MUSKOX AND CARIBOU HEALTH MONITORING PROGRAM

ACTIVITY UPDATE JUNE 2021

UNIVERSITY OF CALGARY
FACULTY OF VETERINARY MEDICINE

Update prepared by the Kutz Research Group

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Activity Update June 2021

Introduction

The Muskox and Caribou Health Research Program is a collaborative program among communities, universities, industry and territorial and federal government agencies. The program was initiated in 2008 in response to the changing health status of muskoxen on Victoria Island and has since grown to include caribou in response to increasing concerns about the health and status of the Dolphin and Union caribou herd.

This program strives to bring traditional, local and scientific knowledge together to better understand the health and population status of muskoxen and caribou in the Kitikmeot and Inuvialuit regions. The hunters and trappers organizations of Cambridge Bay, Ulukhaktok and Kugluktuk are core partners, as are the Governments of Nunavut and NWT, Canada North Outfitting, and the University of Calgary.

The work that we've accomplished to date has only been possible because of the great collaborations among partners. We thank all the individuals and organizations that have contributed to this work and look forward to working with you further. In the following pages, you will see a brief overview of the various projects that are currently underway as well as contact information for the researchers involved.

Please feel free to contact me about the overall project and with any questions or concerns you may have.

Best,

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Kugluktuk Angoniatit Association

Ekaluktutiak Hunters and Trappers Organization

Olokhaktomiut Hunters and Trappers Committee

Government of Nunavut

Government of Northwest Territories

Inuvialuit Game Council

Wildlife Management Advisory Council (NWT)

Nunavut Wildlife Management Board

Hunter-based sampling: What are we collecting from muskoxen and caribou, and why?

