The effect of three allowances of red clover on Red deer fawn growth and liveweight change in lactating hinds

J.H. NIEZEN[1], T.N. BARRY, J. HODGSON, P.R. WILSON, AND C.W. HOLMES

Massey University, Palmerston North, New Zealand.

ABSTRACT

An experiment was conducted at Massey University to measure potential growth rates of fawns and weight changes of hinds during summer, a period when growth is usually limited by inadequate feed supply and/or quality.

Thirty two lactating mixed age hinds and their fawns (average age 32.9 days) were blocked on calving date and randomly assigned to one of 4 treatments on the Massey deer unit. The treatments consisted of low (LC), medium (MC), or high allowance (HC) of pure red clover (6, 12 or 18 kg DM/hd/day) or 12 kg DM/hd/day of ryegrass/white clover pasture (CON). The corresponding stocking rates were 17.5, 8.7, 5.8 or 7.1 hind/fawn pairs/ha on the LC, MC, HC, and CON treatments respectively. Treatments lasted for 61 days from 29 Dec until weaning on 28 Feb. Hinds and fawns were weighed bi-weekly.

Weaning weights of the fawns were 51.3, 49.5, 46.7 and 42.8 kg for the HC, MC, LC, and CON treatments respectively. This corresponded to fawn average daily weight gain of 461, 433 380 and 333 g/day respectively. Fawn growth rates and weaning weights were significantly greater on all clover allowances than on the control ($p<0.05$). HC and MC treatments did not differ but were greater than LC ($p<0.05$).

Hind weight changes followed a similar pattern. Liveweight gains for the hinds was 53, 58, 5 and - 52 g/day for the HC, MC, LC and CON treatments respectively. All three allowances of red clover increased weight gain more than CON ($p<0.09$). HC and MC treatments did not differ but both were greater than LC ($p<0.05$).

Keywords Red clover, deer fawn, lactation, weaning weight..

INTRODUCTION

Under most New Zealand (NZ) pastoral farming conditions the nutrient requirements of red deer hinds and fawns during lactation do not coincide with pasture production, as fawning occurs during early summer when conventional ryegrass/white clover pasture is becoming rank or slowing in growth due to moisture stress (Adam, 1988). This may result in fawns not achieving genetic potential for growth rates from birth to weaning. This is of major consequence to the deer farming in New Zealand, as many of the stags raised for venison production do not attain slaughter weight in their first year and are a source of inefficiency in the industry.

In a series of forage selection trials, undertaken in NZ, red deer preferred red clover to most other pasture plant species and in general, that deer preferred legumes to grasses (Hunt and Hay, 1989). Perennial ryegrass, the basis of most NZ pastures, was least preferred by red deer hinds (Hunt and Hay, 1989).

To date, no studies have been undertaken to determine whether deer raised on preferred pasture species have higher growth rates. Red clover was selected as a species with several desirable characteristics and potentially useful for improving deer growth rates in summer. Red clover has a deep tap root, exhibits drought tolerance and produces its highest amounts of dry matter during the summer months (December, January, February) (R.J.M. Hay *pers. comm.*), coinciding well with deer hind and fawn metabolic requirements.

The aim of this trial was to determine the production of red deer fawns and lactating hinds on three allowances of red clover and compare this to production on ryegrass/white clover pasture under conventional management and dry matter allowances.

[1] Present address: Ministry of Agriculture and Fisheries, Flock House Agricultural Centre, Private Bag, Bulls, New Zealand.

MATERIALS AND METHODS

Animals

Thirty two mixed age multiparous hinds and their fawns (average age 32.9 ± 4.43 days mean ± SE) of both sexes were statistically blocked on calving date and randomly assigned to one of four treatments, one allowance of ryegrass/white clover or one of three allowances of red clover. The dry matter allowances and animal densities are shown in Table 1. The hinds had been mated to one of two red deer stags the previous autumn. Both hinds and fawns were weighed on a bi-weekly basis. The record of one fawn on the medium red clover allowance was removed from the trial after it contracted osteomyelitis. The treatments lasted 61 days from Dec 29 to Feb 28.

TABLE 1 Dry Matter allowances (kg DM/hind/fawn pair/day), stocking rate and pre and post grazing pasture herbage mass from deer grazing a medium allowance of ryegrass/white clover (CON) or a high (HC), medium (MC) or low (LC) allowance of red clover.

	HC	MC	LC	CON
DM allowance (kg/pr/day)	16.4	10.8	5.4	9.9
Stocking Rate (pr/ha)	5.8	8.7	17.5	7.1
Pre-grazing pasture mass (kg DM/ha)	3420	3420	3420	3660
Post-grazing pasture mass (kg DM/ha)	1390	950	420	1270

Pastures

Red clover was sown in early spring, at a seeding rate of 8kg/ha over an area of 2.75 hectares divided into 5 roughly equal sized paddocks. Prior to sowing the area was sprayed with a contact herbicide. After emergence of the red clover, the area was sprayed with MCPB to control weed infestation.

Each paddock was divided in half withn the HC comprising one of the halves and the MC and LC the other. The treatments alternated sides with each rotation. The red clover paddocks were grazed following a 30 day rotation, averaging 6 days per paddock. The high allowance paddock was grazed by weaner stags following grazing by the hinds and fawns.

