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EFFECT OF DATE OF HARVEST AND CONSERVATION METHOD ON THE FEEDING VALUE OF CONSERVED PASTURE FOR BEEF CATTLE AT PASTURE

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SUMMARY

Early and late cut unwilted and wilted silages and late cut hay were offered *ad libitum* to beef cattle together with a restricted pasture allowance. All supplements increased liveweight and carcass gains relative to unsupplemented cattle and decreased pasture utilization. Although wilting increased total DOM intake of early cut silage, there was no significant response in animal production. Cattle offered late harvested hay ate similar quantities of DM and gained carcass weight at similar rates to cattle offered late harvested unwilted silage. These intakes and carcass gains were significantly lower than those of cattle offered the late harvested wilted silage.

INTRODUCTION

Price schedules for export beef encourage finishers to produce carcasses of at least 221 kg. An overall daily gain from birth of 0.36 kg carcass (0.7 kg liveweight) is required to reach this carcass weight in 18 months. Since compensatory growth in young beef cattle is only partial, and unreliable (Joblin, 1969; Everitt and Jury, 1977), it might be preferable to aim for a more constant rate of gain than to rely on a fluctuating store-feeding compensatory-growth system. Conservation of surplus herbage for feeding during periods of pasture shortage could be important in this context, as well as assisting in sward management.

Daily carcass gains of 0.36 kg require a high quality supplement if pasture allowance is restricted. Since both stage of growth and conservation method have been shown to affect intake of conserved pasture and performance of housed animals (McIlmoyle, 1977), it was decided to evaluate these factors under New Zealand grazing conditions.

EXPERIMENTAL

CONSERVATION

Six 1.62 ha paddocks of perennial ryegrass/white clover dominant pasture were closed from grazing on September 1, 1976. Three paddocks were cut 8 weeks later (1 week before ear-emergence) and ensiled either immediately (EU) or 2 days later

(EW). The remaining paddocks were cut on November 22. One third of each paddock was ensiled immediately (LU), or 1 day later (LW), or 2 days later as field-cured hay (LH). All herbage was cut with a disc mower; the ensiled material was picked up with a precision-chop forage-harvester (4 to 8 cm chop) and the hay with a conventional baler.

FEEDING

The five conservation products were offered *ad libitum*, over an 11-week period starting March 23, 1977, to groups of ten (5 Friesian and 5 Hereford × Angus) 8- to 10-month-old steers which received also a daily herbage allowance of 5 kg DM per animal. A similar group of cattle was offered only the pasture allowance (C) and a further group was slaughtered immediately to determine initial carcass:liveweight ratios.

Area required to supply the herbage allowance for 7 days was based on 24 randomly chosen quadrats cut to ground level. The area for each group was strip-grazed, with daily breaks, without a back fence. Yields after grazing were determined weekly for each group from 5 randomly selected quadrats taken from the breaks grazed on the previous 2 days. Pre- and post-grazing herbage samples were retained for *in vitro* organic matter digestibility (OMD) determinations.

Recorded quantities of the supplements were offered daily; refusals were removed and recorded three times weekly. Samples for oven-DM determinations were taken on each of these occasions.

In vivo OMD coefficients (corrected for volatiles) of the 5 conservation products were determined at a similar daily feeding level (2.7 to 3.0 kg DM/animal) with 3 Friesian steers (189 to 208 kg LW), using the total faecal collection method.

Cattle were weighed unfasted each week before entering a new paddock and at the end of the experiment. Three Friesian and 3 Hereford × Angus cattle were slaughtered from each treatment at the end of the experiment to determine carcass:liveweight ratios.

RESULTS AND DISCUSSION

Table 1 shows that delaying cutting by 4 weeks virtually doubled DM yield but reduced OM digestibility. The rate of decline in OMD (0.10 to 0.22 units/day) was less than in overseas studies (Minson *et al.*, 1960; Strickland, 1977; McIlmoyle, 1977) and probably reflects the greater clover content of Waikato pastures. Wilting more than doubled DM content of the ensiled herbage at both harvests but there was little difference in DM percentage between EW and LU silage. Wilting had little effect on OMD of the pasture cut early but at the later harvest wilting and hay-making reduced digestibility by 4.0 and 5.9 units, respectively.

TABLE 1: AMOUNT, DM CONTENT AND DIGESTIBILITY OF CONSERVED PASTURE SUPPLEMENTS

	EU	*EW*	*LU*	*LW*	*LH*
DM conserved (kg/ha)	3630	3500	7070	6870	5870
DM content at harvest (%)	12.0	28.6	25.0	55.4	68.1
DM content at feeding (%)	14.0	25.5	23.0	50.4	82.8
OM digestibility (%)[1]	70.6	70.0	67.8	63.8	61.9

[1] Silages corrected for volatiles.

Intake data for weeks 2 to 11 inclusive are summarized in Table 2; week 1 was considered an acclimatization period during which supplement allowances were gradually increased.

At both harvests, wilting substantially increased silage DM and DOM intake which agrees closely with other experiments where silage has been offered as a sole ration (Marsh, 1978). DM intake of LH was slightly (5%) lower than that of LU. Some overseas trials with cattle have shown markedly higher (> 40%) DM intakes of hay than of silage made from the same crop but in others differences have been small (< 5%) (Brown *et al.*, 1963; Waldo *et al.*, 1966; Wellmann, 1966; Bishop and Kentish, 1970).

