ANALYSIS OF THE CHARACTERISTICS OF THE LACTATION CURVES IN A GROUP OF HIGH PRODUCING DAIRY FARMS IN NEW ZEALAND

A thesis presented in partial fulfilment
of the requirements for the degree of

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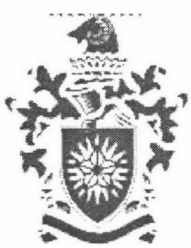
in
Pastoral Science



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ABSTRACT

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This project focused on the analysis of the characteristics of the lactation curves in a group of commercial dairy farms in New Zealand which use supplementary feed strategically in order to increase overall production through increases in production per animal and per hectare (*AGMARDT-Dairy Farm Monitoring Programme*). The relationship between levels and quality of feeding, sward characteristics, sward management and levels of milk production were analysed in different phases of the lactation. In all lactation phases studied milksolids yield was more closely related to intakes from supplements than to intakes from pasture, reflecting the relatively high levels of supplements used, especially in late lactation. Average peak yield was 2.04 (1.88-2.26) kg MS/cow/day and significantly associated with total intake, enhanced by strategic use of supplements, but not significantly associated with pasture consumption, even though this provided 88% of the total intake at peak. Peak yield increased by 3.8 g MS with an increase of 1 MJME of supplements eaten, which on average is higher than the responses found experimentally. Quality of pasture and of the total diet was also moderately correlated to peak yield. A temporary decline and recovery in MS yield of on average 3.02 (0.89-4.56) kg of MS "loss" over 40 days, was observed immediately after the peak period. This appeared to be associated with a period of adverse climatic conditions in mid October, which resulted in decreases in nutrient intake as reflected in marked changes in milk protein content and protein:fat ratio that were not adequately compensated by changes in supplement feeding. Close monitoring of the concentrations of protein and fat in milk at this time would help in the assessment of the herd's nutritional status, and of the need to modify feeding strategies although, on average, this "loss" represented less than 1% of the total lactation yield. Long term rate of post peak decline in MS yield (from peak to late lactation) was 4.00 (2.57-4.72) g

MS/cow/day. Peak yield was the only factor associated significantly with post peak decline, and this correlation was positive as expected. The absence of significant correlations between rate of decline and feeding level over the same period, appeared to be a consequence of the low variability in the data. However, in general, the farms with higher rates of post peak decline apparently consumed slightly more supplements during peak period and also over the post peak decline period. Average MS yield in late lactation was 1.16 (1.01-1.24) kg MS/cow/day. Although not significant, there was a negative association between milk yield in late lactation and pasture quality. This appeared to be an effect of the relatively high level of supplementary feed input, which improved the diet consumed, but also caused some substitution for pasture eaten, resulting in some decrease in utilisation efficiency and pasture quality. Total lactation yield was 417 (374-438) kg MS/cow and the most important component affecting it was lactation length which was on average 243 (208-272) days. Between farm differences in peak yield and late lactation yield were not strongly related to total lactation yield, indicating the flexibility of lactation response to the relatively high levels of supplementation in mid to late lactation. However, these two components when combined with lactation length, made significant contributions to the model. It is concluded that the *AGMARDT-Dairy Farm Monitoring Programme* demonstrates that a management strategy based on close monitoring of pasture conditions and the flexible use of supplementary feeds, can achieve high milk production per cow and also per hectare. The results also suggest the need for development of more effective methods for pasture measurements. The use of milk composition as a short-term indication of nutrient status may also be useful as a tool to provide a qualitative basis for feed management decisions.

Keywords: pasture based systems, supplementary feed, lactation curves, peak yield, post peak decline, level of feeding, quality of feeding, sward conditions.

To my Mum ***Giselda****,*

who has taught me the meaning of

Courage

To my Dad ***Tadeu****,*

who has taught me the meaning of

Happiness

To my Uncle ***Francisco Lombardi Neto****,*

who has taught me that the love by the

Science is a life-long journey

To my beloved aunt ***"Tuta"*** *(in memoriam),*

who taught me the importance of

Education in our lives

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