# Influence of feeding post-lambing on ewe and lamb performance at grazing

P. V. RATTRAY

Whatawhata Hill Country Research Station, Hamilton

K. T. JAGUSCH, D. M. DUGANZICH, K. S. MACLEAN and R. J. LYNCH

Ruakura Agricultural Research Centre, Hamilton

## ABSTRACT

In each of 2 years mixed age Coopworth ewes (1978, 58 kg; 1979, 55 kg) were randomised immediately before lambing and offered a range of herbage allowances (2, 4, 6, 8 and 10 kg DM/ewe) from mixed pasture of contrasting mass (1978, 2300 *v* 4140; 1979, 2100 *v* 3600 kg/ha) and lucerne (1978, 4390 kg/ha; 1979, 3000 kg/ha) until weaning at 10 weeks post-lambing. Final ewe weight, weight change, weight of lamb weaned per ewe and ewe fleece weight all increased with allowance. Lamb weaning weights started to level off above 8 kg DM/ewe but ewe gains and fleece weight continued to increase. On the higher-mass pasture ewes were lighter in 1978 and lambs were lighter in 1979. Lucerne-fed ewes lost more weight and produced less wool, but had similar (1978) or heavier (1979) lambs at weaning than pasture-fed ewes. The importance of feeding during lactation on lamb weaning weight was highlighted and management implications discussed.

## INTRODUCTION

Lamb growth rates and their effect on weaning weights obviously have an important influence on the proportion of lambs that can be drafted prime off the mother, the length of time required after weaning for finishing lambs to suitable killing weights, the ability of lambs or hoggets to achieve important early target weights at given dates or ages and may even influence reproductive performance at maturity.

Recent work has shown under grazing that ewe body weights and fleece weight can be manipulated quite markedly by the amount of pasture offered in late pregnancy. In spite of very large differences in pre-lambing feeding levels and ewe live weight, carryover effects on ewe milk production and lamb growth were almost nil when ewes received common grazing after lambing (Rattray *et al.*, 1982).

This paper reports work where ewes grazed a range of pasture and lucerne levels from immediately prior to lambing until weaning.

## EXPERIMENTAL

In the spring of 1978 and 1979 at Ruakura groups of mixed-age Coopworth ewes grazed a range of herbage allowances from ryegrass-white clover pasture of 2 contrasting pre-grazing herbage masses or from lucerne (Tables 1 and 2). Ewes from synchronised (progestagen sponges) matings only were used. In 1978 first cycle ewes were offered pasture and second cycle ewes lucerne, while in 1979 all ewes were first cycle ewes. Five levels of each herbage were used each year, but in 1979 the highest lucerne allowance had to be abandoned because of slow growth. Ewes were randomised on to treatments on a live-weight basis and litter size (based on X-ray diagnosis on day 100).

Treatments commenced 1 week before expected mean lambing date and continued until weaning when lambs averaged 10 weeks of age.

Pasture measurements were made using techniques similar to those described by Rattray (1977). Ewe and lamb live weights, ewe 6-month fleece weight and average daily milk production at 2, 4 and 10 weeks post lambing from a sample of ewes were recorded (using the oxytocin technique and milking machines similar to that described by Rattray *et al.*, 1975).

## RESULTS AND DISCUSSION

Pasture measurements summarised in Tables 1 and 2, show the high proportion (89% and more) of green material in the swards at this time of the year and the effects of increasing allowance on post-grazing pasture mass, intake and utilisation. Ryegrass-clover pasture mass had little influence on these parameters apart from on post-grazing residue. Except for the lowest feeding level in 1978, intakes were generally higher on lucerne than on pasture, especially in 1979. The relative grazing dates differed between 1978 (cycle 2 ewes) and 1979 (cycle 1 ewes). In 1979 low residual levels and high levels of utilisation were achieved because the lucerne was less mature and contained less fibrous stalk. This is partly reflected in the amount of green material (91 *v* 95%) and *in vitro* digestibilities (64 *v* 68%). However leaf/stem ration may have been a better indicator as much of the unpalatable stem was classed as green material.

