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Assessing sustainable source of encapsulation for dietary calcium chloride: Impacts on key serum and urine markers in dairy cows

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The objective of this pilot trial was to validate the effects of supplementation of a new generation sustainable encapsulated dietary calcium chloride (enCaCl) on key serum markers and urine pH. Multiparous (\bar{X} :3.8) cows were randomly assigned to receive 180 g/head/day (144 g/d of CaCl₂) with standard enCaCl (CON; n = 19; NutriCAB™, Kemin Animal Nutrition and Health, Belgium) or enCaCl with alternative palm oil-free coating agents (POF; n = 17; NutriCAB™ ef) as a top-dress starting from 3 wk before expected calving date until calving. Cows were housed in separate dry cow pens for relevant groups, were transferred to the lactation pens after calving, and were milked twice daily. Blood samples were collected at calving (d0), d1, d2, d3, d4, and d7 from the tail vein and serum was collected. Spot urine sampling followed by pH monitoring was performed to evaluate net acid excretion. Robust Fit Outliers with Huber M-Estimation (K=4), Shapiro-Wilk test, and Q-Q plots were executed for data quality. Log transformation was performed, if needed. Data was analyzed using Fit Model procedure with REML (JMP 16.1, SAS). The model incorporated fixed effects for group, DIM, and two-way interactions with random effect of cow as experimental unit. The results were presented as Lsmeans, and significance was established at $p < 0.05$. Serum levels of tCa (2.15 vs. 2.09 ± 0.04 mmol/L), P (1.38 vs. 1.44 ± 0.10 mmol/L), Mg (0.95 vs. 0.96 ± 0.02 mmol/L), and Ca:P ratio (1.61 vs. 1.54 ± 0.09) in cows fed with the POF had similar response with those in cows fed with the CON ($P > 0.05$). While all mentioned parameters were significantly changed by over time (DIM; $P < 0.01$), no interaction was observed between treatment and DIM ($P > 0.05$). Serum NEFA (0.59 vs. 0.61 ± 0.07 mmol/L) and BHBA (0.65 vs. 0.63 ± 0.05 mmol/L) levels were similar in POF vs. CON cows. Urine pH levels did not change in POF vs. CON cows (6.57 vs. 6.20 ± 0.25 ; $P > 0.05$). Evidence indicated that sustainable source of encapsulated CaCl₂ variant performs similar to current version of encapsulated CaCl₂ in terms of key Ca metabolism markers.

KEYWORDS:

Encapsulation, Calcium, sustainability