

the effects of extending the dietary anion cation difference into the first 3 days of lactation in multiparous dairy cattle with the use of magnesium chloride hexahydrate drenches on blood calcium levels.

Materials and Methods

Adult Holstein cows at a commercial dairy in their 2nd or higher lactation, with a urine pH of 6.8 or less on the day of calving, were randomly assigned to a study group, resulting in 13 cows in the treatment group and 14 cows in the control group. Treatment cows received 480 g oral magnesium chloride hexahydrate once daily for 3 days for acidification, starting on the day of calving. Urine pH was measured daily for 5 days starting on day of calving to assess acidification status; blood was collected on day of calving, day 2 and day 4 post-calving, and analyzed for ionized calcium concentrations with the iSTAT handheld blood analyzer. Differences in blood ionized calcium and urine pH were compared using longitudinal data analysis with the PROC MIXED procedure of SAS. Differences were considered significant at the $P < 0.05$ level.

Results

Urine pH was significantly lower in treatment than control cows on day 1 (6.39 ± 0.19 for treatment vs 7.22 ± 0.25 for control), day 2 (6.77 ± 0.26 for treatment vs 7.91 ± 0.10 for control), and day 3 (6.78 ± 0.28 for treatment vs 7.95 ± 0.07 for control) post-calving. Blood ionized calcium concentrations were significantly different from baseline (1.08 ± 0.02) in both treatment and control cows on day 2 (1.15 ± 0.01) and day 4 post calving (1.18 ± 0.01). No difference was found between treatment and control groups in ionized calcium concentrations on days 0, 2 or 4 in milk.

Significance

Oral supplementation with magnesium chloride hexahydrate resulted in the desired acidification of urine pH in the treatment group as when feeding an anionic close-up diet. Continued acidification of dairy cows 3 days into lactation did not result in higher blood calcium concentrations compared to controls. Further research into the physiological reasons for this finding is needed.

Effects of prophylactic supplementation with QuadriCalMINI oral calcium boluses on peripartum calcium, urine pH and health in a commercial Jersey herd supplemented with anionic salts

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Introduction

The detrimental effects that subclinical hypocalcemia has on postpartum performance and the lack of a cow-side diagnostic tool drives researchers to focus on designing preventive management strategies. The objectives of this study were to evaluate the effect of prophylactic supplementation with oral calcium boluses after calving on postpartum calcium concentration, subclinical hypocalcemia prevalence, urine acidification, ketosis and endometritis.

Materials and Methods

Multiparous Jersey cows from a 3,500-cow herd were randomly assigned to control (no calcium supplementation ($n=67$)) or treatment (2 oral calcium boluses ($n=64$), (QuadriCalMINI, Bio-Vet, Barneveld, WI)). The first calcium bolus was given at 2:30 h after calving ($SD \pm 1:54$ h) and the

second at 18:21 h after calving ($SD \pm 11:56$ h). Coccygeal blood and midstream urine were collected immediately before the first and second bolus administration and 1 h after each bolus was administered. Serum samples were analyzed for total calcium. Urinary pH was measured cow-side with a handheld meter (LAQUAtwin B-712, Horiba, Montpellier, FR). Blood β -hydroxybutyrate (BHBA) concentrations were determined at 5, 8 and 11 d postpartum using a handheld meter (Precision Xtra; Abbot, Alameda, CA). Clinical endometritis was evaluated based on the observation of purulent or mucopurulent vaginal mucus retrieved with Metricheck (Simcro, NZ) from 28 to 40 d postpartum. Treatment effects on serum calcium and urine pH were evaluated with linear mixed models with repeated measures using the MIXED procedure of SAS (Cary, NC). The prevalence of ketosis and endometritis was evaluated using the chi-square option of the FREQ procedure of SAS.

Results

Subclinical hypocalcemia (≤ 8.5 mg/dL) prior to treatment administration was 58% for control and treatment ($P = 0.96$). One hour after bolus administration, serum calcium concentration was significantly greater in treated cows at first (8.65 vs 8.01 mg/dL; $P < 0.001$) and second (8.71 vs 8.23 mg/dL; $P < 0.001$) bolus administration. However, no significant differences were observed prior to second bolus administration (8.23 vs 8.01 mg/dL; $P = 0.12$). There was a treatment effect on urine pH (7.0 control vs 6.1 treatment; $P < 0.001$) and a significant treatment by time interaction ($P = 0.02$). No treatment effects were observed on ketosis

prevalence (26.7%; $P = 0.97$), defined as ≥ 1.4 mmol/L of BHBA in blood at least once during the sampling period or endometritis (47%; $P = 0.93$).

Significance

These results suggest that postpartum total serum calcium concentration can be increased with oral bolus administration; however, serum calcium concentration might not be maintained by the time the second bolus is administered. Based on urine pH, this study also demonstrated that Quadri-CalMINI oral Ca supplementation successfully acidified cows.

The association of prepartum blood magnesium concentration with postpartum subclinical hypocalcemia

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Introduction

Advances in dairy cattle nutrition and management have been able to significantly minimize macromineral imbalances capable of contributing to the development of clinical disorders in the periparturient period. Despite these improvements, subclinical disorders still influence dairy cow health and performance, as the hormonal and metabolic challenges associated with the transition period influence macromineral homeostasis. Although the association of subclinical hypocalcemia (SCH) with early lactation health events has been described, little is known regarding the association of prepartum magnesium status with postpartum health and production. Therefore, the primary objective of this study was to describe the association of prepartum blood magnesium concentrations with the risk of postpartum SCH development, as well as the risk of diagnosis of retained placenta, metritis, hyperketonemia, and displaced abomasum.

Materials and Methods

A retrospective cohort study was carried out in 2 large dairy herds located in New York State from April until November, 2015. This project was part of a larger observational study requiring repeated blood sample collection throughout the periparturient period. To be included in this study, cows were required to have blood samples collected approximately 1 week prior to expected parturition, within 4 h after calving, and at 2 days-in-milk (DIM); additionally,

cows could not have received any calcium treatment within 48 h post-parturition. Plasma samples from 1 week before calving, within 4 h of the postpartum, and at 2 DIM were sent to the Animal Health Diagnostic Center at Cornell University for mineral panel analysis. Prepartum subclinical hypomagnesemia was classified as plasma magnesium concentrations ≤ 0.8 mmol/L. Postpartum SCH was classified as plasma total calcium concentration ≤ 2.1 mmol/L. Health events (retained placenta, metritis, and displaced abomasum) for the first 60 DIM were extracted from the on-farm herd management software (DairyComp305, Valley Agricultural Software, Tulare, CA). Diagnosis of hyperketonemia was made by the research group based on blood β -hydroxybutyrate (BHB) measurement with the Precision Xtra meter (Abbott Laboratories, Lake Bluff, IL) at 3, 5, 7, and 10 DIM. Cows were classified as hyperketonemic if any of the BHB concentrations were ≥ 1.2 mmol/L. Results were analyzed using chi-squares and relative risk calculations performed on SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results

A total of 301 animals met the study inclusion criteria (92 from herd A, and 209 from herd B), being 34.5%, and 65.5% of primiparous and multiparous, respectively. Thirty-seven animals (17 primiparous and 20 multiparous) were classified as subclinically hypomagnesemic during the prepartum period, and 109 animals (2 primiparous and 107 multiparous) were classified with SCH within 4 h of calving.