Pre-lambing live weights of the ewes averaged 58 kg in 1978 and 55 kg in 1979, while corresponding conceptus-free weights averaged 50 and 47 kg. Litter

**TABLE 1** Herbage measurements 1978

| Herbage mass pre-grazing (kg DM/ha) | Ryegrass-white Clover 2300 | | | | | Ryegrass-white clover 4140 | | | | | Lucerne 4390 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Herbage allowance (kg DM/ewe/d) | 2.0 | 4.1 | 6.0 | 8.1 | 10.7 | 2.0 | 4.1 | 6.0 | 7.9 | 10.6 | 2.0 | 4.0 | 6.1 | 7.9 | 10.1 |
| Herbage allowance (kg green DM/ewe/d) | 1.8 | 3.6 | 5.3 | 7.2 | 9.6 | 1.8 | 3.6 | 5.3 | 7.0 | 9.4 | 1.9 | 3.7 | 5.6 | 7.3 | 9.3 |
| Post-grazing mass (kg DM/ha) | 465 | 1055 | 1560 | 1670 | 1970 | 775 | 2050 | 2445 | 2990 | 3430 | 1275 | 1815 | 2675 | 3190 | 3340 |
| Intake (kg DM/ewe/d) | 1.6 | 2.1 | 1.9 | 2.0 | 2.3 | 1.6 | 2.1 | 2.4 | 2.2 | 2.3 | 1.4 | 2.3 | 2.3 | 2.6 | 2.5 |
| Utilisation/ grazing[a] (%) | 79 | 52 | 32 | 25 | 21 | 81 | 51 | 40 | 27 | 21 | 71 | 58 | 38 | 33 | 23 |

[a] Pasture disappearance/pre-grazing mass.

size in 1978 averaged 1.5 (pasture) and 1.3 (lucerne) and in 1979 1.4 lambs/ewe.

Ewe live weights, weight changes over lactation and production of lamb wool are summarised in Table 3. All increased with allowance, and there was a significant allowance x herbage interaction for ewe weight but not production.

Ewes tended to lose more weight on lucerne in both years at all levels of feeding and gained less on greater pasture mass at higher allowances in 1978. The pasture at the higher mass appeared to be more mature and stalky but this was not reflected in the percent green (1978, 89 *v* 89; 1979, 93 *v* 92) or *in vitro* digestibility (1978, 75 *v* 74; 1979, 77 *v* 76) so some other factor(s) affecting intake or feed utilisation must have been responsible (Rattray and Joyce, 1974).

Weight of lamb weaned per ewe was adjusted to an average litter size of 1.5 lambs/ewe. Apart from litter size (single *v* twin) other factors adjusted for that significantly affected litter weight in both years were: lamb sex and birth weight, weaning age (within the limited range approx. ± 1 week), initial ewe weight and in 1979, ewe age. There was a birth type (single *v* twin) x allowance effect ($P<0.01$) in both years in that the difference between singles and twins at weaning was greater at low feeding levels (e.g., on lucerne in 1978: 20.1, 24.0, 25.3, 25.8 and 24.4 for singles and 14.1, 18.7, 19.8, 21.6 and 20.9 kg for twins). Lamb growth rates ranged from 194 to 291 g/d for singles and 120 to 237 g/d for twins. The effect of allowance on weight of lamb weaned was highly significant in both years and tended to level off above 8 kg DM/ewe/d, in a similar manner to ewe weight. The effect of herbage type was significant in 1979 with ryegrass clover pasture of the lower mass being superior to the higher mass, but slightly inferior to lucerne.

