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Twin-suckling beef cows using foster calves: effects on calf and cow performance

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ABSTRACT

Hereford x Friesian cows were used to compare the calf and cow performance of 66 single-calved cows (Single Cows) rearing only their own calf (Single Calf) and 45 contemporary single-calved cows (Foster Cows) rearing their own calf (Own Calf) plus a foster calf (Foster Calf). Fostering was successful in 85% and 95% of attempts in 1990 and 1991, respectively. Mean weaning weight was lowest in the Foster Calf group but comparable in the Own Calf and Single Calf groups (140 vs 194 vs 202 kg, P<0.001). Single Cow and Foster Cow groups were similar in mean live weight immediately post-calving (413 vs 415 kg, NS) and at weaning time (452 vs 437 kg, NS), and the mean interval to first oestrus was about 7 weeks in both groups. Cow efficiency (ie kg calf weaned/kg cow post calving liveweight) was approximately doubled in the Foster Cow group. We conclude that twin-suckling dairy x beef breeding cows using a foster calf appears to be a useful option for dramatically increasing cow efficiency.

Keywords: foster calf, fostering, twin-suckling, beef cows, cow efficiency.

INTRODUCTION

The biological efficiency of beef cows is important because of its association with economic efficiency. Biological (ie beef) output of a beef breeding herd is a function of both the calf and the breeding female Weaning more than one calf per cow per year (ie twin-weaning) increases the number of calves weaned and thereby increases the total weight of calf weaned per cow. Few other options exist to achieve such large potential gains in the biological efficiency in beef cows.

There are three main ways to achieve twin-weaning in cattle: 1. naturally twinning (eg Gregory *et al.*, 1990; Morris and Day, 1990); 2. induced twinning through the artificial manipulation of ovulation rate (eg Gordon *et al.*, 1962; Bindon and Hillard, 1992) or through embryo transfer (McMillan *et al.*, 1993); and 3. fostering of one or two calves. Results from twin-/multiple-suckling trials have been reported under pasture grazing in Ireland (Drennan, 1971 a,b; Nicoll, 1982 a,b;), Australia (Rowan *et al.*, 1970) and France (Petit *et al.*, 1978). Since little NZ data is published on the effects of twin-suckling through fostering on calf and beef cow performance (eg Everitt and Phillips, 1971), the aim of this study was to provide such information.

MATERIALS AND METHODS

A total of 111 spring-calving Hereford x Friesian cows aged 2-10 years were used in this study conducted during 1990/91 and 1991/2 at the Whatawhata Research Centre.

Cow management

All cows were strip-grazed on pasture behind an electric fence for the 3-4 weeks prior to calving. The cows were in calf following insemination with Hereford semen in 1989 and Friesian semen in 1990. Within 24 h of birth, calves were tagged and cows and calves were weighed. A random sample of cows (Foster Cows) was allocated to rear their own calf (Own Calf) plus a foster calf (Foster Calf). The remaining cows (Single Cows) reared only their own calf to weaning (Single Calf). All cows were grazed together until weaning time, when calves were 5-6 months of age, and the cows and their calves were weighed. In 1990 cow and calf live weight were recorded on 3 other occasions (11 Oct, 3 Dec and 11 Jan). All cows were tail-painted from 2 weeks after calving and checked 2-3 times weekly for signs of first post-calving oestrous activity.

Foster calves

In 1990, foster calves were born to other Hereford x Friesian cows in the same herd. In 1991, calves were derived from a dairy herd and were mainly Friesian bull calves. Foster Calves were weighed and fostered within 24 h (1990) or 48 h (1991) of birth . For fostering, pairs of calves differed by no more than 15% in birthweight to minimise the risk of lighter calves being pulled around by heavier calves. Calves were fostered by the 'dog-collar method' in which the Own calf and the Foster Calf were joined by 40 cm of rope attached via a swivel to a dog collar on each calf. The correct length of rope and the presence of the swivel were essential for minimising tangling of calves. Each Foster Cow and her 2 calves were then placed in a small pen with access to feed and water for 24 h. They were then shifted into a 0.5 ha paddock for up to 7 days before the collars were removed. Calves were observed several times daily while joined and then twice a day for up to 5 days after separation. Any cow which behaved too antagonistically (kicking, butting) toward the Foster Calf during the first 48 h of fostering was no longer used for fostering, and was excluded from any subsequent results.

