THE STRATEGIC USE OF LUCERNE PASTURES AS FEED FOR SHEEP

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ABSTRACT

Evidence is given in this review showing lucerne is better than conventional pastures for finishing lambs, irrespective of season, provided animals are offered 3-4 kg DM/head/day. Intrinisic advantages for flushing ewes on lucerne are also apparent, provided leaves are not infected with fungi, as this causes plants to produce oestrogenic substances that suppress ovulation rate. Lucerne's inability to produce high quantities of dry matter during winter, and poor growth in early spring during lambing, limits its injection into ryegrass-white clover based farming systems to approximately 15% of the total area. Higher injections result in short rest periods between grazings that reduce lucerne yields, which in turn places more pressure on the grass component with further reduced production through overgrazing. At 15% injection however, the positive attributes of lucerne (lamb finishing, summer growth, flushing ewes) can be accommodated compatible with high stock numbers and thereby, high output per hectare.

INTRODUCTION

Stewart (1967) summarised the positive attributes of lucerne as higher production and less inter-seasonal variability compared with conventional pastures, good summer viability, and an excellent feed for finishing lambs. On the negative side, current New Zealand strains of lucerne featured marked winter dormancy, delayed early spring growth, and reduced reproductive performance of ewes.

Experience with all lucerne farms show reduced life of stands occur through over-grazing in winter and set stocking during lambing (Topp, 1955, 1965). More ideal grazing management requires lucerne be spelled over winter (Janson, 1974), and otherwise rotationally grazed after 35-40 day rest periods (Iverson, 1965). Thus Stewart and Taylor (1965) found improved technical efficiency by including a summer fallow and turnips and greenfeeds as part of the annual renewal programme, and for winter-early spring feeding, such that lucerne only contributed to 70% of the farm area. Lucerne-tama ryegrass systems alone for prime lamb production (Vartha and Fraser, 1978) also caused winter feeding difficulties exacerbated by periodic failure of tama establishment, such that the area of lucerne used by these workers (80%) had to be reduced and replaced by ryegrass-white clover and/or other grasses (Fraser and Vartha, 1979), in order to bridge the gap between winter and spring feeding policies. On farms with a high proportion of lucerne, lambing in early September rather than August allows conservation practices still to be conducted in most years besides finishing the lambs, but this can be a problem if attempts to bridge the gap are actioned by later lambing.

Information on the use of lucerne for finishing lambs was given at this Conference last year (Jagusch *et al.*, 1979) and will be updated in this paper. In addition, results will be presented on the use of lucerne for flushing ewes, together with our experience incorporating lucerne into ryegrass based farming systems under conditions of intensive sheep management.

FINISHING LAMBS

Effect of Season:

Experiments conducted this year (79/80) (Fig. 1) show lucerne-fed lambs maintain substantial growth, irrespective of season, provided they are given herbage allowances of 3.5-4.0 kg DM/head/day. As with results from the previous year (78/79) (Jagusch *et al.*, 1979), allowances less than these produce poor growth, and during autumn possible liveweight losses.

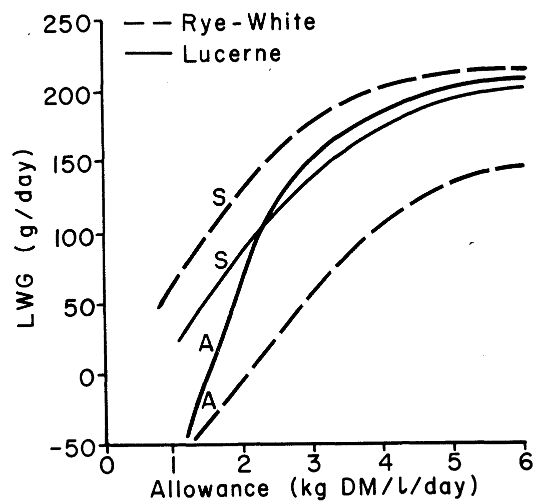

Figure 1: Effect of allowance in spring (S) and autumn (A) on lamb growth.

