DEER GROWTH AND PRODUCTION

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INTRODUCTION

In 1984 three species of deer accounted for 95% of all deer farmed in New Zealand. In descending order these were red (82.5%), fallow (8.7%), and Wapiti-type deer (3.8%).

The rapid increase in the number of farmed deer appears to have resulted from the retention of virtually all farm bred females. In addition, these have been supplemented by wild captured deer. Consequently, it is of some interest to evaluate the performance of these farmed deer and gain an understanding of the factors affecting performance. It is also perhaps not surprising that attention has been focused on the question of selecting 'economically' superior animals. For the Cervus genus this will be particularly challenging given the large range in mature body size, liveweight gains and differences in the age at sexual maturity for particular species and hybrids.

This paper presents growth and production information for red and fallow deer. Some factors are identified that affect performance.

GROWTH

Birth to weaning

Typically, for the northern region, calving of red deer starts in early November and is followed by fallow deer in early December. Over the lactation period of about 100 days calves of both species exhibit rapid growth (Table 1). This growth is characterised by faster gains in males than females and is associated with reasonable variation between animals of the same sex.

Table 1: Mean growth rates and variation (sd) between birth and weaning in red and fallow deer. (g/day)

Red			Fallow		
	Stags	Hinds		Bucks	Does
Ruakura	420 (41)	340 (40)	Ruakura	160 (18)	146 (13)
Farm 5	424 (33)	358 (59)	Ruakura	170 (16)	142 (11)
Farm 7	387 (58)	338 (52)	Farm 4	189 (16)	160 (10)

Using data from monitored farms, preliminary analyses were done to gain an understanding of the factors affecting reproductive performance (Asher and Adam 1985). Major factors examined were farm, calf sex and age of dam. Additional sources of variation included dam liveweight (previous March weaning), birth date, weaning age and birth weight. The analyses included red and fallow deer but tabular results are given for red deer only (Table 2).

Table 2: Relationships of birth weight, weaning weight and liveweight gain with dam weight, birth date and age at weaning for red deer.(Asher and Adam 1985).

	Birth Wt. (kg)	Weaning Wt. (kg)	Daily gain (g/d)
Regression coefficient (s.e.)			
Dam weight (kg)	0.04*** (0.007)	0.07* (0.03)	0.6* (0.28)
Birth weight (kg)	-	1.42*** (0.27)	5.3** (2.72)
Weaning age (days)	-	0.31*** (0.02)	0.5 (0.18)

Birth weight was positively associated with dam live weight and birth date for red deer and this also occured for fallow deer. In turn weaning weights for both species were positively related to birth weight and weaning age. Thus for red deer each additional 1 kg in birth weight increased weaning weight by 1.4 kg . The corresponding increase for fallow deer was 1.1 kg. Equally, for every week weaning was delayed in March, weaning weights increased by 2.1 kg in red deer and 1.4 kg in fallow deer. Even though birth weights, weaning weights and daily calf gains were adjusted for several covariates, significant differences were found between red deer farms (Table 3). For fallow deer there were no differences in adjusted performance between farms (Asher and Adam 1985).

* $P < 0.05$
** $P < 0.01$
*** $P < 0.001$

Table 3: Adjusted mean values for birth weight, weaning weight and liveweight gain up to weaning for red deer.(Asher and Adam 1985)

	Birth Wt. (kg)	Weaning Wt. (kg)	Daily gain (g/d)
Adjusted means (n)			
Overall	9.1	40.8	321 (176)
Sex			
Stag	9.4	42.1	334 (88)
Hind	8.9	39.4	309 (88)
s.e.d	0.2	0.5	5
Farm			
R1	10.3	45.3	393 (8)
R2	9.2	42.6	331 (43)
R4	9.5	39.3	319 (49)
R5	7.6	35.8	242 (76)
s.e.d	0.4	1.3	13

Weaning to 15 months

Increases in live weight found with male red and fallow deer between 3-4 and 15 months of age followed a seasonal pattern (Fig. 1).