Cow efficiency

Individual cow efficiency was expressed as the total weight of calf weaned as a proportion of cow post-calving liveweight.

RESULTS

Calf performance

Fostering was successful in 85% of attempts in 1990 and 95% in 1991. In most cases of failure, the foster calf was removed within a few hours of the start of fostering as a result of antagonistic behaviour by the cow. Calf deaths to weaning were low (1 in each group).

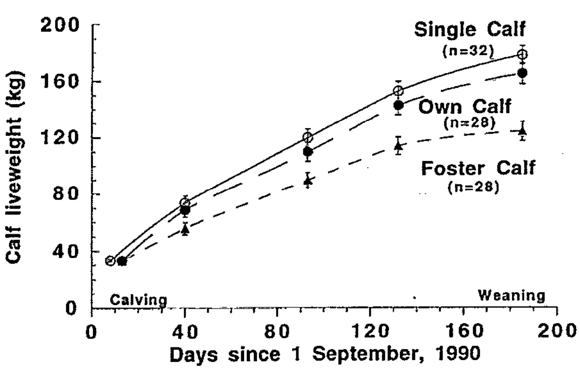
TABLE 1: Mean (±SE) birthweight and weaning weight of Single Calf, Own Calf and Foster Calf born in 1991*

Calf Description*	Number Reared	Birth Weight kg	Weaning Weight kg
Single Calf	34	39.1 ± 0.8	226 ± 6.0
Own Calf	17	38.4 ± 1.1	223 ± 7.0
Foster Calf	17	36.1 ± 14	165 ± 7.8

* See text for full description.

Mean birth weight was similar in the three groups of calves (overall mean = 33.3 and 38.2 kg in 1990 and 1991, Table 1). Mean calf weaning weight was almost 40% higher in 1991 compared with 1990 (217 vs 157 kg, P<0.01). Calf liveweight was lower in the Foster Calf group in both years (Table 1 and Figure 1). In 1990-born calves, mean calf weaning weight was 171 kg in Single Calves and Own Calves compared with 124 kg in Foster Calves. Foster Calves appeared to show an increasing growth disadvantage, in absolute and proportionate terms, with increasing age. In 1991-born calves, mean weaning weight was lowest in the Foster Calf group but comparable in the Own Calf and Single Calf groups (165 vs 223 vs 226 kg respectively, P<0.001).

FIGURE 1: Liveweight pattern in Foster Calf, Own Calf and Single Calf from calving to weaning (1990 Results)*

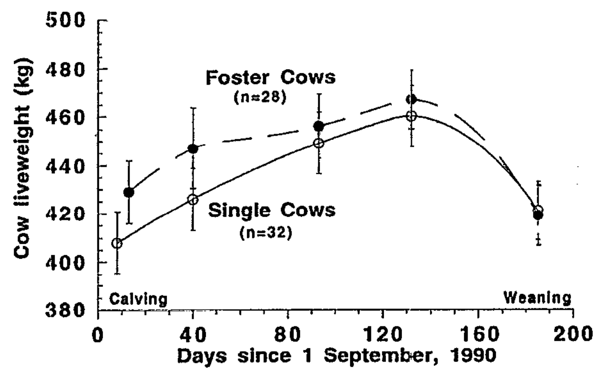


* See text for full description.

Cow performance

Mean cow liveweight immediately post-calving was similar in both years (419 vs 410 kg) but cows were heavier at weaning in 1991 compared with 1990 (420 vs 470 kg respectively, P<0.01). In 1990/91, Single Cow and Foster Cow groups had similar mean liveweight immediately post-calving (408 vs 429 kg, NS) and at weaning (421 vs 419 kg, NS) (See Figure 2). In 1991/92, Single Cows and Foster Cows weighed 419 vs 401 kg (NS) immediately post-calving and 482 vs 455 kg (P<0.05) at weaning.

FIGURE 2: Liveweight pattern in Foster Cow and Single Cow from calving to weaning (1990 Results)*



* See text for full description.

The mean interval from calving to first oestrus was 35 days in both groups of cows in 1990 compared with 66 and 72 days in Single and Foster Cows in 1991.

