A Guide for Aging Muskoxen Based on Mandible Examination

Refining three methods: tooth eruption patterns, mandible measurements, and cementum annuli analysis

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WHAT IS THE ISSUE?

We aimed to improve reliability and practicality of muskox aging techniques. We fill gaps in previous research and offer a solid foundation for future studies and conservation efforts for this species.

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WHAT DID WE FIND?

Tooth Eruption Patterns: Used 260 jaws (Fig. 1) collected from Community-Based Wildlife Health Surveillance (CBWHS) programs. We examined the sequence and stages of tooth eruption from x-rays and physical examination. Effective for young muskoxen up to 60 months old (Fig. 2).

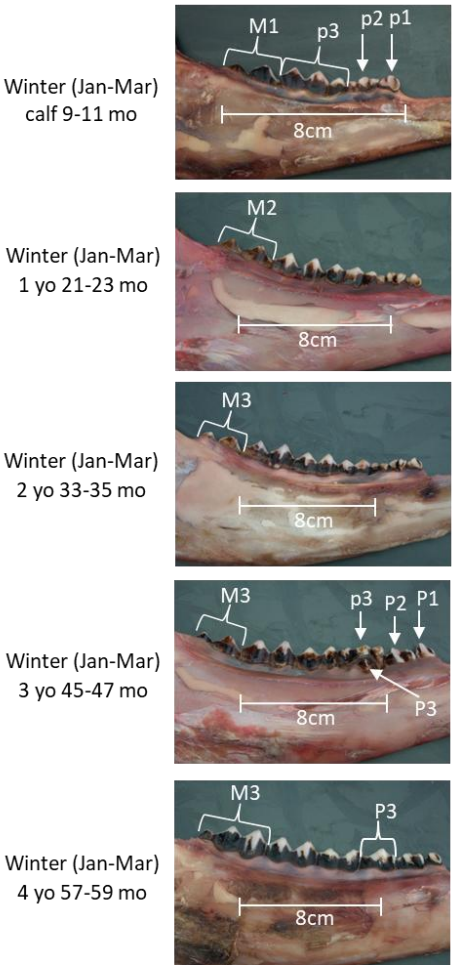


FIG. 2 Eruption of premolars ("p"= primary, "P"= permanent) and molars ("M") in muskoxen from calf up to 5 years old (60 months), with age in months. Each example was harvested in winter.

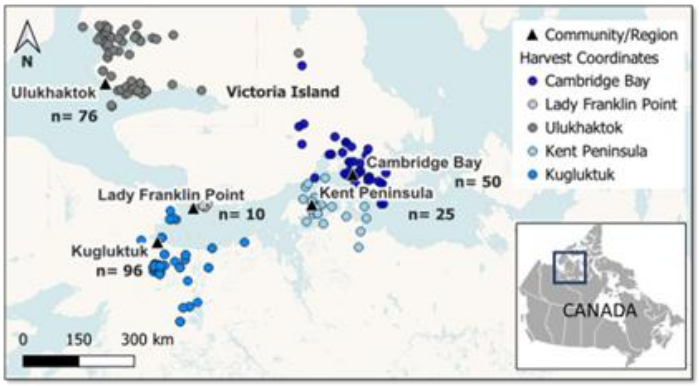


FIG. 1 Harvest locations of muskox mandibles collected through CBWHS programs in NU and the NT, Canada.

Mandible Measurements: Used 219 jaws collected from commercial harvests on Banks Island. Measurements (Fig. 3) of jaw length (caudal and total) were strongly associated with age, effective up to 60 months.

