07 ± 0.24	0.27 ± 0.005	1.34 ± 0.25
Ox kidney							
11388	Ox Kidney	0.59 ± 0.12	0.43 ± 0.03	1.02 ± 0.15	0.56 ± 0.15	0.42 ± 0.01	0.98 ± 0.16
11407	Ox Kidney	0.46 ± 0.11	0.70 ± 0.14	1.16 ± 0.25	0.40 ± 0.06	0.46 ± 0.006	0.86 ± 0.07
11412	Ox Kidney	0.45 ± 0.09	0.52 ± 0.13	0.97 ± 0.22	0.43 ± 0.10	0.27 ± 0.005	0.70 ± 0.11
11440	Ox Kidney	0.82 ± 0.19	0.57 ± 0.03	1.39 ± 0.22	0.76 ± 0.21	0.56 ± 0.02	1.32 ± 0.23
11472	British Ox Kidney	0.72 ± 0.24	0.56 ± 0.04	1.28 ± 0.28	0.50 ± 0.17	0.55 ± 0.03	1.05 ± 0.20
11513	Ox Kidneys	0.48 ± 0.07	0.47 ± 0.03	0.95 ± 0.10	0.48 ± 0.07	0.46 ± 0.008	0.94 ± 0.08
11515	Diced Ox Kidney	0.96 ± 0.19	0.45 ± 0.04	1.41 ± 0.24	0.88 ± 0.06	0.44 ± 0.03	1.32 ± 0.09
Pig kidney							
11379	Pig Kidney	0.22 ± 0.08	0.15 ± 0.02	0.37 ± 0.10	0.11 ± 0.01	0.13 ± 0.009	0.24 ± 0.02
11387	Pig Kidneys	0.23 ± 0.09	0.16 ± 0.02	0.39 ± 0.11	0.10 ± 0.02	0.14 ± 0.005	0.24 ± 0.02
11392	Pig Kidneys	0.24 ± 0.10	0.08 ± 0.02	0.32 ± 0.12	0.07 ± 0.01	0.05 ± 0.002	0.12 ± 0.02
11408	Pig Kidneys	0.16 ± 0.07	0.05 ± 0.02	0.21 ± 0.08	0.003 ± <0.001	0.03 ± 0.002	0.03 ± 0.002
11442	Pig Kidney	0.57 ± 0.23	0.11 ± 0.02	0.68 ± 0.25	0.02 ± 0.001	0.08 ± 0.004	0.10 ± 0.005
11457	Pig Kidneys	0.22 ± 0.09	0.18 ± 0.08	0.40 ± 0.17	0.02 ± <0.001	0 ± -	0.02 ± <0.001
11482	Pig Kidneys	0.23 ± 0.09	0.11 ± 0.05	0.34 ± 0.13	0.07 ± 0.01	0.02 ± 0.002	0.09 ± 0.01
11519	Pig Kidneys	0.20 ± 0.08	0.11 ± 0.03	0.31 ± 0.10	0.05 ± 0.02	0.06 ± 0.004	0.11 ± 0.02

		Concentrations (ng WHO-TEQ/kg fat basis)					
		Upper bound			Lower bound		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Chicken liver							
11400	Chicken Liver	0.27 ± 0.33	0.18 ± 0.08	0.45 ± 0.08	0.26 ± 0.05	0.15 ± 0.003	0.41 ± 0.06
11406	Chicken Liver	0.14 ± 0.19	0.08 ± 0.08	0.22 ± 0.08	0.04 ± 0.006	0.02 ± <0.001	0.06 ± 0.006
11414	Chicken Livers	0.27 ± 0.36	0.11 ± 0.10	0.38 ± 0.10	0.11 ± 0.01	0.09 ± 0.002	0.20 ± 0.01
11417	Free Range Chicken Liver	0.38 ± 0.48	0.08 ± 0.11	0.46 ± 0.11	0.27 ± 0.04	0.006 ± <0.001	0.28 ± 0.04
11419	Fresh Chicken Livers	0.20 ± 0.28	0.15 ± 0.13	0.35 ± 0.13	0.04 ± 0.003	0.04 ± 0.002	0.08 ± 0.005
11422	Chicken Liver	0.36 ± 0.45	0.45 ± 0.23	0.81 ± 0.23	0.35 ± 0.09	0.15 ± 0.003	0.50 ± 0.09
