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# Calf weaning and summer grazing strategies for efficient beef cow use on hill country

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## ABSTRACT

The impact on beef herd performance of weaning calves before or after cows clean-up low quality summer pasture was assessed.

Surplus pasture was cleaned-up by weaned cows, and unweaned cows and calves, using either a single hard grazing (1 x 56 d rotation) or 2 x 28 d rotations commencing 20 January in 1986 and 22 January in 1987. Pastures had accumulated about 4.5 t dry matter (DM)/ha after being retired from grazing in late November as a pasture control measure. Weaned calves were fed quality (70+ % green) pasture at pre-graze masses of 1.5, 2.0 or 2.3 t DM/ha under set-stocking 1986, or a fast rotation, 1987.

Unweaned calves gained 38 and 39 kg over the 8 weeks in 1986 and 1987, respectively. There was no effect of pasture clean-up method on calf growth. Calves in the best weaned treatment gained just 23 and 30 kg in 1986 and 1987, respectively.

Weaned calves suffered from facial eczema (mean gamma glutamyl transferase (GGT) 290 iu) in 1986 which reduced their growth. The rank pasture reduced exposure to facial eczema (mean GGT cows and calves 15 iu). Calf age had no effect on calf growth rates.

Weaned cows lost 3 and 15 kg in each year. Unweaned cows lost 20 kg more than weaned cows.

Benefits of late weaning were increased calf growth and reduced demand for quality autumn pasture. They were considered to outweigh costs of cow liveweight loss.

**Keywords** Weaning date; beef cow; calf growth; pasture surplus; facial eczema; hill country.

## INTRODUCTION

On hill country, surplus pasture growth cannot be utilised through conservation. The consequence of allowing surplus pasture to build up over the entire farm is poor pasture quality in late summer and autumn. This leads to poor autumn stock performance (Smeaton *et al.*, 1984) and in the longer term this management encourages pasture reversion (Sheath *et al.*, 1984).

An efficient strategy for managing feed surplus is to control pasture on a portion of the farm and retire the rest from grazing (Sheath *et al.*, 1984). This provides quality feed in autumn for growing and finishing lambs or cattle, or for flushing ewes. The low quality feed which accumulates on retired paddocks needs to be removed over late summer to promote subsequent winter growth from this land.

Breeding cows appear most suited to removing the large mass of pasture which accumulates. Neither sheep nor goats are suitable. Sheep pick out green material but sustain high liveweight losses at grazing pressures required to make them eat significant dead pasture (Guy *et al.*, 1981). Goats can not be readily

forced to clean-up lodged dead material (D.G. McCall pers. comm.).

Grazing of retired pasture should commence about the time total farm feed demand and pasture growth come into balance. This is usually mid summer in North Island hill country. Calves will commonly be between 3 and 5 months of age at this time and could be weaned.

The aim of this study was to determine effects on cow and calf growth of leaving calves unweaned while cows clean-up low quality surplus pasture, compared to weaning calves onto high quality pasture while cows alone remove the surplus low quality feed.

Supplementary aims were to compare effects of calf age at weaning and cow breed (Angus v Friesian cross) on results.

## MATERIALS AND METHODS

### Design

The trial ran for an 8 week period in each of 2 years. It commenced on 20 January in 1986 and 22 January in 1987. Surplus pasture was accumulated

by retiring paddocks from grazing in the third week of November. High quality pasture for weaned calves was prepared by regular sheep and cattle grazing over November and December. These grazings removed reproductive tillers and were timed to produce desired quantities of pasture in mid January.

Weaned cows and unweaned cows and calves grazed surplus pasture together. Two clean-up treatments were used:

1. A single hard grazing of 1 week duration per paddock to a residual of 1.3-1.5 t dry matter (DM)/ha (1 x 56 d rotation); and
2. 2 x 28 d rotations over the same farmlet area with a 1 week grazing duration per paddock.

