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BRIEF COMMUNICATION

A study of early venison production from grazing red deer

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In order to meet the requirements of Northern Hemisphere markets and to give the farmer maximum price/kg, it is necessary to produce venison in New Zealand of >50 kg carcass weight (92-95 kg live weight) in the August-November period. In the two experiments reported here, this has been attempted using red deer (*Cervus elaphus*) stags just under one year old. To achieve this objective it is necessary to attain good rates of animal growth over winter, a time when both rates of pasture production (Korte *et al.*, 1987) and deer growth rates (Kay, 1985) are at their low point in the annual cycle, and when pasture M/D values and the efficiency of ME utilisation are less than in spring (Waghorn and Barry 1987).

Two experiments with stags grazed on rye-grass/white clover pastures were carried out to study the effects on winter and spring rates of liveweight gain (LWG) of altering both the amount of herbage available to each animal, and of improving forage nutritive value. Different levels of allowance/height of standard perennial ryegrass/white clover pasture, and of similar pastures direct-drilled in late summer with an annual ryegrass ("Grasslands, Moata") were offered. Moata improved winter DM production (Armstrong, 1981) and had higher nutritive value than perennial ryegrass in experiments conducted with sheep (Ulyatt, 1981). A further objective was to study the effect of active immunisation against melatonin upon rates of winter LWG, giving a primary immunisation, followed by booster immunisations 8 and 12 weeks later.

Experiment 1

In a 2x2x3 factorial experiment, 48 weaner stags weighing 55.7 kg ± 0.58 (SE) were assigned to two levels of pasture DM allowance (6.3 (high) and 4.5 (medium) kg DM/animal/day), two types of pasture (perennial ryegrass/white clover and the same pasture direct-drilled with Moata) and three types of immunisation (none, vehicle and vehicle + antigen) on 14 May 1987. Rotational grazing was used, with weekly breaks, using electric fences, with a 5 week rotation during winter and a 3 week rotation in spring.

TABLE 1 Liveweight gain (g/d) and percentage of stags (n=12) attaining slaughter liveweight (92-95 kg) by early December for stags offered high (6.3 kg DM/head/d) and medium (4.5 kg DM/head/d) allowances of pasture and Moata in 1987 (Experiment 1).

	Allowance (kg DM/head/d)				SE
	6.3		4.5		
	Pasture	Moata	Pasture	Moata	
Liveweight gain					
Winter	103	110	91	99	18.7
Spring	184	222	186*	176	18.8
Stags to slaughter (% total)					
	0	25	0	17	

* Not true result because of problems in keeping animals behind electric fences.

LWG during winter (Table 1) was approximately 100 g/d and was not significantly

affected by either pasture allowance or the introduction of Moata. LWG increased in spring, and tended to be higher for animals grazing Moata high pastures than those grazing pasture high or Moata medium pastures ($P < 0.1$; Table 1). Because of temperament problems, the deer were very difficult to handle in spring and in particular to keep behind electric fences. For these reasons, data collected from the pasture medium group over this period are not considered true values.

Moata comprised approximately 20% of total DM in both the medium and high pastures during winter. During spring this increased to 40-50% in the Moata high group and 30% in the Moata medium group. Antibody titres against melatonin were slow to develop, being absent during winter and slowly increasing during spring to attain a mean value of $1:1571 \pm 583$ by early November. Animals given the melatonin antigen grew at the same rate as the control and vehicle groups over both winter and spring.

Experiment 2

In a 2x2x2 factorial experiment, 52 weaner stags weighing $60.1 \text{ kg} \pm 0.62$ were continuously stocked on one of two levels of pasture surface height (10 cm v 5 cm), two types of pasture (perennial rye-grass/white clover and the same pasture direct-drilled with Moata) and two types of immunisation (none v vehicle + antigen) on 30 May 1988. Because of the slow antibody response encountered in Experiment 1, the immunisation procedure in Experiment 2 commenced at weaning in late February.

TABLE 2 Liveweight gain (g/d) and percentage of stags attaining slaughter live weight (92-95 kg) by early December for stags offered pasture or Moata at heights of 10 or 5 cm in 1988 (Experiment 2).

	Height (cm)				SE
	10		5		
	Pasture	Moata	Pasture	Moata	
Number of stags	12	14	12	14	
Liveweight gain					
Winter	153	131	74	79	9.0
Spring	234	209	147	211	0.1
Stags to slaughter (% total)					
	75	79	8	36	

During winter, LWG was much greater in animals grazing at high (10 cm) than at medium (5 cm) pasture height ($P < 0.001$; Table 2), with the introduction of Moata having no effect. During spring there was an interaction ($P < 0.001$) between pasture height and the presence of Moata, with LWG being high on 10 cm pastures and not affected by pasture type. LWG was lower in animals grazing perennial ryegrass/white clover pasture at the 5 cm height and was increased by the presence of Moata ($P < 0.001$), with LWG of the Moata medium group being similar to that of the high groups. As a result of high LWG in both winter and spring, 75-79% of animals grazing at the greater pasture height reached the target live weight by early December (92-95 kg live weight).

Despite Moata initially comprising 40-50% of the pasture DM in direct-drilled paddocks, its proportion declined during a very wet winter under continuous stocking, and values during spring were approximately 15 and 25% for Moata high and Moata medium areas respectively.

The immunisation procedure produced no responses in LWG in either winter or spring.

CONCLUSIONS

These studies have shown that it is feasible to grow young stags to 92-95 kg live weight by one year of age, but only when pasture allowance is high during both winter and spring. When pasture availability was high in winter, LWG of up to 150 g/d was achieved with no additional response to Moata, indicating that the animals' seasonal rhythm was limiting further growth. Whilst we have been able to raise an antibody titre against melatonin, the animals' response was slow and antibody levels were either zero or very low in winter. Increases in winter growth rate may be achieved by starting the immunisation sequence against melatonin at birth, as done by Duckworth and Barrell (1989), who successfully increased winter growth rates in both weaner male and female red deer.

Responses to the inclusion of Moata did occur in the spring, but only when significant proportions could be retained in the sward (high allowance 1987; medium allowance 1988). Future experiments should therefore aim at grazing management systems which result in higher

proportions of Moata in spring pastures (>70%).

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