11433	Chicken Liver	0.55 ± 0.76	0.51 ± 0.37	1.06 ± 0.37	0.08 ± 0.004	0.22 ± 0.04	0.30 ± 0.05
11479	Chicken Liver	0.36 ± 0.44	0.21 ± 0.12	0.57 ± 0.12	0.36 ± 0.08	0.15 ± 0.002	0.51 ± 0.08
11503	Chicken Liver	0.39 ± 0.47	0.24 ± 0.12	0.63 ± 0.12	0.39 ± 0.08	0.17 ± 0.002	0.56 ± 0.08
11529	Chicken Livers	0.33 ± 0.46	0.32 ± 0.25	0.65 ± 0.25	0.09 ± 0.02	0.08 ± 0.003	0.17 ± 0.02
11532	Chicken Liver	0.30 ± 0.38	0.31 ± 0.17	0.61 ± 0.17	0.30 ± 0.08	0.15 ± 0.02	0.45 ± 0.09
Poultry liver							
11378	Poultry Liver	0.52 ± 0.16	0.08 ± 0.02	0.60 ± 0.18	0.44 ± 0.02	0.06 ± 0.001	0.50 ± 0.02
11396	Gressingham Duck (Sold as Duck Liver)	0.17 ± 0.07	0.07 ± 0.02	0.24 ± 0.09	0.02 ± 0.001	0.03 ± 0.001	0.05 ± 0.002
11418	Halal Poultry Liver	0.56 ± 0.19	0.07 ± 0.01	0.63 ± 0.20	0.14 ± 0.01	0.06 ± 0.002	0.20 ± 0.02
Venison liver							
11506	Venison Liver	31 ± 1.6	16 ± 0.2	48 ± 1.8	31 ± 1.6	16 ± 0.14	48 ± 1.72
11522	Roe Venison Liver	109 ± 5.4	50 ± 0.5	159 ± 5.9	109 ± 5.4	50 ± 0.46	159 ± 5.90
13314	Red Deer Liver, Kincardine	98 ± 4.8	22 ± 0.2	120 ± 5.0	98 ± 4.8	22 ± 0.15	120 ± 4.97
13315	Red Deer Liver, Braemar	24 ± 1.3	5.9 ± 0.09	30 ± 1.4	24 ± 1.3	5.9 ± 0.04	30 ± 1.31
13316	Red Deer Liver, Perthshire	64 ± 3.2	14 ± 0.2	78 ± 3.3	64 ± 3.2	14 ± 0.10	78 ± 3.25
13317	Red Deer Liver, Glenesk	92 ± 4.5	19 ± 0.2	112 ± 4.8	92 ± 4.5	19 ± 0.13	112 ± 4.67
13318	Red Deer Liver, Sutherland	24 ± 1.2	7.2 ± 0.1	31 ± 1.3	24 ± 1.2	7.1 ± 0.05	31 ± 1.25
13319	Red Deer Liver, Fort Augustus	13 ± 0.8	3.8 ± 0.06	17 ± 0.8	13 ± 0.8	3.7 ± 0.03	17 ± 0.79
13320	Red Deer Liver, Invernesshire	45 ± 2.2	17 ± 0.2	62 ± 2.5	45 ± 2.2	17 ± 0.11	62 ± 2.36
13321	Red Deer Liver, Loch Carron	20 ± 1.1	5.4 ± 0.09	25 ± 1.1	20 ± 1.1	5.4 ± 0.04	25 ± 1.09
Veal liver							
11397	Natural Farmed Welsh Veal Liver	0.33 ± 0.08	0.25 ± 0.05	0.58 ± 0.12	0.33 ± 0.08	0.17 ± 0.005	0.50 ± 0.09

		Concentrations (ng WHO-TEQ/kg fat basis)					
		<i>Upper bound</i>			<i>Lower bound</i>		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Lamb liver							
11372	Lamb Liver	11 ± 0.72	2.15 ± 0.04	13 ± 0.77	11 ± 0.64	2.09 ± 0.01	13 ± 0.65
11374	Lamb Liver	13 ± 0.79	2.92 ± 0.04	16 ± 0.83	13 ± 0.79	2.89 ± 0.02	16 ± 0.81
