Encapsulated calcium butyrate: A novel feed supplement for optimising pre-weaning growth rate of dairy calves in a pasture-based system

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Encapsulated calcium butyrate (ECAB, ButiPEARL™, Kemin Industries, Inc. Des Moines, Iowa) is a novel and innovative feed technology developed to release butyrate continuously and slowly in the gastrointestinal tract of animals. Butyrate promotes rapid growth and development of rumen papillae for a better absorption of digested nutrients that enables dairy calves to transition smoothly from liquid milk to concentrates with minimal metabolic disorders (Pereira *et al.* 2017; Eckert *et al.* 2015; Ferreira & Bittar, 2011). This study investigated the effect of supplementing dairy heifer calves with ButiPEARL™ on average daily weight gain, liveweight and body conformation traits.

The study was conducted using forty-eight newly born heifer calves (7 ± 0.4 days old; average liveweight 39.3 ± 5.3 kg) comprising purebred and crossbred Friesians, Jersey and Swedish Red. Calves were kept under the same pasture-based management system and utilised in a complete randomised experimental design for eleven weeks. The treatment groups included the Control (no supplementation), Low (4 kg/t) and High (6 kg/t) doses of ButiPEARL™. Feed intake, liveweight, average daily weight gain and body conformation parameters were subjected to a repeated measures general mixed model (proc mixed) analysis in SAS. Treatment diet, calf breed, dam parity, week of measurement and their first-order interactions fitted as fixed effects, while dam age was fitted as a random effect and all the initial body weight and conformation measurements fitted as covariates.

Dose affected liveweight, average daily weight gain, chest girth, withers height, body length and body condition score ($P < 0.05$). The Low dose resulted in the highest average daily weight gain (0.83 ± 0.03 kg/day), heaviest liveweight (72.08 ± 1.6 kg), widest chest girth (95.94 ± 0.7 cm), longest body length (82.92 ± 0.6 cm) and best body condition score (1.99 ± 0.1; Table 1). Calves assigned to Control and High doses had similar liveweights (65.37 ± 1.4 kg vs 65.74 ± 1.5 kg), average daily weight gain (0.71 ± 0.0 kg vs 0.74 ± 0.0 kg) and chest girth (93.35 ± 0.7 cm vs 92.91 ± 0.7 cm; Table 1).

	Treatment[1,2]			
Trait	Control	Low ECAB	High ECAB	*P* - value
Body weight, kg	65.4±1.4[b]	72.1±1.6[a]	65.7±1.5[b]	*0.001*
Average daily weight gain, kg	0.71±0.03[b]	0.83±0.03[a]	0.74±0.03[b]	*0.001*
Chest girth, cm	92.9±0.7[b]	95.9±0.7[a]	93.4±0.7[b]	*0.001*
Withers height, cm	88.2±0.5[ab]	88.9±0.5[a]	87.4±0.7[b]	*0.001*
Body length, cm	80.1±0.6[c]	82.9±0.6[a]	81.5±0.6[b]	*0.001*
Body condition score	1.30±0.08[c]	1.99±0.12[a]	1.67±0.10[b]	*0.001*

[1]Treatments: Low ECAB = 4 kg/tonne encapsulated calcium butyrate; High ECAB = 6 kg/tonne encapsulated calcium butyrate
[2]Means within row with different superscripts are significantly different.

Table 1. Effect of encapsulated calcium butyrate (ECAB) on growth and body conformation of calves after 77 days of supplementation.

These findings suggest that calf starter rations containing 4 kg/t ButiPEARLTM will improve overall liveweight and body conformation traits of newborn calves in a pasture-based system. Practical implications of supplementing neonatal dairy calves with ECAB is the potential to wean calves early and reduce age at first calving, which has been shown to result in improved lifetime performance.

References

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