Effect of Grazing Management:

The results in Table 1 show that lamb performance improved by increasing the grazing interval from a one week rotational system to that of continuous grazing over 6 weeks, when animals were given similar areas. However, the confounding issue of a concomittant increase in lucerne allowance is also apparent because lengthening the grazing

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interval gives animals access to larger areas of regrowth. Furthermore, a proportion of the plants were allowed to age, thus increasing fungal infection and oestrogen (coumestans) content of the leaves (Loper *et al.*, 1964, 1967). A further experiment was therefore conducted with finishing lambs whereby the allowance component was stabilised at approximately 3.0 kg DM/head/day (Table 2). Under these conditions grazing management had no differential effect on lamb growth rate and oestrogens were only recorded in lucerne fed to that group on a 3-weekly shift. In this experiment continuous grazing substantially reduced lucerne recovery.

TABLE 1: Effect of grazing interval on lamb growth when lucerne area constant

Grazing Interval	Growth (g/lamb/day)	Coumestan (ppm)	Allowance (kg DM/lamb /day)	35 day regrowth (t DM/ha)
1 week	148	63	2.8	2.9
2 weeks	183	42	3.1	2.7
3 weeks	188	279	3.3	2.5
Continuous	219	175	4.2	2.5

Initial LW =20 kg, n =24/group.

TABLE 2: Effect of grazing interval on lamb growth when lucerne allowance constant

Grazing Interval	Growth (g/lamb/day)	Coumestan (ppm)	Allowance (kg DM/lamb /day)	35 day regrowth (t DM/ha)
1 week	183	0	2.8	3.2
3 weeks	180	17	2.8	2.8
Continuous	166	0	2.9	2.0

Initial LW =19 kg, n =16/group.

Effect of Fungicide:

Oldfield *et al.* (1966) obtained positive responses in the growth rate of wether lambs by feeding coumestan-rich lucerne meals. We tried to mimic this situation by grazing stands sprayed with fungicide (Manzate 200 plus Benlate) to produce clean, non-oestrogenic lucerne and compare lamb growth rates with non-sprayed infected stands. Both Fig. 2 and Table 3 show that clean stands promote growth equal to or better than those infected with fungi. Indeed, fungal disease tends to harden plants earlier due to leaf sencence, compared with those sprayed, such that any advantage gained by higher oestrogen levels is negated in the grazing situation by poorer quality lucerne having a higher proportion of stem.

In all trials lucerne had been sprayed with aphicide.

FLUSHING EWES

Table 4 shows the ovulation rates obtained when ewes were fed either grass pasture or 20, 35 and 50 day lucerne regrowth respectively, several weeks before mating. An additional lucerne-prairie grass (50 day regrowth) mix was also tested. In the absence of fungal foliar disease, even in the 50 day lucerne regrowths, no oestrogens were recorded in leaf samples. Ovulation rates and lambing percentage were therefore high (variable losses of multiple ovulations between groups are considered to be a random effect). On the other hand, the catastrophic loss of potential lambs through feeding oestrogenic lucerne prior to, and during mating, is shown by the data in Table 5. Foliar disease and in particular common leaf spot (Pseudopeziza medicaginis) was prevalent during this experiment, and coumestan concentrations in leaf samples reached 500-600 ppm in certain paddocks before mating, and over 200 ppm during mating. It can be seen that oestrogenic lucerne lowers twinning rate, with the result that the proportion of single lambs born increase and a concomittant increase in lamb mortality is possibly association with this (dystokia).

Figure 2: Effect of fungicide spray on growth of lucerne-fed lambs.

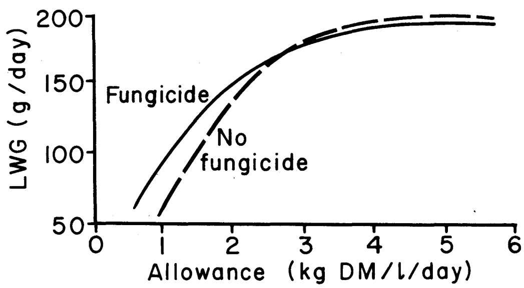


TABLE 3: Effect of fungicide spray on growth (g/lamb/day) of Lucerne-fed lambs during spring and autumn.