Cow efficiency

Cow efficiency was higher in 1991 compared with 1990 mainly because of heavier calves in the second year (0.54 vs 0.44 in Single Cows and 0.97 vs 0.67 in Foster Cows). Cow efficiency was 52% and 80% higher in Foster Cows compared with Single Cows in 1990 and 1991 respectively.

DISCUSSION

The major finding in this study was that a single-born calf reared by its own dam as a co-twin to a foster calf had a weaning weight similar to a contemporary single-born and single-reared calf. Thus, the extra calf output from a twin-suckling system based on fostering one calf is largely a function of the growth performance of the foster calf. This is at variance with Irish studies, using Hereford x Friesian and Friesian cows, which indicate a 35-40 kg (15-20%) reduction in weaning weight of a natural calf when reared as a co-twin to a foster calf (Nicoll. 1982 b). It is difficult to explain the different outcomes in the two studies. Differences in 'adoption success' between the two studies may be important since this is known to impact on calf growth rate (Le Neindre *et al.*, 1978), through differences in calf milk intake (Nicoll, 1982 b). Whatever the cause of the difference in outcome between the two studies, the consistent finding over the two years in our study suggests that our results are reasonably repeatable.

In the current study the calves fostered onto dairy x beef cows grew more slowly to weaning compared with either the cows' own calves reared as co-twins to foster calves or calves reared as singles. A similar outcome was apparent in an Australian study where calf growth was the same in foster and natural calves reared as a co-twin while collared for 74 days, but foster calves subsequently grew slower. This suggests that cow-foster calf bonding was incomplete and that the cows' own calf was preferred and as a result had a higher milk intake. Although systematic behavioural observations were not carried out in this study, is was apparent that some foster calves were feeding off more than one cow, generally another foster cow. Certainly, 'sharemilking' appears to be more common following fostering than in natural single suckling (Nicoll, 1982 b). The fostering method used in this study, in the context of foster calf growth, may be deemed to have been partially successful and highly successful if calf survival is used as an index. Other studies comparing calf survival in fostered versus artificially-reared calves indicate much lower mortality in the former system (Everitt and Evans, 1970). Our strategy of removing foster calves from unsatisfactory foster cows at an early stage, and matching calves of similar size may have contributed to the low mortality rate.

In spite of the lower growth performance of foster calves, cow efficiency was improved by about 50% in 1990 and 80% in 1991 (65% over both years combined). This compares favourably with a 65% improvement apparent in an Irish study (Nicoll, 1982 a, b). Although a crude cow efficiency index was used in this study, the results indicate that considerable scope exists to enhance efficiency through twin-suckling. Enhancement might be greater with a fostering system which promoted a stronger bond between foster dam and calf, as milk intake and therefore calf growth would be higher. Results suggest that the advantage in efficiency to fostering is greater under conditions that promote faster calf growth (eg 1991). However, more data is required to confirm this.

The second major finding was that cow liveweight change from calving to weaning was not unduly lower in cows rearing two calves, in accordance with other results (Nicoll, 1982 a; Rowan and Wall. 1970). Thus, there is only a small cost of rearing two calves in cow liveweight at weaning. It is unlikely that subsequent reproduction would be lower because the interval to first post-calving oestrus was similar in cows rearing either one or two calves. Furthermore, the interval was well within the 70 day mean threshold beyond which herd fertility would be expected to fall (Pleasants *et al.*, 1991). A similar calving to conception interval in single- and twin-suckled cows has been reported elsewhere (Rowan and Wall. 1970). We were not able to study the sustainability of twin-rearing over several seasons in this study. However, if the small cow liveweight difference due to twin-suckling is not recompensed over the post-weaning period, and accumulates through several seasons, some reproductive loss may eventuate.

In summary, these results illustrate that 1. the 'dog collar' method can be successfully used to foster calves onto beef cows, 2. calf growth is lower in a fostered calf but not in the fostered cow's own calf compared with a contemporary single-suckled calf, and 3. neither cow liveweight nor reproductive performance appears to be significantly reduced by rearing two calves.

In conclusion, twin-suckling dairy x beef breeding cows using a foster calf increases biological efficiency. A foster system that allows a stronger bond between foster cow and calf, and would thus promote faster gain in foster calves, would further enhance productivity gains in beef breeding cows.

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