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Estimated pasture intake and cow output of single and twin calving beef breeding cows

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ABSTRACT

Over two years at Whatawhata Research Centre mixed age Hereford x Friesian beef cows pregnant with either one or two calves were compared in a feed intake study.

Pasture dry matter (DM) intake by the cows was estimated using slow-release, chromic oxide, rumen capsules.

Twin pregnant/suckled cows ate similar amounts per day as 'single' cows in autumn. Over both groups, estimated intake was 6-8 kg DM/cow/day. Daily intake in late pregnancy was also similar in both groups (6.6 vs 6.1 kg DM/hd respectively, $P > 0.05$).

During early to mid lactation the estimated DM intake of twin suckled cows was about 2.5 kg more DM/cow/day (20% more) than of single suckled cows ($P < 0.05$).

The liveweights of single and twin cows showed a similar pattern. The single and twin pregnant cows were of similar liveweight for most of the year except during mid-lactation in year 2 when twin suckled cows were about 10% lighter ($P < 0.05$).

Twin suckled cows were always thinner during lactation by 1 condition score ($P < 0.01$).

At weaning, twin reared calves were 20% lighter than single reared calves (168 vs 210 kg, $P < 0.01$).

Twin suckling cows have higher estimated intake than single sucklers during lactation and they are lighter and thinner at this time but they wean a total calf weight of 320 kg; 60% more than their 'single' contemporaries. The results show that twinning cows present an opportunity to increase feed utilisation efficiency especially if their increased mid-lactation food demand could be matched correctly with seasonal pasture growth patterns.

Keywords: Feed intake; pasture; cow output; twins; calving; liveweight; weaning; beef cows.

INTRODUCTION

Single suckled beef cows typically are run on hill country farms because of their flexibility in the face of seasonal pasture growth and their complementarity with other stock classes (McCall, 1994; Pleasants *et al.*, 1991). This arises largely because their feed demand varies depending on their physiological status. These features of flexibility and complementarity are most apparent during the spring when pasture is growing rapidly and is of high quality and then during summer-autumn when pasture quality is poorer and only supports low intake by other stock classes, e.g. sheep (McCall, 1994). Suckling beef cows are able to consume this poorer quality (surplus) pasture and continue to support acceptable calf growth rates (McCall *et al.*, 1988).

The above flexibility is based around the single suckling cow, calving in early spring, thereby aligning her changing feed requirements as closely as possible with pasture growth. This matching of feed demand with pasture growth is further enhanced by reducing the cow's body reserves particularly in the autumn and winter (Pleasants *et al.*, 1994).

"Twinning cows" as a developing technology is an attempt to capitalise on some of the above management benefits and to further improve efficiency and profitability (Farquharson and Griffith, 1991).

Twinning cows have higher energy requirements for pregnancy and lactation (Koong *et al.*, 1982). Twin-born calves are lighter at birth, but the milk production of twin suckled cows is higher (Nicoll, 1982). Twin suckling cows tend to be lighter during lactation and each calf at weaning is

lighter than single suckled calves (Nicoll, 1982; diskin and Sreenan, 1985; Reid *et al.*, 1986). Despite this, the combined litter weight of twin calves at weaning is typically 1.6 times that of single calves.

The hypothesis we tested was that twin suckling cows have a different pattern of feed intake from single suckling cows with the main difference expected to be increased feed intake during lactation and after weaning when liveweight recovery might be expected to occur. In theory, therefore, the lactational feed demand pattern of the twin suckling cow should better match the spring pasture supply. Quite possibly therefore, the management and feeding recommendations for single rearing cows are likely to be inadequate for twinning cows.

The aim of the current study was to measure pasture intake and production of twinning vs single rearing beef cows on hill country at various times of the year.

MATERIALS AND METHODS

The trial was carried out in 1991 and 1992 as part of a larger study on beef cow liveweight and feed intake at Whatawhata Research Centre. DM intake was measured at four periods of each year *viz* pre-calving (July), early lactation (October), mid lactation (December), and postweaning (March).

