

# **Importance of licks to mountain goats in north-eastern British Columbia**

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# Overview

- **Background**
  - Types of licks
  - Theories on the function of licks
- **Research objectives**
  - Methods
  - Results
- **Conclusions**
  - Integration and interpretation of results
  - Recommendations



## **Wet licks**

- Elk and moose



## **Dry licks**

- Mountain goats and Stone's sheep

- Licks may be used by ungulates that are unable to meet demands with forage alone

# Theories on lick function:

## 1. Sources of elemental supplements:

- a. High use of licks may be influenced by high physiological demand (lactation)
- b. Several elements (sodium) concentrated in lick material
- c. Low concentration of sodium in forage



# Theories on lick function:

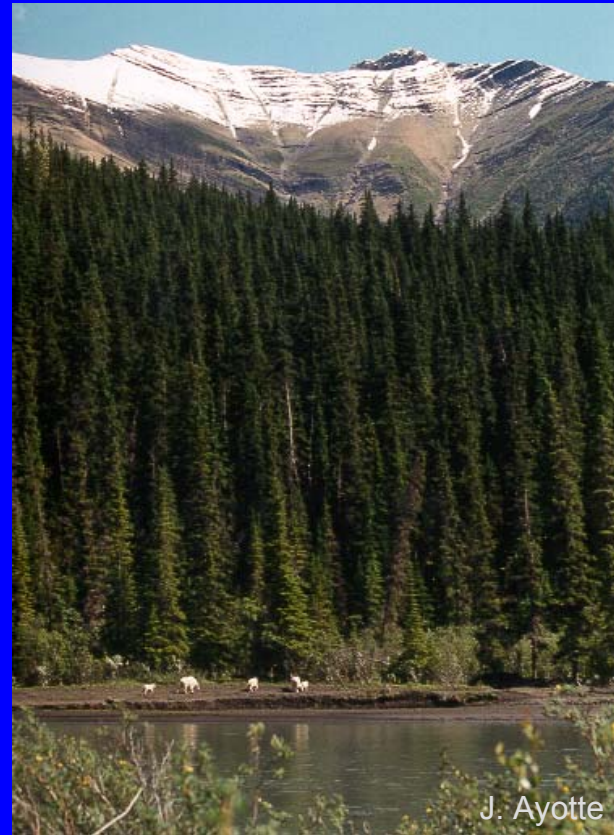
## 2. Source of buffers and binding compounds to minimize digestive disorders

- a. Properties of spring forage (low fibre, high potassium) cause digestive disorders (acidosis, osmotic imbalance)
- b. High use of licks may be influenced by transition to spring forage
- c. Carbonates and clays improve digestive performance of livestock