Early weaned calves were fed at 1 of 3 levels. In 1986 feeding level was controlled by set stocking calves (2 replicates) on controlled pasture maintained at 1.5, 2.0 or 2.3 t DM/ha by *put and take* of buffer cattle. In 1987 a quick (3 paddock, 7 d/paddock) rotation was used with stocking rate adjusted to maintain pre-graze mass at the above levels.

### Animals

Thirty two weaned cows and 32 unweaned cows and calves were used in the 2 pasture clean-up treatments each year. Cows were balanced for breed, (Angus and Hereford x Friesian), and mean calving date, (25 August (early) and 2 October (late)).

All calves were by Angus bulls. A minimum of 12 calves were allocated to each weaned calf treatment randomised on breed, age and live weight.

### Measurements

Animal live weight was recorded 1 to 2 h off pasture. Blood serum gamma glutamyl transferase (GGT) levels were recorded in all stock at the end of the trial to assess effects of facial eczema.

Pre and post-graze pasture mass and composition were determined on each paddock using methods described by Smeaton *et al.* (1983). Measurements were made once per week on set stocked paddocks.

### Carryover Effects

Effects of pasture clean-up treatment on autumn-winter pasture production were assessed from 2-tooth ewe (1986) and hogget (1987) liveweight gain, plus change in average farmlet pasture cover over 2 x 56 d rotations from 26 March to 16 July. Stocking rates were 16.8 and 16 sheep/ha in 1986 and 1987 respectively. Apparent pasture intake of sheep was assessed from feed tables (Ulyatt *et al.*, 1980).

### Analysis

Regression analyses were conducted separately for each year. Live weight at the start, adjusted for breed and calving date, was used as a covariate.

## RESULTS

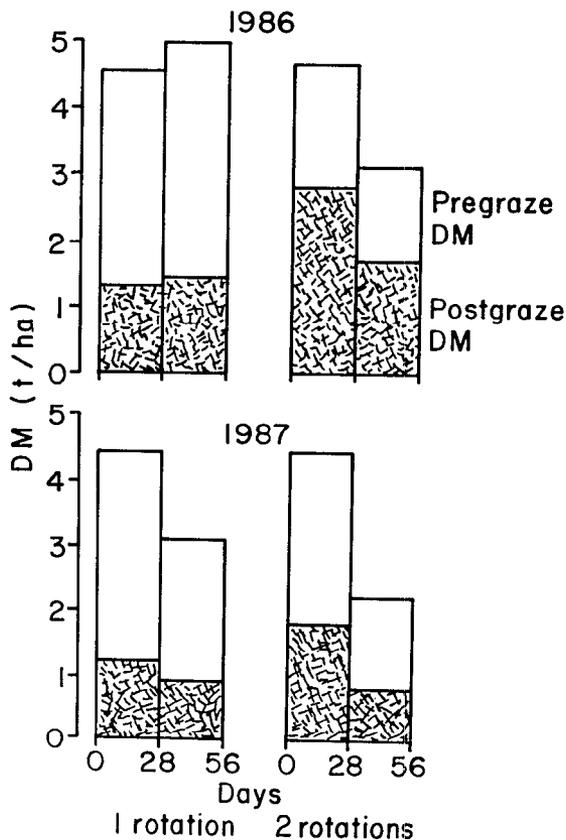
### Pastures

Rainfall data for the 2 years (Table 1) show 1986 was considerably above average for summer rainfall while 1987 was a drier than normal summer. Almost all January rainfall in 1987 came in the week the trial started.

**TABLE 1** Rainfall (mm) for Whatawhata Research Centre Climate Station (met. C75801) over the months of trial.

Year	Months			
	December	January	February	March
Mean	130	94	100	111
1985-86	141	226	126	58
1986-87	50	133	37	115

Average pre-graze pasture mass of surplus pasture was lower in 1987 (3.5 t DM/ha) than 1986 (4.3 t DM/ha) owing to less surplus accumulating and less regrowth between grazings on twice grazed farmlets.



