THE EFFECT OF CEREAL GRAIN-BASED SUPPLEMENTS ON BLOOD β-HYDROXY-BUTYRATE CONCENTRATIONS IN DAIRY COWS IN A PASTURE-BASED SYSTEM

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Although ketone bodies in the lactating dairy cow predominantly originate from the breakdown of body reserves, the rumen epithelium is also a source (Leighton *et al*. 1983). The type of ketone body formed from acetate and butyrate in the rumen epithelium appears to be related to the propionate concentration in the rumen, with the addition of propionate favouring β-hydroxybutyrate (BHB) production (Baldwin and Jesse 1996). Supplementing dairy cows grazing pasture with cereal grain-based concentrates is a common practice in Australia, resulting in an increase in both the proportion and quantity of rumen propionate production. This study aimed to quantify the effect of diet on BHB concentration in lactating dairy cows in positive energy balance, and the significance of these levels in terms of body reserve mobilisation.

Eight multiparous Holstein cows in each of groups 3 and 5 were in late lactation and 10 multiparous Holstein cows in each of groups 1, 2 and 4 were in early-mid lactation. Groups 1-5 relate to variations in pasture and concentrate intake such that the % of concentrates varied from 10 to 47% (see Table 1). Blood samples for BHB concentrations were taken approximately 3-4 hours after the morning milking/feeding, a time when the effect of diet (concentrate) on ketone bodies in circulation would be greatest (Andersson and Lundstrom 1984). The relationship between plasma BHB and % concentrate for all cows in positive energy balance is shown in Figure 1.

Table 1. Mean (± se) pasture intake and concentrate intake and % concentrate in the diet for each group.

Group	Pasture intake (kg DM/cow/day)	Concentrate intake (kg DM/cow/day)	% concentrates of total DM intake
1	19.2 (1.2)	2	10 (0.6)
2	17.8 (0.8)	3.8	22 (0.9)
3	15.8 (0.5)	4.1	26 (0.8)
4	15.4 (0.8)	5.9	39 (2)
5	12.0 (0.6)	5.5	47 (2)

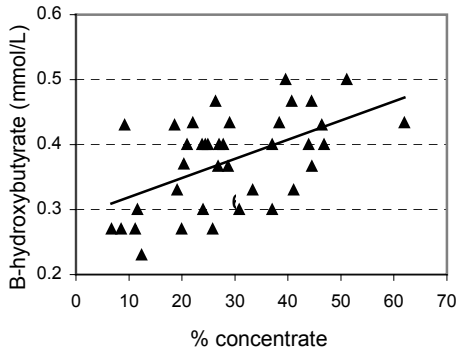

Figure 1. Relationship between plasma B-hydroxybutyrate (BHB) and % concentrate for all groups (r^2=0.29, P<0.01); BHB (mmol/L) = 0.2893 + 0.2958 % concentrate).

Blood BHB concentration significantly increased (P<0.01) as the % of concentrate in the diet increased. However, blood BHB remained below 0.5 mmol/L when cows were fed up to 60% concentrate, well below BHB levels associated with significant body reserve mobilisation.

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