

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

Pasture quality and animal performance over late spring and summer

B.M. BUTLER AND C.J. HOOGENDOORN

Agronomy Department
Massey University, Palmerston North

M.A. RICHARDSON

Grasslands Division
DSIR, Kaikohe

ABSTRACT

The data from 2 series of trials were used to examine the effects of variation in leaf, green and total allowance on the herbage intake and milk production of dairy cows and the liveweight gain of weaned lambs over late spring and summer.

Both the herbage intake and milk production of dairy cows and the liveweight gain of lambs were better related to leaf allowance than to green or total herbage allowance. With lambs, however, there were differences in liveweight gain at similar leaf allowances between experimental periods. These were largely accounted for by the percentage of dead herbage in the pasture.

It is suggested that differences in animal performance over late spring and summer may be influenced by the level of leaf mass and dead matter in pasture but not the level of green grass stem.

Keywords Dairy cows; weaned lambs; herbage intake; milk production; liveweight gain; leaf allowance; pasture quality.

INTRODUCTION

Herbage intake and animal performance are more closely related to green than total herbage allowance or mass (Ratray and Clark, 1984). However, it has been found that animal performance may be reduced on reproductive swards with a high green herbage mass (Hughes, 1983; Smeaton, 1983), although there have been exceptions reported (Jagusch *et al.*, 1979; K.T. Jagusch, pers. comm.). It has been suggested that expressing herbage allowance or mass on a leaf rather than a green or total dry matter basis may give a more precise indication of intake and animal performance (Holmes and Macmillan, 1982). The effects of variation in leaf, green and total allowance on the herbage intake and milk production of dairy cows and the liveweight gain of weaned lambs were examined in separate trials.

EXPERIMENTAL

In the summers of 1982-83 and 1983-84 weaned lambs were grazed at common total dry matter (DM) allowances on pastures that had previously been treated with either mefluidide or paraquat, or laxly grazed in late spring. In 1982 lambs were offered a total DM allowance of 2 kgDM/lamb/d from 6 December to 28 January. Results were analysed over the whole period. In 1983, DM allowances of 1.3 and 3.0 kgDM/lamb/d were offered. Results from 1983 were analysed as 3 3-weekly periods between 24 November and 24 January. In both years total pre-

grazing herbage was dissected into grass leaf, grass stem, total clover and dead herbage components. Leaf allowance therefore consisted of grass leaf plus total clover components.

The data for dairy cows were derived from 3 trials (Hoogendoorn, 1986). In 2 of the trials (1982 and 1983) groups of lactating cows were offered a generous (48 kgDM/cow/d) or restricted (12 kgDM/cow/d) DM allowance over a 5 week period commencing in mid November on swards that had been grazed laxly (2500 kgDM/ha residual herbage mass (RHM)) or intensively (1000 kgDM/ha RHM) in spring. In the third trial (1984) cows were offered a common leaf allowance of 16 kgDM/ha over a 5 week period commencing in mid November on swards that had been laxly (2500 kg DM/ha RHM), moderately (1500 kgDM/ha RHM) or intensively (1000 kgDM/ha RHM) grazed during spring. In all 3 trials total pre-grazing herbage was dissected into grass and clover leaf, stem and dead components. Herbage intake was measured by difference.

RESULTS

In 1982-83 there was a significant relationship between lamb liveweight gain (LWG) and leaf allowance (LA) (Fig.1) of

$$LWG = -17 + 0.147 LA \quad R^2 = 0.78^{***}$$

LWG was however not significantly related to either green or total DM allowance. Similarly in

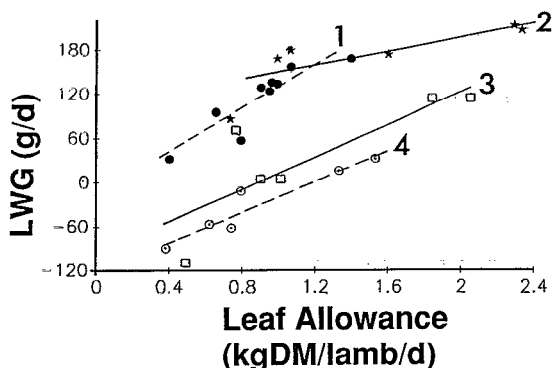


FIG. 1 Relationship between lamb liveweight gain (LWG) and leaf allowance in 1982-83 (●,1) and 1983-84 during period 1 (★,2), period 2 (□,3) and period 3 (○,4).

1983-84 LWG was more closely related to LA ($R^2=0.78^{***}$) than to either green ($R^2=0.22^*$) or total DM ($R^2=0.05$ NS) allowance. LWG during measurement period 1 was greater than during measurement periods 2 and 3 at equivalent leaf allowances thereby affecting their interrelationships (Fig. 1):

$$\begin{aligned} \text{Period 1 LWG} &= 94 + 0.52 \text{ LA} & R^2 &= 0.56^\dagger \\ \text{Period 2 LWG} &= -103 + 0.112 \text{ LA} & R^2 &= 0.59^* \\ \text{Period 3 LWG} &= -121 + 0.104 \text{ LA} & R^2 &= 0.88^{**} \end{aligned}$$

Inclusion of the proportion of dead herbage (DH) into the regression of data pooled across periods largely accounted for these differences as:

$$\text{LWG} = 47 + 0.090 \text{ LA} - 599 \text{ DH} \quad R^2 = 0.79^{***}$$

Although grass reproductive stem (live and dead) was not separated from other herbage, it was observed that these were major components in grass stem and dead herbage fractions respectively. In neither year did the inclusion of grass stem influence the regressions.