# Consider the costs

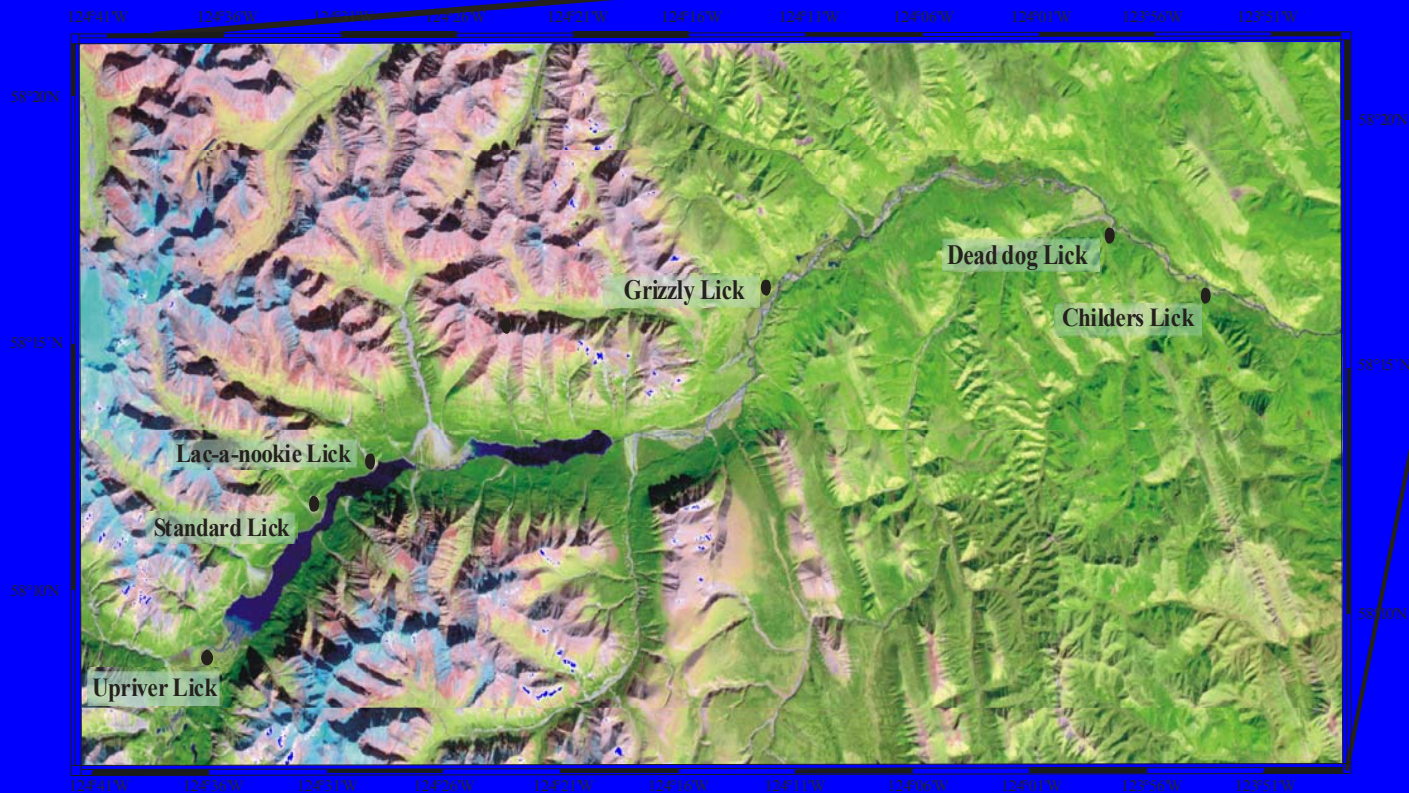
- Threat of predation



# Study area:

Tuchodi watershed, northern Rocky Mountains,  
Muskwa-Kechika Management Area, BC.

- Three wet and three dry licks



# Behavioural observations

- Temporal patterns of use (May – August 2002)
- Spatial patterns (high- and low-use sites) to guide soil sampling



# Infra-red remote trail cameras

- complement behavioural observations



# Summary of behavioural observations

- 6-h shifts, start times 0500, 1100, 1700 hrs
- 3 Dry licks: 52 shifts (312 h)
- Focal animal observations and 15-min scan samples

