

## Range monitoring using exclosures on Southampton Island (N.W.T., Canada): The effect of exclosures on snow condition

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*Abstract:* Snow drifting and its potential consequences on the vegetation, is believed to be a problem associated with the use of exclosures in the Arctic. Surprisingly, previous studies using exclosures as an experimental tool to analyze the impact of *Rangifer* grazing did not discuss this problem. The objective of this paper is to test the effects of the exclosures on snow characteristics.

The exclosures (5 m x 5 m; n=13) were made of heavy farm fencing (9.5 gauge galvanized wire), 100 cm high with horizontal strands about 15 cm apart with vertical stays every 41 cm, and 45 imp gal barrels (n=4) filled with rocks served as fence posts. We measured snow characteristics (depth and hardness) at each exclosure twice in winter (March and May 1990) using a Ramsonde penetrometer. Outside the exclosures, snow characteristics were measured at 4 m and 5 m away from the fence on each side, for a total of 8 readings. Inside the exclosures, 8 readings were taken every meter along two perpendicular transects. To analyze the snow melting chronology in the spring we visited 3 exclosures at the end of June 1990 to observe snow disappearance on the ground within the exclosures relative to the surrounding areas.

Snow was significantly deeper inside the exclosures (March: 55.8 cm vs 51.5 cm; May: 65.3 cm vs 61.1 cm). Within 20 cm of each drum snow depth was shallower. Snow hardness was slightly lower inside the exclosures, although the difference was not significant (March: 34.5 kg vs 34.7 kg; May: 32.7 kg vs 37.6 kg). Ram resistance, an integrated measure of snow depth and hardness correlated to the watercontent, did not differ significantly (March: 1925 kg·cm vs 1787 kg·cm; May: 2135 kg·cm vs 2297 kg·cm). Apparently, snow disappeared on the ground within the exclosures at the same rate as it did from surrounding areas, except in the immediate periphery (30 cm) of each drum, where the snow melts faster.

Snow depth was influenced by the presence of exclosures. However, the integrated ram resistance, an important parameter as it is correlated to water content, did not differ within and outside the exclosures. In the immediate periphery of each drum snow condition as well as the snow melting pattern were affected. To minimize this potential problem, we suggest to establish a one meter buffer zone around each drum where the vegetation characteristics are not considered. Under the conditions prevailing during the study, we conclude that the use of exclosures can not be discarded on the basis of their potential change to snow conditions, and should be considered as a valuable tool to monitor range conditions.

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