	Spring		Autumn	
Replicate	Sprayed	Unsprayed	Sprayed	Unsprayed
1	154	132	146	60
2	107	136	147	82
3	118	146	110	103

Lambs offered 3.0 kg DM/head/day, n = 20 group.

TABLE 4: The performance of ewes flushed on non-oestrogenic lucerne.

Treatment	Ovulation rate	Lambing (%)	Barren (%)	Embryonic loss (%)
Grass	1.56	131	5	19
20 day lucerne	1.67	119	12	28
35 day lucerne	1.83	129	6	43
50 day lucerne	1.65	118	16	17
Lucerne Praire mix.	1.56	134	7	11

n = 100/group

TABLE 5: The performance of ewes flushed on oestrogenic lucerne.

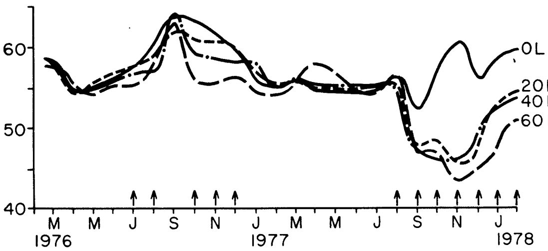
	Lucerne	Grass
Ovulation Rate	1.04	1.38**
Barren (%)	7.5	7.9 NS
Singles (%)	84.8	69.4**
Twins (%)	7.7	22.7**
Lambing (%)	100.2	114.8**
Lamb Deaths (%)	5.3	2.3*

n = 500/group

FARMLET STUDY

Over two years (1976/77) four 2 ha self-contained farmlets at Ruakura (15 paddocks per farmlet) carrying 24.7 Coopworth ewes/ha, and with proportions of 0, 20, 40 or 60 percent of the area under lucerne, were intensively managed for high net pasture production and therefore high prime lamb output per hectare (Jagusch *et al.,* 1978). Ewes were lambed in late September 1976 and early-mid September 1977. Two paddocks on each farmlet were conserved as silage, but hay was fed back to the animals in winter (75 days), so as to monitor intake more easily (ewes consumed about 300 and 400 g DM/head/day during winters of 1976 and 1977 respectively). With the exception of a short period (4 weeks) of set stocking over lambing, ewes were rotationally grazed with emphasis being given to lengthy rest periods for lucerne paddocks, when possible. Ewe liveweights are thus considered the best test of relative feed flow on each farmlet and these are given in Fig. 3.

Figure 3: Ewe liveweights on farmlets containing 0, 20, 40 and 60 percent lucerne (L.) Arrows denote months with feed supply problems on lucerne farmlets.



In contrast to the all-grass farmlet, negative divergence in ewe liveweights for those given lucerne occur in late winter and spring, a situation which tended to increase with higher lucerne injection and being partiuclarly apparent in the second year. On the other hand, positive divergence occurred in autumn 1977. During the first year and early into the second, these fluxes reflect stock movements aimed at giving lucerne paddocks sufficient rest between grazings. For this reason, the amplitude of the liveweight changes by season for ewes on the all-grass system are regular and smooth.

The animal production data for the 2 years are given in Table 6. Through good close grazing, lucerne paddocks produced fairly well in summer-autumn, remained free of fungi and relatively clear of aphids, such that in both years lambing percentages were augmented on the farmlets containing lucerne. This was independent of mating weight, since all groups weighed 54kg in 1976, and 56 kg in 1977. However, ewes on the 60 percent lucerne farmlet did gain substantial weight after the rams were joined, giving a flushing effect during mating.

TABLE 6: Lamb and Wool production from farmlets containing 0, 20, 40 and 60 percent lucerne (L).

