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Ration balancing in New Zealand dairy farm management:

A case farm simulation study

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Abstract

New Zealand dairy farmers are amongst the most cost effective producers of milk in the world. Nevertheless the genetic potential of New Zealand cows for milk production remains substantially underutilised. The present relatively low milksolids production per cow is a consequence of pasture-based feeding systems that do not provide all of the nutrients necessary for high (>30kg/cow/day) milk production. A potential means to increase per cow production is to balance pasture diets to provide the correct quantities and ratios of nutrients to meet target levels of milksolids production.

A review of the information available on the nutrient characteristics of feeds available in New Zealand for dairy cattle was completed. This indicated that most feed sources are documented only in very simple nutritional terms and generally few of the parameters necessary for ration balancing are included. Also regional and seasonal variation in feed quality is poorly defined. Implementation of ration balancing programs on dairy farms will require the development of a more comprehensive feed database, especially for forages.

The simulation model UDDER was used to investigate alternative strategies to profitably increase production per cow on a case study dairy farm. This analysis indicated that extending lactation by 30 days and supplementing pasture in early lactation with maize silage could increase milkfat yield by 17.9 kg per cow and the annual gross margin by \$78.9 per cow. Thus there appears to be scope to profitably increase production per cow on the case study farm. However, UDDER is an energy-based model and does not consider the nutritional composition of the cows daily feed intake. CAMDAIRY, a computer program for analysing dairy cow rations, was therefore used to evaluate the nutritional adequacy of the diets "fed" to the cows by UDDER. This analysis suggested that the diets provided excess rumen undegradable protein (RDP) and as a consequence of this milk production was likely to be overestimated by UDDER. A diet that provided nutrients for higher levels of milk production was then formulated. The benefits of that diet were calculated using a spreadsheet partial budget that considers both immediate and carry-over effects of supplementation on financial returns. This showed that the diet formulated by CAMDAIRY could increase profit by \$7.93 per cow.

It was concluded that ration balancing would be a useful aid to feed management on New Zealand dairy farms, but requires feed and animal monitoring systems to be put in place to determine the type(s) and period(s) of supplementation required. Ration balancing software such as CAMDAIRY should be used with caution until it has been more widely validated for New Zealand pastoral feeding systems. In particular this study suggests that further research on the utilisation of pasture protein is required.

Keywords: Milk production; UDDER; CAMDAIRY; supplements; ration balancing; pasture systems.

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