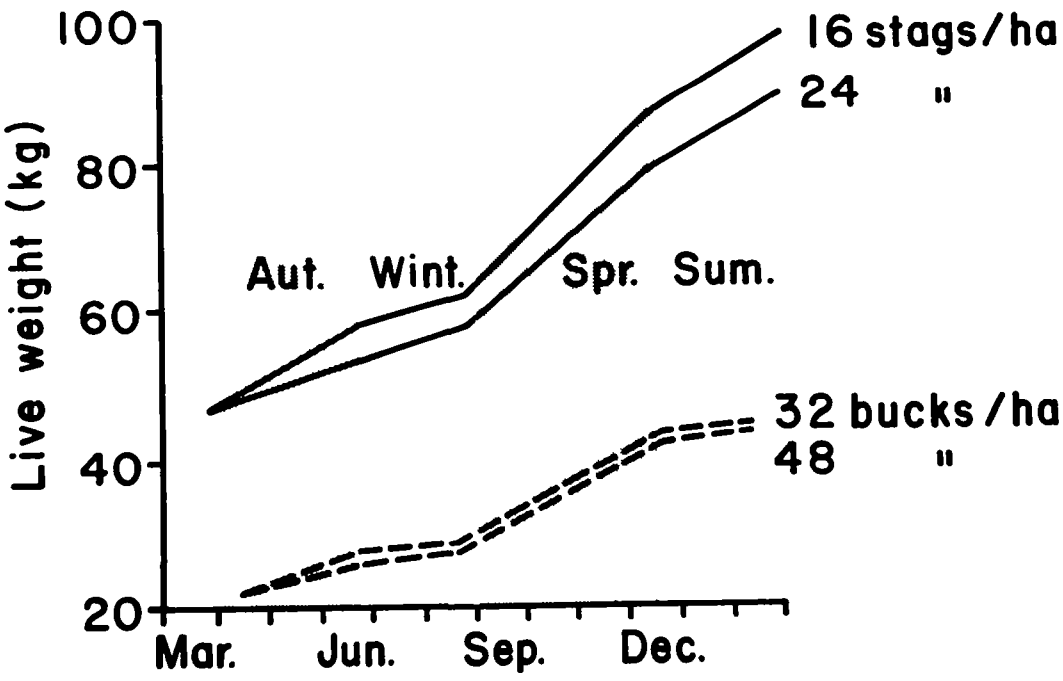

Fig. 1: Effects of season and stocking rate on the growth patterns of male red and fallow deer.

Characteristically growth for both species was highest in spring and lowest during winter. Growth over autumn was intermediate between winter and spring. For present purposes winter is taken as a 65 day period with all other seasons as 100 days.

Liveweight increases over autumn (3-6 months of age) can be critical to achieving desired weights in stags and hinds at 15 months. Recent on-farm data with red deer stags showed that average liveweight gains varied from 125 to 170 g/d between farms (Table 4).

Table 4: Daily liveweight gains of red deer stags between weaning and 15 months of age

Year	Farm	Autumn	Winter	Spring	Summer
1984	R25	137	67	211	159
1985	R25	125	93	196	143
1985	R7	170	34	230	130

Over a 100 day autumn these gains would be equivalent to changes in liveweight of between 12.5 and 17 kg per stag. Given a daily dry matter intake of around 1.5 kg/weaner this would represent a daily intake of between 26 and 38 kg dm/ha for stags stocked at 16 and 24/ha. In many areas this could exceed the rate of pasture growth between March and June. Not surprisingly, the effect of increasing stocking rate with red and fallow deer was most marked where potential intakes exceeded realised pasture growth such as in autumn (Table 5).

Table 5: Effects of stocking rate and season on the growth of male red and fallow deer

Species	Stocking Rate/ha	Season Autumn	Winter	Spring	Summer
Red	16	137	67	211	159
	24	87	49	196	143
Fallow	32	68	22	117	28
	48	53	25	116	41

Information from an earlier trial indicated that average daily gains of 200 g/d were possible with red stags over autumn. To examine this further, weaner red deer stags were offered pasture allowances of 2, 3, 4, 5 and 7 kg dm /day over a three week period during autumn. Unanalysed results from this pasture allowance trial indicated this to be the case (Fig. 2). The results suggest that to achieve average liveweight gains of 200 g/d pasture offer must exceed expected maximum daily intake by a factor of at least three.