11385	Lamb Liver	3.98 ± 0.33	0.75 ± 0.02	4.73 ± 0.35	3.97 ± 0.29	0.74 ± 0.02	4.71 ± 0.31
11389	Fresh Welsh Lamb Liver	7.04 ± 0.64	1.75 ± 0.13	8.79 ± 0.77	7.03 ± 0.67	1.51 ± 0.01	8.54 ± 0.68
11398	Sliced Lamb Liver	0.92 ± 0.10	0.50 ± 0.02	1.42 ± 0.12	0.91 ± 0.09	0.47 ± 0.003	1.38 ± 0.09
11427	Lamb Liver	5.22 ± 0.54	1.02 ± 0.02	6.24 ± 0.56	5.19 ± 0.46	0.99 ± 0.01	6.18 ± 0.48
11439	Lamb Liver	1.51 ± 0.25	0.59 ± 0.02	2.10 ± 0.26	1.48 ± 0.24	0.58 ± 0.01	2.06 ± 0.25
11443	Lamb Liver (Halal)	25 ± 1.56	3.18 ± 0.06	28 ± 1.61	25 ± 1.56	3.16 ± 0.04	28 ± 1.60
11445	Lamb Liver	0.95 ± 0.24	0.41 ± 0.01	1.36 ± 0.25	0.94 ± 0.27	0.39 ± 0.005	1.33 ± 0.27
11452	Lamb Liver	13 ± 0.91	2.38 ± 0.05	15 ± 0.96	13 ± 0.89	2.36 ± 0.02	15 ± 0.91
11456	Lamb Liver	9.08 ± 0.64	2.04 ± 0.03	11 ± 0.67	9.07 ± 0.56	2.03 ± 0.02	11 ± 0.59
11459	Lamb Liver	7.49 ± 0.84	1.81 ± 0.19	9.30 ± 1.03	7.47 ± 0.75	1.43 ± 0.01	8.90 ± 0.76
11469	Sliced Lamb Liver	0.66 ± 0.18	0.38 ± 0.04	1.04 ± 0.21	0.56 ± 0.09	0.31 ± 0.004	0.87 ± 0.10
11473	New Zealand Farm Assured Lamb Sliced Liver	0.35 ± 0.12	0.26 ± 0.01	0.61 ± 0.13	0.20 ± 0.02	0.24 ± 0.004	0.44 ± 0.03
11490	Liver, Bacon & Mash	1.34 ± 0.43	0.47 ± 0.02	1.81 ± 0.46	1.00 ± 0.25	0.44 ± 0.006	1.44 ± 0.26
11494	Lamb Liver	2.78 ± 0.38	1.43 ± 0.05	4.21 ± 0.42	2.77 ± 0.36	1.38 ± 0.02	4.15 ± 0.37
11501	Sliced Lamb Liver with Onions	0.93 ± 0.29	0.22 ± 0.02	1.15 ± 0.30	0.73 ± 0.185	0.19 ± 0.004	0.92 ± 0.19
11509	Lamb Liver	20 ± 2.07	1.69 ± 0.04	22 ± 2.11	20 ± 2.07	1.68 ± 0.03	22 ± 2.10
11527	Lamb Liver	0.54 ± 0.14	0.46 ± 0.07	1.00 ± 0.21	0.46 ± 0.07	0.31 ± 0.006	0.77 ± 0.08
11530	Fresh Lamb Liver	9.77 ± 0.82	2.36 ± 0.09	12 ± 0.91	9.75 ± 0.67	2.22 ± 0.02	12 ± 0.69
11531	Lamb Liver	0.65 ± 0.14	0.42 ± 0.06	1.07 ± 0.20	0.58 ± 0.05	0.30 ± 0.003	0.88 ± 0.05
Calf liver							
11403	Calf Liver	0.36 ± 0.12	0.20 ± 0.005	0.56 ± 0.02	0.15 ± 0.01	0.19 ± 0.006	0.34 ± 0.02
11415	Milk Fed Calf Liver - Dutch	0.56 ± 0.14	0.68 ± 0.008	1.24 ± 0.09	0.49 ± 0.07	0.54 ± 0.008	1.03 ± 0.08
11481	Calf Liver	1.54 ± 0.40	0.66 ± 0.03	2.20 ± 0.05	1.38 ± 0.20	0.62 ± 0.03	2.00 ± 0.23
11521	Calf Liver	4.97 ± 0.40	4.01 ± 0.06	8.98 ± 0.14	4.95 ± 0.31	3.97 ± 0.06	8.92 ± 0.37

		Concentrations (ng WHO-TEQ/kg fat basis)					