**FIG. 1** Pre- and post-graze pasture masses resulting from surplus pasture clean-up treatments.

**TABLE 2** Pasture mass and composition offered to weaned calves

Treatment	1986		Pre-graze (kg DM/ha)	1987	
	Set stock (kg DM/ha)	Composition (% green DM)		Post-graze (kg DM/ha)	Composition (% green DM)
W <sub>1500</sub>	1350	62	1590	1410	56
W <sub>2000</sub>	1910	68	2120	1730	73
W <sub>2300</sub>	2220	70	2400	2095	64

Stock on 2 x 28 d rotations had higher residuals in the first 28 d but lower pre-graze masses in the second,

han 1 x 56 d rotation stock (Fig. 1). Coefficient of variation for pre and post-grazing pasture averaged 19 and 10% respectively for the data in Fig. 1.

Percentage green pasture was similar between years despite different climatic conditions. They were 50 and 55% green pre-grazing and 30 and 24% post-grazing in 1986 and 1987 respectively. Absolute green masses were highest in the wet year, 1986.

In contrast to the low quality (% green DM) of surplus pasture, pastures prepared for weaned calves contained 65 to 70% green DM across the range of pasture mass feeding levels (Table 2). Coefficient of variation of pasture mass over the 8 week trial period averaged 13 to 14% for the means in Table 2.

Intake, calculated by pasture disappearance, averaged 10 and 10.3 kg DM/cow/d on surplus pasture in 1986 and 1987, respectively. Average intakes for 1 and 2 rotation treatments were 9 and 11.3 kg DM/cow/d respectively. Feeding tables (Ulyatt *et al.*, 1980) were used to estimate intake for weaned cows, this was 6.3 kg DM/cow/d and by difference suggested an intake of 13.3 kg DM/unweaned cow plus calf/d.

### Weaning Date

No significant interactions occurred between the weaning date treatment and other factors for cows or calves.

Unweaned calves gained virtually the same live weight each year (Table 3) with less than 2 and 0.5 kg difference between clean-out treatments in year 1 and year 2 respectively. The best weaned calf treatment (W2000) failed to grow as fast as unweaned calves in each year (Table 3). The difference in weaned calf performance between years was due to effects of facial eczema in the second month of the 1986 trial. Blood GGT levels were significantly elevated in weaned calves at the end of the 1986 trial (Table 4), particularly on the lowest feeding level. Two calves showed clinical signs of facial eczema in the W1500 treatment. This contrasted with the obvious absence of facial eczema

**TABLE 3** Weaning treatment effects on cow and calf performance.

Stock type	Treatment	Year	
		1986 (Wet)	1987 (Dry)
Cow	Start live weight (kg)	448	466
	Liveweight loss (20 Jan- 17 Mar) (kg)		
	Unweaned	-22	-35
	Weaned	-3	-15
	SED	5.5	2.4
	Significance	**	***
Calf	Start live weight (kg)	148	155
	Liveweight gain (20 Jan- 17 Mar) (kg)		
	Unweaned	38	39
	W <sub>1500</sub>	14	22
	W <sub>2000</sub>	24	30
	W <sub>2300</sub>	21	26
	SED	1.8	1.7
	Significance	***	***

in cows and unweaned calves grazing rank pasture and the low GGT levels of weaned calves in 1987.

Unweaned cows lost more live weight than weaned cows while cleaning-up surplus pasture. The cost to cow live weight was about 20 kg irrespective of year effects (Table 3).

### Calving Date

Calf age in mid January (mean age 110 v 149 d) had no effect on calf growth, either weaned or unweaned, over the succeeding 8 weeks. Growth of early and late born calves were both 27 kg in 1986 and 32 and 33 kg respectively in 1987.

Early calving cows were 20 kg heavier than late calvers at the start of the 1986 trial and 12 kg lighter in 1987. They lost more weight ( $P < 0.01$ ) in 1986 and less in 1987 than late calvers and so early and late calvers ended up at similar weights at the end of March each year (5 to 7 kg difference).

