

PCB Residues in Feedlot Steers

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It was established that 113 head of feedlot steers, located in the state of Kansas, had been exposed to Aroclor 1260 for a period of about five months prior to moving to a feedlot (ROBENS & ANTHONY 1980). The source of the exposure was waste transformer oil used as an insecticide carrier in a backrubber.

Tailhead fat biopsies (5-10 g each) were collected and submitted to the Toxicology Section, National Veterinary Services Laboratories for analysis. Biopsies were individually wrapped in aluminum foil and identified prior to shipment.

EXPERIMENTAL

Biopsies were rendered in 125-mL flasks by heating in an oven at 120 C until the fat melted. Exactly 0.10 g of the rendered lipid was weighed into a 15-mL graduated tube and diluted to 10.0 mL with hexane. No further cleanup was needed.

PCB analysis was done on a gas chromatograph equipped with a ⁶³Ni detector and a 1.8 m x 3 mm i.d. glass column packed with 3% OV-101 on 80-100 mesh Chromosorb G-HP and operated at 220 C. Injections varied from 2.0-6.0 µL.

Quantitation was done by peak area summation of all PCB peaks compared to an authentic Aroclor 1260 standard. Confirmation was done on a Finnigan Model 4000 GC/MS/DS equipped with INCOS Model 3.1 software and similar column conditions.

Transformer oil was diluted in hexane until the detector response was within the range of the standard.

RESULTS

Results of the PCB analyses are shown in Table 1. Those samples which were not in the linear range were diluted further in hexane. A chromatogram of a typical biopsy sample extract is shown in Fig. 1 compared to Aroclor 1260. Fig. 2 is a comparison of the waste transformer oil to Aroclor 1260. The transformer oil was greater than 95% pure Aroclor 1260 as analyzed by gas chromatography.

Table 1. PCB Levels in Steer Biopsy Samples in parts per million as Aroclor 1260

Animal #	Level	Animal #	Level	Animal #	Level
1	150	39	600	77	70
2	800	40	160	78	320
3	300	41	390	79	350
4	300	42	2200	80	110
5	360	43	100	81	290
6	930	44	570	82	560
7	1100	45	80	83	990
8	120	46	340	84	950
9	310	47	560	85	360
10	130	48	240	86	1000
11	810	49	590	87	440
12	170	50	520	88	300
13	240	51	160	89	520
14	380	52	120	90	270
15	470	53	460	91	310
16	1500	54	410	92	830
17	320	55	300	93	790
18	830	56	250	94	190
19	590	57	430	95	150
20	410	58	220	96	850
21	300	59	140	97	250
22	510	60	800	98	210
23	700	61	620	99	400
24	630	62	310	100	200
25	740	63	800	101	290
26	310	64	100	102	140
27	600	65	610	103	80
28	100	66	150	104	630
29	400	67	230	105	620
30	460	68	810	106	170
31	950	69	550	107	500
32	450	70	930	108	120
33	370	71	260	109	480
34	750	72	670	110	490
35	260	73	1300	111	240
36	510	74	190	112	440
37	470	75	600	113	720
38	80	76	490		

DISCUSSION

The concentration of PCB in the fat samples ranged from 70 to 2200 ppm with an average of 470 ppm. The extremely high levels of PCB present in the samples allowed the relatively simple extraction procedure. No change in detector response was noted during the period of analysis, which was about three weeks.

Fig. 1 (fat extract and Aroclor 1260) shows that peak a, a hexachlorobiphenyl, in the biopsy is relatively larger than the earlier eluting lesser chlorinated biphenyl when compared to the standard

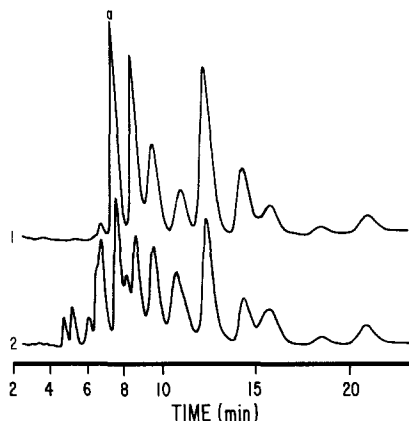


Figure 1. Chromatograms of 1) typical steer fat extract and 2) Aroclor 1260 standard

Aroclor 1260. Without exception, all 113 biopsy samples had identical chromatographic profiles, with only small differences in relative amounts of each peak. Chromatograms of unexposed beef fat extracts showed no detector response in the region where the Aroclor 1260 eluted.

The accumulation of the higher chlorinated PCB in the fat is consistent with studies done in other species (ALBRO & FISHBEIN 1972, GRANT et al. 1971) and different environments (GREICHUS et al. 1977).

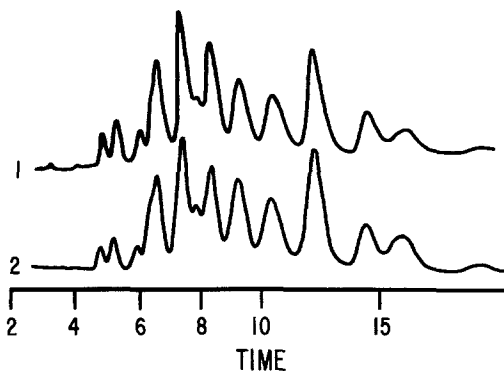


Figure 2. Chromatograms of 1) transformer oil and 2) Aroclor 1260 standard

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