

Comparison of Rumen Fill and Rate of Passage in Reindeer and Muskoxen Fed a Common Diet: Digestive Strategies and Competitive Interactions

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Caribou and muskoxen are potentially competitive foragers, yet little is known of the way they digest common food types, information we must have to interpret diet use and preference in northern ecosystems. We hypothesized that reported differences in rumen fill and passage rates between caribou/reindeer (~85 kg) and muskoxen (~250 kg) are a function of diet and level of intake, and not a function of difference between an intermediate feeder and a grazer, *sensu* Hoffman. We fed a common diet (25% chopped Brome hay/ 75% concentrate pellets) at four levels of DM intake (1.3–3.3% BW) to rumen-cannulated reindeer (RD, 2 ad. females) and muskoxen (MO, 2 cast. males). Rumen DM fill (RDF, g/kgBW), liquid fill (RLF, l/kg BW), liquid passage rate (LPR, /h) and liquid outflow (LO, ml/h) were determined with pulsed intraruminal doses of Co-EDTA. Relative rumen fill was not different between RD and MO (RDF 13.2v14.0) (RLF 135v133), contrary to the grazer-browser hypothesis of Hoffman. The absolute difference in fill (RD<MO) was proportional to BW differences. DM fill/DM intake for RD (0.57) was less than MO (0.81 P<0.05). In absolute units, RDF (kg) increased with intake (kg/d) in separate regressions for RD and MO. This contrasted with absolute rumen liquid fill. Absolute RLF (l) for RD was independent of intake; whereas a linear increase was noted for MO. LPR of RD exceeded MO (0.112v0.076, P<0.05). LPR increased with intake in RD but not in MO. Although LO for RD was less than MO (1115v2043, P<0.01), a common interspecies regression related LO (Y) to DM intake (X): $Y=358X+434$ ($R^2=0.46$). Liquid flow rate drives much of the passage of particulate matter from the rumen, thus DM flow likely parallels liquid flow. Since LPR of RD>MO, particulate matter of this diet should have a longer relative residence time in MO; therefore we should expect MO to digest fiber more efficiently (i.e. more completely) than RD when feeding at similar intake rates. Further, since LPR increases with DM intake in RD, we expect ruminal digestion of particulate matter to vary with intake in RD but to remain relatively constant with intake in MO.



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