

## Calving and maternal body weight change in the reindeer

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Earlier studies in Ungulates have indicated that reproductive success is closely related to the mother's reproductive condition or factors affecting this (Sadleir 1969, Guinness *et al.* 1978). Calf birth-weight, growth and survival are indicated to be dependent on eg. maternal age and weight as well as nutrition (Bergerud 1975, Albon *et al.* 1983, Rognmo *et al.* 1983, Eloranta & Nieminen 1986).

Mitchell & Brown (1974) showed that red deer hinds (*Cervus elaphus*) which had not raised a calf the previous summer were significantly more fertile than hinds that had done so. The fertility of hinds is documented to reduce also with late calving in the spring (Clutton-Brock *et al.* 1983). One explanation suggested for the higher fertility of hinds with higher body-weight and early calving would be that they are more likely to meet the energy demands of pregnancy and lactation, which becomes pronounced with late calving, and produce a viable calf, without risking their lives. In this paper we test the prediction that calving followed by lactation reduces the mother's condition i.e. the body-weight and future reproductive success.

Reproduction was studied in the experimental reindeer herd in Inari, Kaamanen (69°10N') in Northern Finland. The fertility and weight changes of a stock of semi-domesticated reindeer (*Rangifer tarandus tarandus L.*) over a period of 16 years has been assessed. The reindeer grazed natural vegetation within the enclosed area of about 70 km<sup>2</sup>. Besides this the reindeer were offered supplementary food during the winter months. The reindeer calved yearly in a paddock of 8 ha. During the calving period the animals were fed with lichens, molasses and pelleted concentrates.

The data collected consisted of 842 hinds aged 1 to 14 years when giving birth. Fertility seemed to be age- and weight-dependent, as shown in our earlier study, the calving rate clearly increased with age up to 5 years being 87.2% in hinds calving at the age of 3 to 5 years (Eloranta & Nieminen 1987). Also the weight of hinds is known to increase during the first five years (Eloranta & Nieminen 1986). The present observations on the influence of calving and lactation on the mother's condition and fertility show that reproduction stress reduces neither the body-weight nor the fertility in reindeer in conditions with abundant food.

The reindeer were divided into four groups: true yield (hinds which had not given birth the previous summer); yield (hinds which had borne a calf but lost it during the calving season); summer yield (hinds which had lost the calf in sum-

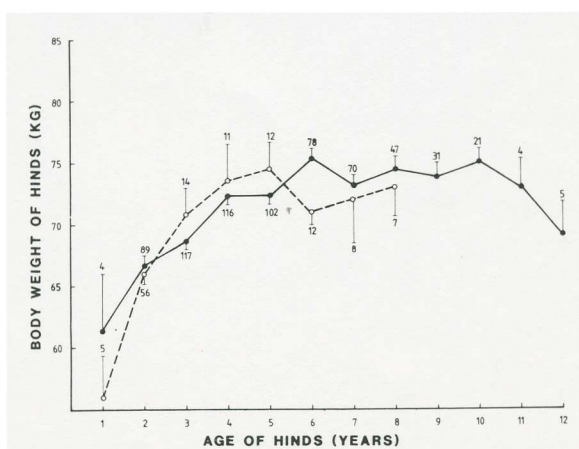


Figure 1. Autumn body-weight (kg  $\pm$  S.E.) of hinds of different ages according to their calving success. ● calved hinds; ○ true yield hinds (Eloranta & Nieminen 1987).

Table 1. Birth-weight of calves ( $\bar{x} \pm S.D.$ , sample sizes shown in parenthesis) in different cohorts of hinds according to their reproductive status.

Reproductive status of the mother	Birth-weight of calves	F-value			
		TY	Y	SY	M
True yield (TY)	5.00 + 1.00 (93)				
Yield (Y)	5.20 + 0.88 (53)	1.49 <sup>ns</sup>			
Summer yield (SY)	5.27 + 0.79 (84)	3.85 <sup>ns</sup>	0.22 <sup>ns</sup>		
Milk (M)	5.50 + 0.90 (420)	23.23 <sup>***</sup>	5.50*	5.14*	

Statistical probabilities refer to differences between groups,  $P < 0.001$ \*\*\*,  $P < 0.05$ \*,  $P < 0.1$ <sup>ns</sup>.

mer) and milk (hinds which had successfully reared a calf the previous summer).

There were no significant differences in the body-weight of yield, summer yield and milk hinds ( $F = 0.44$ ; d.f. = 2;  $p < 0.7$ ) in autumn. Contrary to belief, the true yield hinds proved to be slightly leaner in autumn compared to the calved ones. None of the age groups studied showed significant weight differences between true yield and calved hinds either (Figure 1).

Milk, summer yield and yield hinds did not differ in fertility (84.4%, 83.3% and 85.1% respectively) True yield hinds showed even lower fertility (75.4%) than the calved ones (84.3%) (Eloranta & Nieminen 1987). The birth-weight of calves varied clearly with the reproductive status of the mother ( $F = 9.46$ ; d.f. = 3;  $p < 0.001$ ) (Table 1). Milk hinds produced the most viable calves. There were no difference in the calf birth-weight of yield, summer yield and true yield hinds.

The difference in birth-weight was not due to sex-difference in different cohorts of hinds. Of the total of 676 calves whose sex was identified 344 (53.6%) were males. Although the sex-ratio was slightly male biased, the trend was not, however, significant ( $G = 3.30$ ; d.f. = 1;  $P < 0.1$ ). In true yield and yield hinds the calf sex-ratio also favoured males (57.9% and 60.0% respectively) but the sex difference was not significant. In summer yield and milk hinds the amount of male and female progeny was well-balanced (50.6% and 50.8% males respectively).

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