SUMMER LAMB PRODUCTION FROM PUNA CHICORY (*Cichorium intybus*) AND LUCERNE (*Medicago sativa*)

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SUMMARY

The need for quality nutrition over summer to finish prime lambs in Eastern Australia led to a comparison of puna chicory with the more traditional dryland lucerne. Four month old second cross lambs were grazed on the chicory and lucerne and slaughtered as large lean lambs. Liveweight gain, carcase weight and fat were measured.

Both pastures produced excellent forage with daily lamb growth rates of 172 - 312 g/day and lean carcases. Cryptorchids grew significantly faster than female lambs and lambs on chicory grew significantly ($P<0.05$) faster than those on lucerne in three of five groups. It was concluded that both pastures produced quality forage to finish lambs over summer.

Keywords: summer pasture, prime lambs, chicory, lucerne

INTRODUCTION

Current interest in the lamb industry in south eastern Australia is centred on the production of large, lean lambs and for the product to be available throughout the year. Knowing that quality summer forage is limited (Moore *et al.* 1993) encouraged us to review pasture species that would provide satisfactory lamb growth rates over summer. Of the perennial species available only grasslands Puna chicory (*Cichorium intybus*) - a herb with a long, stout taproot - and lucerne (*Medicago sativa*) were considered promising. Overseas data indicated that animal growth rates on chicory, compared to grasses and clovers, were good (Fraser *et al.* 1988; Reid *et al.* 1993).

In this paper we compare Puna chicory with lucerne (cv. *aurora*) as dryland pastures for weaned lambs over the late Spring to Autumn period of two years, in the traditional lamb producing region of Cowra.

MATERIALS AND METHODS

Pasture establishment

Two hectares each of chicory and lucerne were sown on adjacent sites on 21 August 1991 in eutrophic red chromosol soils (Isbell 1993). The chicory was surface sown in rows 18 cm apart at a rate of 3 kg/ha with 103 kg/ha Mo superphosphate fertiliser, together with Junee and Dalkeith varieties of clover at the rate of 3 kg/ha each. The lucerne was sown at 4 kg/ha in a similar procedure to chicory and with clover.

Management

Both the chicory and lucerne were divided into four equal areas for replication, with each replicate again divided into 4 equal areas for grazing management. Animal movements were based on chicory needing a minimum 14 day stock free period after destocking at 80-100 mm height and restocking where possible at 250 to 300 mm height. Lucerne was managed so as to provide a 30 day stock free period and animals destocked when leaf and light stem availability were becoming limited. Chicory being nonleguminous, ammonium nitrate fertiliser (150 kg/ha) was applied in late July 1992 and 1993 to both chicory and lucerne.

Animals

Lambs were four months old, weaned Poll Dorset x (Border Leicester x Merino) of cryptorchid and female (Groups 1, 2, 3) and cryptorchid (Groups 4, 5) sex. Each group of lambs was slaughtered (Table 1) as the average estimated carcase weight approached a marketable weight and were not overfat, ie less than 4 condition score (<20 mm tissue depth at the GR site).

Measurements

Liveweight and bodyfat score (Russel *et al*. 1969) were recorded every three weeks, or earlier if associated with a change in plots; fasted weight was measured preslaughter. At slaughter a hot carcase weight was taken and the tissue depth at the GR site (11 cm from spinal midline on 12th rib) measured within two hours.

Forage dry matter (DM) production was estimated from 1m^2 quadrats. Pasture samples taken at the beginning of each grazing period were sent for laboratory analysis for nitrogen (N), acid detergent fibre, and metabolizable energy (ME) and digestibility were estimated (Table 1). A simple index of soil moisture conditions, effective rainfall, was determined from the on site recording of rainfall (mm) and evaporation (mm) for each grazing period.

RESULTS

Cryptorchid lambs grew significantly ($P<0.07$) faster c.32% than female lambs in each group and there was no pasture x sex interaction (($P>0.05$); Table 2). Growth rate on lucerne was greater than on chicory in only one group (1, female) and this difference was not significant.

Lamb sex affected fat deposition with cryptorchid lambs significantly leaner than female lambs ($P<0.01$) regardless of pasture type (Table 3). When GRs were adjusted to the average group carcase weight, there was no difference in leanness between pasture types ($P>0.05$).

Table 1. Grazing interval for each group of lambs on chicory and lucerne pasture, effective rainfall and the associated pasture production and composition

			Chicory				Lucerne			
Group	Date	Effective rainfall[A]	N% in DM	ME MJ/kg DM	Dig %	DM[B] kg green/ha	N% in DM	ME MJ/kg DM	Dig. %	DM kg green/ha
1	15.9.92 to 4.11.92	2.1				1736				1672
	15.9.92		3.8	11.2	75	-	5.1	12.0	80	-
	13.10.92		3.0	10.5	70	-	4.5	11.3	76	-
	4.11.92		3.0	9.5	64	-	4.6	10.8	72	-
2	6.11.92 to 3.1.93	2.6				1809				1372
	6.11.92		3.0	9.5	64	-	4.6	10.8	72	-
	27.11.92		2.9	10.1	68	-	3.7	10.4	69	-
	21.12.92		1.3	9.3	62	-	3.9	10.8	72	-
3	7.1.93 to 11.2.93	0.2				2143				2067
	24.1.93		2.3	10.9	73		-	-	-	
	4.2.93		2.6	11.3	75	-	3.1	11.4	7.6	-
4	19.9.93 to 18.10.93					n.a.				n.a.
	23.9.93		3.5	10.7	72	-	5.0	11.9	80	-
	30.9.93		3.6	10.5	70	-	5.3	12.6	84	-
	8.10.93		2.0	6.6	44	-	2.5	8.6	57	-
5	18.10.93 to 30.11.93					n.a.				n.a.
	19.10.93		3.4	10.5	70	-	5.0	12.2	81	-