Four paddocks of perennial ryegrass/white clover were used for the CON treatment. These paddocks had previously either been grazed by deer or had silage taken from them. They were selected for grazing based on visual appraisal of the quantity and quality of feed available.

Sampling Procedure

Standing dry matter estimations were made on paddocks (6 cuts/paddock) prior to animals grazing and immediately following grazing. Three cages were distributed through each treatment and samples for final DM as well as estimated intake for chemical analysis were taken. All herbage samples were freeze dried and ground to pass through a 1mm sieve. Nitrogen concentration was determined using the Kjeldahl method. *In vitro* digestibility was determined by the enzymatic hydrolysis method (Roughan and Holland, 1977).

Statistical Methods

All analysis was undertaken using SAS GLM procedures. Least square means for hind and fawn weight were compared. Growth rate of the fawns from birth to the onset of the trial was measured and used as a covariate. However, this was not significant, nor were any interactions ($P>0.05$) and therefore only main effects were used in the statistical model.

RESULTS AND DISCUSSION

The high pre-grazing mass on the ryegrass/white clover (Table 1) was due to two paddocks being irrigated to ensure adequate feed supplies. The stocking rate on the CON was similar to management practices on the deer unit in previous years and reflects industry practices and production in the Manawatu region. Organic matter digestibility (OMD) (%) and total nitrogen (%) was 82.9 and 3.6, 82 and 3.33, 79.7 and 2.69 and 72.1 and 2.61 on the HC, MC, LC and CON treatments respectively. Animals on the HC treatment left high

levels of residue (Table 1). Animals on the LC treatment (LC) grazed the clover to extremely low levels and probably had intake restricted during the last 2 days of each shift.

Fawn growth rates and weaning weights did not differ between the HC and MC treatments (Table 2) but both were significantly greater than on the LC treatments ($P<0.05$) which was greater than on the CON treatments ($P<0.05$). The peak growth rates on the HC and MC treatments indicated that an upper limit of growth had been attained for pure red deer fawns on red clover. The growth rates on the HC and MC are greater than previous reports (Loudon *et al*., 1984) where the hinds and fawns were grazed on similar ryegrass allowances as the CON group in this trial. However, growth rates of the fawns in their trial was greater than the of the fawns on the CON treatment in this trial.

TABLE 2 Fawn average daily gain (ADG), fawn weaning weight and hind weight change on a medium allowance of ryegrass/white clover (CON) or a high (HC), medium (MC) or low (LC) allowance of red clover.

	HC	MC	LC	CON	SEM
Fawn ADG (gm/day)	461	433	380	333	45.2
Fawn Weaning Weight (kg)	51.3	49.5	46.7	42.8	2.76
Hind Weight Change (gm/day)	53.3	58.3	5.3	-52.2	42.0

Hind weight changes followed a similar pattern to the fawn growth rates. Hinds on the HC and MC treatments did not have significantly different weight gains, but both were greater than the gain on the LC treatment ($P<0.05$) while the hinds on the CON treatment lost weight over the duration of the trial (Table 2). That hinds on the CON treatment lost weight suggests that either the feed allowance was not generous enough or hinds do not have the capability to ingest adequate amounts of mature ryegrass/white clover to meet metabolic requirements. Results from Hunt and Hay (1989) indicate that the low palatability of high endophyte ryegrass may also be a factor in limiting production in red deer.

The results from this trial show that 50kg weaning weights are readily attainable in pure red deer by the end of February. This is an important factor in a high proportion of stags can attaining slaughter weight (> 92kg LW; 50kg carcass wt) by 1 year of age if raised on either red clover or ryegrass/white clover pasture post weaning (G. Semiadi *pers. comm.*). This may be of importance to the deer industry as venison stags would not be required to be raised to 2 years of age in order to meet carcass size requirements.

ACKNOWLEDGEMENTS

The author wish to thank Charlie Howell, Kerry Killorn, Brigette Revol and Gono Semiadi for their assistance in this work.

REFERENCES

Adam, J. L., (1988) Pasture for deer production. In *Proceedings of the New Zealand Grasslands Association* (Ed. R. E. Burgess), pp 37-40. Palmerston North: New Zealand Grassland Association.

Hudson, R. J. and Adamczewski, J. Z. (1990). Effect of supplementing summer ranges on lactation and growth of wapiti (*Cervus elaphus*) *Canadian Journal of Animal Science. 70*: 551-560.

Hunt, J. F. and Hay, R. J. M. (1989). Alternative pasture species for deer productionin the Waikato. In *Ruakura Deer Industry Conference, Proceedings of the conference held at Ruakura Agricultural Centre.* (Eds. G. Asher and J. Squire), pp 31-33. Hamilton: Ruakura Agricultural Centre.

Loudon, A. S. I., Darroch, A. D., and Milne, J. A. (1984). The lactation performance of red deer on hill and improved pasture species. *Journal of Agricultural Science*, Cambridge *102*: 149-158.

Roughan, P. G. and Holland, R. 1977. Predicting *in vitro* digestibilities of herbages by exhaustive enzymic hydrolysis of cell walls. *Journal of the Science of Food and Agriculture 28*: 1057-1064.