		Upper bound			Lower bound		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Pig liver							
11370	Pig Liver	3.01 ± 3.65	0.25 ± 0.03	3.26 ± 0.66	2.97 ± 0.24	0.22 ± 0.007	3.19 ± 0.25
11373	Pig Liver	1.01 ± 1.25	0.19 ± 0.04	1.20 ± 0.25	0.97 ± 0.12	0.10 ± 0.002	1.07 ± 0.12
11395	Pig Liver	2.17 ± 2.62	0.30 ± 0.02	2.47 ± 0.46	2.14 ± 0.17	0.28 ± 0.008	2.42 ± 0.18
11399	Pig Liver	1.46 ± 1.91	0.17 ± 0.07	1.63 ± 0.48	1.12 ± 0.06	0.14 ± 0.07	1.26 ± 0.13
11402	Pig Liver	2.13 ± 2.56	1.07 ± 0.06	3.20 ± 0.49	2.06 ± 0.14	0.99 ± 0.008	3.05 ± 0.15
11404	Pig Liver	1.46 ± 1.68	0.23 ± 0.02	1.69 ± 0.24	1.45 ± 0.21	0.20 ± 0.005	1.65 ± 0.22
11420	Pig liver	4.75 ± 5.38	1.67 ± 0.09	6.42 ± 0.71	4.74 ± 0.61	1.54 ± 0.01	6.28 ± 0.63
11423	Pig Liver	3.55 ± 4.22	0.98 ± 0.11	4.53 ± 0.78	3.43 ± 0.19	0.85 ± 0.009	4.28 ± 0.20
11432	6 Pig Liver Slices	2.57 ± 3.35	0.70 ± 0.21	3.27 ± 0.99	2.12 ± 0.08	0.27 ± 0.004	2.39 ± 0.08
11438	Pig Liver	2.24 ± 2.95	0.26 ± 0.02	2.50 ± 0.73	1.78 ± 0.08	0.24 ± 0.005	2.02 ± 0.08
11441	Pig Liver	1.01 ± 1.34	0.15 ± 0.02	1.16 ± 0.35	0.65 ± 0.03	0.13 ± 0.01	0.78 ± 0.05
11449	British Pork Liver	2.55 ± 3.11	0.53 ± 0.10	3.08 ± 0.66	2.54 ± 0.58	0.34 ± 0.006	2.88 ± 0.59
11463	Liver Sausage	0.37 ± 0.48	0.12 ± 0.07	0.49 ± 0.13	0.30 ± 0.06	0.11 ± 0.07	0.41 ± 0.13
11465	Sliced Pig Liver	2.36 ± 3.07	0.16 ± 0.02	2.52 ± 0.73	2.08 ± 0.07	0.13 ± 0.004	2.21 ± 0.08
11483	Pig Liver	3.43 ± 3.97	0.58 ± 0.04	4.01 ± 0.58	3.42 ± 0.52	0.51 ± 0.004	3.93 ± 0.53
11484	Pork Liver	2.19 ± 2.84	0.55 ± 0.04	2.74 ± 0.69	1.78 ± 0.08	0.49 ± 0.006	2.27 ± 0.08
11487	Fresh Welsh Pig Liver	2.09 ± 2.56	0.49 ± 0.15	2.58 ± 0.62	2.03 ± 0.20	0.22 ± 0.005	2.25 ± 0.20
11493	Pig Liver	0.53 ± 0.64	0.58 ± 0.04	1.11 ± 0.15	0.46 ± 0.04	0.53 ± 0.008	0.99 ± 0.04
11520	Sliced Pig Liver	4.07 ± 4.80	0.46 ± 0.04	4.53 ± 0.77	4.04 ± 0.74	0.40 ± 0.01	4.44 ± 0.75
11523	Sliced Pig Liver	1.24 ± 1.53	0.21 ± 0.03	1.45 ± 0.31	1.21 ± 0.13	0.15 ± 0.004	1.36 ± 0.14
11534	Rare Breeds Pig Liver	2.29 ± 2.97	0.91 ± 0.13	3.20 ± 0.81	2.08 ± 0.08	0.65 ± 0.007	2.73 ± 0.09
Ox liver							
11421	Chopped Liver	0.24 ± 0.07	0.12 ± 0.01	0.36 ± 0.04	0.19 ± 0.04	0.10 ± 0.001	0.29 ± 0.04
