

Hexachlorobenzene Analysis in Old Crow Traditional Foods

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Introduction



A contaminant biomonitoring project was conducted in Old Crow, YT between 2018 and 2020. Blood levels of **hexachlorobenzene (HCB)**, an **organochlorine pesticide**, were found at **higher concentrations in people in Old Crow** than in the general Canadian population and First Nations communities across the ten provinces.

Based on feedback from the community after the return of biomonitoring results, a traditional food monitoring project was designed to: 1) to **generate current, regional data on HCB levels in commonly eaten traditional foods in Old Crow**; 2) to **identify possible sources of HCB exposure using the dietary surveys** conducted in 2019.

Methods

Sample Selection and Collection

Traditional food sampling targeted commonly eaten foods in Old Crow, and the fatty tissue of these foods (when applicable). All proposed sample types were collected, with the exception of Chinook salmon, due to historically low salmon numbers in the community. Sampling by Old Crow harvesters began in July 2020 and is ongoing in Fall 2021.

Sample Type	Sample Details	Status Fall 2021	
		Analysis Complete	Analysis Pending
Water	Up Porcupine River	2	0
	Down Porcupine River	2	0
	Up Crow River	2	0
Moose	Liver, Fat, Bone	1	3
Caribou	Liver, Fat, Bone	9	0
Chum Salmon	Muscle	10	0
Whitefish	Muscle	0	10
Loche	Liver	10	0
Berries	Low Cranberries	1	0
	Low Blueberries	2	0
	Salmonberries	1	0
	Crowberry	1	0

Sample Analysis

Organochlorine levels, including HCB, and lipid levels, where applicable, were analyzed using High Resolution Mass Spectrometry at ALS Laboratories.

Results Interpretation

WATER: HCB levels in water are compared to a drinking water guideline of 1000 ng/L (1).

FOODS: HCB in foods is compared to maximum residue limits (MRLs), which are the standards for pesticides in commercial foods. MRLs set below the level of exposure known to cause adverse health issues (2). It is quite common for some foods, particularly meats, to be higher than these levels. HCB levels in foods were compared to an MRL of **10 ng/g tissue/wet weight** when lipid concentrations were below 10%, or **10 ng/g lipids when lipid** concentrations were greater than 10% (3).

Results and Discussion

Table 2: HCB Levels in Traditional Foods

Sample Type	n	%> LOD	%> 10ng/g wet weight or lipid*	% Lipids	Wet Weight		Lipid-Normalized*	
					Units	GM (min-max)	Units	GM (min-max)
Water	6	17	-	-	ng/L	<LOD (<LOD - 0.97)	-	-
Berries	5	60	0	0	ng/g tissue	0.0086 (<LOD - 0.047)	-	-
Salmon Muscle	10	100	0	<0.5 - 1.5	ng/g tissue	0.55 (0.088 - 1.2)	-	-
Loche Liver	10	100	80	20 - 50	ng/g tissue	3.0 (1.9 - 6.8)	ng/g lipids	8.7 (5.8 - 21)
Caribou	Liver	9	89	0	ng/g tissue	1.8 (<LOD - 2.6)	-	-
	Fat	9	100	100	ng/g tissue	19 (10 - 30)	ng/g lipids	28 (20 - 41)
	Bone Marrow	9	100	100	ng/g tissue	21 (13 - 33)	ng/g lipids	23 (13 - 34)
Moose	Liver	1	100	0	ng/g tissue	0.29	-	-
	Fat	1	100	0	ng/g tissue	1.7	ng/g lipids	1.9
	Bone Marrow	1	100	0	ng/g tissue	1.6	ng/g lipids	1.8

* Comparison is made to lipid-normalized MRL when lipid concentration > 10%



WATER: HCB levels in river water near Old Crow were generally too low to be detected, and were more than 100 times lower than drinking water standards.



BERRIES: HCB levels in berries near Old Crow were more than 100 times lower than the threshold for market berries.