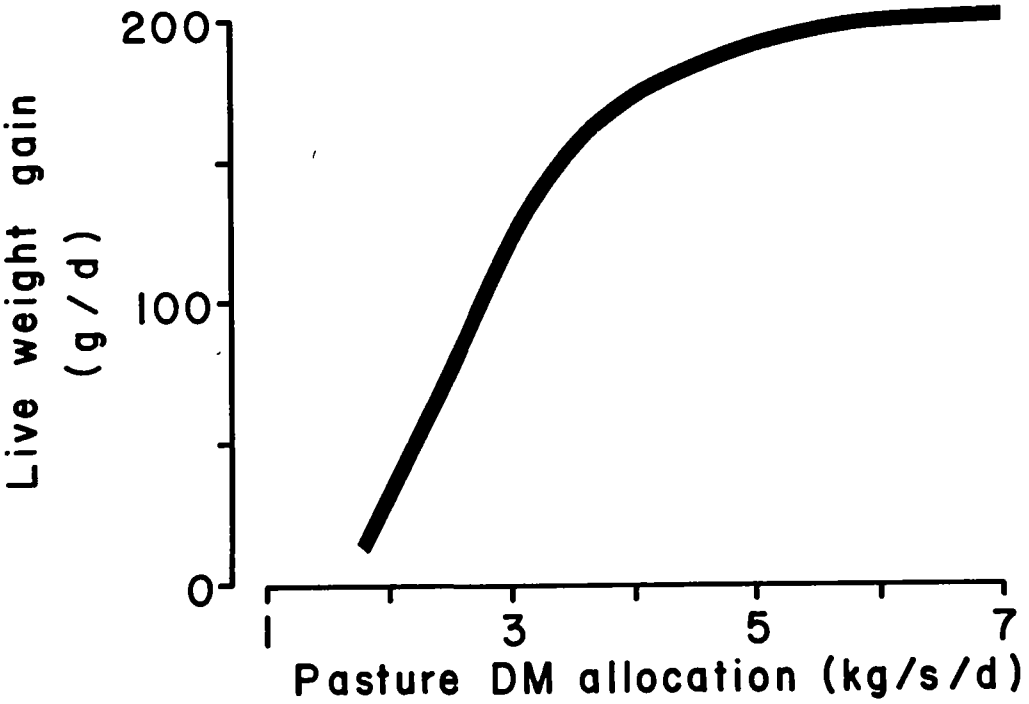

Fig. 2: Growth responses of weaner red deer stags to daily pasture allowances over autumn.

From weaning to 15 months of age the growth of red deer hinds follows a similar pattern to that of the stags (Fig. 4). However, both average daily gains and liveweight at 15 months will be lower for hinds than stags. As expansion in the deer industry slows surplus 15 month old hinds will undoubtedly be sold as venison. To command the present premium schedule hind liveweights will need to be much higher than presented in this paper.

15 to 27 months

At around 15 months of age male red and fallow deer reach puberty. This is accompanied and followed by a virtual cessation in growth (Table 6).

Table 6: Seasonal growth in rising two-year old red deer stags (g/day)

Trial	Stocking Rate/ha	Season	
		Autumn-Winter	Spring
1	16	12	192
	20	-7	204
	24	13	195
2	12	6	185
	16	20	220
	20	10	137

The virtual cessation of growth in red deer stags, as seen in stocking rate trials and from on-farm monitioring, appears to extend for a six month period from March to August inclusive. A similar lack of growth was also reported with fallow bucks (Asher 1986) and with stags individually fed a high quality diet ad-libitum indoors (Fennessy 1981). For some groups of stags in the latter trial the period of minimal growth was apparently shorter than found for pasture fed stags reported here. Possibly because of the poor performance of rising two-year red stags over the autumn-winter a number of farmers opt to slaughter animals at 15 months of age.

Over the spring rising two-year old red deer stags can be expected to gain in excess of 220 g/d. But to achieve this growth requires a generous daily pasture allowance.