## Licking intensity

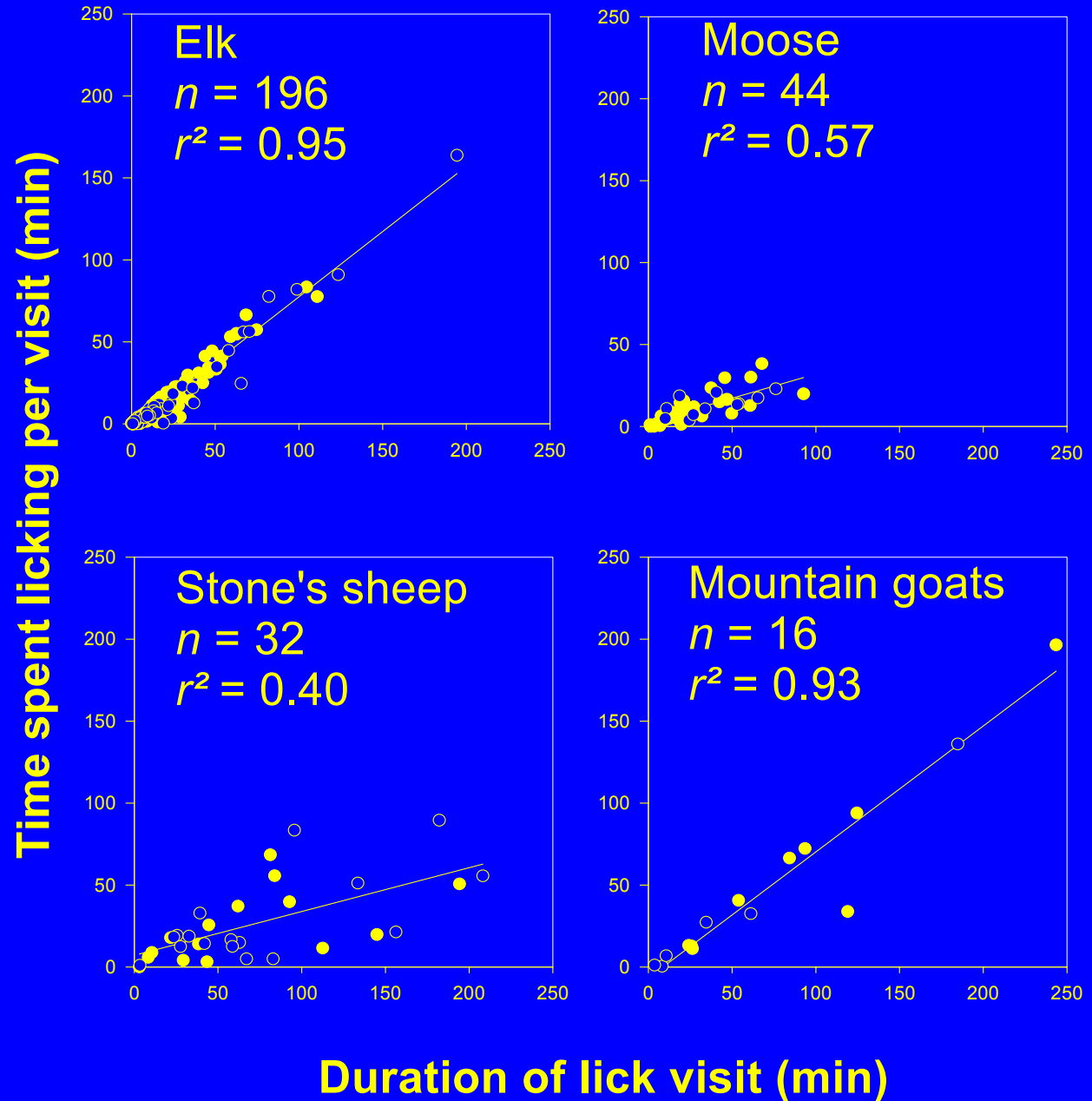


## Peak attendance



# Licking intensity

- Species-specific differences

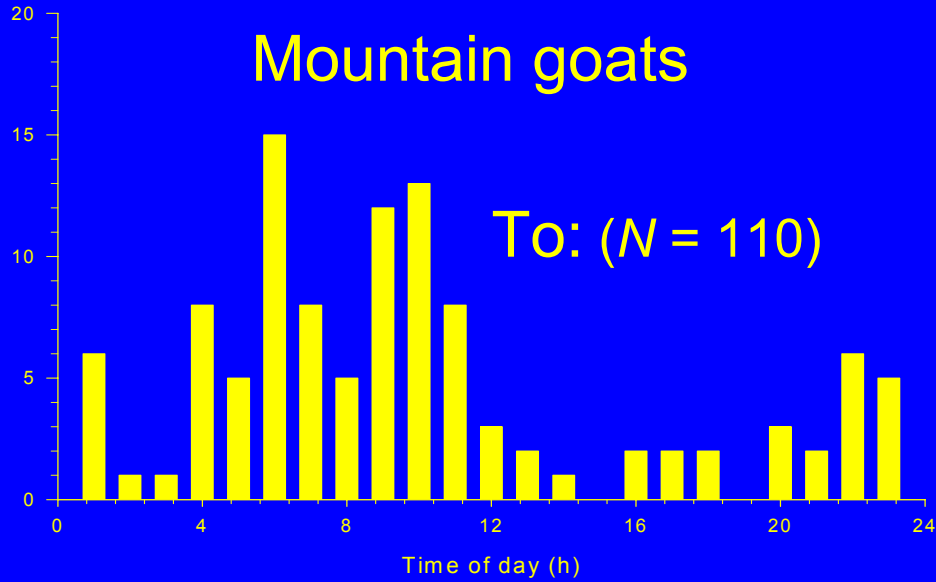


## Length of lick visit and time spent licking by mountain goats (mean $\pm$ SE)

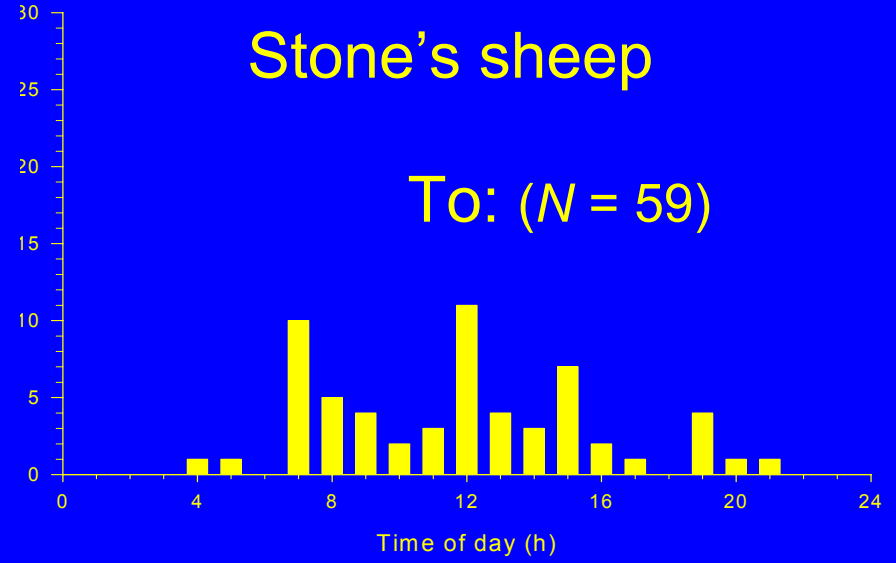
<u>Species/sex</u>	<u>N</u>	<u>Visit (min)</u>	<u>Lick (min)</u>	<u>Proportion</u>
Goat female	10	110 $\pm$ 30	54 $\pm$ 19	0.56 $\pm$ 0.08
Goat male	6	64 $\pm$ 31	34 $\pm$ 21	0.50 $\pm$ 0.12