11424	Ox Liver	2.35 ± 0.33	1.55 ± 0.16	3.90 ± 0.32	2.34 ± 0.31	1.28 ± 0.01	3.62 ± 0.32
11428	Ox Liver	1.38 ± 0.27	2.05 ± 0.17	3.43 ± 0.30	1.37 ± 0.27	1.82 ± 0.03	3.19 ± 0.30
11450	British Ox Liver	3.42 ± 0.63	0.77 ± 0.09	4.19 ± 0.65	3.41 ± 0.64	0.62 ± 0.01	4.03 ± 0.65
11451	Ox Liver	2.30 ± 0.33	1.70 ± 0.20	4.00 ± 0.33	2.28 ± 0.32	1.36 ± 0.01	3.64 ± 0.33
11468	Ox Liver	4.99 ± 0.95	3.30 ± 0.09	8.29 ± 0.33	4.77 ± 0.27	3.29 ± 0.06	8.06 ± 0.33
11508	Ox Liver	1.77 ± 0.35	0.53 ± 0.07	2.30 ± 0.11	1.70 ± 0.11	0.40 ± 0.004	2.10 ± 0.11
11510	Ox Liver	1.15 ± 0.18	1.03 ± 0.06	2.18 ± 0.18	1.14 ± 0.17	0.95 ± 0.009	2.09 ± 0.18

		Concentrations (ng WHO-TEQ/kg fat basis)					
		Upper bound			Lower bound		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Chicken pâté							
11382	Organic Chicken Pate	0.79 ± 0.20	0.45 ± 0.04	1.24 ± 0.24	0.76 ± 0.21	0.44 ± 0.03	1.20 ± 0.25
11383	Smooth Chicken Liver Pate	0.21 ± 0.08	0.06 ± 0.01	0.27 ± 0.09	0.18 ± 0.09	0.05 ± 0.005	0.23 ± 0.10
11430	Chicken & Bacon Pate	0.20 ± 0.08	0.20 ± 0.06	0.40 ± 0.14	0.04 ± 0.009	0.10 ± 0.02	0.14 ± 0.03
11448	Chicken, Bacon & Red Wine Pate	0.32 ± 0.13	0.06 ± 0.02	0.38 ± 0.14	0.007 ± <0.001	0.04 ± 0.003	0.05 ± 0.003
11470	Pate de Foie de Volaille au Calvados	0.21 ± 0.08	0.05 ± 0.01	0.26 ± 0.10	0.009 ± <0.001	0.03 ± 0.002	0.04 ± 0.002
11528	Chicken Liver Pate	0.18 ± 0.07	0.21 ± 0.08	0.39 ± 0.15	0.007 ± <0.001	0.04 ± 0.004	0.05 ± 0.004
Duck pâté							
11431	Duck & Champagne Pate	0.36 ± 0.12	0.24 ± 0.06	0.60 ± 0.18	0.18 ± 0.03	0.14 ± 0.02	0.32 ± 0.05
11474	Duck & Orange Pate	0.11 ± 0.04	0.04 ± 0.01	0.15 ± 0.06	0.002 ± <0.001	0.03 ± 0.005	0.03 ± 0.005
11486	Rannoch Smoked Duck Pate	0.25 ± 0.10	0.05 ± 0.01	0.30 ± 0.11	0.02 ± 0.001	0.03 ± 0.002	0.04 ± 0.003
Pork pâté							
11381	Reduced Fat Brussels Pate	0.24 ± 0.08	0.10 ± 0.02	0.34 ± 0.10	0.12 ± 0.01	0.09 ± 0.006	0.21 ± 0.02
11384	Medium Coarse Ardennes Pate	0.31 ± 0.12	0.08 ± 0.02	0.39 ± 0.13	0.12 ± 0.02	0.06 ± 0.007	0.18 ± 0.02
11393	Brussels Reduced Fat Pate	0.35 ± 0.12	0.32 ± 0.09	0.67 ± 0.21	0.19 ± 0.02	0.15 ± 0.002	0.34 ± 0.02
11413	Garlic and Liver Pate	0.90 ± 0.23	0.09 ± 0.02	0.99 ± 0.25	0.74 ± 0.11	0.07 ± 0.001	0.81 ± 0.11