TABLE 2: PRE- AND POST-GRAZING PASTURE YIELDS (kg/ha) AND DAILY PASTURE AND SUPPLEMENT INTAKES FOR WEEKS 2-11 INCLUSIVE (kg)

	C	*EU*	*EW*	*LU*	*LW*	*LH*
Supplement:						
DM intake[1]	—	3.26	4.63	4.26	5.40	4.04
DOM intake[1]	—	1.97	2.81	2.63	3.11	2.32
Pasture:						
Pre-grazing yield	2985	3020	2985	2985	3020	3020
Post-grazing yield	910	2045	1990	1935	2460	2250
Utilization (%)	69.5	32.3	33.3	35.2	18.5	25.5
DM intake	3.43	1.58	1.59	1.71	0.88	1.24
DOM intake	2.15	1.11	1.10	1.16	0.64	0.91
Total:						
DM intake[1]	3.43	4.84	6.22	5.97	6.28	5.28
DOM intake[1]	2.15	3.08	3.91	3.79	3.75	3.23

[1] Corrected for silage volatiles.

Using variation between weeks as the error term, post-grazing DM yields of pastures grazed by all supplemented groups were significantly greater ($P < 0.01$) than that of the C group. Between supplemented groups only the difference between the LU and LW groups reached significance ($P < 0.05$). Intake of pasture DM, based on the pre- and post-grazing sample cuts, was more than halved by offering supplements *ad libitum*. Although mean pasture DM intake declined by 0.44 kg for each 1.0 kg supplement DM eaten, differences between treatments were inconsistent. Predicted OM digestibility coefficients of the ingested herbage were C, 68.7; EU, 76.5; EW, 72.3; LU, 73.3; LW, 77.8 and LH, 79.3.

Animal data are presented in Table 3. Although mean initial liveweight and predicted carcass weight of cattle were 206 and 101.7 kg, respectively, after the 7-day acclimatization period significant differences ($P < 0.001$) in liveweight existed between treatments, presumably owing to differences in gut-fill. All supplements significantly increased daily liveweight and carcass gains and final live and carcass weight compared with unsupplemented cattle. There was no significant difference in live- or carcass-weight gains between unwilted and wilted silages at the early harvest or between these and liveweight and carcass gains of cattle offered LU silage. Within the late harvest comparisons, liveweight gains from both LW and LH were significantly greater than that from LU but the killing-out percentage of the cattle fed LH was significantly lower. Thus carcass gain and final carcass weights of the LM cattle were similar to those of the LU cattle and significantly lower than those of the LW cattle.

The lack of differences in animal production between the EU and EW silage, where a 42% difference in silage DM intake occurred, is disturbing. When differences in ash content and OMD of both silage and pasture are accounted for, a 27% difference

TABLE 3: ANIMAL PRODUCTION DATA (kg)

	C	*EU*	*EW*	*LU*	*LW*	*LH*
Liveweight (week 2)	193a	199b	202bc	201bc	205c	206c
Daily LW gain (weeks 2-11)	0.19a	0.62b	0.65b	0.60b	0.81c	0.76c
Daily carcass gain (weeks 1-11)	0.05a	0.30b	0.30b	0.26b	0.35c	0.26b
Final liveweight	210a	242b	249b	246b	263c	259c
Final carcass weight[1]	105.4a	125.2b	125.2b	122.5b	129.5c	122.0b
Killing-out percentage[1]	50.4b	51.7c	50.4b	49.8b	49.3b	47.1a

[1] Kidney and channel fats included.
Means without a similar letter differ significantly at the 5% level.

in total DOM intake still exists between these treatments. Converting DOM to metabolizable energy (ME), using factors of 15.7, 15.2, and 14.9 MJ/kg DM for pasture, silages and hay respectively showed predicted daily gains (M.A.F.F., 1975) of EW and LU cattle (of similar DOM intake) were 0.22 and 0.24 kg greater than actual daily gains. Predicted gains of the remaining treatments were either similar to or lower than actual gains. This could indicate that DOM and hence ME intake were overestimated in the EW and LU cattle treatments. This might be partly due to OMD values being determined at lower intakes (1.47 and 1.38 kg DM/100 kg LW) than total DM intake of the EW and LU cattle in the field (2.74 and 2.63 kg DM/100 kg LW, respectively) but a reduction in OMD of EW of 11.4 units would be required to fully account for the difference. The effect of wilting at the late harvest gave increases in DM and DOM intake and a substantial increase in both liveweight and carcass gains and thus supports many of the overseas data (Marsh, 1978).

The early *vs* late harvest comparison is confounded by DM content which is known to affect both intake and cattle gains (Marsh, 1978). However, the lack of significant differences between EW and LU silages, which approximated in both DM content and OM digestibility, indicates that less importance might be attached to stage of growth in the more clover-dominant New Zealand pastures than in the more grass-dominant British pastures. However, before any recommendations to this effect can be made, further testing of this hypothesis is required and for this reason the experiment is being repeated.

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