**TABLE 2** Herbage measurements 1979

| Herbage mass pre-grazing (kg DM/ha) | Ryegrass-white clover 2100 | | | | | Ryegrass-white clover 3600 | | | | | Lucerne 3000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Herbage allowance (kg DM/ewe/d) | 2.0 | 4.2 | 5.8 | 8.2 | 10.2 | 2.0 | 4.1 | 6.1 | 8.1 | 10.3 | 2.1 | 4.0 | 6.1 | 8.3 |
| Herbage allowance (kg green DM/ewe/d) | 1.9 | 3.8 | 5.4 | 7.6 | 9.4 | 1.8 | 3.8 | 5.7 | 7.5 | 9.5 | 2.0 | 3.8 | 5.8 | 7.9 |
| Post-grazing mass (kg DM/ha) | 570 | 1070 | 1370 | 1840 | 1810 | 780 | 2155 | 2600 | 2660 | 2880 | 205 | 800 | 1410 | 1610 |
| Intake (kg DM/ewe/d) | 1.5 | 2.0 | 2.0 | 1.8 | 2.3 | 1.6 | 1.9 | 1.6 | 1.9 | 2.4 | 1.9 | 2.7 | 2.8 | 3.1 |
| Utilisation/grazing (%) | 73 | 48 | 34 | 22 | 23 | 79 | 45 | 25 | 24 | 23 | 90 | 69 | 45 | 38 |

**TABLE 3** Influence of herbage allowance, mass and type during lactation on production per ewe.

| Herbage Allowance (Kg DM/ewe/d) | Low RG | | | | | High RG | | | | | Lucerne | | | | | RSD (±) | Significance Allowance | Herbage | Interaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 4 | 6 | 8 | 10 | 2 | 4 | 6 | 8 | 10 | 2 | 4 | 6 | 8 | 10 | | | | |
| | | | | | | | | 1978[a] | | | | | | | | | | | |
| Ewe weaning wt.[b] (kg) | 43 | 48 | 50 | 53 | 54 | 46 | 48 | 51 | 50 | 52 | 39 | 45 | 46 | 49 | 50 | 3.8 | — | — | **(*) |
| Ewe wt. change[c] (kg/10 weeks) | −6.4 | −2.7 | 0.2 | 2.7 | 3.6 | −4.3 | −1.4 | 1.2 | −0.6 | 1.6 | −11.8 | −6.0 | −4.2 | −1.7 | −0.4 | 3.8 | — | — | *** |
| Wt. lamb weaned[de] (kg/ewe) | 24 | 29 | 31 | 34 | 34 | 25 | 30 | 32 | 34 | 34 | 27 | 32 | 33 | 34 | 33 | 3.6 | *** | NS | NS |
| Wool (kg/ewe)[c] | 1.66 | 1.79 | 1.84 | 1.95 | 1.96 | 1.88 | 1.80 | 1.86 | 1.84 | 1.91 | 1.56 | 1.84 | 1.73 | 1.79 | 1.84 | 0.33 | ** | NS | NS |
| | | | | | | | | 1979[a] | | | | | | | | | | | |
| Ewe weaning wt.[b] (kg) | 41 | 47 | 51 | 54 | 53 | 41 | 47 | 51 | 49 | 54 | 38 | 45 | 50 | 48 | — | 3.5 | | | *** |
| Ewe wt. change[c] (kg/10 weeks) | −6.4 | −0.4 | 3.2 | 6.8 | 4.6 | −5.9 | 0.1 | 3.3 | 2.2 | 6.7 | −9.0 | −3.0 | 2.9 | 1.3 | — | 3.5 | — | — | *** |
| Wt. lamb weaned[de] (kg/ewe) | 25 | 31 | 31 | 34 | 35 | 23 | 28 | 30 | 32 | 34 | 26 | 30 | 34 | 35 | — | 3.3 | *** | *** | NS |
| Wool (kg/ewe)[e] | 1.55 | 1.63 | 1.84 | 1.88 | 1.86 | 1.52 | 1.58 | 1.76 | 1.81 | 1.90 | 1.37 | 1.56 | 1.57 | 1.71 | — | 0.30 | *** | ** | NS |

[a] n/group 30 on Ryegrass-white clover; 15 on lucerne.

[b] 24-hour fasted weight.

[c] Adjusted for conceptus (pre-lambing weight minus total litter weight at birth + 0.70).

[d] 10 weeks post partum;

[e] Adjusted litter size 1.5 lambs/ewe.

