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 0.0–0.1 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).

The resulting equations were: FCM = a_i + 13.1±2.18 (SGM CP%) - 0.376±0.0698 (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 (31c/L).


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