[A] Rainfall/evaporation$^{0.75}$
[B] Mean DM pregrazing of each new area
n.a = Not available

Table 2. Liveweights (mean values ± s.e. kg) and growth rate (g/h.day) for each group of cryptorchid and female lambs on chicory and lucerne pastures.Values in parentheses are numbers of lambs for each pasture

Sex	Chicory			Lucerne			Significance
	Initial wt.	Final wt.	Growth rate	Initial wt.	Final wt.	Growth rate	
Group 1							
Crypt. (16)	34.8 ± 1.1	50.3± 1.3	312	35.2± 1.1	47.6± 1.0	248	Sex ***
Female (16)	31.9± 0.5	42.6± 1.4	194	32.5± 0.7	42.9± 0.9	183	Pasture **
Mean	33.8± 0.4	46.5± 1.2	272	34.3± 0.8	45.3± 0.8	227	
Group 2							
Crypt. (20)	33.3± 0.6	47.4± 0.7	243	33.2± 0.5	46.7±0.6	233	Sex ***
Female (16)	31.1± 0.5	42.1± 0.7	190	31.3± 0.7	41.7± 0.5	180	Pasture n.s.
Mean	32.3± 0.4	45.0± 0.7	219	32.4± 0.4	44.5± 0.6	209	
Group 3							
Crypt. (20)	28.2± 1.0	38.3± 1.0	289	27.1± 1.3	35.0± 1.4	188	Sex ***
Female (16)	25.0± 0.6	32.9± 1.2	224	24.6± 0.6	31.6± 1.0	172	Pasture **
Mean	26.4± 0.6	36.0± 0.9	261	25.6± 0.7	33.4± 0.9	180	
Group 4							
Crypt. (64)	31.7± 0.7	40.5± 0.9	304	30.0± 0.6	38.3± 0.6	287	Pasture *
Group 5							
Crypt. (32)	38.3± 0.9	49.6± 1.0	262	37.3± 0.9	47.9± 1.1	247	Pasture n.s.

*** $P < 0.001$; *$P < 0.05$; n.s. $P > 0.05$.

Table 3. Carcase weight (kg, mean values ± s.e.) and tissue depth (mm) at the GR site for lambs off chicory and lucerne pastures

Group	Sex	Carcase Weight			Tissue depth		
		Chicory	Lucerne	Significance	Chicory	Lucerne	Significance[A]
1	Crypt.	25.0 ± 0.8	23.2 ± 0.7	Sex ***	14.5 ± 0.9	12.0 ± 0.7	Sex **
	Female	22.2 ± 0.8	21.9 ± 0.5	Pasture n.s.	16.2 ± 1.0	14.9 ± 0.7	Pasture n.s.
2	Crypt.	22.0 ± 0.4	21.8 ± 0.4	Sex **	12.6 ± 0.6	12.3 ± 0.6	Sex **
	Female	19.7 ± 0.4	20.2 ± 0.4	Pasture n.s.	13.4 ± 1.0	13.6 ± 0.7	Pasture n.s.
4	Crypt.	18.5 ± 0.6	18.1 ± 0.4	Pasture n.s.	8.7 ± 0.6	8.7 ± 0.6	Pasture n.s.
5	Crypt.	22.0 ± 0.7	21.6 ± 0.8	Pasture n.s.	12.4 ± 0.7	13.0 ± 0.8	Pasture n.s.

[A] When GR corrected to average carcase weight; *** $P < 0.001$; n.s. = not significant at $P = 0.05$.

DISCUSSION

Pregrazing DM production levels of lucerne and chicory (Table 1) show the potential of these two pastures to provide forage over summer although quality of the forage was influenced by soil moisture. Both lucerne and chicory pastures successfully produced heavy, lean lambs over the summer period which can be a nutritionally difficult period for animal growth in the region (Moore *et al.* 1993).

In three of the five lamb groups, growth rates on chicory pastures were significantly ($P<0.05$) greater than on lucerne which confirms earlier reports of its feed value (Fraser *et al.* 1988). In Spring the chicory and lucerne pastures both contained a minor amount of subterranean clover which would have provided some forage. This would have influenced lamb growth rates in the first, fourth and possibly fifth groups of lambs. However, chicory and lucerne were the dominant sources of forage, especially as the season progressed. There was no effect of pasture type on the leanness of the lamb, which agrees with Scales (1993) who also observed no difference between chicory and lucerne, but cryptorchids were significantly ($P<0.01$) leaner than their female associates. This is not unexpected (Hall and Holst 1992) and cryptorchidism is a management technique to produce heavy, lean lamb commercially.

In conclusion, these pastures produced sufficient DM of quality forage to produce lambs over summer. Their agronomic differences may be important to farmers in that chicory lacks the hay production utility of lucerne; it is not a legume but it needs to be rotationally grazed like lucerne to prevent grazing of young regrowth and to stop excessive stem growth.

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