**TABLE 4** Ewe milk production litres/ewe/d.

| Weeks of Lactation | 2 | | | 4 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Low RG | High RG | Lucerne | Low RG | High RG | Lucerne | Low RG | High RG | Lucerne |
| Allowance 1978[a] | | | | | | | | | |
| 2 | 2.1 | 2.1 | 1.6 | 1.7 | 1.7 | 1.6 | 0.6 | 0.7 | 0.6 |
| 4 | 2.6 | 2.3 | 1.7 | 2.0 | 2.1 | 1.8 | 1.0 | 1.0 | 0.8 |
| 6 | 2.2 | 2.4 | 1.9 | 1.9 | 2.0 | 2.0 | 0.9 | 1.1 | 1.0 |
| 8 | 2.7 | 2.7 | 2.0 | 2.3 | 2.2 | 2.2 | 1.2 | 0.9 | 1.0 |
| 10 | 2.5 | 2.7 | 2.0 | 2.2 | 2.4 | 1.7 | 1.0 | 1.3 | 1.0 |
| RSD | | 0.58 (n = 264) | | | 0.59 (n = 264) | | | 0.35 (n = 261) | |
| Allowance | | *** | | | *** | | | *** | |
| Herbage | | *** | | | *** | | | * | |
| Interaction | | ns | | | ns | | | ns | |
| No. born (Single/Twin) | | *** | | | *** | | | *** | |
| Allowance x No. born | | ns | | | ns | | | * | |
| Ewe age | | ns | | | ns | | | ns | |
| Ewe initial weight | | ns | | | * | | | *** | |
| | | (b = 0.02 (litre/ewe/d)/kg) | | | (b = 0.03) | | | (b = 0.02) | |
| Allowance 1979[b] | | | | | | | | | |
| 2 | 2.2 | 1.9 | 2.1 | 1.8 | 1.6 | 1.7 | 0.7 | 0.6 | 0.5 |
| 4 | 2.4 | 2.3 | 2.4 | 2.1 | 2.1 | 1.9 | 1.0 | 0.7 | 0.7 |
| 6 | 2.4 | 2.5 | 2.8 | 2.3 | 2.2 | 2.0 | 0.9 | 0.7 | 0.8 |
| 8 | 2.6 | 2.1 | 2.5 | 2.0 | 1.8 | 1.9 | 1.0 | 0.8 | 0.8 |
| 10 | 2.7 | 2.3 | — | 2.3 | 2.3 | — | 1.0 | 0.8 | — |

[a] Adjusted for ewe initial weight and litter size to 1.5 lambs/ewe.

[b] Not statistically analysed because of missing data.

Although the lucerne ewes were lighter in both years, their lambs were either similar to or heavier than those on mixed pasture, suggesting that the ewes may have diverted more ingested nutrients into milk than into replacement of maternal tissue. In earlier trials (Rattray, 1975; 1976) ewes grazing lucerne produced more milk than grass-fed controls, however such does not appear to be the case here (Table 4), where lucerne ewes produce similar (1979) or lesser (1978) amounts of milk. In spite of significant differences in milk production between herbages in 1978 (mainly due to the lower levels on lucerne) lamb growth rates did not differ, and although lucerne ewes appeared to produce similar levels of milk in 1979 their lambs grew faster than on the other herbages (Table 3). Although the overall intake per ewe was similar or greater on lucerne than on the ryegrass pastures (Tables 1 and 2), ewe live weight gains were generally less. This coupled with the milk production data, would suggest that the lambs on lucerne were consuming more herbage than those on the mixed pasture. High quality lucerne has been shown to be an ideal feed for young early-weaned lambs with limited rumen capacity (Jagusch *et al.*, 1970; Rattray *et al.*, 1976). In other studies lambs have shown an ability to adjust herbage intakes to compensate for differences in milk production (Langlands, 1973; Rattray *et al.*, 1975).

Ewe fleece weights increased linearly with allowance (Table 3) and like ewe weights, were lower on lucerne than on mixed pasture.