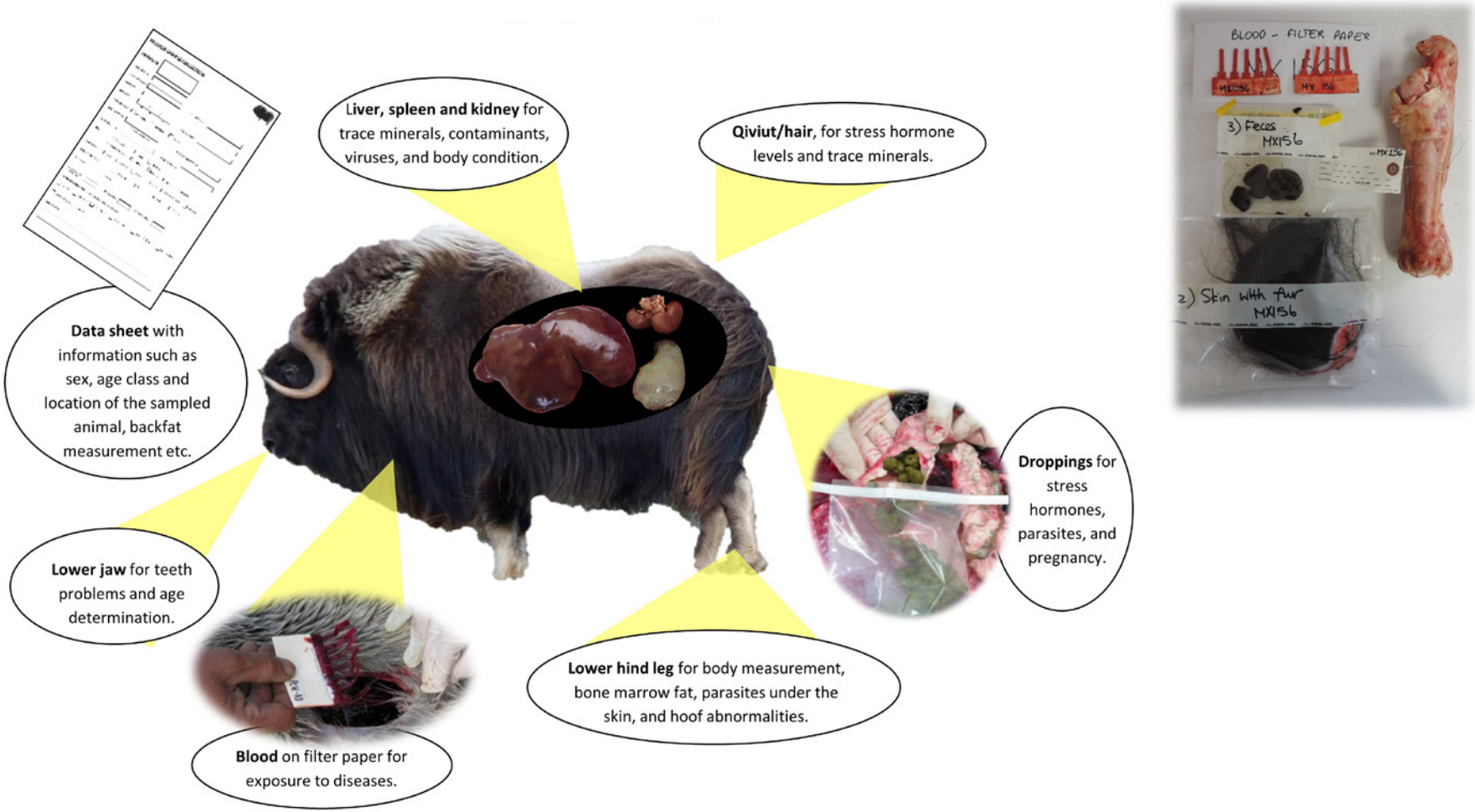

Figure 1: Samples collected on harvested Dolphin and Union caribou and muskoxen.

FABIEN MAVROT

Passive health surveillance in Ulukhaktok:

In March 2020, strange "pebbles" were found in the meat of a muskox harvested in Ulukhaktok. After this picture (Figure 2) had been originally posted on Facebook, the Hunters and Trappers Committee contacted the Kutz Research group and together with the local wildlife officer and regional biologists, we facilitated the shipping of the tissue to the Diagnostic Services at the University of Saskatchewan (the Diagnostic Unit at the University of Calgary was shut down at this time).

It could be confirmed that the pebbles were so-called "joint mice", scar tissues sometimes found in the joints and that the meat was safe to eat. This example emphasizes the usefulness of the passive surveillance system to detect abnormal findings in wildlife that could be potentially relevant to both animal and human health.

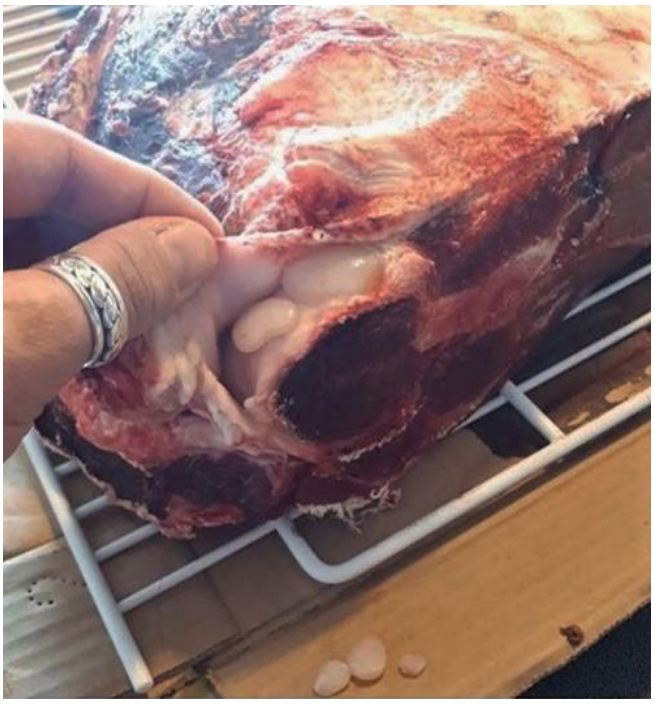

Figure 2: "Pebbles" found when cutting the meat of a muskox (credit: L. Alikamik)

JESPER MOSBACHER

Trace elements in muskox hair:

Using muskox hair, we can track differences in essential trace minerals across time and geographic locations. For example, our results indicate that selenium (a trace mineral important for reproduction as well as calf growth and survival) is lower in muskoxen around the communities of Ulukhaktok and Cambridge Bay (Victoria Island) when compared to other populations (Figure 3). Mosbacher et al. (in preparation).

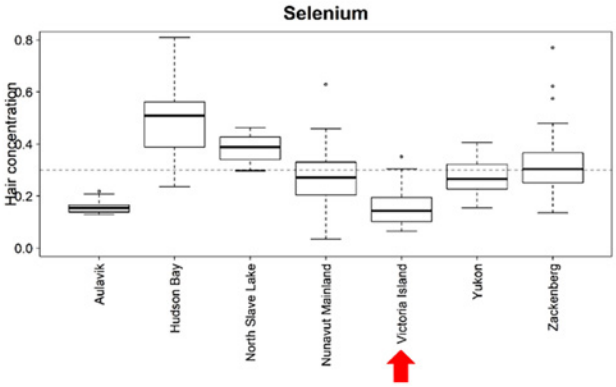

Figure 3: Selenium level in parts per million (vertical axis) in muskox hair from different populations (horizontal axis). The horizontal dotted line represents the level of selenium considered normal in domestic cattle.

