Energy nutrition of young red deer (*Cervus elaphus*) hinds and a comparison with young stags

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ABSTRACT

Nine red deer hinds run as 2 groups were fed to appetite on a concentrate diet, indoors, from 5 to 17 months of age. Group food intake and individual liveweight gains were recorded. Food intake varied seasonally with greater amounts being consumed in summer than winter. Similarly liveweight gain was faster in summer than winter. From the relationship between intake and liveweight gain it was calculated that the hinds need 0.52 MJ metabolizable energy (ME)/kg$^{0.75}$/d for maintenance and require 55 MJ ME/kg for liveweight gain.

These values result in slightly higher requirements for hinds than previously reported. In comparison with age matched stags, hinds have lower amplitude seasonal fluctuations in food intake and live weight and although maintenance requirements are similar between the sexes, stags require less energy for growth.

Keywords Metabolisable energy; red deer hinds; maintenance, growth, food intake.

INTRODUCTION

The energy requirements for maintenance and liveweight gain for young growing red deer stags have been know for some time (Simpson *et al.*, 1977a, b; Fennessy *et al.*, 1981). Although estimates of the energy requirements for hinds based on the stag data, have been available, (Fennessy *et al.*, 1981) no actual measurements have been made. Although hinds and stags both have a seasonal pattern of growth and food intake, controlled by day length, the amplitude of seasonal fluctuations is less in hinds (Suttie and Simpson, 1985). Moreover hinds grow more slowly than stags (Suttie 1981). Thus the applicability of estimates of energy requirements derived from stags to hinds is not clear.

The aim of the present study as to measure growth and voluntary food intake in a group of young hinds and to calculate energy requirements for maintenance and liveweight gain.

MATERIALS AND METHODS

Nine red deer hind calves, who had been bottle reared to induce tameness were penned indoors in 2 groups from May when they were 5 months old until the following May. They were fed to appetite a pelleted diet containing 46% barley, 35% lucerne, 15% soybean meal and 4% minerals and vitamins. The ration supplied 11 MJ metabolizable energy (ME)/kg dry matter (DM) and 26 g nitrogen/kg DM. Group food intake was recorded and each hind was weighed weekly.

For a comparison of food intake, weight gain and energy requirements with stags, data have been taken from Fennessy *et al.* (1981). The stags in that study were kept in similar conditions to the hinds except that they were penned individually.

RESULTS

Food Intake

The hinds voluntary food intake varied with season (Fig. 1). Intake fell between May and July, was low over the winter and rose in the spring from September. Food intake was highest in the October to January period and then fell during the autumn. The intake pattern of the stags was similar to the hinds until September. Thereafter the stags ate more reaching a peak in February. In contrast to the hinds the food intake of the stags dropped markedly in March and April.

Live Weight

The hinds grew rapidly during May (autumn) (Fig. 2) gaining 141 g/d. This period was followed by 1 of slower growth (80 g/d) during the months of June to August (winter). Growth rate then increased so that in spring from September to November it was 141 g/d; it was slightly less in summer (December-February) at 123 g/d. During autumn (March-May) the hinds maintained their weight. At 15 months of age the hinds averaged 89 ± 10.2 (mean $\pm$ SD) kg with a range of 71 to 101 kg.

The pattern of liveweight gain of the stags was similar to the hinds until August; they then grew more rapidly until March before losing weight during the breeding season between March and April.

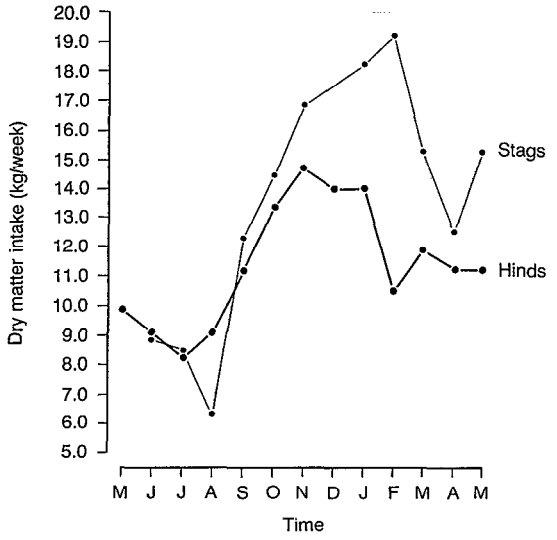

FIG. 1 Mean monthly dry matter intake for 1 year. Hind data from the present study, stag data from P.F. Fennessy and I.D. Corson (unpublished data).

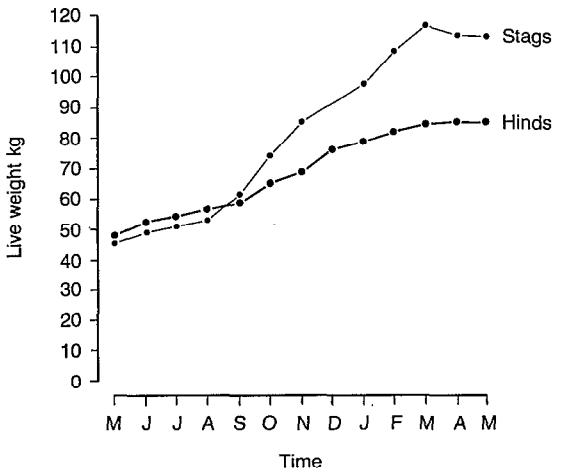

FIG. 2 Mean monthly live weight for 1 year. The deer were aged 5 to 17 months of age. Hind data from the present study, stag data from P.F. Fennessy and I.D. Corson (unpublished data).