## CONCLUSIONS

These results show the considerable responsiveness of 55 to 58 kg ewes to feeding during lactation. Ewe live weight, fleece weight and lamb weaning weights all increased with increasing pasture allowance. Weight of lamb weaned tended to level off above a herbage allowance of 8 kg/ewe/d, however ewe gains and wool growth still tended to increase. These responses are similar to those obtained in Southland (K. F. Thompson, pers. comm.). Ewes of heavier or lighter weights may have responded somewhat differently as they have different amounts of maternal reserves for buffering differences in feed supply.

The results also showed the superiority of lucerne for feeding suckling lambs, however few farms would have areas of lucerne large enough to adopt this practice (Jagusch *et al.*, 1980).

The danger of allowing spring ryegrass-clover pasture to accumulate and become too mature was also partly demonstrated. Pasture masses below 3000 kg DM/ha for lactating ewes should be the aim and this is in line with current recommendations (K. Milligan, pers. comm.). The response in weight of lamb weaned per ewe of + 10 to + 11 kg (between extreme treatments) is much greater than was obtained with differential feeding in late pregnancy (Rattray *et al.*, 1981) or from mid pregnancy to weaning (Clark, 1978). This is in agreement with the early work of Coop (1950) who found feeding level during lactation to be much more important than feeding level in late pregnancy.

These findings have considerable management implications. Currently there is an emphasis on controlled grazing during winter, which allows some accumulation of pasture *in situ*. This leads to decisions in late winter-early spring on whether to allocate these pasture reserves to ewes before or after lambing. On the one hand there is concern that under-feeding before lambing might cause pregnancy toxaemia and low lamb birth weights and vigour; or that over-feeding before lambing could cause an increased incidence of bearing trouble and lambing difficulties as well as pasture shortage after lambing. Farmers who set stock their ewes up to 4 weeks before lambing for ease of management (Smith *et al.*, 1976) often find all their saved pasture is consumed as a result, leaving a deficit for a variable period after lambing.

Where pasture shortages are liable to occur around lambing, strict rationing of pasture can continue right up until lambing, if ewes are in average to good condition, conserving pasture *in situ* that can then be used for the more important period immediately after lambing.

## ACKNOWLEDGEMENTS

Sheep nutrition staff for field work and measurements, Nutrition Centre laboratory staff for chemical analyses.

## REFERENCES

Clark, D. A., 1978. *Proc. N.Z. Grassld. Ass., 40:* 81.

Coop, I. E., 1950. *J. agric. Sci., Camb., 40:* 311.

Jagusch, K. T.; Clarke, V. R.; Jay, N. P., 1970. *N.Z. Jl agric. Res., 13:* 808.

Jagusch, K. T.; Rattray, P. V., Smith, J. F.; Lynch, R. J.; Oliver, T.; Brunswick, L. F. C., 1980. *Proc. Agron. Soc. N.Z., 10:* 19.

Langlands, J. P., 1973. *Anim. Prod., 31:* 224.

Rattray, P. V., 1975. *N.Z. Ministry of Agriculture and Fisheries Research Division Annual Report:* 46.

——— 1976. *Ibid.* 48.

——— 1977. *N.Z. Jl exp. Agric. 5:* 345.

Rattray, P. V.; Jagusch, K. T.; Duganzich, D. M.; MacLean, K. S.: Lynch, R. J., 1982. *Proc. N.Z. Grassld. Ass., 43:* 223.

Rattray, P. V.; Joyce, J. P., 1974, *N.Z. Jl agric. Res., 17:* 401.

Rattray, P. V.; Morrison, M. C. L.; Farquhar, P. A., 1976. *Proc. N.Z. Soc. Anim. Prod., 36:* 179.

Rattray, P. V.; Morrison, M. C. L.; Oliver, T. W., 1975. *Proc. N.Z. Soc. Anim. Prod., 35:* 138.

Smith, M. E.; Dawson, A. D.; Short, W. D., 1976. *Proc. Ruakura Fmrs' Conf.,:* 22.