

Donald R. Johnson

Department of Biological Sciences
University of Idaho
Moscow, Idaho 83843

and

Donald R. Miller

Institute of Natural and Environmental Resources
University of New Hampshire
Durham, New Hampshire 03824

Observations on Reproduction of Mountain Caribou

Abstract

Aspects of reproduction of the West Kootenay band of mountain caribou are described. Four or five calves are produced yearly by this band of about 25 animals. Behavior of the rutting band, sequence of antler development and loss, and apparent occurrence of suckling by a yearling are described. The only confirmed calf mortalities have resulted from collisions with motor vehicles. Recruitment compares favorably with that of other stable caribou populations, but it would not compensate for even a slight increase in mortality for this small population.

Several aspects of the reproductive biology of mountain caribou (*Rangifer tarandus montanus*) in the Kootenay Pass region of British Columbia have been observed since 1972. About 25 caribou occur in the vicinity of the pass; a few others occur farther south in northern Idaho and northeastern Washington. Our observations on reproduction were made incidental to studies of other aspects of caribou ecology.

Most caribou in the Kootenay Pass region occur in a single band during late winter and early spring. This group consists of both sexes and all age groups. Bulls disperse from this aggregation in early May and remain segregated as single animals or groups of two or three until the rut. Following calving, which apparently occurs in late May and early June, cows, calves, yearlings, and a few attendant bulls remain primarily in the Summit and Carolina Creek basins throughout the summer months.

Encounters with this group have enabled us to estimate the number of calves produced yearly since 1972 (Table 1). Since repeated counts by independent observers were often identical, we believe that these are accurate estimates of calf production. There is no confirmed evidence of calving south of the International Boundary (Freddy, 1974); but single cows with calves have been sighted in northern Idaho in September and November (A. Dargan and E. Bierman, pers. comm.).

The first evidence of pre-rutting behavior occurs in early September when bulls engage in mild sparring. Large bulls at this time possess polished antlers. We usually found antler-rubbed trees, 2-3 m in height, in small clearings on benches or on moist ground in the head of cirques. Most of these (80 percent) were subalpine fir (*Abies lasiocarpa*). The remainder were Engelmann spruce (*Picea engelmanni*) and white-barked pine (*Pinus albicaulus*). Additional damage to small trees probably resulted

from brush thrashing (Lent, 1965a), but we did not observe this behavior. Most antler-rubbed trees die as a result of this damage.

TABLE 1. Calf production and survival. West Kootenay Band.

Year of Birth	Number	Source and Date
1972	4	Darkwoods Ltd. personnel, 10 May 1973
1973	5	G. Schroeder, 9 August 1973
	4	D. Freddy, 20 March 1974
1974	5	Woods and Thompson, 31 July 1974
	5	G. Leslie, 10 February 1975
1975	4	R. Silver, 24 July 1975
	2	J. Martin, 26 April 1976
1976	5	The sum of a road-kill 4 July 1976 and 4 seen by R. Kerr, 29 November 1976

We consider mid-October the peak of the rut. Freddy (1974) found evidence of active spermatogenesis in a large bull shot on Kootenay Pass in late October (found 31 October and dead several days). We observed a rutting band at the headwaters of Lost Creek on 17 October 1974, consisting of a large dominant bull, three mature cows, two yearling cows, and two subordinate bulls. This group moved to the head of a cirque in the early morning and remained there throughout the day. The large bull paid close attention to one of the cows, which he periodically attempted to mount. He kept the other bulls at a distance of 15-20 m using head threats and sometimes by rushing at them. The tended cow occasionally rubbed her head against him. The bull regularly emitted a grunting sound; Bergerud (1973) has described this sound as a hoarse, guttural pant. The band moved to level ground in the late afternoon and the dominant bull mounted the cow for 5-7 seconds. She offered some resistance, and we could not be sure that copulation had taken place, although Bergerud (1974) has identified successful mounts which were this brief. The cow terminated contact by kicking with both hind feet. We were able to bring the bull into close range by imitating his grunting sounds.

Based on counts of large bulls with renewed antler growth in late spring, we believe that there are at least three rutting groups in the vicinity of Kootenay Pass. We have reports of such bands in the headwaters of Curtis Creek (1975) and Hidden Creek (1977). There is considerable movement between groups, especially by subordinate bulls. Most rutting activity subsides in late October when the large bulls begin losing their antlers. There is progressive antler loss throughout the winter and spring by medium-sized and finally smaller bulls. We recovered a freshly dropped antler of a small bull on 14 April.

