Influence of Subclinical Hypocalcemia on Plasma Biochemical Parameters, Lipid Mobilization, Liver Lipid Infiltration, and Common Postpartum Diseases in Dairy Cows

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Abstract

We hypothesized that cows with subclinical hypocalcemia at calving would have greater elevations in liver associated biochemical parameters and non-esterified fatty acid (NEFA) concentrations compared to normocalcemic cows. One hundred multiparous Holstein cows were assigned to one of two groups 1) normocalcemic (n=49; ionized calcium [iCa] ≥ 1.0 mmol/L) or 2) hypocalcemic (n=51; [iCa] <1.0 mmol/L) based on whole blood [iCa] on the day of calving. Blood samples were collected from all cows for measurement of [iCa], NEFA concentrations, and plasma chemistry profiles at days -14, 0 (calving), 3, 7, 14, 21, and 35. On day 0, hypocalcemic cows had lower [iCa] than normocalcemic cows ($P < 0.001$) and lower total plasma Ca ($P < 0.001$). Hypocalcemic cows had lower plasma phosphorus concentrations on days 0 ($P = 0.002$), 7 ($P = 0.05$), 14 ($P = 0.03$), and 21 ($P = 0.04$). Hypocalcemic cows had higher NEFA concentrations on days 0 ($P = 0.01$) and 21 ($P = 0.02$). Hypocalcemic cows also tended to have higher NEFA concentrations on day 14 ($P = 0.12$). Hypocalcemic cows had more lipid in the hepatocytes on day 35 ($P = 0.0008$). No differences were detected between groups for total or direct bilirubin concentration, gamma glutamyl transferase or aspartate aminotransferase activity ($P > 0.05$). These data provide evidence of an association between calcium status at calving, fat mobilization, and liver lipid infiltration.