

# Using hair as an Indicator of Mercury Exposure in Sled Dogs

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## Introduction

- The Alaskan sled dog is a mixed breed that has traditionally been bred for endurance, speed and strength. This study included eight Alaskan sled dogs.
- Sled dogs are found only in close connection with human populated (especially Arctic) areas and are a good example of a species that is subject to many of the same environmental factors as humans and Arctic wildlife.
- One environmental factor of significant importance is mercury present in foods. Mercury is both a naturally occurring element and byproduct of human industries.



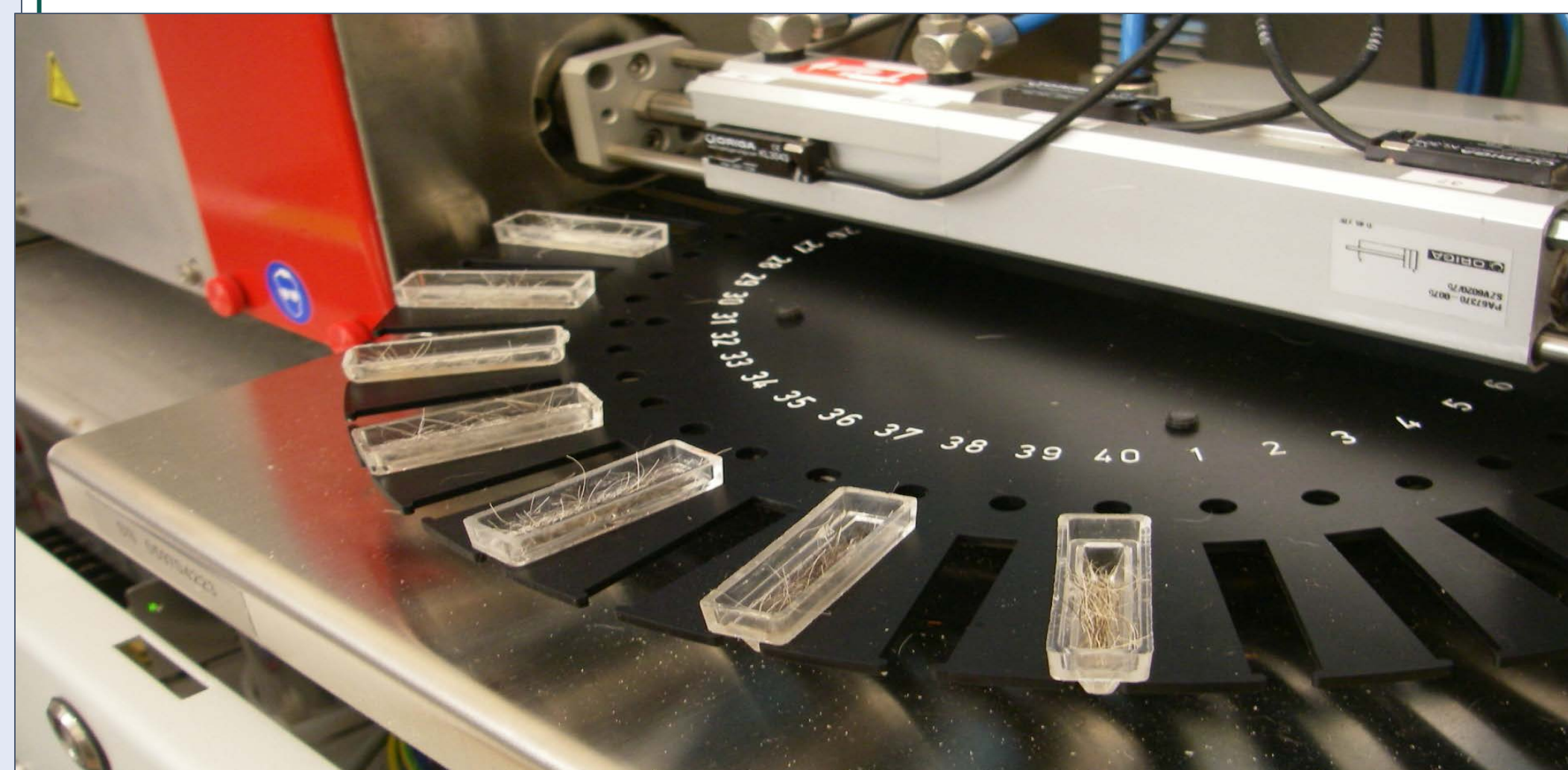
## Objectives

It was hypothesized that the dogs fed the fish diet would show increased mercury concentrations in their hair, over time, when compared to the control dogs (on a fish-free diet).