# Hourly patterns of lick use: trail camera data

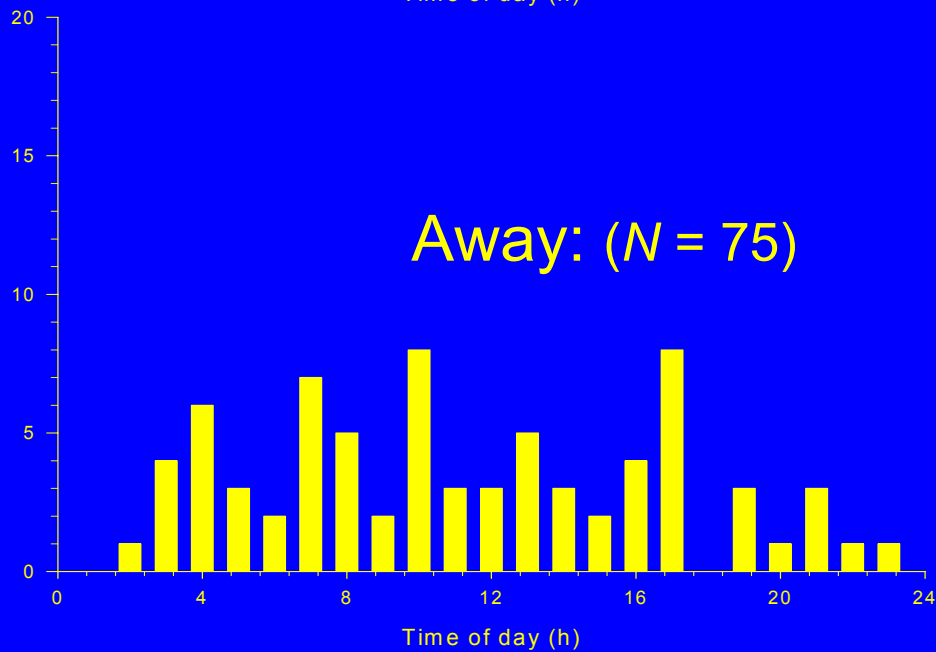
## Mountain goats



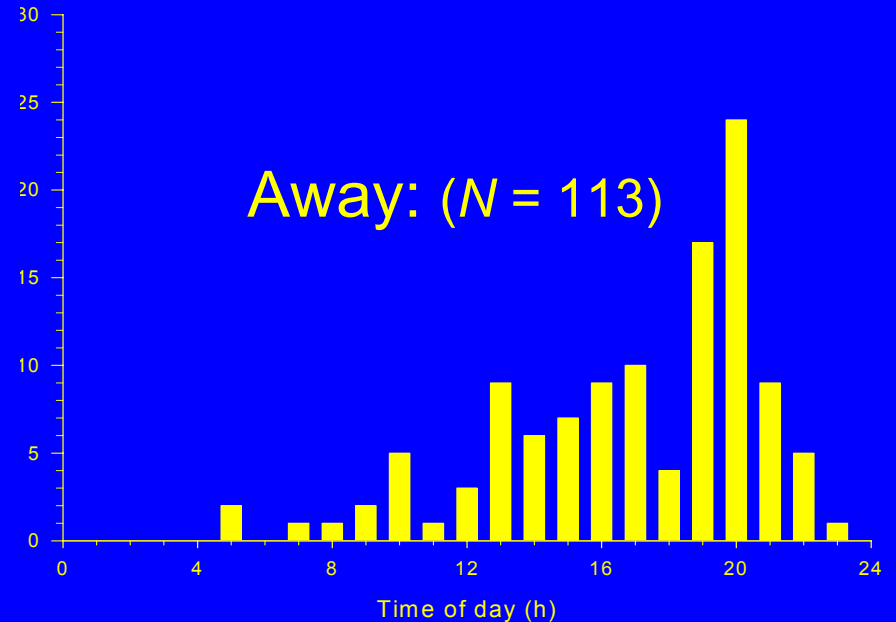
## Stone's sheep



## Away: ( $N = 75$ )



## Away: ( $N = 113$ )

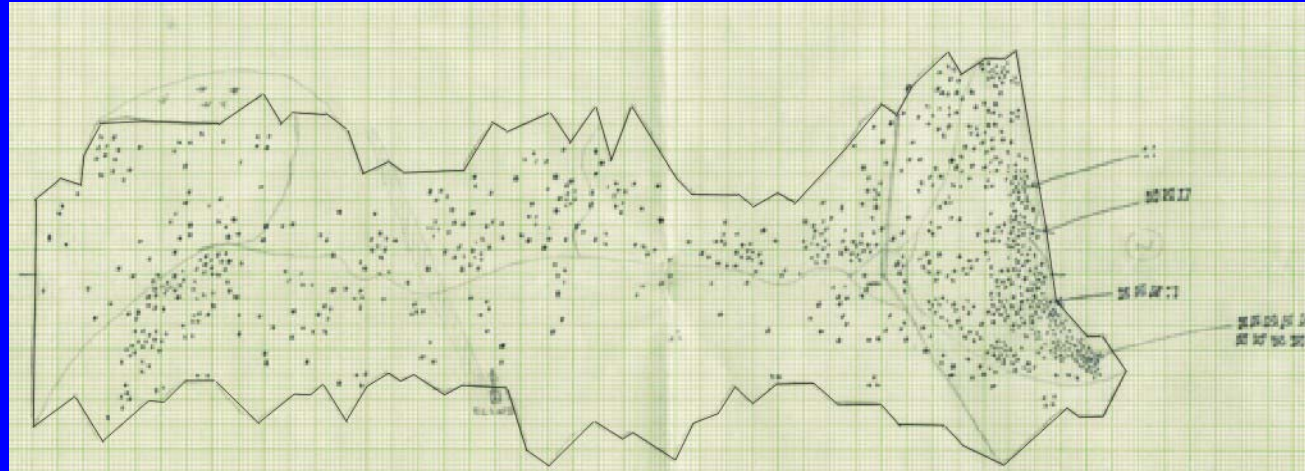


# Seasonal patterns of lick use:

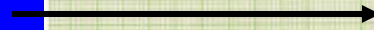
<u>Species</u>	<u>Peaks</u>	<u>Potential influences</u>
Mountain goats & Stone's sheep	<ul style="list-style-type: none"><li>• early July</li><li>• early August</li></ul>	<ul style="list-style-type: none"><li>• forage change</li><li>• lactation demands &amp; predation threat</li></ul>
Elk	<ul style="list-style-type: none"><li>• late May</li><li>• late June</li></ul>	<ul style="list-style-type: none"><li>• forage change</li><li>• lactation demands</li></ul>
Moose	mid-July	forage tannins ?

# Spatial use of licks to guide soil sampling (plotted scan samples)

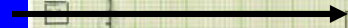
Animal locations...



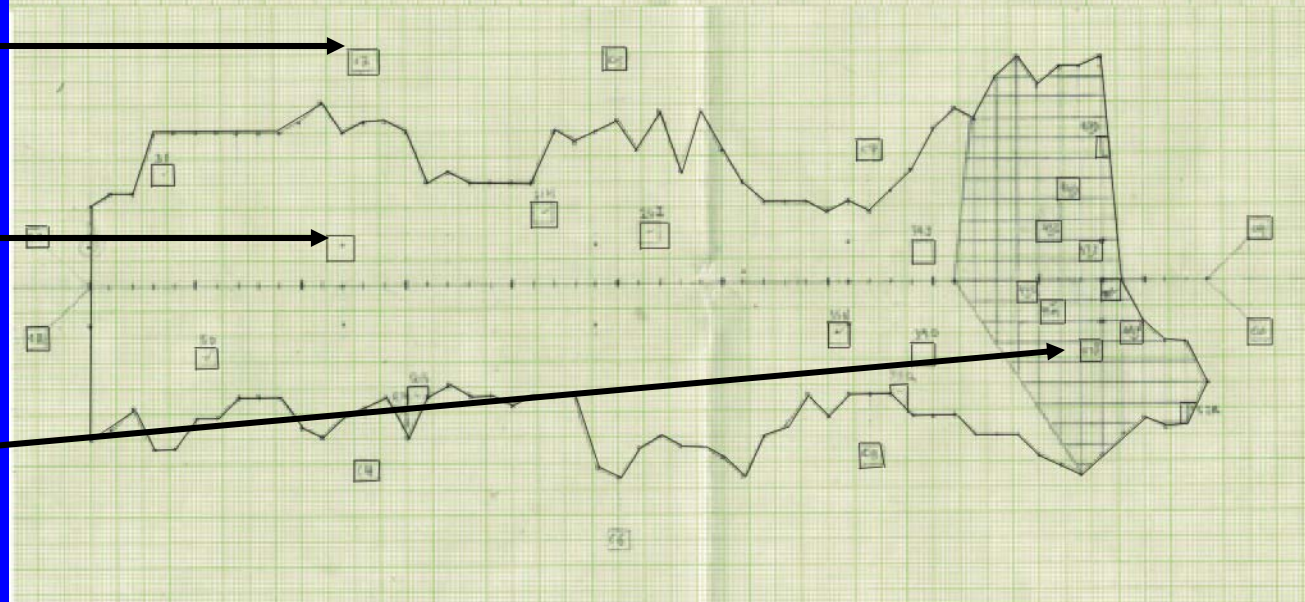
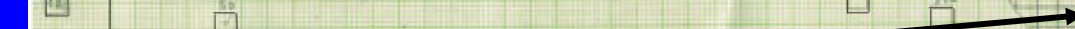
10 Control sites