PRATAP KAFLE

Lungworm abundance in muskoxen:

The plot in Figure 4 shows how the abundance (number of parasites infecting an animal) of two lungworms found in muskoxen around Cambridge Bay and Ulukhaktok has increased in recent years. *Umingmakstrongylus pallikuukensis* (up) is a lungworm specific to the muskox. *Varestrongylus eleguneniensis* (ve) is shared by muskoxen and caribou. Both parasites are harmless to people. Kafle et al. (2020)

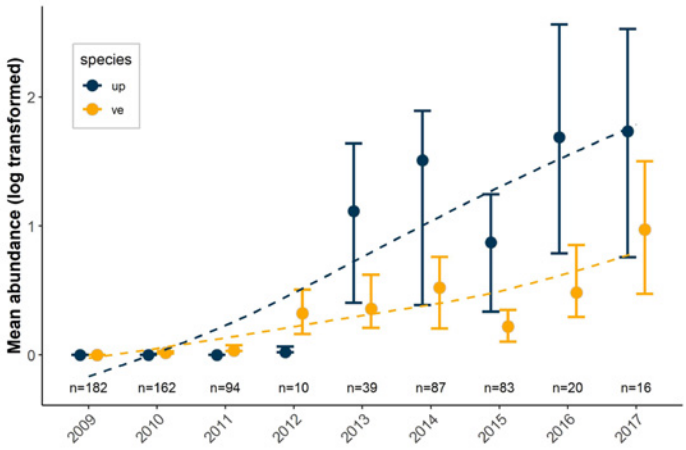

Figure 4: Vertical axis: abundance of lungworms in muskox fecal samples on Victoria Island. Horizontal axis: year of collection. In blue: *Umingmakstrongylus pallikuukensis* (up). In yellow: *Varestrongylus eleguneniensis* (ve).

JULIETTE DI FRANCESCO

Stress in muskoxen:

Based on the analysis of the undercoat hair (qiviut) of muskoxen, we can assess seasonal and sex-based differences in the stress hormone cortisol. Our data indicate that males in fall - early winter have the highest level of stress hormone (Figure 5). This might be due to the stress associated with the rut. In the future, we aim to use the level of stress hormone in the hair as an indicator of the overall health of the animals. DiFrancesco (2020).

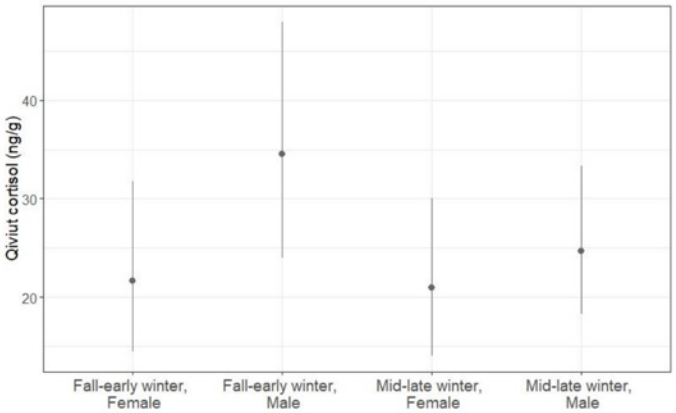

Figure 5: Level of stress hormone (cortisol) detected in muskox hair (vertical axis). Results are grouped by sex and season (horizontal axis).

XAVIER FERNANDEZ AGUILAR

Brucella in muskoxen

Using the blood collected on the filter papers from the sampling kits, we conduct serological analyses to assess disease trends. Serological analyses detect an immune response against the infection and indicate whether the tested animal had been in contact with the bacterium that cause brucellosis.

In recent years, we have documented an increase in *Brucella* exposure in muskoxen around the communities of Ulukhaktok and Cambridge Bay (Figure 6). This is especially relevant because *Brucella* can be transmitted to people.