## Methods

### Phases of The Study

1. Acclimation to Fish-Free Kibble Diet (3 weeks before Exposure)
2. Exposure to Fish meals (Week 0-12)
3. Fish-free Hg Elimination (Week 13-22)



- During the three phases, four of the dogs (P, G, A and S) were fed commercial fish free kibble twice a day and acted as the control.
- The four fish fed dogs (C, K, M and T) had a diet change during the exposure phase, which included one meal of keta (chum) salmon (1 meal of kibble per day and 1 meal of fish per day).
- The salmon feed was fed proportional to the dog's caloric needs and ranged in weight from 198-458g.
- Hair samples were collected for each animal while preparing for blood collection from the cephalic vein (on the foreleg) during acclimation, on day 0 of week 0 and on the last day of week 12.
- Hair samples were washed with a 1% Triton 100™ detergent.
- The samples were analyzed using a DMA-80 total mercury analyzer.



## Results

### Foreleg Hair Concentration of THg (Mg/Kg) Over Time by Individual Dog

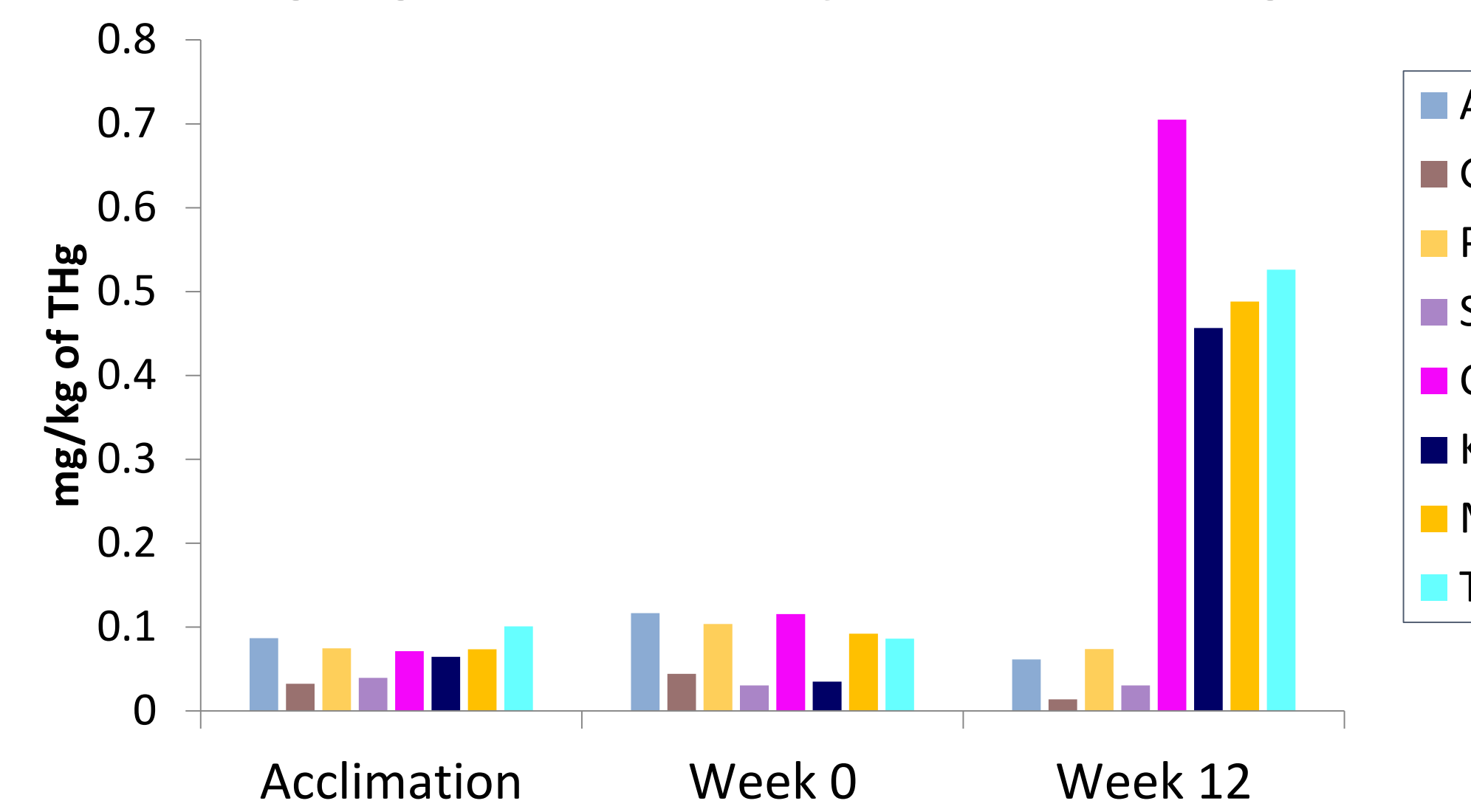


Figure 1. Shows the average concentration [mg/kg] of T-Hg present in the control and experimental dogs foreleg hairs from May-August.

