CARIBOU FEEDING HABITS ON FORESTED WINTER RANGES

by

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The following report is incomplete and sketchy in many respects. It involves one of a number of purely exploratory projects which the author has undertaken over a period of years, incidentally to other work. The line of investigation, it is believed, shows promise. More intensified and systematic efforts might be well worth while either as a separate undertaking or in conjunction with general range studies, nutritional work, or stomach analysis.

WINTER FEEDING AREAS

On forested winter ranges barren-ground caribou (Rangifer arcticus arcticus Richardson) utilize two main ecological types for feeding. These are:

1. Mature spruce forest, which comprises a number of sub-types, all having a significant growth of fruticose lichens of the genera Cladonia and Cetraria;

2. Sedge areas along lake and stream margins and in swamps, which may or may not grow significant quantities of willow, alder, and glandular birch.

The spruce forest type seems to be much preferred but this may be because sedge areas are generally much smaller in number and extent than spruce forested areas.

Caribou sometimes utilize quite different types of vegetation for feeding. Occasional heavy use has been noticed in areas of Juniperus communis growth, and on rocky hilltops covered with the foliose lichen Umbilicaria hyperborea. Such use is not frequent, however, and always seems to occur in the absence of available areas of the preferred feeding types. The use of such marginal areas is not considered in this paper.

FEEDING HABITS

Where snow depth is only a few inches or less, caribou feed by grazing on exposed vegetation with a great deal of random pawing with the forefeet to expose additional food. Under more usual winter conditions, where the snow is two or more feet in depth, a marked and characteristic pattern emerges. The animals consistently dig feeding craters with the forefeet and feed on the vegetation exposed.

In snow three feet deep, a typical crater is usually three and a half to four feet wide at its upper margin and six inches to one foot wide on the ground at the bottom. Occasionally craters may be dug towards a bank at an oblique angle rather than straight down to a horizontal surface. The craters seldom overlap but are often so close together that they nearly touch. Thus only a fraction of the ground cover in the feeding area is utilized and overgrazing in one winter is unlikely. Feeding caribou are constantly on the move and seldom cover the same ground twice in a single season.

The appearance of a heavily utilized feeding area in winter is remarkable, particularly from the air. Every foot of lichen productive forest for hundreds of square miles may be pock-marked with holes so close together that none of the snow looks untrampled. It is worth remarking that the feeding craters, from the air, strongly resemble the bedding holes made by the caribou when they lie down. The bedding holes, however, are generally found in unproductive, open areas such as lake ice or swamps.

It is indeed remarkable how little effort appears to be wasted in finding food. Hundreds of feeding holes were inspected, but not one was found that had not had suitable food plants at the bottom. The ability of caribou to find sedges along river margins and fruticose lichens in heavily burned areas is particularly remarkable. The plants often grow in distinct, separate clumps rather than a continuous carpet, and the feeding craters strike these clumps with uncanny accuracy.

Feeding craters are used exclusively on many winter ranges and so provide an unparalleled opportunity for investigating the feeding habits and preferences of caribou. To obtain a sample one need only follow fresh caribou trails and examine the vegetation in each crater. It would be difficult or impossible to estimate accurately the percentage of each species eaten from the various craters, but the mere presence or absence of a species indicates percentage if a sufficient number of craters are examined. It is doubtful that the winter feeding habits of any other big game animal lend themselves as well to quantitive analysis.

During the caribou studies a number of craters have been examined over a four-year period in the Mackenzie District, Northwest Territories. A presentation of the findings may be of interest and at least indicative of what might be expected from more thorough work along the same lines. The results of the examinations made to date are presented in Table 1.

Table I. Living plants found in 262 caribou feeding craters over a four-year period, showing the plant or combination of plants found in each crater.