Mixed age deer

Red stags and fallow bucks exhibit characteristic liveweight changes after sexual maturity. These liveweight changes are centered around the breeding season. In the spring and summer, leading up to the rut males grow rapidly. This is accompanied by increases in neck girth and testes size during late summer. Over the rut there is a rapid decrease in body weight (Fig. 3). For fallow bucks the weight loss can vary between 15 and 25%, due to a 70-80% reduction in grazing activity and a marked increase in rutting behaviour.

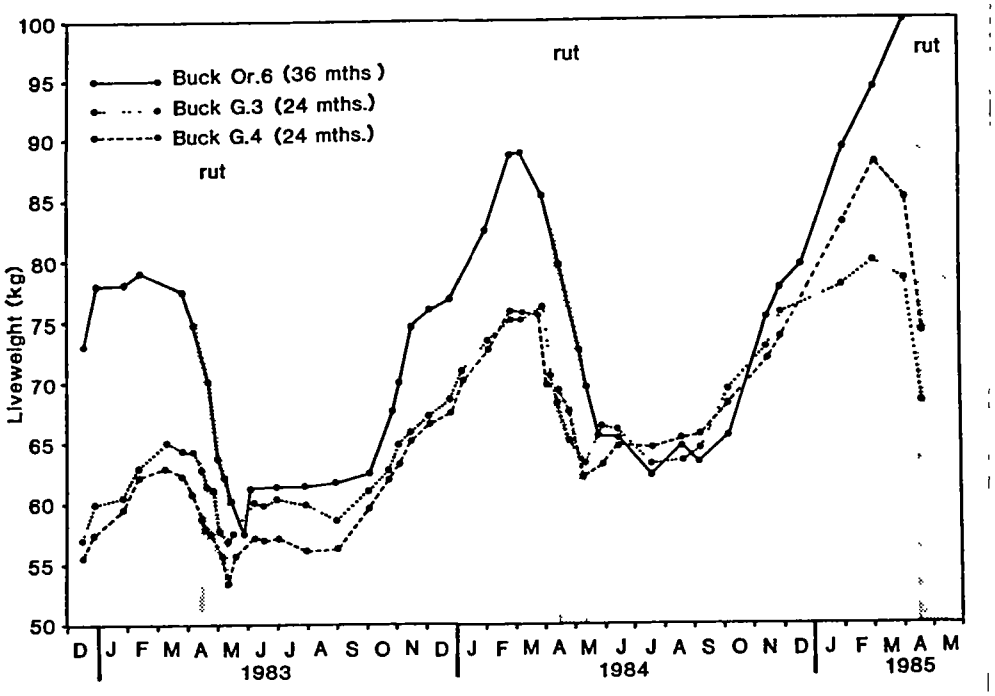

Fig. 3: Liveweight changes of sexually mature fallow bucks (Asher 1986)