- No significant change ( $p$  value = 0.57) in the concentration of THg present in the control dogs foreleg hairs over the course of the experiment, but does show a significant increase ( $P < 0.0001$ ) in THg concentration of foreleg hairs of the fish fed dogs during the experiment (Figure 1). Average total mercury is shown in Figure 2.

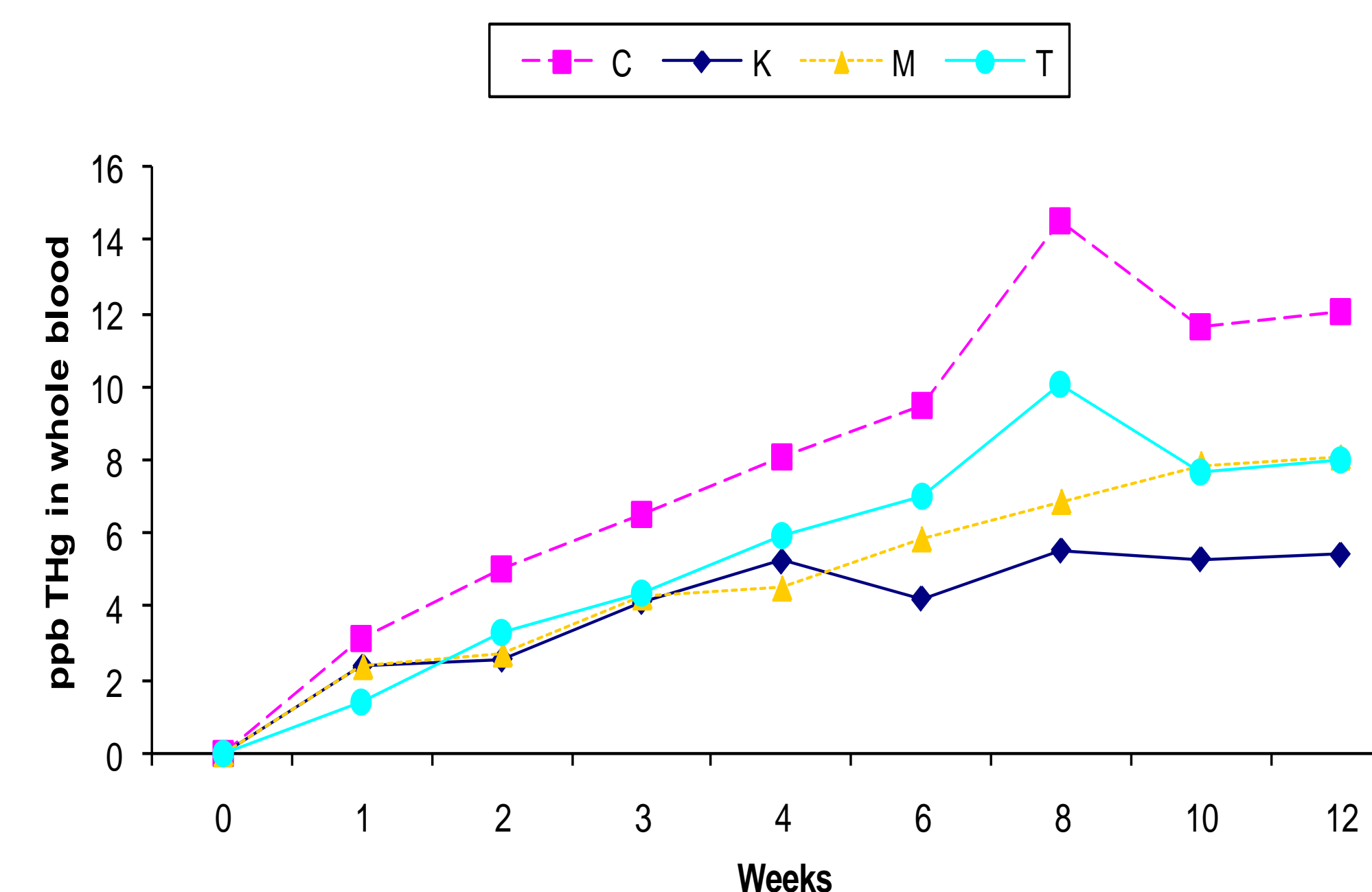


Figure 3. THg (corrected for weight and PCV differences amongst the dogs) detected in whole blood over the 12 weeks of exposure for the 4 dogs on the fish diet (Lieske et al., 2011).

