

## Dissolution rates of calcium boluses and their effects on serum calcium in dairy cattle

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Calcium supplement boluses vary greatly in content and bioavailability. *In vivo* dissolution and bioavailability studies were conducted to compare commercial calcium supplement boluses with various contents of calcium chloride and calcium carbonate. The commercial products studied included: Bolus 1 (Calcium Chloride, No Calcium Carbonate), Bolus 2 (Calcium Chloride, Medium Calcium Carbonate), and Bolus 3 (Calcium Chloride, High Calcium Carbonate). Using fistulated animals, a bolus was placed in a pre-weighed coarse mesh net for 30, 60, 90, 120, 180, and 240 minutes. Bolus 1 was the quickest to dissolve (<90 minutes), followed by Bolus 2 (<180 minutes). The high calcium carbonate bolus (Bolus 3) remained after 240 minutes *in vivo* with a minimum of 75% of the original bolus weight still intact. The calcium uptake in 30 Holstein cows (second and third lactation) were randomly allocated to one of three oral calcium protocols: Treatment 1 (two high calcium chloride boluses at time 0); Treatment 2 (one high calcium chloride bolus at time 0 with a second bolus 12 hours later); or Treatment 3 (two high calcium carbonate boluses at time 0). Cows with severe hypocalcemia (<1.8 mmol/L) responded with a higher serum calcium increase than cows with milder hypocalcemia (>1.8 mmol/L, <2.12 mmol/L). The high calcium carbonate bolus group (Treatment 3) did not show a rapid increase in serum calcium as compared to the high calcium chloride groups (Treatments 1 and 2). The animals receiving Treatment 1 had a greater and more persistent serum calcium response than animals receiving Treatment 2. The study outcome suggests that calcium chloride/calcium sulfate boluses are more effective at generating a serum calcium response than boluses containing high amounts of calcium carbonate and that two boluses administered rapidly after calving may be more effective than the traditional treatment of giving 2 boluses 12 hours apart.

## Etiology of Scours in Veal Calves, and Evaluation of Activated Charcoal as an Alternative to Antibiotics

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Neonatal calf diarrhea (or “scours”) is a major cause of death and economic loss in the beef and dairy industries. Although caused by a variety of pathogens, including viruses, bacteria, and parasites, scours treatment often involves systemic antimicrobials, which only target bacteria. Given the current climate of concern surrounding antimicrobial stewardship and resistance, novel therapies are needed. Activated charcoal can adsorb a variety of substances, including bacteria, toxins, and viruses, and might present a viable alternative to antibiotics. This study aims to identify the most common etiological agents for non-severe scours in 258 veal calves from a single site in southern Alberta and compares the efficacy of charcoal to that of a standard antibiotic (treatments C and A, respectively). A commercially available kit (Bovine Enterichek) was used to detect the most common scours-causing agents in Day 0 fecal samples: Rotavirus, Coronavirus, *Escherichia coli* K99 (F5), and *Cryptosporidium parvum*. Direct plating of the fecal samples was also employed to quantify *Campylobacter spp.* and total coliforms. The vast majority of positive samples were non-bacterial: 61.9%, 1.95%, and 77.0% of the animals were positive for rotavirus, coronavirus, and *C. parvum*, respectively, while just 0.78% of the animals were positive for *E. coli* K99 (F5). *Campylobacter spp.* and total coliforms were recovered in 1.6% and 92.2% of samples, respectively. For both A and C, positivity rates decreased significantly by Day 7 relative to Day 0, suggesting a reduction in pathogen load regardless of treatment. Mortality was 6.2% and most animals (91.5%) recovered over the 7-day observation period, with no significant differences between treatments A and C. The mean time-to-recovery was 2.3 days, with group C being slower to recover than A (2.7 vs 2.1 days, respectively; P=0.0243). Overall, treatment with antibiotics had little benefit relative to charcoal; indeed, a healthy immune response might be more important than either treatment. Nonetheless, non-antimicrobial treatments for diarrhea could provide an effective tool to reduce antibiotic use and optimize production efficiency.