10 Low-use sites



10 High-use sites



# Collecting soil samples for analyses

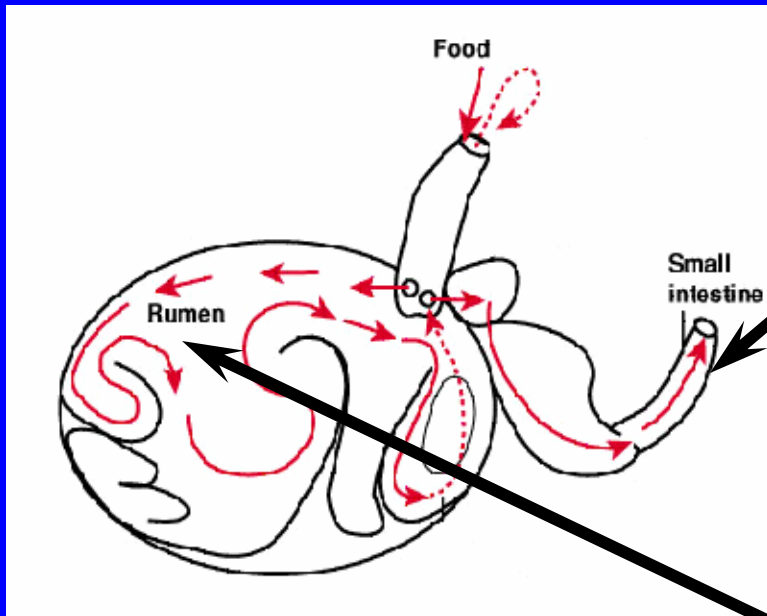


- 30 soil samples from 6 licks (3 wet, 3 dry) : 200 soil samples

# Methods of soil analyses

## 1. Elements: absorption sites in small intestine (pH 2.5)

- Macro: Na, Mg, Ca, K, P, S
- Trace: Fe, Cu, Mn, Zn



<http://www.geocities.com/magicgoatman/rumination.html>

## 2. Buffering capacity: optimal pH for rumen bacteria (pH 7)

- Clays
- Carbonates

# Summary of soil composition: all licks

Higher at lick	Type of lick	# of licks
Sodium	dry	3
	wet	2
Iron	dry	0
	wet	3
Magnesium	dry	2
	wet	2
Sulphate	dry	2
	wet	1
Carbonates	dry	3
	wet	2

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# Elemental concentrations in forage

- 6 primary forage species weighted by proportions in mountain goat diet
- 3 elevation zones, 3 collection periods
- Analyzed for macro- and trace elements



# Elemental concentrations (ppm): diet and requirements

Element	Dietary	Required	
		Maintenance	Lactation
Sodium	50-90	600-800 (wild) 2500 (sheep)	1000 (cow)
Iron	200-700	27-45 (wild) 25-40 (sheep)	50 (cow)
Magnesium	3600-6200	900-1800 (wild)	1700-2000 (cow)

- Sources: NRC (1996), Lintzenich and Ward (1997), Underwood (1977), Church (1975)

# Conclusions

- The use of licks is a complex interaction between physiological demands, forage composition, and properties of lick soils
- Patterns in the use of licks are variable over time and among individuals
- Licks serve multiple functions

# Licks are sources of supplemental sodium



## Given that:

- High seasonal use coincides with high lactation demands
- High sodium in soil at all three dry licks
- Low sodium in diet

# Licks are sources of carbonates for pH buffering

## Given that:

- High use follows transition to spring green-up
- High carbonates in soil at all dry licks
- Signs of scouring/diarrhea



# Recommendations

- Managers should consider that the use of licks is a fundamental component of mountain goat foraging strategies
- Additional research is needed to quantify elemental demands (Na, Fe, Mg) during lactation as well as the effects of spring forage transition on digestive disorders



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# Acknowledgements

- **UNBC Committee:** K. Parker, M. Gillingham, L. Arocena, D. Heard
- **Funding:** Muskwa-Kechika Trust Fund and UNBC Northern Land Use Institute
- **Field crew:** M. Shook, A. Anderson, P. Hirshfield
- **Ross Peck Outfitting:** D. Gunn, Pecks, and Warrens
- **Soil analyses:** C. Chisholm, D. Dick, P. Sanborn, M. Rutherford, W. Hines and C. Dawson at BC MoF Analytical Research Lab
- **Fellow grad students:** A. Batho, D. Gustine, E. Jones, B. Lay, B. Milakovic, A. Walker, H. van Oort