Faecal output was estimated using chromic oxide as a faecal marker. Slow release capsules, marketed by Captec (NZ) Ltd were used to give a continuous dose of chromic oxide over the measurement period (Harrison *et al.*, 1981;

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Ellis *et al.*, 1982). *In vitro* DM digestibility of pasture (Tilley and Terry, 1963) was determined and cow DM intake then calculated using the manufacturers chromic oxide release rate and assayed faecal chromic oxide levels (Costigan & Ellis, 1987). The rate of recovery of chromium was assumed to be 100%. Faecal samples were taken daily from each cow on days 6 to 9 and 13 to 16 after dosing of the Captec capsules. Within each cow, equal sub-samples were combined to provide one estimate of daily DM intake over the measurement period.

For each measurement period, approximately 8 twin and 8 single pregnant/suckled Hereford x Friesian cows were sampled from a larger herd of cows involved in a programme of induced twinning by embryo transfer at Whatawhata Research Centre (McMillan *et al.*, 1993). Calving occurred mainly during September of each year.

The experimental cows were grazed together during the measurement period (as they were at all other times). Liveweight and condition score were recorded at the beginning and end of each period. Data were analysed using the Genstat Statistical Package of Rothamsted Experimental Station.

RESULTS

There were no differences in the estimated intakes of the twin and single cows except in December 1991 and October 1992 (Table 1). Trial design was such that differences smaller than about 1.2 kg DM/cow/day (approximately 10% of intake) could not be detected as significantly different.

TABLE 1: Estimated Pasture intake (kg DM/cow/day) for twin and single pregnant/suckling beef cows.

	Measurement Period			
	Oct	Dec	Mar	Jul
1991				
Singles	11.21	17.85	8.48	6.09
Twins	11.56	21.40	8.00	6.56
SED	0.74	0.89	0.61	0.60
Significance	NS	**	NS	NS
1992				
Singles	8.52	11.34	6.54	6.52
Twins	9.87	10.96	6.85	5.80
SED	0.44	1.02	0.47	0.56
Significance	*	NS	NS	NS

TABLE 2: Pasture intake estimates adjusted for metabolic liveweight (kg DM/cow LW^{0.75}/day).

	Measurement Period			
	Oct	Dec	Mar	Jul
1991				
Singles	0.116	0.174	0.085	0.061
Twins	0.117	0.206	0.081	0.062
SED	0.006	0.011	0.006	0.005
Significance	NS	*	NS	NS
1992				
Singles	0.080	0.102	0.064	0.063
Twins	0.096	0.110	0.070	0.057
SED	0.002	0.010	0.004	0.004
Significance	**	NS	NS	NS

Presentation of data on the basis of LW^{0.75} did not alter these results (Table 2).

During all periods in 1991 twin suckling cows were of similar weight to the single suckled cows (Table 3). In 1992 the twin suckling cows were significantly lighter, except in late pregnancy (July). Also during lactation (Oct, Dec, Mar) the twin suckling cows were thinner than the single suckling cows by about 1 condition score unit.

The mean liveweights of the experimental cows were not always typical of their herd contemporaries (Table 4). Twin suckled cows in 1992 were about 7% lighter ($P < 0.01$) than the single suckled cows during lactation but they tended to be heavier in late pregnancy (Table 4).

At weaning single suckled calves were about 45 kg heavier (21%) than the twin calves ($P < 0.001$, Table 4) but twinning cows reared 330 kg of calf compared to the 210 kg average single calf; an increase of 57%.

DISCUSSION

Cow Intake:

The key finding is that twin suckling cows eat up to 20% more DM than single sucklers during lactation. This concurs with Graham *et al.* (1990) and Rose and Wilton (1991) but not Nicoll (1982) who found no difference.

DM intake appears not to differ at other times of the year, a result observed also by Rose and Wilton (1991). Graham *et al.* (1990) and Koong *et al.* (1982) found that twin-pregnant cows had up to 13% higher energy requirements than single pregnant cows. The twinning cows in our study may not have been able to satisfy their requirements given feed available - especially compared to those of Graham *et al.* (1990) which were fed at high levels.