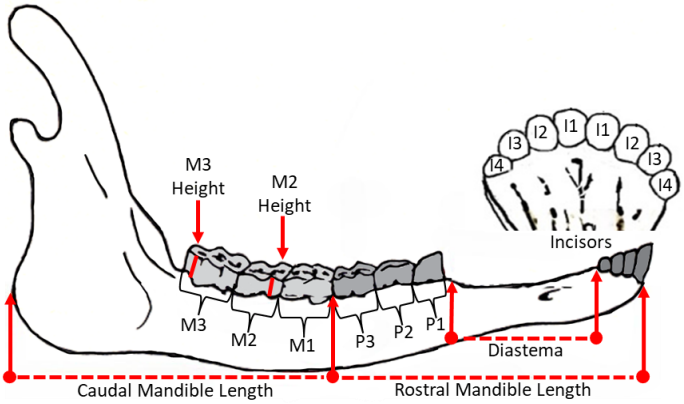


FIG. 3 Measurements recorded for muskox mandibles. I= incisor, P= premolar, M= molar.

Cementum Annuli Analysis (CAA): Involves counting growth layers in tooth cementum (Fig. 4). We assessed accuracy by comparing cementum age estimates with the known ages of captive muskoxen (n= 15), which revealed a tendency for cementum to underestimate age in older animals. Adjustments were made based on these known-age comparisons. Subsequently, we applied to muskoxen from the CBWHS (n= 32) to predict actual ages from cementum estimates (Fig. 5).

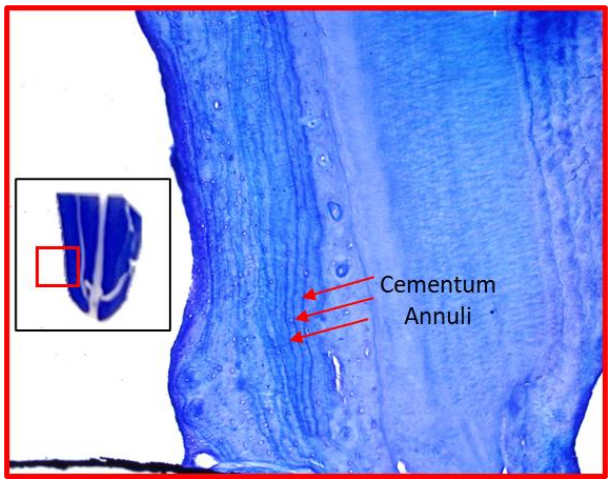


FIG. 4 Cementum annuli from a known aged captive muskox. Red box indicates zoomed in location on tooth