Plants Found in Craters	(No. of Craters Examined) 1951	1952*	1953	1954	Total	Per Cent of Total
Lichen	--	5	3	68	76	29.0
Lichen, Labrador tea	--	4	--	22	26	9.9
Lichen, *Vaccinium* sp.	--	2	--	12	14	5.3
Lichen, willow	--	9	--	--	9	3.4
Lichen, sedge	--	2	--	5	7	2.7
Lichen, moss	--	4	2	--	6	2.3
Lichen, crowberry	--	--	--	5	5	1.9
Lichen, juniper	--	--	--	4	4	1.5
Lichen, crowberry, tea	--	--	--	3	3	1.1
Lichen, bearberry	--	--	3	4	7	2.7
Lichen, spruce	--	1	--	--	1	0.4
Lichen, grass	--	--	1	--	1	0.4
Lichen, sedge, saxifrage	--	--	1	--	1	0.4
Lichen, sedge, moss, *Vaccinium*	--	--	1	--	1	0.4
Sedge	18	1	--	27	46	17.6
Sedge, willow	16	1	--	--	17	6.5
Sedge, birch	4	--	--	4	8	3.0
Sedge, *Vaccinium* sp.	--	--	--	6	6	2.3
Sedge, Labrador tea	--	1	--	1	2	0.8
Sedge, willow, alder	1	--	--	--	1	0.4
Labrador tea	--	--	--	8	8	3.0
Labrador tea, *Vaccinium* sp.	--	--	--	6	6	2.3
Bearberry	--	--	3	--	3	1.1
Willow	2	--	--	--	2	0.8
Grass	--	--	--	1	1	0.4
Sedge, birch, alder	1	--	--	--	1	0.4
Totals	42	30	14	176	262	100.0

*Craters examined by A. G. Loughrey north of Great Bear Lake, March, 1952.

It will be noted in Table I that the craters investigated in 1951 all lay in a sedge area. This would necessitate separate analysis but for the fact that the craters investigated in 1953 were in a lichen area. In addition the 1954 investigations were in a predominantly lichen range. The 1952 sample area was about equally composed of sedge and lichens. The total investigations are believed to represent the two major ecological types in proportions frequently found by caribou. The proportional availability of the two types is quite variable and this would have to be taken into account in future investigations.

Table I shows that lichens and sedges show up in the feeding craters far more frequently than other plants. Lichens were present in 61.4 per cent of the craters examined and sedges in 34.5 per cent. They were found together in 3.5 per cent of the craters. It is interesting to note that a few sedges are commonly found in lichen areas, but lichens of the sort used by caribou are very seldom found in sedge areas.

Because most feeding craters contain more than one type and species of utilized plant, the per cent occurrences obtained as in Table I do not indicate accurately how much each plant is utilized. A more correct picture is presented by totalling individual occurrences of each species of plant in all craters examined, and them making percentage comparisons. This has been done in Table II below.

Table II. Number of occurrences of each plant species in the feeding craters examined, percentage occurrence of each, and percentage each makes up of total ground cover as measured by 5,000 random line-point samples.

Species	No. of Occurrences	Per Cent Occurrence	Per Cent of Ground Cover
Lichen	161	40.6	21.7
Sedge	90	22.7	2.1
Labrador tea	45	11.4	5.9
Willow	29	7.3	0.7
Vaccinium sp.	27	6.8	4.9
Bearberry	10	2.5	2.6
Glandular birch	9	2.3	1.2
Crowberry	8	2.0	2.6
Moss	7	1.8	11.6
Juniper	4	1.0	1.2
Grass	2	0.5	1.2
Alder	2	0.5	0.6
Prickly saxifrage	1	0.3	0.3
Spruce	1	0.3	4.4
Totals	396	100.0	61.0

Table II gives a somewhat different and clearer picture of plant utilization. Lichens (40.6 per cent) and sedges (22.7 per cent) make up the bulk of the material eaten but both Labrador tea (11.4 per cent) and willow (7.3 per cent) show up in more than incidental quantities. Labrador tea is almost universal on caribou ranges and common on both sedge and lichen areas. Inevitably, some of it is eaten incidentally with the major preferred species, but the above figures, as well as visual observation of feeding caribou, lead me to conclude that it is also sought for its own sake. Willows are common everywhere but they are not so closely associated with lichens and sedges that the caribou could not avoid them if they wished. Their presence in craters certainly indicates selective feeding.