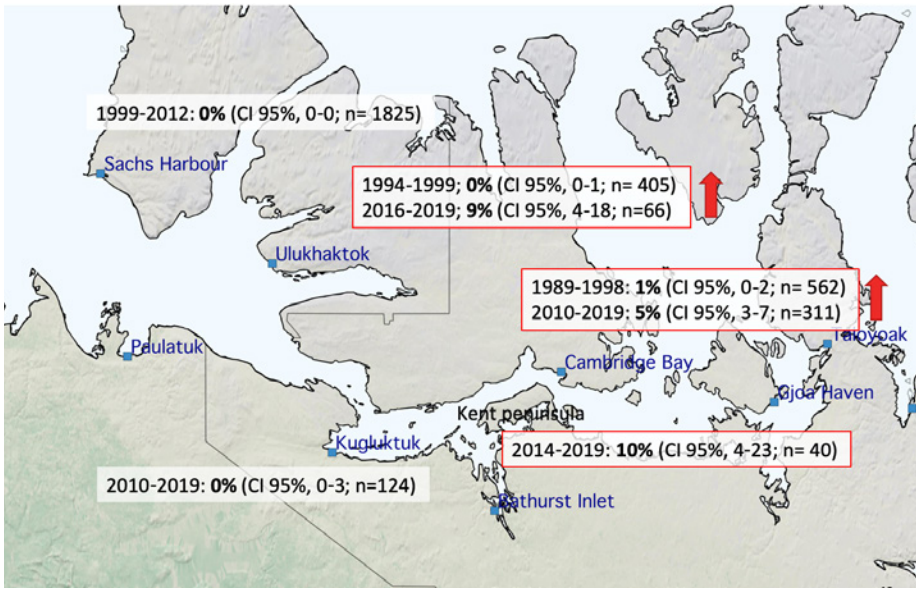

Figure 6: Summary of serological analysis for exposure to the bacterium Brucella in muskoxen on Banks and Victoria Island and on the adjacent mainland. Red arrows indicate an increase of Brucella exposure in recent years. (Updated from Tomaselli et al., 2019)

FILIP RAKIC

Bluenose-East Caribou Health Monitoring:

Using blood collected on filter paper, as well as blood collected during capture/collaring activities, we are able to conduct numerous serological assays in order to better understand disease exposure in barren-ground caribou. This is especially important in the Bluenose-east herd (BNE), where recent health monitoring information is generally limited. Here, we combine filter paper samples collected from hunters between 2017-2019, and serum samples taken during capture/collaring between 2012-2020, in order to examine the BNE's exposure to five pathogens (Figure 10). For most pathogens, seroprevalence is similar to past work in other barren-ground caribou herds and did not change significantly over time. *Toxoplasma gondii* is the sole pathogen with differing seroprevalence between sampling sources, which may reflect different environmental exposure, or another confounding factor. The next steps for this research are to explore differences in exposure between males and females, and patterns of co-exposure (being exposed to more than one pathogen at once), for these five pathogens within the BNE herd. Rakic et al. (in preparation).

