MILK YIELD, PROLACTIN AND IGF-I IN COWS THAT CALVE IN SPRING OR AUTUMN

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The majority of New Zealand dairy cows calve in spring so that the greatest feed demand coincides with highest pasture accumulation rates (Garcia and Holmes 1999). Cows that calve in autumn and produce milk in winter, generally achieve lower peak daily milk yields than spring-calving cows (Garcia and Holmes 1999; Suksombat *et al*. 1994). This can be only partly explained by nutritional effects. Photoperiod effects on circulating IGF-I and prolactin may also affect peak milk production of autumn-calving cows (Dahl *et al*. 2000). The present study was designed to measure concentrations of circulating IGF-I and prolactin at peak lactation of spring- and autumn-calving cows fed on pasture alone or pasture supplemented with maize silage.

The experiment was carried out during a 3-week period in the winter month of June 2000 and repeated in September 2000 with 34 multiparous Friesian cows at peak lactation. Two diets were offered; generous pasture allowance alone (G), or restricted pasture allowance supplemented twice daily with maize silage (G + MZ). Cows were ranked according to age, number of prior lactations, and current level of production, and then blocked into pairs. Each cow within the pair was then randomly assigned to one or other of the dietary groups.

The linear model included the effects of season, diet, interaction between season and diet, day of measurement (within season), interaction between day of measurement and diet (within season), and as covariables, breeding values for milk, protein and fat (as estimated by Livestock Improvement Corporation, Hamilton) and days in milk. Least-square means for each of the variables studied on days 0, 7, 14 and 21 of the experimental period were obtained using the PROC MIXED of SAS (SAS, 2000).

In both seasons, milk yield was significantly higher ($P>0.01$) by day 21 for the G group than for the G + MZ group (24.8 *vs* 20.3 and 26.3 *vs* 23.7 litres/day for autumn and spring respectively). Prolactin and IGF-I were not consistently or significantly different between the two diet groups in either season. Comparisons between spring- and autumn-calving cows showed that daily milk yield was significantly lower for autumn-calved cows than for spring-calved cows, by 3.25 litres ($P> 0.01$). Prolactin concentration was significantly ($P>0.01$) higher in spring (5.99ng/mL) than in autumn (4.08 ng/mL), but there was no difference in IGF-I concentration between season ($P= 0.0655$).

Prolactin has a role in the initiation and maintenance of milk production (Akers *et al*. 1980), and data from the present study indicate that the depressed milk yield in autumn may be associated with decreased prolactin concentration. IGF-I concentration is thought to be affected by photoperiod (Dahl *et al*. 2000; Tucker 2000) although such a relationship was not identified in the present study. However, there may have been differences in nutrient intake between seasons, due to composition of feed in each season, which masked seasonal differences in IGF-I concentration. Further investigation is required, and the next proposed experiment is designed to isolate the effects of IGF-I and prolactin from the effects of photoperiod for cows grazing generous pasture during winter.

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