Antler formation and loss by cows is less predictable and influenced by pregnancy (Lent, 1965b; Skoog, 1968). Mature cows which are not pregnant shed first, usually in April. We have seen single-antlered cows in mid- and late April along with several which were antlerless. Some of these may have been older, barren cows. Although a few non-gravid cows retain their antlers into the calving season, most of those which carry antlers at calving are pregnant. Counts of antlered cows at calving then provides an estimate of natality (Skoog, 1968). Such a count would be unreliable for the West Kootenay band, however, because of their small number. Dennis Money photographed 18 animals near Kootenay Pass on 30 April 1974, of which only three cows were

antlered (two of these with a single spike). At least five calves were produced that spring (Table 1), more than we could anticipate based on the count of antlered cows prior to calving.

We have little information on the ovarian cycle in this population. A single corpus luteum was found in the ovary of a mature cow killed in a collision with a motor vehicle on 12 November 1976. It measured 10 mm in diameter, a value within the range of corpora lutea of pregnancy (Dauphiné and McClure, 1974). We could find no embryo in the uterus, an indication of a very recent pregnancy or perhaps a "silent heat." Ovarian cycling has been studied by McEwan and Whitehead (1972), who report estrous cycles of 10-12 and 24 days in captive animals.

Although the calves of Alaskan caribou are weaned by mid-September (Skoog, 1964), a few yearlings are known to suckle, even after their mothers have given birth to other calves (Lent, 1966). We encountered a mature antlerless cow with an enlarged udder, accompanied by a yearling cow, on 20 August 1975. Although we did not see the yearling suckle, we cannot explain the enlarged udder for any other reason unless the cow had recently lost her calf. Nursing by female yearlings would be more likely than by males since the former maintain a longer association with their mothers (Lent, 1966; Kelsall, 1968).

Only two instances of calf mortality have been confirmed, both as a result of collisions with motor vehicles along B.C. Highway 3 near Kootenay Pass (Freddy, 1974; Johnson and Todd, 1977). Gary Schroeder saw a calf limping in August, 1973. The calf count by David Freddy the following spring was one less than that Schroeder observed (Table 1), possibly an indication of its eventual death.

Recruitment, as measured by the proportion of calves in the population, reflects both pregnancy rates and calf survival. Recruitment in North American caribou populations usually ranges from 10-25 percent (summary by Parker, 1972). In a population of 25 animals, four or five calves such as that produced by the West Kootenay band would seem adequate for stability, given the present mortality rates. This recruitment would not compensate for even a slight increase in mortality for this small population.

We thank the U.S. Forest Service, the Washington Game Department, the National Geographic Society, and the West Kootenay Outdoorsmen for support during this study.

Literature Cited

- Bergerud, A. T. 1973. Movement and rutting behavior of caribou (*Rangifer tarandus*) at Mount Albert, Quebec. *Canad. Field-Nat.* 87: 357-369.
- . 1974. Rutting behaviour of Newfoundland caribou, pp. 395-435 in V. Geist and F. Walther (eds.) *The Behaviour of Ungulates and Its Relation to Management*. IUCN, Morges, Switzerland. 940 pp.
- Dauphiné, T. C., Jr., and R. L. McClure. 1974. Synchronous mating in Canadian barren-ground caribou. *J. Wildl. Manage.* 38: 54-66.
- Freddy, D. J. 1974. Status and Management of the Selkirk Caribou, 1973. University of Idaho, Moscow, M.S. thesis. 132 pp.
- Johnson, D. R., and M. C. Todd. 1977. Summer use of a highway crossing by mountain caribou. *Canad. Field-Nat.* 91: 312-314.
- Kelsall, J. P. 1968. *The Migratory Barren-Ground Caribou of Canada*. *Canad. Wildl. Service*, Queens Printer, Ottawa, Ontario, 340 pp.
- Lent, P. C. 1965a. Rutting behavior in a barren-ground caribou population. *Animal Behavior* 13: 259-264.
- . 1965b. Observations on antler shedding by female barren-ground caribou. *Canad. J. Zool.* 43: 553-558.

- . 1966. Calving and related social behavior in the barren-ground caribou. *Z. für Tierpsychologie* 23: 601-657.
- McEwan, E. M., and P. E. Whitehead. 1972. Reproduction in female reindeer and caribou. *Canad. J. Zool.* 50: 43-46.
- Parker, G. R. 1972. Biology of the Kaminuriak Population of Barren-Ground Caribou. Part 1: Total numbers, mortality, recruitment and seasonal distribution. *Canad. Wildl. Service, Report Series No. 20*, 95 pp.
- Skoog, R. O. 1968. Ecology of the Caribou (*Rangifer tarandus granti*) in Alaska. Univ. of California, Berkeley, Ph.D. thesis. 699 pp.

Received December 30, 1977

Accepted for publication February 23, 1978