11425	Traditional Brussels Pate	0.24 ± 0.09	0.09 ± 0.02	0.33 ± 0.10	0.12 ± 0.02	0.07 ± 0.002	0.19 ± 0.02
11429	Brussels Pate	0.15 ± 0.05	0.21 ± 0.07	0.36 ± 0.11	0.09 ± 0.009	0.09 ± 0.02	0.18 ± 0.03
11477	Brussels Pate	0.28 ± 0.11	0.10 ± 0.02	0.38 ± 0.13	0.05 ± 0.001	0.09 ± 0.01	0.14 ± 0.01
11500	Liver & Bacon Spreading Pate	0.22 ± 0.07	0.08 ± 0.02	0.30 ± 0.10	0.11 ± 0.009	0.020 ± 0.006	0.13 ± 0.01
11507	Spicy Basque Pate	0.33 ± 0.13	0.05 ± 0.01	0.38 ± 0.14	0.10 ± 0.02	0.03 ± 0.008	0.13 ± 0.03
11511	Brussels Pate	0.55 ± 0.19	0.06 ± 0.01	0.61 ± 0.20	0.29 ± 0.03	0.04 ± 0.002	0.33 ± 0.03
11517	Medium Coarse Ardennes Pate	0.13 ± 0.05	0.07 ± 0.02	0.20 ± 0.06	0.08 ± 0.008	0.06 ± 0.004	0.14 ± 0.01
11518	Brussels Pate	0.19 ± 0.06	0.10 ± 0.02	0.29 ± 0.08	0.15 ± 0.009	0.09 ± 0.01	0.24 ± 0.02
Other							
11390	Chitterlings	0.20 ± 0.08	0.37 ± 0.16	0.57 ± 0.24	0.06 ± 0.009	0.03 ± 0.001	0.09 ± 0.01
11394	Chitterlings	0.22 ± 0.09	0.16 ± 0.07	0.38 ± 0.16	0.02 ± 0.002	0.04 ± 0.002	0.06 ± 0.004
11386	Welsh Lamb Sweetbreads	0.45 ± 0.05	0.17 ± 0.02	0.62 ± 0.07	0.44 ± 0.06	0.14 ± 0.003	0.58 ± 0.06
11454	Throatbreads	0.91 ± 0.11	0.26 ± 0.02	1.17 ± 0.13	0.90 ± 0.10	0.23 ± 0.002	1.13 ± 0.11

		Concentrations (ng WHO-TEQ/kg fat basis)					
		Upper bound			Lower bound		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Ox tongue							
11377	Raw Ox Tongue	0.26 ± 0.06	0.23 ± 0.01	0.49 ± 0.07	0.24 ± 0.04	0.21 ± 0.002	0.45 ± 0.04
11410	Ox Tongue (ex delicatessen counter)	0.31 ± 0.11	0.73 ± 0.04	1.04 ± 0.15	0.16 ± 0.02	0.72 ± 0.02	0.88 ± 0.05
11435	Ox Tongue with Gelatine	0.43 ± 0.11	0.49 ± 0.07	0.92 ± 0.18	0.33 ± 0.05	0.37 ± 0.004	0.70 ± 0.06
11436	Ox Tongue Pressed	0.29 ± 0.10	0.27 ± 0.07	0.56 ± 0.17	0.14 ± 0.01	0.14 ± 0.002	0.28 ± 0.01
11453	Raw Ox Tongue	0.41 ± 0.08	0.54 ± 0.03	0.95 ± 0.12	0.35 ± 0.03	0.50 ± 0.008	0.85 ± 0.04
11471	Ox Tongue	0.37 ± 0.10	0.48 ± 0.05	0.85 ± 0.15	0.29 ± 0.07	0.46 ± 0.01	0.75 ± 0.08
11498	Ox Tongue - Cooked	0.23 ± 0.06	0.45 ± 0.03	0.68 ± 0.09	0.15 ± 0.03	0.40 ± 0.008	0.55 ± 0.04
11526	Ox Tongue (cured ox tongue in jelly – display)	0.39 ± 0.11	0.52 ± 0.10	0.91 ± 0.21	0.30 ± 0.06	0.36 ± 0.005	0.66 ± 0.06
Pig tongue							