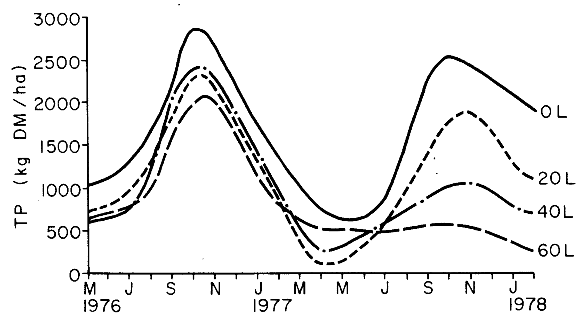
Farmlet	Lambing (%)		Birth LW (kg)		Weaning LW (kg)		Post wean Grain (kg)		Wool (kg)	
Year	76	77	76	77	76	77	76	77	76	77*
0L	126	108	4.6	5.3	20.9	22.9	111	157	2.9	4.0
20L	134	116	4.8	5.3	19.9	19.8	130	163	2.9	4.2
40L	133	126	4.8	5.0	20.7	16.5	140	—	2.8	3.8
60L	127	124	4.8	5.2	20.5	17.2	142	—	2.8	3.6

*Double shear

There were no differences recorded in the birth weight of lambs in both years and in 1976 increasing the proportion of lucerne substantially improved post weaning growth.

In 1977 the treatments were terminated at weaning on the 40 and 60 percent lucerne farmlets. Wool weights were also down in these groups (Table 6). It can be seen from Fig. 4 that

Figure 4: Total net pasture production (TP) from farmlets containing 0, 20, 40 and 60 percent lucerne (L).



there was a dramatic fall-off in pasture production on these farmlets, contributed to by both failure of the grass component and also the lucerne to grow well in spring. Lambs and then the ewes had to be withdrawn, necessitating closure of the experiment, even though the all-grass and the 20 percent lucerne farmlet could have carried on.

Careful examination of the pasture production graph shows that within 3 months of starting the experiment, pressure was being exerted on all paddocks on the farmlets containing lucerne. Lower spring peaks and higher winter depressions reflected lower pre- and post-grazing yields, although not invariably so because there was a conscious management effort to hold ewes off paddocks till they showed sufficient growth (3000 kg DM/ha) and were ready to graze. Whilst good grazing management was achieved on the all-grass farmlet and almost so on that containing 20 percent lucerne, rotation lengths became shorter on the high lucerne farmlets, with the result that both the lucerne and grass component became over-grazed with time. Coupled with this situation under high stock numbers, and contrary to findings elsewhere in the country (O'Connor *et al.,* 1968; Vartha and O'Connor, 1968), we have shown ryegrass pastures produce equally as well and better than lucerne in this environment (14,000 kg DM/ha/a vs 12,000 in this experiment).

CONCLUSION

In sheep systems based on ryegrass-white clover which produce high quantities of DM/ha, there seems little point from a biological point of view injecting more than about 15 percent of the total farm area into lucerne. Of course, other grounds such as expense to establish and maintain, weed infestation, different fertiliser requirements, and lucerne's poor performance on wetter soils with high water tables, will influence decisions. However at this level of injection (15%) lucerne can be grazed properly, thus controlling fungi, aphids, weeds and maintaining sward vigour, in spite of lower or equal yields to that of ryegrass pastures. Under these conditions lambs can be finished easily when conventional pastures are being eaten down hard or else are going to seed. Furthermore, high quality conserved feed can be made in given seasons, and because of its summer viability, stands can be prepared by hard grazing after lambs are finished, to flush ewes with the intrinsic benefit of a high protein feed. However, higher injection of lucerne, in the absence of an alternative winter-early spring feed supply in the form of energy-costing crops and greenfeeds, is not compatible with high stock numbers, although this conclusion might have to be qualified if the farmlet experiment had been conducted on pumice soils under conditions of severe summer drought and lower stock numbers. New cultivars of lucerne with higher winter growth rates and earlier spring production might also change findings and therefore conclusions.

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