

Pesticide and Mercury Levels in Bear

by

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Black bear, *Ursus americanus*, occur statewide in Idaho and are hunted as a game animal. Since bears are eaten by humans, concern has been expressed as to what pesticide and mercury levels are present. Pesticide levels have been found in other game animals (PILLMORE and FINLEY, 1963; CASEBEER, 1965; GREENWOOD *et al.*, 1967), but little information is available about bears. The purpose of this study was to determine pesticide and mercury levels in bear tissue collected during the October and November 1972 hunting season.

Methods and Materials

Analysis for pesticides was made on body fat for six of the eight bears studied and for the other two, muscle tissue was used.

Fat and tissue samples were extracted with petroleum ether and partitioned against acetonitrile, using a modified procedure of de FAUBERT MAUNDER *et al.* (1964). The petroleum ether extract was then subjected to fractionation on a florosil column, details of which have been previously reported by MILLS (1961) and MILLS *et al.* (1963). Analysis was by tritium foil electron capture gas chromatography, using a Micro Tek 220 instrument equipped with two differing columns for confirmatory analysis. The following parameters were observed:

Columns:	4% SE-30, 6% QF-1 on Chromosorb W, DCMS, 80-100 mesh.	
	1.5% OV-17, 1.95% QF-1 on Chromosorb W, DCMS, 100-120 mesh.	
Temperatures:	Columns	200° C
	Injection Chamber	220° C
	Detector	205° C
Carrier Gas Flow: (nitrogen)	SE-30, QF-1	90 ml/min.
	OV-17, QF-1	70 ml/min.

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Hair and/or muscle was used to analyze for mercury. In each case, a 1 gram sample was digested by nitric and sulfuric acid using the A.O.A.C. method and equipment (HORWITZ, 1970). Digests were then analyzed using the Coleman MAS 50.

Results and Discussion

Pesticide levels for bears are lower than those for Idaho deer (BENSON and SMITH, 1972). Table 1 shows the highest level found in any bear was 2.055 ppb p,p'DDE in one female. Total DDT for this bear was only 2.899 ppb. The lowest amount in any bear was 0.320 ppb total DDT in a male. Three bears had detectable levels of Dieldrin all of which were in parts per billion.

Mercury levels were also low with the highest level being 275.0 ppb and the lowest 40 ppb.

The average residue levels for both pesticides and mercury found in this study were well below the maximum tolerances allowed in domestic livestock as set by the Food and Drug Administration.

Black bear are not selective in their diet and will eat almost any edible plant or animal they encounter. In areas where humans reside, garbage dumps provide a source of food. Prior to hibernation a layer of fat, often nearly three inches thick, is deposited underneath the skin. During hibernation the fat is used up and there is a loss in body weight of twenty to twenty-five per cent (ERICKSON and YOUATT, 1961). The bears collected for this study were taken from an area in which they would not have had access to garbage containing pesticides. No information could be found to indicate that the areas where the bears were collected had ever been sprayed. It is assumed that the mercury was from a natural source.

Because of the great quantity of fat and the low pesticide sources, the fat presented a dilution factor for pesticides which produced low analytical results.

During utilization of the fat throughout hibernation, it is possible that the pesticides are converted or retained along with the remaining fat. This could possibly be proven by testing bears in the spring when they emerge from hibernation.

We believe that bear meat has little or no significant pesticide residues to endanger the health of the people nor would mercury present a problem.

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TABLE 1
Mercury and Pesticides in Bear Tissue
(All parts per billion)

N	Sex	Tissue	Mercury	p,p'DDE	p,p'DDT	p,p'DDD	Dieldrin	Total DDT
1	M	Hair	110.0	---	---	---	---	---
		Muscle	40.0	---	---	---	---	---
		Fat	51.0	0.174	0.322	---	0.016	0.496
2	M	Hair	183.0	---	---	---	---	---
		Muscle	42.0	---	---	---	---	---
		Fat	60.0	0.083	1.183	---	---	1.266
3	M	Hair	275.0	---	---	---	---	---
		Muscle	48.0	---	---	---	---	---
		Fat	48.0	0.239	1.632	---	---	1.871
4	M	Hair	160.0	---	---	---	---	---
		Muscle	53.0	---	---	---	---	---
		Fat	48.0	0.027	0.293	---	---	0.320
5	M	Muscle	42.0	0.430	0.715	0.237	0.199	1.382
6	M	Muscle	160.0	0.160	0.074	0.140	0.032	0.374
7	F	Muscle	48.0	---	---	---	---	---
		Fat	114.0	2.055	0.844	---	---	2.899
8	F	Muscle	171.0	---	---	---	---	---
		Fat	120.0	NA*	NA*	NA*	NA*	NA*
Range		Hair	110-275	---	---	---	---	---
		Muscle	40-171	0.160-0.430	0.074-0.715	0.140-0.237	0.032-0.199	0.374-1.382
		Fat	48-120	0.027-2.055	0.293-1.632	---	0.016	0.320-2.899

*NA -- Not Available

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