EFFECT OF PROTEIN CONTENT OF A SILAGE AND GRAIN SUPPLEMENT ON THE PERFORMANCE OF COWS IN A TROPICAL PASTURE SYSTEM

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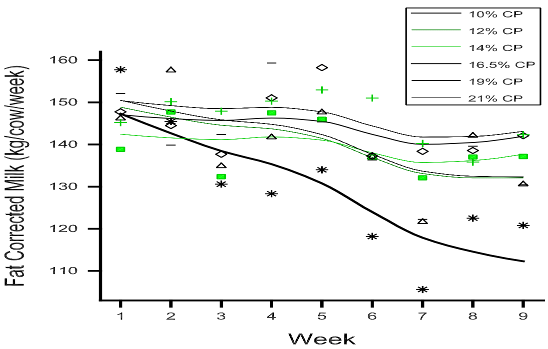
Heat stress and low nutrient intakes are 2 major limitations to high milk production in dairy systems based on tropical grasses. Producers feeding energy supplements to cows housed on a shaded feed-pad during the day and grazing tropical grass pastures at night can reduce these limitations (Davison *et al.* 1996). However, dryland tropical grass pasture is often mature and of low quality in summer-autumn, leading to sub-optimal milk production (Ehrlich *et al.* 2003). The objective of this experiment was to determine whether the level of crude protein (CP) in supplements for cows offered a silage/grain mix (SGM) could improve production and, if so, to what level.

The experiment started in March 2002 with a 1-week adaptation, and an 8-week observation, period. Forty-two Holstein-Friesian cows in early/mid-lactation were stratified and randomly allocated to 6 groups of 7 cows. Each group was offered a SGM (11 kg DM/cow/day) formulated to contain CP of 10, 12, 14, 16.5, 19 or 21% DM. This was achieved by substituting cottonseed meal (CSM) and urea for grain. The SGM consisted of maize silage, barley grain, CSM and urea (4.3, 3.6-6.2, 0.56-2.8 and 0-0.1 kg DM/head/day, respectively). The cows were fed on a shaded feed-pad during the day, and during the evening and night, they grazed rhodes grass (*Chloris gayana* cv. Callide) pasture, with a fresh pasture strip offered each day.

A regression model of parallel smooth curves with additional linear trends for the CP% of each SGM best represented 4% fat corrected milk yield (FCM) (P=0.06), with the slope for 10% CP being different to those for 14, 16.5 and 21% (Figure 1). Similar analyses fitting cubic smoothing splines for the effect of the CP% of SGM on FCM for each week showed that much of the difference in weeks 3-9 could be accounted for by fitting parallel smoothed curves to each week's data. Quadratic regressions that best reflected the curves were then fitted for each week (P<0.001) (Figure 2).

Symbols: 10 *; 12 Δ; 14■; 16.5 ◊; 19-; 21+ %



CP

Figure 1. Milk response to supplement protein levels.

Week 3*; 4Δ; 5■; 6◊; 7+; 8-; 9●;

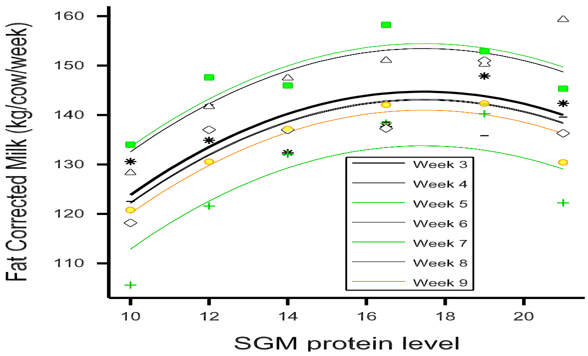


Figure 2. Fitted weekly milk yield curves.

The resulting equations were: FCM = a_i + 13.1±2.18 (SGM CP%) - 0.376±0.0698 $(\text{SGM CP\%})^2$, where: a_i=30.1, 38.9, 39.9, 28.6, 19.2, 28.4, 26.4 ± 16.3 for weeks 3-9. The maximum FCM was reached at a CP of 17.5% in the SGM, while the milk analysis results, flatness of the curves and economic calculations using CSM as the protein suggested that the CP% in SGM of 14% was the minimum and most economical at current milk prices (31^c/L).

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