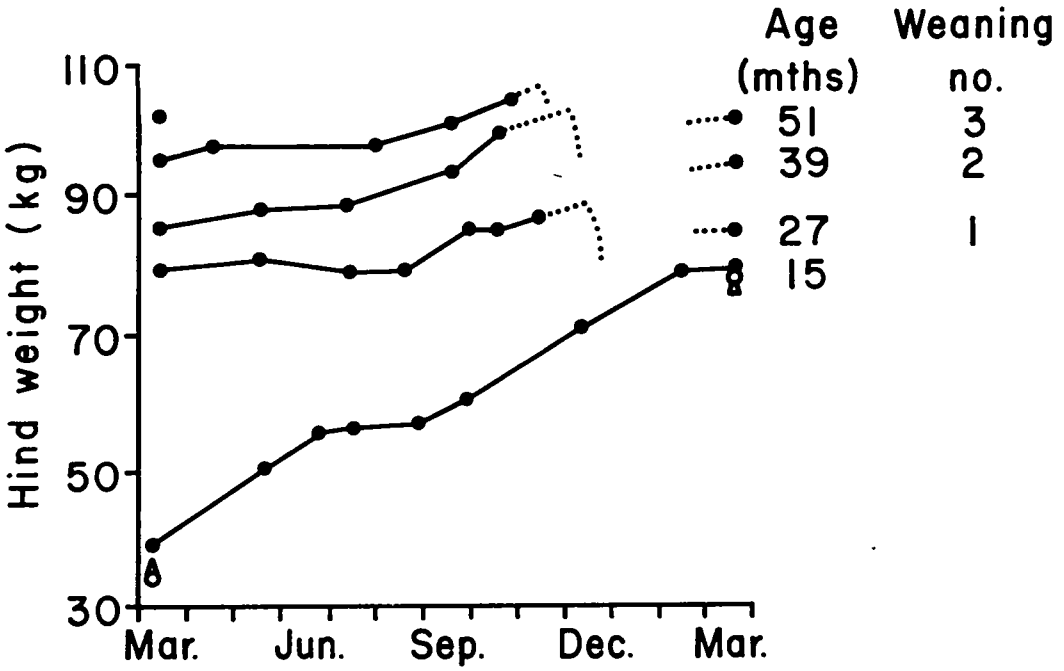

Fig. 4: Liveweight of red deer hinds with increasing age

Both red deer hinds and fallow does aged 15 months and over show very similar growth patterns throughout the year.In the case of red deer hinds at Ruakura there has been a small annual increase in liveweight at successive matings (Fig. 4). However, hinds were not weighed close to calving or during lactation as shown by the dotted lines. Liveweight changes of hinds were small for the period March to August. Thereafter hinds gained in weight as calving approached. No attempt was made to restrict the intake of the majority of these hinds. Very minimal data suggests that their intake does not change markedly to within three weeks of calving. In view of the divergence of opinion concerning feeding levels to hinds before calving clearly more information is required.

PRODUCTION

Venison

Of the differing deer farming systems, venison and weaner production would be two of the more common.

On-farm monitoring of red stags killed at 14 to 16 months has shown a gross production of around 1000 kg/ha hot carcass weight where the stocking averaged 18 stags/ha. Net production, allowing for the estimated carcass weight bought onto the farm, was around 560 kg/ha. This level of production equates well with results from stocking rate trials with red stags and fallow bucks (Table 7).

Table 7: Effects of stocking rate on per animal and per ha production with male red and fallow deer

Species	Stocking Rate/ha	Hot carcass weight (kg) Per animal	Gross/ha	Net/ha
Red	16	56.5	904	498
	24	51.5	1236	625
Fallow	32	25.5	816	430
	48	24.7	1185	608

In these latter trials the effect of increasing stocking rate was to decrease average hot carcass weight (albeit marginally for fallow) and increase per hectare production for both species. For the separate trials, fallow deer stocking rates were established on the basis of an initial animal biomass equal to that for the red deer stags.

Weaner production

Postal survey data over several years indicate red deer calving rates of around 86% and weaning rates of 80% (Table 8). In the case of calving rate, the actual rate may be higher due to the failure to find all calves born and dying.

Table 8: Reproductive performance of red deer hinds in some northern regions.

	Hind Nos,	Minimum Calving Rate (%)	Weaning Rate (%)	Minimum Deaths (%)
1980/1	3629	87.4	80.4	7.9
1981/2	4704	86.4	80.1	7.3
1982/3	7051	84.9	78.4	7.7
1983/4	8463	85.8	79.8	7.0

However, higher producing farms in the survey had weaning rates of between 85 and 95 %. Using an 85 % weaning rate, an average birth weight of 9 kg and two rates of daily gain for calves during lactation estimates can be made of the liveweight produced up to weaning (Table 9).

Table 9: Estimated liveweight production up to weaning

Hinds (n/ha)	Weaners (n/ha)	Liveweight increase (kg/ha) @ 300 g/d	@ 400 g/d
7.4	6.3	245	310
12.4	10.5	410	515

The two stocking rates used cover the range found from on-farm monitoring. Essentially they are intended to illustrate the potential range of liveweight production rather than the effect of stocking rate per se.

Growth in both red and fallow deer follows a seasonal pattern up to 15 months of age. Thereafter annual liveweight changes in sexually mature red and fallow males centres around the rut. For the females of the two latter species liveweight changes take place leading up to and after calving. For both males and females of breeding age annual increases in pre rut liveweight (March) persist for several years.

Within the seasonal pattern of liveweight changes high daily gains can be achieved by applying sound grazing management.

References

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