**TABLE 4** Blood gamma glutamyl transferase (GGT) levels for cows and calves in late March.

Stock type	Treatment	GGT concentration (iu/l) <sup>1</sup>	
		1986	1987
Calves	Unweaned	9	10
	W <sub>1500</sub>	599	71
	W <sub>2000</sub>	125	16
	W <sub>2300</sub>	98	28
	Significance	***	*
Cows	—	11	15

<sup>1</sup> Log transformed for analysis.

### Breed

Interactions between breed and other factors were absent. Calves from Hereford x Friesian cows were 18 kg heavier than from Angus cows in mid January each year and they grew faster over the 8 weeks by 4 ( $P < 0.05$ ) and 5 ( $P < 0.01$ ) kg in 1986 and 1987 respectively.

Hereford x Friesian cows were 20 and 16 kg heavier than Angus cows in mid January 1986 and 1987, respectively. In both years the Hereford x Friesian lost more weight than the Angus (Table 5). In 1987 end of March live weight of Angus and Hereford x Friesian cows were not significantly different.

### Pasture Clean-Out

Method of pasture clean-out (1 v 2 rotations) affected both cow live weight and subsequent pasture performance. Cow liveweight loss was consistent between years for the 1 rotation treatment but not for the 2 rotation treatment (Table 5). Cows cleaning-up surplus pasture by 2 rotations did as well or better over the first month as 1 rotation cows (Fig. 2). In

**TABLE 5** Effect of breed and pasture clean-up treatment on cow liveweight loss (kg) over the trial.

Treatment	Liveweight loss (kg)	
	1986 (wet)	1987 (dry)
Breed		
Angus	-9	-19
Hereford x Friesian	-17	-31
SED	5.5	2.5
Significance	NS	***
Clean-up rotation		
1 x 56 d	-20	-17
2 x 28 d	-6	-33
SED	5.4	2.4
Significance	**	***

the wet year (1986) they maintained a weight advantage owing to some pasture growth between grazings and higher pasture masses than in year 2. In year 2 no appreciable pasture growth occurred between grazings and high cow live weight loss occurred on the second rotation, so cows ended up lighter than 1 rotation cows.

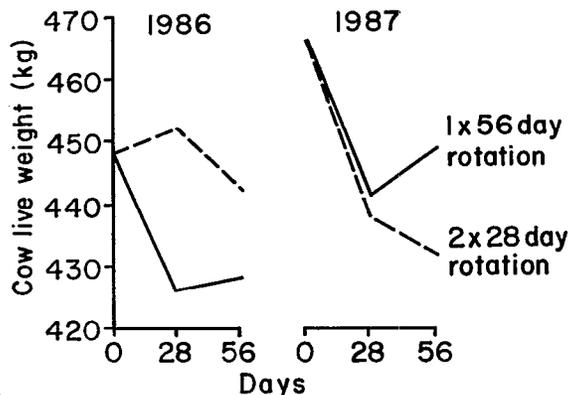
Subsequent pasture and animal production of cleaned-up pasture was highest from paddocks cleaned-up by 2 rotations in both years (Table 6).

### DISCUSSION

Early weaning beef calves in summer, when pasture quality starts to limit production, has commonly been advocated. It is recommended to give calves priority for quality feed and use cows to clean-up low quality pasture. Results of this study suggest this advice is incorrect.

**TABLE 6** Effect of pasture clean-up treatment on subsequent productivity.

Component	1986	1987
Mean production (26 March - 16 July)		
Pasture growth (kg DM/ha)	2380	2070
Sheep liveweight gain (kg/ha)	152	118
Relative production (2 x 28 d rotation = 100)		
Pasture growth	92	74
Sheep liveweight gain	87	75

**FIG. 2** Effect of surplus pasture clean-up treatment on cow live weight.

Calves left unweaned to clean-up low quality surplus pasture in February/March showed significantly greater liveweight gains than the best fed weaned calves. This occurred for early and late born calves and shows the considerable ability of cows to buffer calf growth on poor quality pasture, even in late lactation. This feature of beef cow production offers major advantages in the integration of the beef

herd with other stock classes on a hill country farm. Where unweaned cows and calves clean-up surplus pasture, demand for limited, high quality, autumn pasture can be reduced by eliminating demands of weaned calves. This option provides one of the few productive uses for surplus feed since dry cattle, at best maintain live weight cleaning-up this feed.