Stepwise regression was performed on the pooled data from all 3 cow experiments to determine the effects of pre- and post-grazing herbage mass, DM digestibility, herbage height, grass stem mass, and daily allowance of total dry, green and leaf matter on DM intake (DMI) and milk production. After the effects of year, cow type and experimental period were accounted for, the relationship between DMI and LA (Fig. 2) was:

$$\text{DMI} = 3.9 + 0.6 \text{ LA} \quad R^2 = 0.85^{***}$$

However leaf allowance explained only 15.4% (NS) of the variation in milk production. Neither green, total DM allowance nor any of the other variables contributed significantly to variation in DMI or milk production.

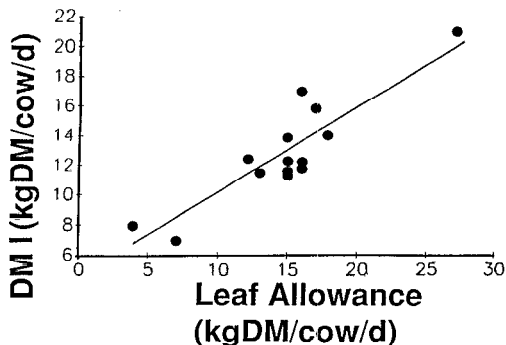


FIG. 2 Relationship between cow dry matter intake (DMI) and leaf allowance pooled over 3 experiments.

DISCUSSION

The results presented here suggest that the intake and performance of sheep and dairy cows over late spring and summer are often better related to leaf allowance than either green or total DM allowance.

Apparent inconsistencies in the intake or performance of animals grazing pastures of similar green herbage mass are most likely due to differences in the leaf content of those pastures rather than any negative influence of grass stem. Thomson *et al.* (1984) also found a lack of direct association between the stem content of pastures in late spring and dairy cow milkfat production. B.M. Butler (unpublished data) likewise found that the liveweight gain of lactating ewes and their lambs over late spring was not depressed by large quantities of grass reproductive stem in the pasture.

In the lamb trials it appeared that once herbage senesced it had a negative influence on animal performance. This result must be interpreted with caution as it is uncertain whether a change in dead herbage content of the pasture was the cause of liveweight gain differences or simply that it happened to occur at the same time. Similar results were however reported by Thomson *et al.* (1984) with dairy cows.

From the data presented in this paper 2 possible sward conditions which may cause lowered animal performance in late spring and early summer, have been identified. The first is a low level of leaf mass, and therefore low leaf allowance, and the second is a high level of dead DM. The former is dependent on the rate of leaf accumulation, and both are influenced by grazing management over late spring and early summer. For example, Butler (1986) found that lax grazing (above 12 cm) with sheep each 14 d during spring reduced net leaf accumulation by more than 40% in both spring and summer compared with

moderate (6-8 cm) or hard (2-3 cm) grazing. By late January lax grazed swards contained 37% dead reproductive stubble compared with less than 13% on the other swards. This represents a difference of more than 1500 kgDM/ha. Therefore, the advantages of fully feeding (lax grazing) stock during spring may be outweighed by the combination of reduced subsequent leaf accumulation and the effect of increased content of dead herbage on stock performance. This is illustrated in the findings of Thomson (1985) who showed that both a deficit and a surplus of annual pasture production with respect to dairy cow requirements were detrimental to milkfat production.

The results presented here highlight the need for further research to elucidate the response of grazing animals to sward conditions over the spring and summer. This is essential if appropriate management decisions over this period are to be made.

REFERENCES

- Butler B.M. 1986 The effect of grazing intensity and frequency during spring and early summer on the sward characteristics of a ryegrass-white clover pasture. M.Agr.Sci. Thesis, Massey University.
- Holmes C.W.; Macmillan K.L. 1982. Nutritional management of the dairy herd grazing on pasture. In *Proceedings dairy production from pasture*. Ed. K.L. Mcmillan and V.K. Taufa. New Zealand and Australian Societies of Animal Production. p. 244-274.
- Hoogendoorn C.J. 1986. Studies on the effects of grazing regime on sward and dairy cow performance. Ph.D. Thesis, Massey University.
- Hughes T.P. 1983. Late spring grazing management. *Proceedings of the Lincoln College farmers' conference* 33: 18-21.
- Jagusch K.T.; Rattray P.V.; Oliver T.W.; Cox N.R. 1979. The effect of herbage yield and allowance on growth and carcass characteristics of weaned lambs. *Proceedings of the New Zealand Society of Animal Production* 39: 254-259.
- Rattray P.V.; Clark D.A. 1984. Factors affecting the intake of pasture. *New Zealand agricultural science* 18: 141-146.
- Smeaton D.C. 1983. Sheep management. *Proceedings of the Ruakura farmers' conference* 35: 47-53.
- Thomson N.A. 1985. The relationship between pasture growth, cow requirements and milkfat production. In *The challenge: efficient dairy production* Ed. T.I. Phillips. Australian Society of Animal Production. p.64-65.
- Thomson N.A.; Lagan J.F.; McCallum, D.A. 1984. Herbage allowance, pasture quality and milkfat production as affected by stocking rate and conservation policy. *Proceedings of the New Zealand Society of Animal Production* 44: 67-70.