MOOSE: Only one moose sample was analyzed as of Fall 2021. This sample had HCB levels well below the market thresholds for meat.



FISH: HCB levels in chum salmon were all below the market threshold for meats, and were similar to those observed in farmed BC chum salmon (4). Most loche liver samples (60%) had HCB levels above the market threshold for meats, but levels were five times lower than Arctic burbot sampled in the 1990s (5). HCB levels in both chum salmon and loche liver were lower than market fish from Canada and other jurisdictions (6).



PORCUPINE CARIBOU: HCB levels in caribou bone marrow and fat were above the MRL for meats, while HCB levels in liver were below this threshold. HCB levels in Old Crow caribou were similar to or lower than levels observed in other northern caribou. However, HCB levels in Old Crow caribou were higher than those measured in samples of market beef.

Figure 1 – Proportion of Caribou Samples Exceeding 10 ng/g for HCB

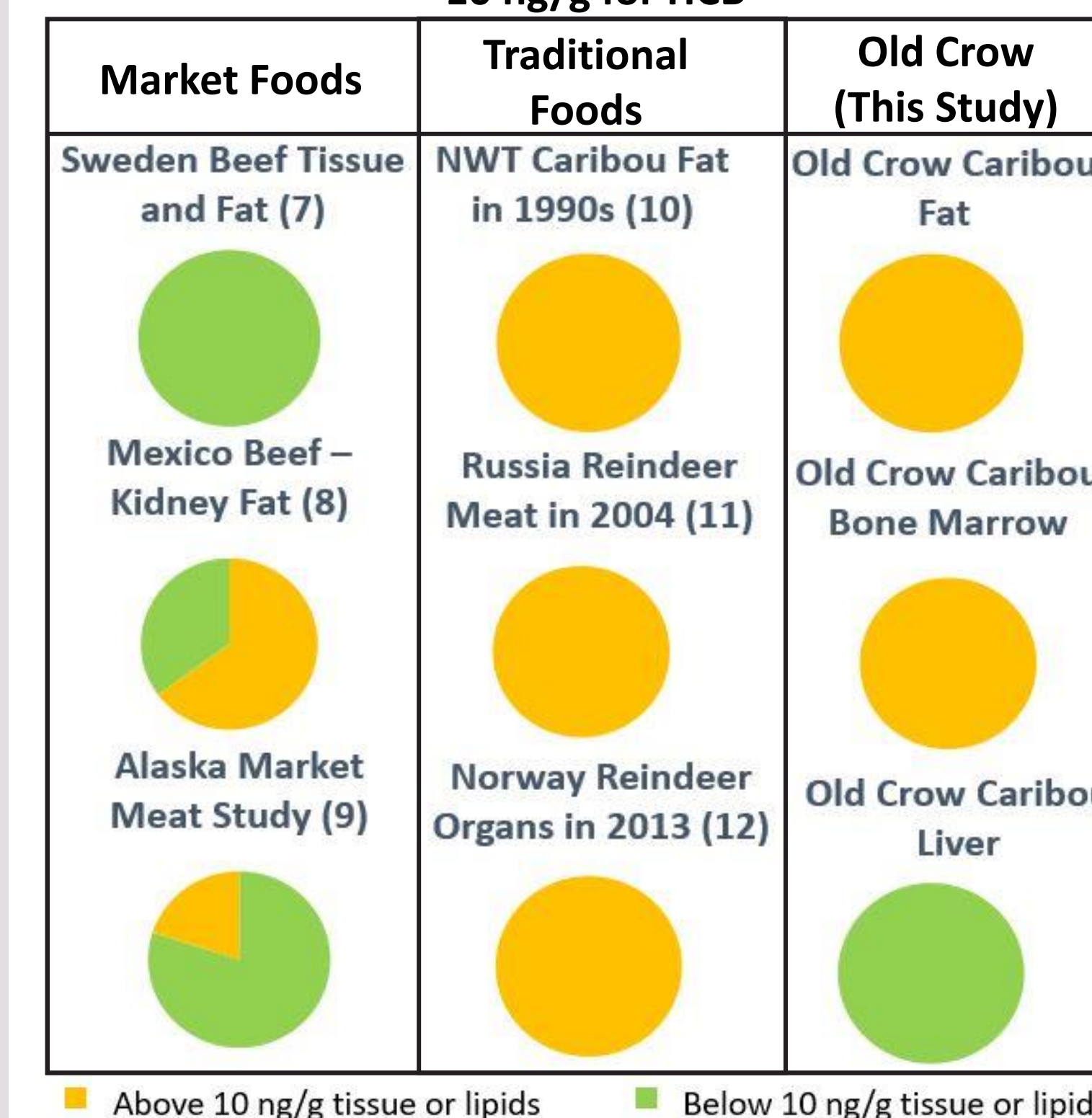
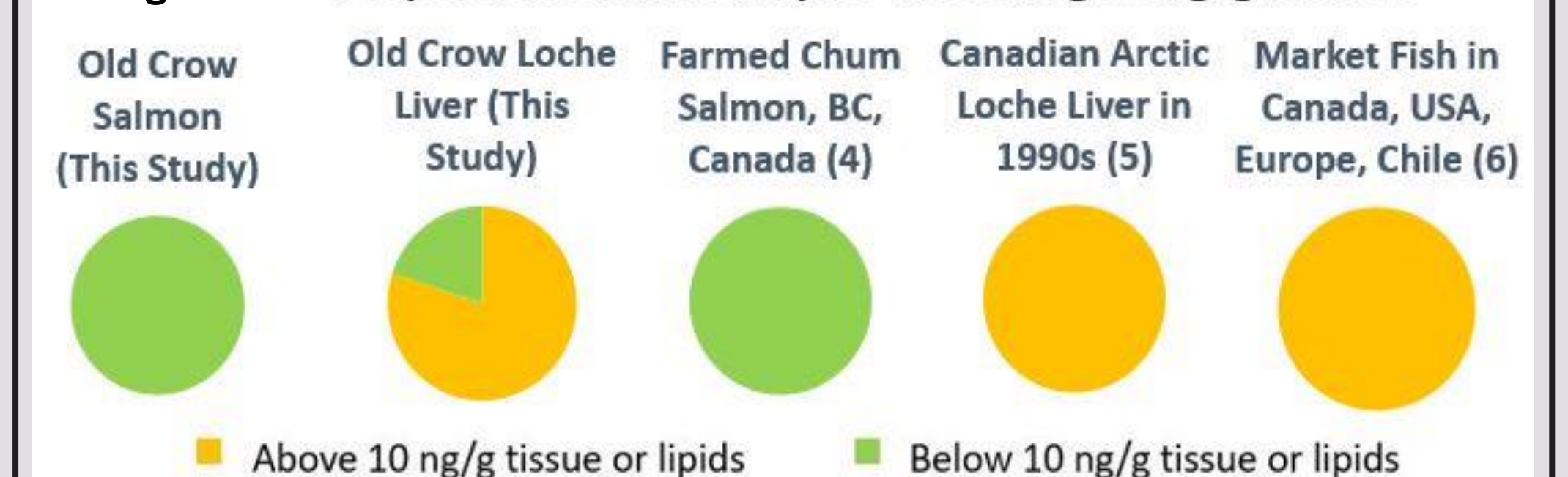


Figure 2 – Proportion of Fish Samples Exceeding 10 ng/g for HCB



Key Messages and Next Steps

- The results of this work support the ongoing evidence that HCB levels in northern traditional foods are decreasing over time.
- Modeling of these results will help to shed some light on whether HCB levels in some northern foods are associated with elevated HCB levels in blood samples of people from Old Crow, and to compare HCB intake from Old Crow traditional foods to available health-based guidelines.
- Overall, these initial results reinforce that the health benefits of traditional foods generally outweigh contaminant risks.**

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