The association of prepartum urine pH and periparturient activity and rumination time on postpartum subclinical hypocalcemia dynamics in Holstein cows

C. Seely, BS, MS; J. McArt, DVM, PhD

Department of Population Medicine and Diagnostic Sciences, College of Veterinary Medicine,
Cornell University, Ithaca, NY 14850

Introduction

Dynamics of subclinical hypocalcemia (SCH) in early lactation dairy cows have been associated with negative health outcomes and decreased production. Our objective was to investigate the association of SCH dynamics with prepartum urine pH, periparturient activity and rumination time, and serum total Ca (tCa).

Materials and methods

A prospective cohort of 89 multiparous Holstein cows from 2 herds in NY were classified into 1 of 4 SCH groups based on mean serum tCa at 1 and 4 DIM: normocalcemic (NC; [tCa] >1.89 mmol/L at 1 DIM and >2.25 mmol/L at 4 DIM, n = 30); transient SCH (tSCH; [tCa] ≤1.89 mmol/L at 1 DIM and >2.25 mmol/L at 4 DIM, n = 12); delayed SCH (dSCH; [tCa] >1.89 mmol/L at 1 DIM and ≤2.25 mmol/L at 4 DIM, n = 23); and persistent SCH (pSCH; [tCa] ≤1.89 mmol at 1 DIM and ≤2.25 mmol/L at 4 DIM, n = 24). Explanatory repeated measures ANOVA models were used to analyze differences between SCH groups and changes over time for prepartum urine pH, activity and rumination time in the 10 d pre- and post-calving, and serum tCa for the first 10 DIM.

Results

Serum tCa was different by SCH group ($P < 0.001$) and was greatest in the NC cows. Prepartum urine pH was numerically lower in the dSCH cows compared to the NC, tSCH, and pSCH cows ($P = 0.5$; 6.15 ± 0.36 and 6.44 ± 0.31, 6.52 ± 0.48, and 6.47 ± 0.32, respectively). Prepartum rumination time was lowest in the pSCH cows compared to the NC, tSCH, and dSCH cows ($P = 0.05$; 481.9 ± 19.8 min/d and 513.6 ± 17.8 min/d, 511.0 ± 27.5 min/d, and 520.3 ± 22.2 min/d, respectively). An interaction of DIM and SCH group was apparent for postpartum rumination time ($P < 0.001$) and was numerically lower in the pSCH cows compared to the NC, tSCH, and dSCH ($P = 0.2$; 467.1 ± 24.1 min/d and 499.8 ± 21.6 min/d, 496.4 ± 33.5 min/d, and 485.8 ± 28.3 min/d, respectively). Postpartum activity time was greatest in the NC compared to the tSCH, dSCH, and pSCH cows ($P = 0.04$; 467.4 ± 22.3 min/d and 429.9 ± 34.6 min/d, 428.6 ± 27.9 min/d, and 421.4 ± 25.0 min/d, respectively).

Significance

Our results suggest that periparturient activity and rumination time are associated with SCH dynamics.