11391	Pork Tongue	0.27 ± 0.11	0.33 ± 0.15	0.60 ± 0.26	0.006 ± <0.001	0.02 ± 0.003	0.03 ± 0.003
11437	Pork Lunch Tongue	0.19 ± 0.08	0.16 ± 0.06	0.35 ± 0.14	0.04 ± 0.007	0.03 ± 0.002	0.07 ± 0.009
11447	Lunch Tongue	0.21 ± 0.09	0.08 ± 0.02	0.29 ± 0.10	0.002 ± <0.001	0.07 ± 0.005	0.07 ± 0.005
11462	Lunch Tongue	0.13 ± 0.05	0.03 ± 0.01	0.16 ± 0.06	0.02 ± 0.003	0.02 ± 0.001	0.04 ± 0.004
11466	Lunch Tongue in Jelly	0.14 ± 0.06	0.04 ± 0.01	0.18 ± 0.07	0.02 ± 0.003	0.03 ± 0.006	0.05 ± 0.009
11475	Lunch Tongue	0.31 ± 0.13	0.06 ± 0.02	0.37 ± 0.14	0.002 ± <0.001	0.02 ± 0.008	0.03 ± 0.008
11488	Lunch Tongue	0.30 ± 0.12	0.15 ± 0.05	0.45 ± 0.17	0.004 ± <0.001	0.05 ± 0.006	0.05 ± 0.006
11516	Lunch Tongue	0.17 ± 0.06	0.16 ± 0.04	0.33 ± 0.10	0.06 ± 0.01	0.12 ± 0.01	0.18 ± 0.02
Haggis							
11485	Traditional Recipe Haggis	0.41 ± 0.13	0.38 ± 0.053	0.79 ± 0.18	0.33 ± 0.07	0.29 ± 0.02	0.62 ± 0.09
11489	Haggis – slicing	0.78 ± 0.13	0.36 ± 0.019	1.14 ± 0.15	0.78 ± 0.13	0.32 ± 0.003	1.10 ± 0.13
11491	Haggis Olives	0.41 ± 0.14	0.27 ± 0.025	0.68 ± 0.17	0.22 ± 0.02	0.25 ± 0.008	0.47 ± 0.03
11495	Haggis	0.46 ± 0.09	0.26 ± 0.022	0.72 ± 0.11	0.45 ± 0.08	0.23 ± 0.009	0.68 ± 0.09
11496	Hand-Made Traditional Haggis	0.48 ± 0.10	0.34 ± 0.030	0.82 ± 0.13	0.42 ± 0.04	0.31 ± 0.007	0.73 ± 0.05
11499	Haggis	0.40 ± 0.09	0.29 ± 0.035	0.69 ± 0.12	0.33 ± 0.03	0.26 ± 0.03	0.59 ± 0.06
11514	Haggis Neeps & Tatties	0.49 ± 0.17	0.25 ± 0.020	0.74 ± 0.19	0.38 ± 0.11	0.25 ± 0.02	0.63 ± 0.13

		Concentrations (ng WHO-TEQ/kg fat basis)					
		<i>Upper bound</i>			<i>Lower bound</i>		
Sample code	Product as described	Dioxins	PCBs	DX+PCBs	Dioxins	PCBs	DX+PCBs
Chicken heart							
11405	Chicken Hearts	0.35 ± 0.13	0.16 ± 0.02	0.51 ± 0.15	0.15 ± 0.03	0.13 ± 0.002	0.28 ± 0.03
Lamb heart							
11426	Lamb Heart	0.93 ± 0.10	0.39 ± 0.03	1.32 ± 0.13	0.92 ± 0.10	0.38 ± 0.02	1.30 ± 0.12
11458	Lamb Hearts	0.91 ± 0.13	0.38 ± 0.02	1.29 ± 0.16	0.90 ± 0.15	0.38 ± 0.01	1.28 ± 0.16
11467	Lamb Hearts	1.20 ± 0.20	0.73 ± 0.05	1.93 ± 0.24	1.18 ± 0.22	0.72 ± 0.02	1.90 ± 0.24
11504	Lamb Heart	0.32 ± 0.10	0.19 ± 0.05	0.51 ± 0.15	0.18 ± 0.06	0.10 ± 0.005	0.28 ± 0.06
11505	Lamb Heart	0.86 ± 0.12	0.29 ± 0.05	1.15 ± 0.17	0.85 ± 0.14	0.20 ± 0.008	1.05 ± 0.15