Methods can certainly be developed for estimating the preferences of caribou for the various foods available to them, beyond the more or less evident preferences indicated above. One method which shows promise is the comparison of known species, and their percentage composition of the ranges, with their percentage utilization. In connection with range analytical studies the author has taken 5,000 point samples on unburned, forested winter ranges. By chance the samples were taken close to the several particular areas where the crater examinations were recorded. Table 2 shows, in addition to the percentage occurrence of plants in the feeding craters, the average percentage of total ground cover for each plant, in the line point samples.

In comparing the per cent occurrence figures for plants in craters and ground cover, a clear scale of preference in feeding is at once apparent. It may be considered that the standard of availability for any plant is its per cent occurrence in the ground cover. If grazing by caribou were completely random, line point samples and crater samples would show the same percentages for each plant. The plants utilized beyond their availability are those preferred and, in varying degrees, actively sought by caribou. Plants utilized in much the same quantity as they are present in the ground cover are merely taken when available - neither actively sought or discarded. Plants which are utilized in lesser proportions than their availability permits are those rejected in varying degrees and, for the most part, taken incidentally in gathering preferred foods. It might also be considered that the plants whose percentage occurrence in the craters is greatest in comparison with percentage availability, are those most actively sought and preferred.

Using these considerations a table of preference for the plants shown in Table I and II might be set up as follows:

Preference Rating	Plant
Preferred plants, actively sought, in apparent order of preference	Sedge Willow Labrador tea Lichens Glandular birch
Plants taken as available, little preference indicated	Vaccinium sp. Bearberry Juniper Crowberry Alder Prickly saxifrage
Taken incidentally or actively rejected	Grass Spruce Mosses All plants found on the range but not in feeding craters

It is interesting to note that lichens are taken by far the most frequently, but their preference rating is far below that of sedge and willow, and slightly below that of Labrador tea. Sedges and willows are taken ten times more frequently than could be expected in random feeding. Labrador tea, lichens, and glandular birch are all taken about twice as often. All other species are taken about as available, or rejected. A large variety of plants which showed up in the point sampling of the ranges in summer never showed up in the feeding craters but none of those species are present in great quantity. Presumably they are never sought by feeding caribou, and are not associated with preferred foods closely enough to be taken incidentally.

Of considerable interest is the very low occurrence of mosses in the feeding craters considering their availability. They might have been expected to show up more frequently than they did, as they often grow in close association with both lichens and sedges. It appears than they are definitely rejected.

There appear to be many possible paths of speculation and investigation in this kind of study. Since the present data ~~is~~ are limited and purely exploratory, the conclusions drawn should be considered subject to modification by further work.

APPENDIX

Plants Referred to in the Text

Lichens	complete specific determinations were not possible but the commonest species were Cladonia alpestris (L.) Rabh., C. mitis Sandst., C. rangiferina (L.) Rabh., Cetraria islandica (L.) Ach. and C. nivalis (L.) Ach.
Sedges	specific determinations were not made but Carex of a number of species was involved.
Labrador tea	Ledum groenlandicum Oeder.
Willow	a number of species of the genus Salix.
Vaccinium	not listed specifically because of some confusion in the raw data. Vaccinium uliginosum L. and V. Vitis-Idaea L. were the commonest species and in about equal quantity. V. Oxycoccos L. was present.
Bearberry	Arctostaphylos Uva-ursi (L.) Spreng. made up most observations with A. rubra (Rehd. & Wils.) Fern. present in trace quantities.
Glandular birch	Betula glandulosa Michx.
Crowberry	Empetrum nigrum L.
Mosses	not specifically determined but including at least three; Hylocomium splendens (Hedw.) Bry. Eur., Polytrichum sp. and Dicranum sp.
Juniper	Juniperus communis L.
Grass	not specifically identified.
Alder	Alnus sp.
Prickly saxifrage	Saxifraga tricuspidata Rottb.
Spruce	Picea mariana (Mill.) BSP

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