

## Generic preference and *in-vivo* digestibility of alectoroid arboreal lichens by woodland caribou

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**Key words:** digestion trials, intake rate, *Alectoria sarmentosa*, *Bryoria*

**Rangifer**, Special Issue No. 9, 379-380

### Introduction

Lichens are eaten by most ungulate species in North America (Bergerud, 1972; Stevenson, 1978; Jenkins & Wright, 1987; Fox & Smith, 1988; Klein & Bay, 1990). However, none of these species are more obligate lichen feeders than woodland caribou (*Rangifer tarandus caribou*) in ecosystems of western North America where deep snowpacks preclude cratering. The digestibility of lichens is reported to vary substantially (21% to 85%; Hanley & McKendrick, 1983; Robbins, 1987) depending on technique and, in the case of *in-vitro* analyses, inoculum source (Person *et al.*, 1980; Thomas *et al.*, 1984; Antifeau, 1987). The objective of this experiment was to determine the *in-vivo* digestibility and generic preference of the 2 primary arboreal lichens found in late-winter woodland caribou habitat in southeastern British Columbia, northern Idaho and northeastern Washington.

### Methods

Three bottle-raised woodland caribou calves were used in a winter field experiment for 12-37 days prior to the initiation of digestion trials. Caribou weights on day 1 were: #1=64kg, #2=69kg, and #3=60kg. Daily diets were composed primarily of lichen and were then shifted to solely lichen 3 days immediately preceding 7-day total collection trials. Trials were conducted March 15-22, 1993. Hand-cleaned arboreal lichen, separated by genus (*Alectoria* and *Bryoria*), was offered *ad lib.* throughout the 7-day trial. Lichen orts were collected daily and air-dried for 72 hours and then corrected for dry matter by oven-drying subsamples for 24 hours at 100° C. All feces were collected and a daily subsample freeze-dried for chemical/microhistological analyses. The remaining feces were oven-dried for 24 hours at 100° C and weighed.

Preference was measured as the percent of each genus consumed during the course of the trial. Contents of feeders containing each genus of lichen were switched daily to minimize any potential feeder placement bias. Caribou had access to water *ad libitum* during the trial. Daily intake was corrected for dry-matter. Caribou were weighed on alternate days throughout the trial.

### Results and discussion

Mean apparent dry matter digestibility (ADMD) was 82% (range=77-86%). All caribou exhibited a strong preference (92%) for lichen in the multi-species *Bryoria* complex (range=87-99%) versus *A. sarmentosa* (8%). Mean daily dry matter intake was 43 g/kg BW<sup>0.75</sup> (range=25-61 g/kg BW<sup>0.75</sup>). These data include 2 days when animal #2 became nearly anorectic, eating only 292 g and 57 g. The 2 calves that spent only 12 days adjusting to a 100% alectoroid lichen diet did not eat as much and lost 1.8 and 4.6 kg during the trial. In addition, these animals did not produce solid feces during the trial indicating less than optimal adjustment to this diet. The calf that had 37 days to adjust to a lichen diet ate substantially more, continued to produce solid feces, and gained 3.2 kg during the trial.

This high ADMD value is in agreement with the only other *in-vivo* study on arboreal lichens (Robbins, 1987) and suggests that lichen digestibility is inadequately measured using *in-vitro* analyses with non-lichen fed inoculum donors. Preference for *Bryoria* may be a function of higher protein content (Antifeau, 1987; this study), lower tensile strength (pers. obs.), or differences in concentrations of secondary plant constituents.

## Acknowledgements

This research was funded by U. S. Fish and Wildlife Service-National Ecology Research Center. We also acknowledge the assistance of the U. S. Forest Service, Idaho Department of Fish and Game, British Columbia Wildlife Branch, Washington Department of Wildlife, Minnesota Zoo, Northwest Trek, Plum Creek Timber Company, Howard Hughes Undergraduate Research Fellowship, Pend Orielle Environmental Team, and the Selkirk Priest Basin Association. In addition, we thank a plethora of first class "lichen-pickers".

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