# Modelling the effect of breakeven date in spring rotation planner on production and profit of a pasture-based dairy system

P.C. Beukes, B.S. Thorrold, M.E. Wastney, C.C. Palliser, G. Levy and X. Chardon
*Dexcel Ltd, Private Bag 3221, Hamilton 2001, New Zealand, Email: pierre.beukes@dexcel.co.nz*

**Keywords:** grass silage, farm cover, management

**Introduction** The breakeven date is the expected date when pasture supply exceeds cow demand. This date is used to plan the rotation rates, slow during the winter, when pasture growth is low and cows are dry, to a fast rotation in spring, when growth is accelerating and most cows lactating. This date is influenced by regional climate, mainly rainfall and soil temperature, which affects timing and rate of growth acceleration. The objective of this modeling exercise was to explore the effect of the breakeven date on milksolids (MS), grass silage, farm cover and economic farm surplus (EFS) over different climate years for the Canterbury region of New Zealand.

**Materials and methods** Observed starting farm covers, herd data, silage stacks, irrigation (585 mm) and fertilizer (200 kg N/ha) schedules from Lincoln University Dairy Farm (LUDF) near Christchurch, Canterbury for the 2002/03 season were used to initialize Dexcel's Whole Farm Model (WFM, Wastney *et al.*, 2002), first with the observed breakeven date of 25 September (Strategy 1) and then with a breakeven date of 20 October (Strategy 2). Both strategies were simulated for five seasons (1994/95 to 1998/99) using observed climate data from LUDF and a stocking rate of 3.65 cows/ha. Seasons were simulated individually (no carry-over) starting 1 June for 365 days. Economic results are presented assuming a payout of NZ$ 3.90/kg MS.

**Results** Averages of model predictions over five climate years are given in Table 1, and model predictions of seasonal changes in farm covers for the 1996 season are shown in Figure 1. An early breakeven date (Strategy 1) resulted in faster rotations earlier in the season with the consequence that lactating cows obtained a larger proportion of their demand from pasture and could be fed less grass silage compared to Strategy 2 (Table 1). The faster rotations earlier resulted in slower recovery of farm covers for Strategy 1, however, covers had recovered to Strategy 2 level before Christmas (Figure 1). With higher covers early in the season more silage could be made with Strategy 2 (Table 1). Generally grass silage has lower nutritional value than spring pasture (Holmes *et al.*, 2002), which explains why MS production per cow and per hectare was lower for Strategy 2 (Table 1). The effect of silage feeding on production was most pronounced in the early part of the season when the breakeven date determines rotation length and the proportion of the daily intake from pasture and from silage. The significantly higher EFS for Strategy 1 (Table 1) confirmed the benefit of feeding quality pasture during peak lactation, although it might be at the expense of farm covers and silage making.

**Table 1** Predicted averages (±SD) with results of paired t-tests

| Parameter | Strategy 1 | Strategy 2 | Significance (P) |
|---|---|---|---|
| Silage fed (kg DM/ha) | 1882±702 | 2050±726 | 0.19 |
| Silage made (kg DM/ha) | 2557±535 | 2816±540 | 0.12 |
| MS (kg/cow) | 399±5.5 | 394±4.9 | 0.02 |
| MS (kg/ha) | 1455±20 | 1439±19 | 0.01 |
| EFS (NZ$/ha) | 2261±265 | 2180±256 | 0.02 |

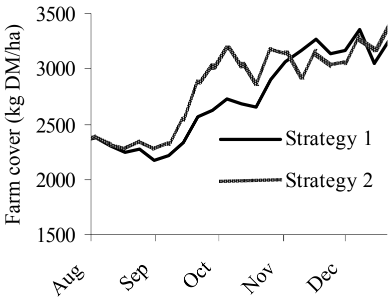

**Figure 1** Effect of breakeven date on average farm cover for the 1996 season

**Conclusions** The results of this modeling exercise show that for the Lincoln farm a breakeven date of 25 September for the spring rotation planner is more profitable than a date of 20 October. Optimum breakeven dates for different farms will depend on stocking rate and local climate.

**References**

Wastney, M.E., C.C. Palliser, J.A. Lile, K.A. Macdonald, J.W. Penno & K.P. Bright (2002). A whole-farm model applied to a dairy system. *Proceedings of the New Zealand Society of Animal Production,* 62, 120-123.

Holmes, C.W., I.M. Brookes, D.J. Garrick, D.D.S. Mackenzie, T.J. Parkinson & G.F. Wilson (2002). Milk production from pasture. Principles and practices. Massey University, Palmerston North, New Zealand, 601.