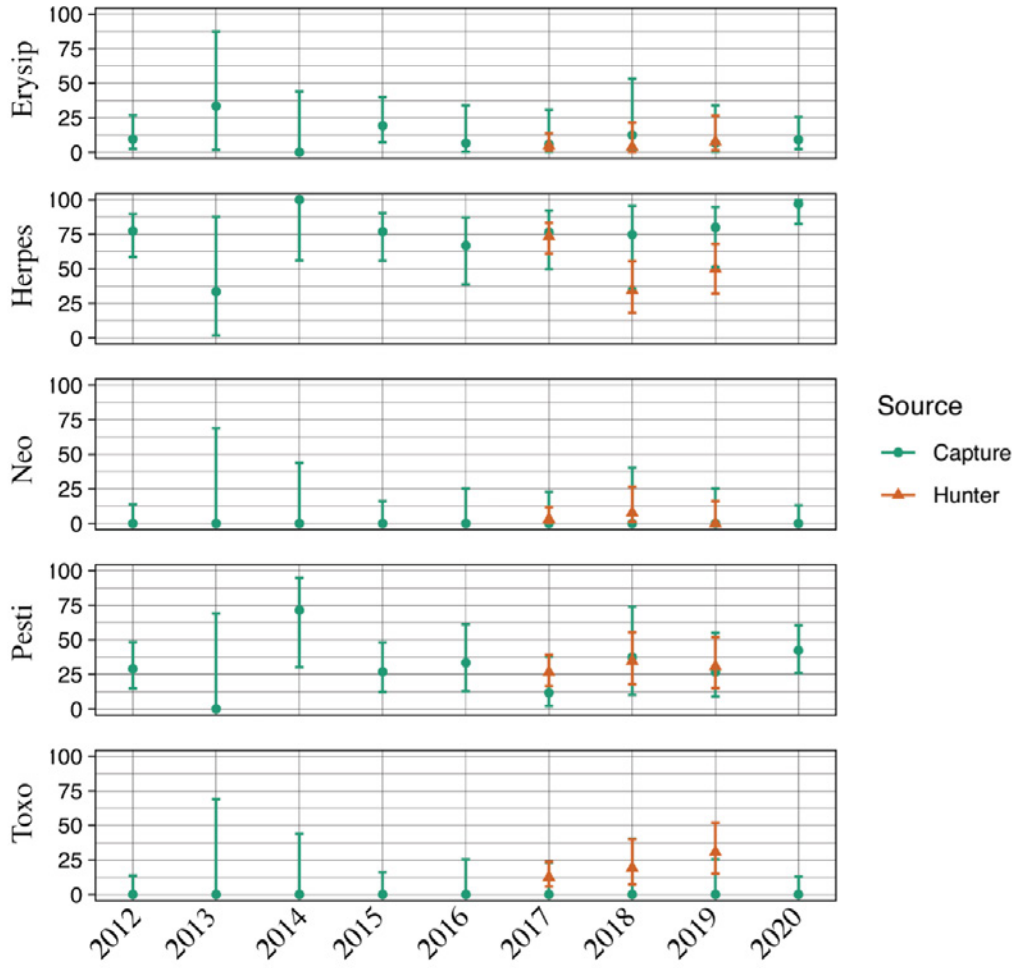

Figure 10: Seroprevalence of *Erysipelothrix rhusiopathiae* (Erysip), *Herpesvirus* (Herpes), *Neospora caninum* (Neo), *Pestivirus* (Pesti), and *Toxoplasma gondii* (Toxo) in the BNE herd from 2012-2020, from Hunter (orange) and capture (green) sample sources. Seroprevalence (%) is on the vertical axis and Year of sampling is on the horizontal axis.

ANDREA HANKE

Kugluktukmiut knowledge on Dolphin and Union caribou: 2018-2020

We facilitated one-on-one interviews with harvesters in fall 2018, group interviews in January 2019, and feedback sessions in January and February 2020. During these sessions, we talked 33 Kugluktukmiut about changes in Dolphin and Union caribou abundance, distribution, and health trends. We used a lot of maps to understand where these changes are on the land. Also, harvesters identified their concerns for the herd and stressed that what they knew reflected their personal experiences on the land and included variations in seasons, year-to-year, weather, and climate.

Combining the information from the interviews, we identified a peak in Dolphin and Union caribou abundance near Kugluktuk in the mid-to-late 1980s. After this, harvesters said Dolphin and Union caribou abundance declined, and that they were seeing caribou further eastward during the winter/spring and further inland on Victoria Island during the summer/fall. We are in the middle of confirming the health results, but they suggest that harvesters first noticed swollen front leg joints and white cysts in the muscle in the 1980s and then a sandpaper feeling and white cysts in the livers in the 1990s. Kugluktukmiut said some of their tops concerns for Dolphin and Union caribou included learning barriers between less experienced and experienced harvesters and the increase in predators, related to changes in predator harvesting practices.

We are facilitating one more set of feedback sessions for the health results before we wrap up this research. Hanke & Kutz (2020).

Roger Hitkolok, Andrea Hanke, Juliette Di Francesco, John Kapakatoak, & Larry Adjun

Eric Hitkolok & Dettrick Hakanaic

ANDREA HANKE

Multi-community Elder interviews on Dolphin and Union caribou: 2021

These interviews focus on Dolphin and Union caribou and what they need to survive and be healthy. To do this, we have been working with the hunters and trappers organizations and in-community researchers in Kugluktuk, Ekaluktutiak (Cambridge Bay), and Ulukhaktok.

We sent backpacks with interview supplies to the communities and completed some training sessions with the in- community researchers. Brandon Langan (Ekaluktutiak), Darlene Hokanak (Kugluktuk), and Susie Memogana (Ulukhaktok) are running these interviews along with Andrea Hanke (UofC), who is attending the interviews by video-call (zoom).

Interview backpacks

We are currently in the middle of interviewing. Afterwards, our next step will be reviewing the interview transcripts with each Elder to correct mistakes and prepare the materials for analysis.

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George Angohiatok

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FUNDERS

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- Social Sciences and Humanities Research Council of Canada / Conseil de recherches en sciences humaines du Canada
- 25 YEARS ANS – Northern Contaminants Program / Programme de lutte contre les contaminants dans le Nord
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- Polar Knowledge Canada / Savoir polaire Canada
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