TABLE 3: Liveweights and condition scores of the single vs twin bearing cows at the end of each measurement period.

	Measurement Period			
	Oct	Dec	Mar	Jul
Liveweights (kg)				
1991				
Singles	457	507	465	469
Twins	470	524	454	502
Significance	NS	NS	NS	NS
1992				
Singles	523	541	476	497
Twins	482	457	416	472
Significance	†	***	**	NS
Typical SED = 23				
Condition Score +				
1991				
Singles	4.3	6.0	6.9	5.5
Twins	.6	5.0	6.9	5.6
Significance	*	**	NS	NS
1992				
Singles	6.4	6.4	5.8	6.0
Twins	5.6	5.4	4.6	5.4
Significance	**	**	*	NS
Typical SED = 0.35				

+ Based on subjective scale 1 to 10: 1 = emaciated, 10 = obese

† $P < 0.1$

TABLE 4: Liveweight (kg) of herd contemporary cows and calves from which the experimental animals were drawn.

	Jul '91	Dec '91	Jul '92	Dec '92
Cows				
Singles	508	485	474	485
Twins	526	489	492	452
SED	14	15	17	14
Significance	NS	NS	NS	**
	Birth '91	Wean '91	Birth '92	Wean '92
Calves				
Singles	39	219	43	197
Twins	30	167	32	160
SED	1.5	8	1.1	8
Significance	***	***	***	***

Cow Liveweight and Condition Score:

Our work and that of McCutcheon *et al* (1991) and Nicoll (1982) suggests that twinning cows are little different in liveweight to single pregnant animals before calving but that relatively, and most importantly, they sometimes lose weight, and always lose condition after calving. In contrast, Koong *et al* (1982) did find that this weight divergence (conceptus free) can occur before calving.

Calf Liveweight:

Twin calves are lighter at birth and weaning than singles, but at weaning, the combined liveweights of the twins is 1.6 that of single suckled calves. Other work shows this ratio can range from 1.55 to 1.87 presumably depending on available feed and its quality and possibly genotype (Diskin & Sreenan, 1985, Diskin *et al*, 1991, Graham *et al*, 1990, Gregory *et al*, 1990, McCutcheon *et al*, 1991, Nicoll, 1982, Reid *et al*, 1986, Rose & Wilton 1991). Nicoll (1982) and Graham *et al* (1990) also found that twinning cows produced 1.22 to 1.6 times more milk than single suckled cows. Nicoll (1982) also concluded that the twin calves would have grown faster if their milk intake was greater. He noticed that double suckled cows nursed significantly more "foreign" calves than those suckling a single calf - an observation we also made.

CONCLUSIONS

The results of this trial confirm other reports by observing that twin-suckling cows respond to their altered status (compared with single suckled cows) in several ways. They:

1. give birth to twin calves which are each lighter than a single born calf.
2. produce more milk to feed the two calves but not twice as much (not measured in this trial).
3. generally eat more during early to mid lactation under similar sword conditions although this may not be a consistent response.
4. may suffer a liveweight and condition disadvantage possibly commencing in late pregnancy and certainly during lactation.
5. wean calves which are 20% or 45 kg lighter individually than single reared calves with variation probably due to post-partum nutrition.

The 60% higher litter weaning weight of twinning cows on hill country, represents the net result of these effects. In a beef herd, this advantage will depend on the percentage of cows that give birth to, and successfully rear, twins.

Although not specifically tested in this study, it can be speculated that the increased feed intake of lactating twinning cows would fit well into hill country farming in a spring calving system where pasture growth is at a high rate. The testing of this is the next obvious research step towards the incorporation and uptake of twinning cow technology on farms and offers opportunities for further quality beef production.

Finally, it must be noted that the effects of twinning on re-breeding of the cow were not investigated in this study and yet it is obviously an important component of the whole system.

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