- The whole blood concentration of THg also increased over the course of the experiment for the fish fed dogs during the exposure phase.

### Average Concentration (Mg/Kg) of THg in Foreleg Hairs

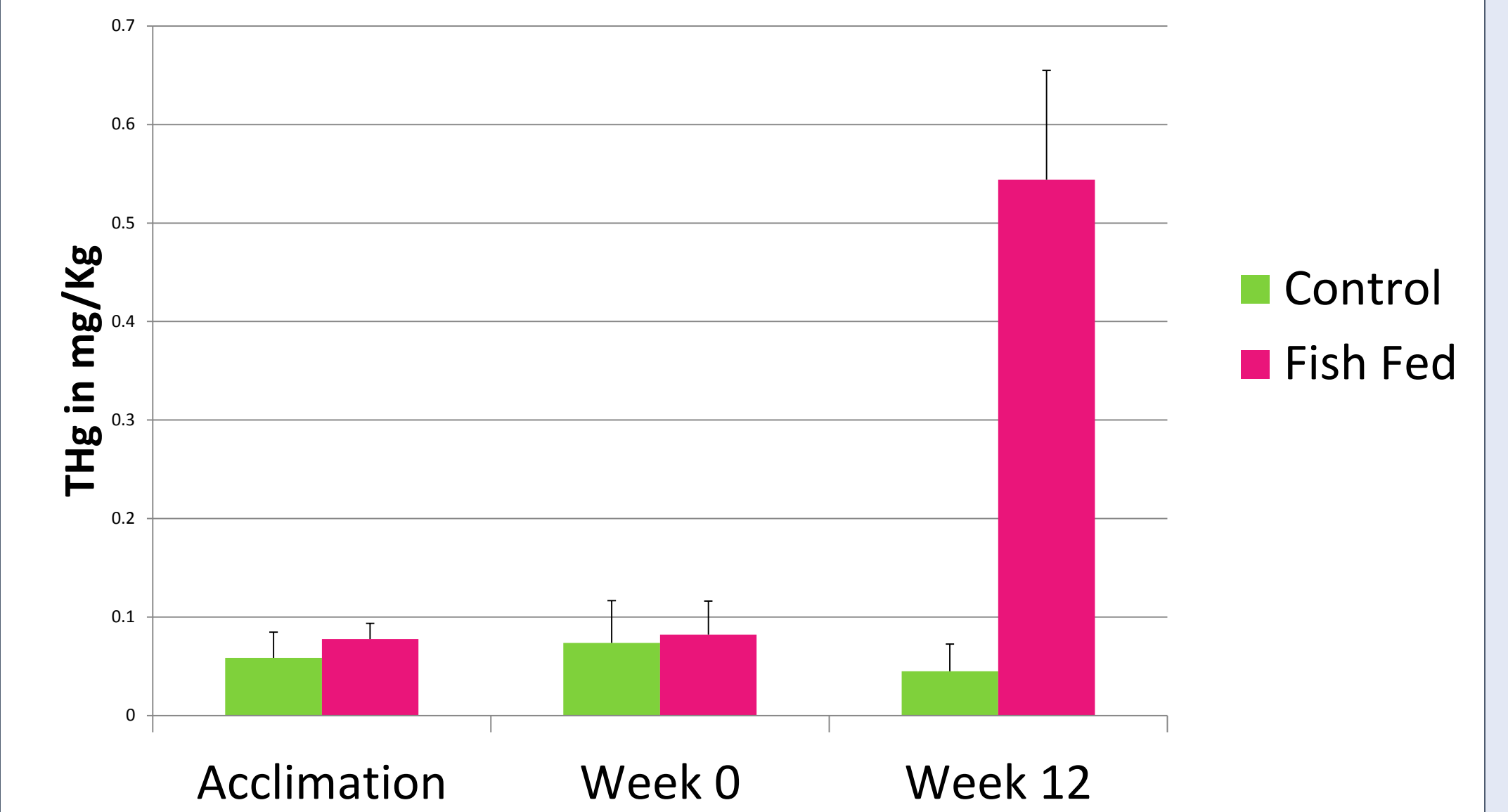
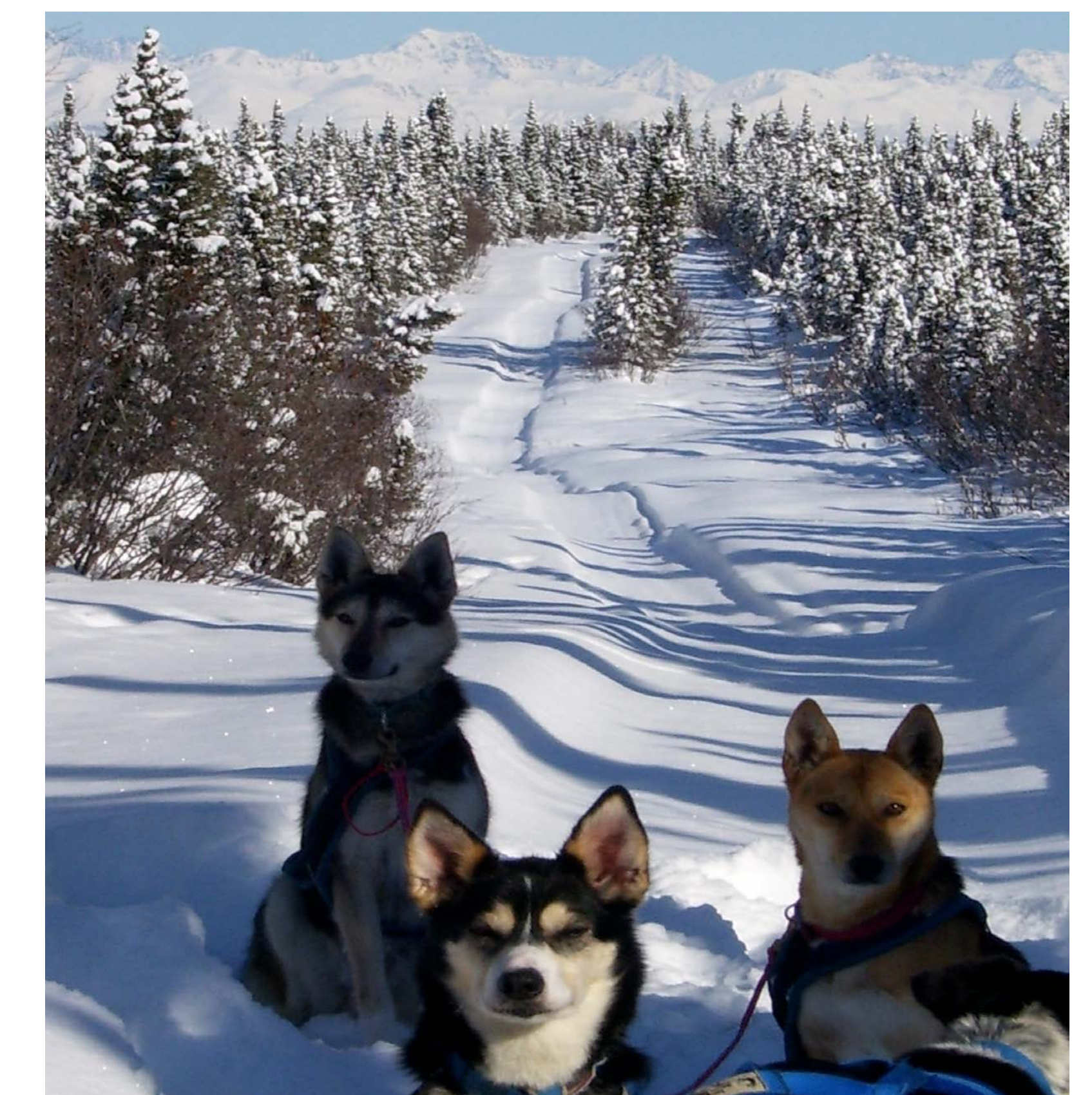


Figure 2. Average and standard deviation of the observed concentration of THg present for the control and fish fed dogs before exposure (Acclimation and Week 0) and after 12 weeks on a fish diet.

## Conclusions

This study showed that sled dogs may be effective in modeling the absorption, accumulation and excretion of THg for species (such as carnivores or humans) who are exposed to mercury through diet.



## References

Lieske, Camilla, Sarah Moses, J Margaret Castellini, Karsten Hueffer and Todd O'Hara. Toxicokinetics of Total Mercury in Canine Blood. Manuscript in progress