INFLUENCE OF PLANE OF NUTRITION ON THE PRODUCTIVITY OF ANGUS HEIFERS

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ABSTRACT

This experiment was designed to study the influence of autumn live weight and nutritionally-enforced live weight change on calf birth weight and the subsequent productivity of three-year-old, primiparous Angus heifers, calving in the spring of 1975. All heifers were pasture fed on "Tuapaka", No. 3 sheep farm, Massey University, and the treatments imposed followed those normally experienced by cattle on hill country. This was achieved by altering pasture intake by the manipulation of stocking rate during first pregnancy.

The research herd of 54 heifers was comprised of animals reared to two-and-a-half-years-of-age at three different origins, namely Massey (Tuapaka), Hawke's Bay and Wairarapa, which consequently gave the three autumn live weight groups.

On 1 May, 1975, a switchover design for pre-calving nutritional plane was initiated by allocating heifers within origin to one of three treatment groups. The first group of 19 heifers was fed at a high plane continuously to calving. A second group of 18 heifers was fed at a high plane of nutrition for 70 days (to 10 July, 1975) until three weeks before the start of calving (30 July, 1975). The third group of 17 heifers was fed on a low plane of nutrition from 1 May to 10 July, 1975, when it was switched to a high plane. The three groups were identified as HP-HP, HP-LP and LP-HP, respectively.

The least squares means for the live weight of the groups at the start of the experiment, at switchover 70 days later, and at the last weighing date before calving were:

1 May, 1975: HP-HP, 382.4kg; HP-LP, 382.0kg; LP-HP, 380.1kg (NS).
10 July,1975: HP-HP, 381.3kg; HP-LP, 382.1kg; LP-HP, 362.2kg ($p < 0.01$).
25 July,1975: HP-HP, 395.7kg; HP-LP, 376.0kg; LP-HP, 375.0kg ($p < 0.01$).

The live weight of the heifers, as classified by origin at the last weighing date before calving (25 July, 1975), did not differ from that at the start of the experiment (1 May, 1975) by more than 1.7kg. The least squares means for the weight of the heifers of the origin

groups at 25 July was: Massey, 367.8kg; Hawke's Bay, 407.4kg; Wairarapa, 371.7kg. The Hawke's Bay heifers were significantly ($p < 0.01$) heavier than those from the other two origins.

The first order interaction between winter nutritional regime and autumn live weight was not significant.

The birth weight of the calf was not significantly influenced by the plane of nutrition of the dam or her autumn starting weight. Within treatments, the least squares means for birth weight were: HP-HP, 27.9kg; HP-LP, 25.7kg; LP-HP, 25.9kg. The maximum difference was 2.1kg. ($0.05 < p < 0.10$). Within origins of dam, the least squares means for birth weight were: Massey, 26.6kg; Hawke's Bay, 27.9kg; Wairarapa, 25.0kg. The difference between extremes was 2.9kg ($0.05 < p < 0.10$).

After calving the heifers and their calves were grouped into three herds according to age of calf. The live weight of both were taken on eight occasions after parturition, including a weight at weaning. Calves were weaned on 11 March, 1976 at 210 days of age. Estimation of the milk consumption of the calf was made by the weigh-nurse-weigh method after a 17-hour separation at each of three 20-day intervals.

The influence of the pre-calving plane of nutrition on the milk consumption and weaning weight of the calf was not significant, although the heaviest calves were weaned by the heifers of the HP-HP group. Compared to the LP-HP group the HP-HP heifers gave preference to lactation ahead of body weight gain to wean heavier calves and have a lighter body weight at weaning. The HP-LP heifers showed relatively poor live weight recovery and weaned the lightest calves.

The influence of the autumn live weight of the dam on the weaning weight of the calf was significant ($p < 0.05$), where the calves of the Hawke's Bay heifers were 18.0kg heavier than those of the other two groups. The amount of milk consumed by their calves at each of the three days of determination was also greater than that of the other two origin groups (NS).

The effect of sex of calf on its weight before and at weaning, and the live weight of the dam showed that male calves were heavier on all occasions, and their dams consequently showed less live weight gain than the heifers rearing female calves. Female calves consumed more milk at each determination (NS).

The time of calving did not significantly affect the birth weight of the calf, but those calves born earliest had an advantage at weaning ($b = -0.89 \pm 0.53$kg/day; $0.05 < p < 0.10$). The effect of climatic variation was discussed as it related to the three post-calving herds.

Evidence was found of residual effects of the previous year's post-calving plane of nutrition, but not autumn live weight, on the live weight change of the heifers in their second gestation and on the birth weight of the second calf.

It was concluded that the advantage of a high live weight in the autumn during the heifer's first pregnancy was positively and significantly exhibited in the weaning weight of its calf. The LP-HP regime, of a mild loss (5%) of autumn live weight to four weeks before calving, with elevated feeding to calving, was believed to be the most advantageous to pasture growth, winter stocking rate and efficiency of pasture utilization by the heifer.

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