# EFFECT OF WINTER WEIGHT LOSS IN HEREFORD COWS ON SUBSEQUENT CALF PERFORMANCE TO WEANING

The effect of winter weight loss in Hereford cows on calf birth weight and performance to weaning was examined over a period of 4 yr. The average winter weight loss of cows (60 ± 36.2 kg mean ± SD) over the period of this study had a significant effect ($P < 0.001$) on calf birth weight, but no significant ($P > 0.05$) effect on the pre-weaning daily gain, or weaning weight of their calves.



The effect of winter weight loss in beef cows on calf birth weight and subsequent performance has not been adequately documented. Some authors (Hight 1966, Tudor 1972) have reported reductions in calf birth weight approaching 20%, while others have recorded no change in calf birth weight (Jordan et al. 1968) in response to cow weight loss. In Western Canada this could have commercial importance as reduced birth weights could also be associated with depressed calf pre-weaning performance (Topps 1977).

This paper reports a study to investigate the effects of winter weight loss on calf birth weight, and pre-weaning performance. Two hundred and fifty-five calvings of Hereford cows ranging in age from 2 to 9 yr were studied over the period 1974–1977. The general management has been fully discussed elsewhere (Berg 1975). Briefly, cows were bred in July and August, to calve in April and May. The breeding herd was on the range the year round, and depended on natural grazing except for 3–4 mo in the winter. Heifers were reared separately from the cow herd, and fed a winter ration higher in grain than that of the cows. Cows were weighed four times a year: January, March, immediately post-calving (within 12 h) and in October. Winter weight loss was defined as the October cow weight minus the weight of the cow immediately post-calving the following year. The mean cow weights in October and post-calving with the corresponding winter weight loss are shown in Table 1. Calves were weighed at birth and at weaning. Weaning was carried out on the same day for all calves in any one year, and was generally in early November. Calves were not creep fed.

The relationships between winter weight loss in cows and birth weight and pre-weaning performance of their calves were investigated using a least squares analysis of covariance. The main effects included in the model were year, age of cow, sex of calf, first-order interactions and the covariates winter weight loss and calf date of birth. Cow age was stratified into four classes similar to that used by Vaccaro and Dillard (1966). Thus dam class 1 = cows

Table 1. Means (kg) and standard deviations (SD) of cow weights and cow weight losses over 4 yr

| | | October w | | Post-calving w | | W loss | |
|---|---|---|---|---|---|---|---|
| Year | n | Mean | SD | Mean | SD | Mean | SD |
| 1973/74 | 70 | 457 | 73.7 | 373 | 51.1 | 84 | 39.0 |
| 1974/75 | 61 | 407 | 64.9 | 355 | 56.5 | 52 | 26.5 |
| 1975/76 | 51 | 410 | 92.3 | 363 | 75.8 | 47 | 34.9 |
| 1976/77 | 73 | 429 | 79.5 | 375 | 63.1 | 54 | 31.5 |
| All years | | 427 | 79.6 † | 367 | 61.5 | 60 | 36.2 |

†Pooled within year SD.

Table 2. Mean squares and regression coefficients from analyses of covariance for birth weight, average daily gain, and weaning weight

| Factor | Main effects | Covariates | df | Mean square | Regression coefficients |
|---|---|---|---|---|---|
| Birth weight | Year | | 3 | 48.685 ** | |
| | Age of cow | | 3 | 91.472 *** | |
| | Sex of calf | | 1 | 184.491 *** | |
| | | Winter wt loss | 1 | 193.750 *** | 0.034 kg/kg |
| | | Calf birth date | 1 | 134.442 ** | 0.052 kg/day |
| | | Residual | 230 | 13.167 | |
| Calf average daily gain to weaning | Year | | 3 | 0.062 *** | |
| | Age of cow | | 3 | 0.162 *** | |
| | Sex of calf | | 1 | 0.100 ** | |
| | | Winter wt loss | 1 | 0.015 NS | 0.000 kg/kg |
| | | Calf birth date | 1 | 0.040 NS | 0.001 kg/day |
| | | Residual | 230 | 0.011 | |
| Calf weaning weight | Year | | 3 | 640.563 NS | |
| | Age of cow | | 3 | 5024.012 *** | |
| | Sex of calf | | 1 | 3509.479 *** | |
| | | Winter wt loss | 1 | 11.967 NS | −0.008 kg/kg |
| | | Calf birth date | 1 | 38268.539 *** | −0.882 kg/day |
| | | Residual | 230 | 319.631 | |

NS $P>0.05$ ** $P<0.01$ *** $P<0.001$.

with one calving (2-yr-olds), and dam class 4 = cows with four or more calvings (5-yr-olds and more). Few dams were available for the 4 consecutive yr of this study, as dams failing to rear a calf or become pregnant were culled. Consequently, there was not sufficient information to estimate cumulative effects. Only cows which weaned a calf were included in this report.

The mean-squares and regression coefficients where appropriate from the analyses of covariance are presented in Table 2. Years, age of cow, and sex of calf were all highly significant sources of variation in calf birth weight and pre-weaning performance, which agrees with the results of other studies (Reynolds et al. 1978). First-order interactions were all non-significant ($P > 0.05$). Winter weight loss had a highly significant ($P < 0.001$) effect on calf birth weight, and the regression coefficient indicated that birth weight was reduced by 0.034 kg per kg of body weight lost by the dam. This was similar to the results of Tudor (1972) who reported a regression coefficient of 0.023 kg. Winter weight loss had no significant ($P > 0.05$) effect on calf average daily gain or calf weaning weight. Calf date of birth had a significant ($P < 0.01$) effect on calf birth weight and weaning weight, but no significant ($P > 0.05$) effect on calf average daily gain. The regression coefficients showed that late-born calves were heavier at birth (0.052 kg per day from the date of the first herd calving) and lighter at weaning (−0.882 kg per day from the date of the first herd calving).

These results indicate that an average cow winter weight loss of 60 kg to calving reduces birth weight by approximately 2.0 kg. These results are in agreement with those of Hight (1966) and Tudor (1972), but differ from those of Jordan et al. (1968), who reported that a 50-kg loss in cow weight had no effect on calf birth weight. This apparent conflict is probably the result of cows starting winter in different body condition (fatness). Thus, in Western Canada it appears that cows can lose body weight over the winter period with no apparent effect on calf performance to weaning. Further work should investigate the cumulative effects of winter weight loss on calf growth and cow reproduction.

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