11525	Lamb Hearts	0.90 ± 0.11	0.51 ± 0.07	1.41 ± 0.19	0.88 ± 0.11	0.44 ± 0.03	1.32 ± 0.13
Pig heart							
11371	Pig Heart	0.35 ± 0.14	0.08 ± 0.01	0.43 ± 0.15	0.07 ± 0.003	0.07 ± 0.02	0.14 ± 0.02
Tripe							
11375	Tripe	0.40 ± 0.08	0.24 ± 0.02	0.64 ± 0.11	0.40 ± 0.09	0.23 ± 0.006	0.63 ± 0.09
11380	Tripe	1.17 ± 0.47	0.21 ± 0.03	1.38 ± 0.50	0.01 ± <0.001	0.15 ± 0.008	0.16 ± 0.008
11434	Tripe	0.29 ± 0.11	0.36 ± 0.09	0.65 ± 0.19	0.09 ± 0.01	0.19 ± 0.003	0.28 ± 0.02
11455	Tripe	0.63 ± 0.21	0.24 ± 0.03	0.87 ± 0.24	0.26 ± 0.02	0.21 ± 0.005	0.47 ± 0.03
11460	Tripe	1.44 ± 0.53	0.31 ± 0.05	1.75 ± 0.59	0.24 ± 0.04	0.23 ± 0.01	0.47 ± 0.05
11497	Tripe	0.54 ± 0.19	0.46 ± 0.07	1.00 ± 0.26	0.15 ± 0.02	0.36 ± 0.03	0.51 ± 0.05
11502	Tripe	0.87 ± 0.35	0.25 ± 0.05	1.12 ± 0.40	<0.001 ± <0.001	0.16 ± 0.004	0.16 ± 0.02
11524	Ox Tripe	1.08 ± 0.43	1.11 ± 0.43	2.19 ± 0.86	0.008 ± <0.001	0.24 ± 0.02	0.25 ± 0.007
Black pudding							
11401	Real Lancashire Black Pudding	0.80 ± 0.31	0.16 ± 0.03	0.96 ± 0.34	0.25 ± 0.07	0.11 ± 0.004	0.36 ± 0.07
11446	Black Pudding	0.34 ± 0.12	0.09 ± 0.02	0.43 ± 0.14	0.14 ± 0.02	0.08 ± 0.006	0.22 ± 0.03
11461	Black Pudding	0.17 ± 0.06	0.06 ± 0.01	0.23 ± 0.07	0.10 ± 0.03	0.05 ± 0.006	0.15 ± 0.04
11464	Premium Black Pudding	0.23 ± 0.09	0.07 ± 0.01	0.30 ± 0.10	0.04 ± 0.006	0.06 ± 0.006	0.10 ± 0.01
11478	Black Pudding	0.24 ± 0.09	0.08 ± 0.02	0.32 ± 0.11	0.08 ± 0.01	0.03 ± 0.007	0.11 ± 0.02
11480	Black Pudding	0.25 ± 0.10	0.05 ± 0.01	0.30 ± 0.12	0.01 ± 0.005	0.04 ± 0.009	0.05 ± 0.009
11492	Black Pudding	0.17 ± 0.05	0.14 ± 0.04	0.31 ± 0.09	0.07 ± 0.02	0.10 ± 0.007	0.17 ± 0.03

Details of additional venison liver samples**Annex 2**

Sample code	Product as described	Retailer	Date of purchase
13314	Red Deer Liver, Durris, Kincardine	Highland Game Ltd Baird Ave Dryburgh Industrial Estate Dundee DD2 3TN	8 March 2006
13315	Red Deer Liver, Invercauld, Braemar		
13316	Red Deer Liver, Glenshee, Perthshire		
13317	Red Deer Liver, Millden, Glenesk		
13318	Red Deer Liver, Berriedale, Sutherland		
13319	Red Deer Liver, Fort Augustus		
13320	Red Deer Liver, Glenfeshire, Invernesshire		
13321	Red Deer Liver, Ach More, Loch Carron		