The absence of any calving date effect on calf growth discounts calf age as an issue in making early (mid summer) weaning decisions for spring born beef calves. For unweaned calves, pasture factors such as quality seemed to override any underlying effect stage of lactation might have on calf performance. Immediate compensation for liveweight loss by early weaning is also unlikely to occur. The weight difference between early and late weaned calves remained the same 6 weeks after late weaning in the 1986 trial.

The liveweight cost to cows of lactating on low quality feed, 20 kg in this study, is not considered a major disadvantage. Cows can be prepared for the liveweight cost by ensuring they are in fat condition (450 kg+) by mid summer. This should be the norm on hill country farms where cows are given maximum intake for 2 to 3 months in late spring to control the maximum area of pasture (Sheath *et al.*, 1984). The major cost is less live weight can be taken off cows over winter, which may mean increased winter feed requirements. Balanced against this are lower maintenance feed costs of the lighter cows and less likelihood of fat cows suffering metabolic diseases pre-calving through continuing to lose weight in late pregnancy.

Grazing rank pasture with cows and calves appears to offer the additional opportunity to reduce exposure to facial eczema in sensitive weaner cattle. Low numbers of *Pithomyces charitarum* spores in rank pasture is the most likely explanation for absence of facial eczema on these pastures in 1986. Sheath *et al.* (1987) found lowest spore numbers in rank pasture and in this study cows and calves grazed close to ground level and would have been expected to consume spores if present.

Faster growth in calves out of Hereford x Fresian cows is consistent with other nutrition trials where these breeds have been compared (McCall *et al.*, 1987). The greater liveweight loss of Hereford x Fresian than Angus cows (both weaned and unweaned) confirm observations that Hereford x Fresian cow live weight is more responsive to feeding level than traditional beef breeds. The greater liveweight loss is probably due to lower fat reserves in Hereford x Fresian cows and hence greater mobilisation of low energy yielding protein. There was no observational evidence to suggest Angus were better foragers than Hereford x Fresian or that preferential feeding would be required for Hereford x Fresian cows over winter.

The best approach to cleaning-up surplus pasture appears season dependant. The advantage of 2 rotations in a wet year, when a large surplus has accumulated, is increased cow intake and reduced liveweight loss. It also favours subsequent pasture regrowth owing to new vegetative growth commencing after the first grazing. This grazing opens up the base of the sward by trampling dead material and allows light to penetrate. Where clean-out is achieved by 1 severe grazing, regrowth is delayed owing to removal of most live tissue and reliance on new seedling growth following autumn rain.

In dry summer seasons the use of 1 clean-up rotation allows rationing of feed and greater control of cow liveweight loss. The disadvantage of 2 rotations is that surplus feed will be cleaned-up more quickly which could necessitate earlier weaning or large cow liveweight losses if other feed is not available.

## CONCLUSIONS

Results of this study support the use of unweaned cows and calves to clean-up poor quality surplus pasture in late summer and autumn. Calf growth is higher than for calves weaned onto high quality pasture and rank pasture reduces exposure of calves to facial eczema.

In implementing this system, it is recommended that surpluses be accumulated on a defined area of the farm and that cows and calves be given full access to this surplus, including any green DM in the base of the sward. Cow liveweight losses would likely be greater than occurred in this study if quality of the surplus pasture had been further depleted by other stock classes before cow and calf grazing. In addition, cows need to be prepared for the weight loss by being in fat condition mid summer. Even with cows in good condition it would be advisable to wean first calving, and any very light cows, before cleaning-up surpluses.

Under the above management 100 cows and calves would clean-up about 3 ha of surplus feed per week.

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