

Effectiveness of Calcium Propionate Gels

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Oral calcium gels are used to elevate blood calcium of periparturient dairy cows. Calcium chloride is the most commonly used ingredient in these products. Although calcium chloride increases blood Ca, it may cause metabolic acidosis and thus is often contraindicated. Calcium propionate may be preferable if it can increase blood calcium without causing acidosis. The objective of this project was to evaluate the effect of oral calcium propionate gels on calcium and acid-base status of dairy cows. Four experiments were conducted in which calcium propionate plus calcium oxide (**PROPOX**) was compared to a control (**CON**; a placebo gel containing the vegetable oil carrier only), calcium chloride in a paste (**CHLORPASTE**), calcium chloride in a liquid (**CHLORLIQUID**) and a calcium propionate plus propylene glycol gel (**CAPROP**). Experiment one and two were switch back designs. Experiment one was conducted with four non-pregnant, non-lactating Holsteins and experiment two was conducted with four late lactation Holsteins. Immediately post treatment (within 5 min), but not subsequently, oral administration of PROPOX increased serum ionized Ca and decreased blood pH ($P < .05$) and tended to elevate blood ionized Ca and serum normalized Ca ($P < .1$) compared to CON. In experiment two, no differences ($P > .1$) were observed between non-pregnant lactating cows administered PROPOX or CON. Experiment three was a single period continuous design comparing high doses (200 g of Ca) from PROPOX, CHLORPASTE, and CHLORLIQUID administered to non-lactating, non-

pregnant Holsteins. Cows given high doses of CHLORPASTE exhibited metabolic acidosis by three hours post treatment (reduced blood pH, bicarbonate, base excess, and urine pH, and greater $p\text{CO}_2$; $P < .05$) and had greater blood ionized calcium concentrations than PROPOX and CHLORLIQUID ($P < .05$). In experiment four, calcium oxide was removed and propylene glycol was added to the calcium propionate based gel. Four pregnant, non-lactating Holstein cows paired by parity were assigned to a completely randomized single period continuous design comparing oral administration of a calcium propionate plus propylene glycol gel (**CAPROP** = 110 g Ca and 454 g propylene glycol) to a propylene glycol gel alone (**CONTROL** = 454 g propylene glycol). Blood and urine samples were taken over time following dosing. By 30 min after dosing, blood ionized and normalized Ca values were 24% and 25% greater ($P < .05$) for cows given CAPROP compared to CONTROL (6.05 vs. 4.87 mg/dl and 6.44 vs. 5.14 mg/dl). Blood Ca remained different for 6 hr ($P < .05$) after dosing. Two hours after dosing, blood pH and HCO_3 were higher ($P < .05$) for cows given CAPROP compared to CONTROL (7.48 vs. 7.42 and 24.59 vs. 21.88). No differences were noted for urine pH ($P > .1$). We conclude that an oral calcium propionate gel is effective in elevating blood calcium concentrations without causing metabolic acidosis.

Key Words: hypocalcemia, acid-base status, calcium gels