Energy Requirements

The ME intake for each hind was taken as the mean intake of the group for each 4 week period. The common (pooled across animals) regression relationship between ME intake (MEI) (MJ/kg$^{0.75}$/d) and liveweight gain (LWG) (g/kg$^{0.75}$/d) was:

$$LWG = 18.34\,MEI - 9.56$$
$$r^2 = 0.423,\ RSD \pm 3.15,\ n = 117$$

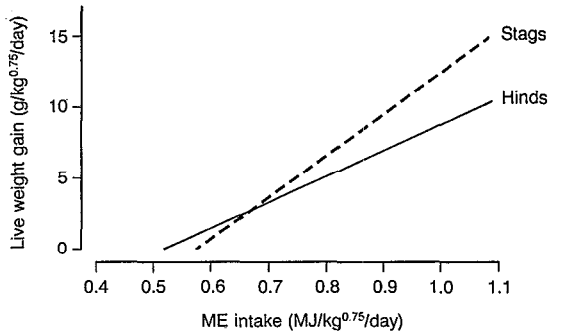

FIG. 3 Relationship between metabolizable energy intake and liveweight gain for hinds and stags. Hind data from the present study, stag data from Fennessy *et al.* (1981).

This means that the hinds required 0.52 MJ ME/kg$^{0.75}$/d for maintenance and 55 MJ ME/kg LWG for production. By comparison, the estimated requirements for the stags were 0.57 MJ ME/kg$^{0.75}$/d for maintenance and 37 MJ ME/kg LWG for production (Fig. 3).

DISCUSSION

The hinds in the present study showed a seasonal pattern of food intake and liveweight gain although these were of lower amplitude than age matched stags fed the same diet. Bandy *et al.* (1970), studying growth and food intake of male and female black tailed deer (*Odocoileus hemionus*) found that female deer actually grew faster for the first 6 months of life but thereafter males grew faster and for a longer period during each growth season. This resulted in both a higher seasonal live weight and a higher asymptotic body size. Food intake patterns were similar, but the seasonal rhythm of the females was of a lower amplitude and no identifiable drop in intake due to the rut was evident. Similarly male and female reindeer and caribou (*Rangifer tarandus*) studied by McEwan (1968) and McEwan and Whitehead (1970) showed pronounced seasonal rhythms of weight gain and food intake but those of the female deer were consistently of lower amplitude than the male deer. Therefore the pattern of growth and intake of hinds in the present study is consistent with reports from other deer species. The reasons for the similarity in intake and growth between the sexes up to about 6 months of age may be because it is only at that age that young male deer begin to secrete measurable amounts of testosterone (Suttie *et al.*, 1984) and thus begin to develop male secondary sexual characters such as rapid weight gain.

Although few studies on the body composition of female red deer have been carried out, it is clear that female deer are fatter than males at the same body size (Blaxter *et al.*, 1974). It thus seems that liveweight gain of females is qualitatively and

quantitatively different from that of males; that is, the probable reason for the higher energy requirement for liveweight gain in the female than in the male is that the female deer is laying down relatively more fat than the male. In contrast the maintenance energy requirements are similar.

The present study was undertaken on hinds kept indoors. They were thus sheltered from all outdoor environmental conditions. Previous research on stags (Fennessy *et al.*, 1981) indicated that the maintenance energy requirement of animals kept outdoors during winter was 0.85 MJ ME/$kg^{0.75}$/d in contrast to 0.57 MJ ME/$kg^{0.75}$/d for indoor deer. Although no data are available for hinds kept outdoors it seems reasonable to accept that a similar increase in maintenance would be required for animals kept outdoors particularly during winter.

Fennessy *et al.* (1981) extrapolated from the stag data to calculate ME requirements for hinds. They estimated that the maintenance requirements for deer kept outdoors were 30, 50, 30 and 10% higher than those kept indoors during autumn, winter, spring and summer respectively. Using these percentages and the calculated requirements from the present study, along with the actual growth rates achieved, the daily ME requirements for hinds would be 18, 19, 23 and 22 MJ ME/d during autumn, winter, spring and summer respectively. These values are 5 to 16% higher than previously estimated, reflecting the higher energy requirement for liveweight gain. It is critical that red hinds reach a live weight greater than 70 kg at 15 months of age (Fennessy *et al.*, 1986) in order to breed and it is desirable for the herd average to be over 80 kg to achieve a herd fertility above 90%. The average weight of hinds in the present study was 89 kg; they thus exceeded the minimum requirements.

Therefore the importance of feeding hinds at appropriate levels of nutrition to achieve satisfactory weight gains to 15 months is apparent.

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