

Research Summaries 1

Close-up diet DCAD, urine pH, and total plasma calcium at calving on a commercial Jersey herd

A. Valdecabres, DVM; D. Rolle, DVM; V. J. Ramírez, DVM; S. Rodríguez, DVM; N. Silva-del-Río, DVM, PhD
 Veterinary Medicine Teaching and Research Center, University of California Davis, Tulare, CA 93274

Introduction

Inducing a compensated metabolic acidosis by feeding anionic salts in close-up cows has been shown by some researchers to be a useful strategy for milk fever prevention. The objectives of this study were to 1) determine the daily variability of the dietary cation-anion difference (DCAD) in close-up diets; 2) evaluate the daily variability of urine pH and the proportion of cows that were properly acidified based on urine pH; 3) determine if acidification levels were maintained as parturition approached; 4) investigate the relationship between DCAD level and urine pH; and 5) evaluate the association between urine pH days prior to calving and postpartum calcium concentration on a commercial Jersey herd.

Materials and Methods

Over a 40-d period, feed bunk samples were collected daily for wet chemistry analysis. Mixing uniformity was evaluated weekly by sampling 5 feed bunk locations. Enrolled cows were fed a close-up diet for at least 10 d. Midstream urine was collected from 70 multiparous cows via manual stimulation for cow-side urinary pH measurements. Coccygeal blood samples were collected after calving for total plasma calcium analysis (47 cows). The evaluation of changes on urinary pH at -10 to 0 d relative to calving (RC) was conducted with the

MIXED procedure of SAS with repeated measurements. The association between DCAD and urine pH was evaluated using the CORR procedure of SAS.

Results

DCAD ranged from -136 to 151 mEq/kg of DM with a coefficient of variation (CV) of 216%, and DCAD distribution throughout the feed bunk was highly variable (CV=36 to 182%). The within-day variation of urine pH ranged from a CV of 3 to 19%. There was a tendency for an effect of day of the week ($P=0.07$) on urine pH, which was greatest on Monday (6.2) and lowest on Saturday (5.9). Urine pH was lower from -10 to -6 d RC (5.6 to 6.1) compared to -5 to 0 d RC (6.0 to 6.2; $P=0.08$). There was a tendency for a weak association between the dietary DCAD fed 24 h prior and the urine pH ($r=0.31$; $P=0.09$). Although urine pH was not associated with postpartum total plasma calcium from -10 to -4 d RC, it was from -3 to 0 d RC ($P=0.02$).

Significance

Our results indicate that in the study herd there was a wide within- and across-day variation in DCAD as well as urinary pH. Urine pH might not be a good indicator of postpartum plasma calcium levels.

Extension of anionic diet into the first three days of lactation and its effect on calcium blood levels in postpartum dairy cattle

G. Maier, DVM, MPVM, DACVPM; B. McNabb, DVM, MPVM, DACT; R. Pereira, DVM, PhD; S. Aly, BVSc, MPVM, PhD;
 H. Rossow, PhD

School of Veterinary Medicine, Department of Population Health and Reproduction, University of California-Davis, Davis, CA 95616

Introduction

Although the incidence of clinical hypocalcemia in postpartum dairy cows is low on US dairies, subclinical hypocalcemia post-calving is common and has been associ-

ated with metabolic and infectious disease. It is common farm practice to feed a diet rich in anions to prepartum dairy cattle to support calcium homeostasis; however, this diet is typically discontinued at parturition when calcium needs are still high. The objective of this study was to determine

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

A. Valdecabres, DVM; D. Rolle, DVM; A. Belaid, DVM; N. Silva-del-Río, DVM, PhD

Veterinary Medicine Teaching and Research Center, University of California Davis, Tulare, CA 93274

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). Coccyeal 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.