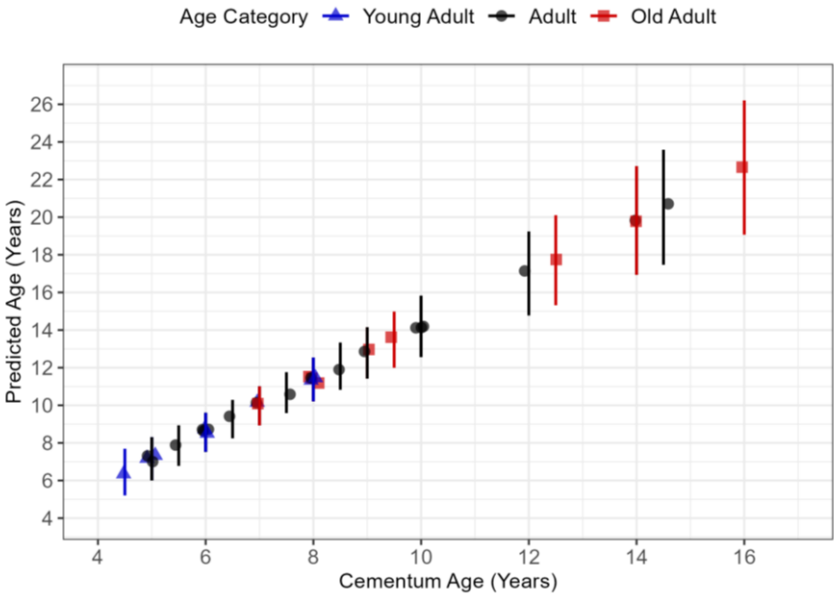
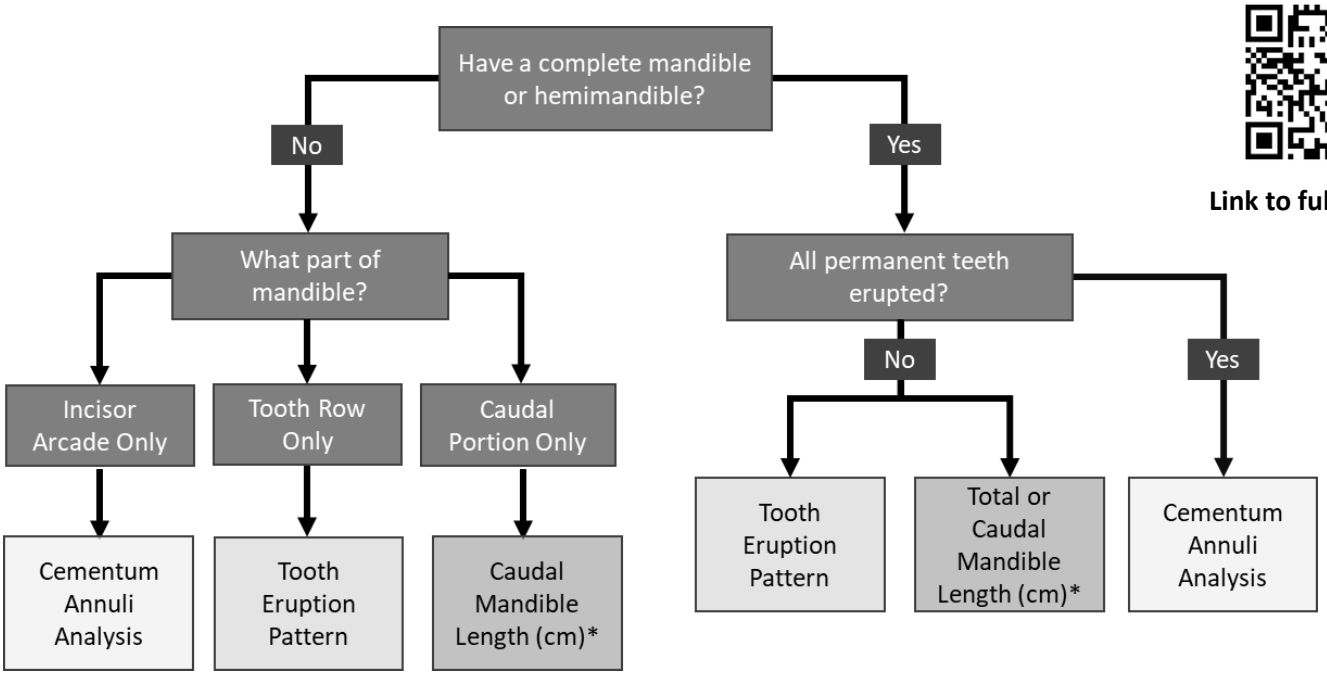


FIG. 5 Cementum age and the corresponding predicted age for 32 CBWHS harvested muskoxen from NU and the NT. Predicted values were determined using a fitted linear model based on captive muskoxen of known age.

Summary of Methods

Combining methods, we developed a decision tree (Fig. 6) to guide selection of an aging method depending on available sample. Tooth eruption is recommended for muskoxen up to 5 years of age because of its simplicity and consistency. When tooth eruption cannot be assessed or needs confirmation, mandible measurements are useful. For unknown-age muskoxen assessed as 5 years or older, CAA is recommended, as it provides an estimate rather than a broad classification once teeth complete eruption.



Link to full paper!

FIG. 6 Decision tree for selecting an appropriate aging method for muskoxen based on available sample type.
*Sex is required to estimate age since both total and caudal length differ for muskoxen 3 years and older.

Thank you to all those who make our research in the Arctic possible

The Kutz Research Group works closely with arctic communities, territorial governments, and industry partners to investigate and monitor wildlife health in the North. The information and results presented here are a direct result of these collaborations. We thank all our collaborators and funders who have made this broader program successful. Please contact Susan Kutz skutz@ucalgary.ca if you have any questions about this program.

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ArcticNet

Canada North Outfitting

NSTP PFSN – Northern Scientific Training Program / Programme de formation scientifique dans le Nord

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