

Effect of concentrate build-up strategy in early lactation on production performance, health and fertility of high-yielding dairy cows

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Introduction The high milk production potential of the modern dairy cow frequently results in excessive and prolonged periods of negative energy balance (NEB) during early lactation. The most common approach to reduce NEB is to increase energy intake by increasing the proportion of concentrates being offered. However, offering diets containing high levels of concentrates can lead to rumen acidosis, impaired rumen function and reduced intakes, the latter exacerbating NEB. Introducing concentrates into the diet of fresh calved cows at a slower rate is likely to improve rumen function. Furthermore, diet crude protein (CP) content is likely to be reduced through offering a lower concentrate diet in early lactation. Offering a lower protein diet has been shown to reduce milk output, have no effect on dry matter intake, and thus improve cow energy status (Law *et al.*, 2009). The objective of this study was to compare two very different strategies by which to introduce concentrates into the diet in early lactation, namely a rapid build-up (RBU) or a delayed build-up (DBU) strategy.

Material and methods From calving onwards, sixty autumn-calving Holstein Friesian cows (mean parity 3.1) were offered a basal diet (via feeder wagon) containing 35% concentrate and 65% forage on a dry matter (DM) basis (150 g CP/kg DM and 12.0 MJ metabolisable energy (ME)/kg DM). Cows were allocated to one of two post-calving concentrate allocation strategies (via out-of-parlour feeders), namely a rapid build up of concentrates (RBU) or a delayed build up of concentrates (DBU). With the rapid build-up treatment cows were offered 2.0 kg concentrate/cow/day on the day of calving, and this was then built up incrementally (0.5 kg/day) to a maximum of 7.0 kg/cow/day at day 10 post calving. Cows allocated the delayed build-up treatment received no additional concentrate via out-of-parlour feeders until day 28 of lactation, and thereafter received incremental concentrate levels (0.5 kg/day) to a maximum of 7.0 kg /cow/day at day 42 post calving. Once these concentrate feed levels had been achieved, diets were designed to have a CP and ME content of 180 g/kg DM and 12.4 MJ/kg DM respectively. Cows remained on these two dietary treatments until day 150 of lactation. Data were analysed using the residual maximum likelihood procedure via Genstat.

Results Total dry matter intake was unaffected by concentrate build-up strategy (Table 1). However, forage intake was significantly higher for cows allocated to DBU treatment ($P < 0.001$; Figure 1), while concentrate intakes were lower ($P < 0.01$). Neither milk yield nor milk composition was affected by concentrate build-up strategy ($P > 0.05$). Despite the lack of treatment effects on milk production, cows on DBU returned to positive energy balance earlier (week 7 post-calving) than those on RBU (week 19 post-calving). From weeks 3-7 post-calving, cows allocated to DBU produced 3.5kg less milk/day than those allocated to RBU ($P < 0.001$). Reproductive performance was unaffected by treatment ($P > 0.05$).

Table 1 Effect of concentrate allocation strategy on DM intake, milk production and energy balance (day 1-150 of lactation)

	Rapid Build-Up	Delayed Build-Up	SED	P value
Dry matter intake (kg / day)	20.5	21.4	0.53	NS
Forage intake (kg DM/ day)	9.0	10.4	0.34	***
Concentrate intake (kg DM / day)	11.5	11.0	0.19	**
Milk yield (kg / day)	38.9	37.9	1.61	NS
Milk fat (g / kg)	40.5	41.6	1.43	NS
Milk protein (g / kg)	34.2	33.3	0.71	NS
Energy balance (MJ / day)	-21.3	-6.3	7.91	P=0.06

Conclusions Adopting a delayed concentrate build-up strategy in early lactation improved forage intake while having no detrimental effect on production performance. This resulted in a trend towards improved energy status of the cows on this treatment, although reproductive performance was unaffected.

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References

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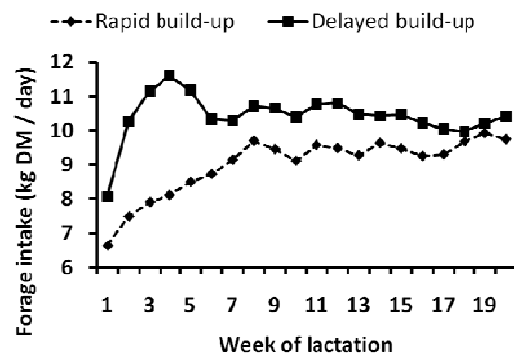


Figure 1 Forage intake during the first 140 days of lactation