Dietary Calcium Levels for Close-up Dry Cows Fed Anionic Supplements

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Nutritionists have differing opinions on the amount of calcium to feed to pre-fresh cows being supplemented with anions to reduce dietary cation-anion difference (DCAD). With calcium recommendations ranging from no supplemental calcium to upwards of 200 grams/cow/day, there are anecdotal reports of “success” throughout the range. The scientific literature can provide some guidance on this subject.

Beede et al. (1999) fed diets with 0.47%, 0.99%, 1.51%, and 1.94% calcium to pre-partum cows that had been metabolically acidified (urine pH ranging from 6.3 to 6.6) by feeding a chloride supplement. A positive DCAD group (urine pH=8.1) was fed a diet with 0.47% calcium. Plasma ionized calcium (iCa) on day of calving was diagnostically normal (4.32 mg/dl) for positive DCAD control cows, and it was significantly higher for all 4 acidified groups. But, no measures of health or performance in the transition period or through 70 days of lactation were affected by pre-partum calcium level for the acidified cows.

Using Holstein cows, Goff and Horst (2012) fed a pre-partum diet with 0.46% calcium to a positive DCAD control group (urine pH of 8.2) and diets with 0.46% and 0.78% calcium to two groups of mildly acidified cows (urine pH ranged from 7.1 to 7.4). Cows fed the positive DCAD treatment were hypocalcemic (plasma calcium = 7.17mg/dl) at time of calving, whereas both acidified groups had normal blood calcium levels (plasma calcium = 8.0 mg/dl or higher). For the metabolically acidified cows, calcium intake did not affect calcium status at time of calving.

Rodriguez et al. (1999) fed diets with 0.48% or 1.98% calcium to Holstein cows for 28 days before expected calving date. Both groups were metabolically acidified to a similar degree (average urine pH of 6.1) by feeding a chloride supplement. Cows fed 1.98% calcium had lower plasma total calcium at calving, and lower iCa (3.68 vs. 4.44 mg/dl) within 12 hours after calving. The incidence of clinical hypocalcemia (iCa<4.0 mg/dl) was 36% vs. 9% for 1.98% and 0.48% calcium, respectively. Measures of bone formation and resorption indicated that the high level of dietary calcium reduced bone calcium mobilization.

These trials suggest that benefits may be realized from feeding anionic supplements to pre-fresh cows when the basal diet creates challenges to maintaining normal calcium status. Low to moderate amounts of dietary calcium appear adequate for achieving normal calcium status at calving, with no apparent advantage to feeding higher levels (1.51% to 1.94%). One trial suggests that high dietary calcium (1.98% of diet DM) has a negative impact on blood calcium status on day of calving. While having a modest amount of supplemental calcium throughout the digestive tract at time of calving would seem judicious, several aspects of good DCAD management are likely more important than calcium intake.

References:
Beede et al., 1999. J. Dairy Sci. 82(Suppl. 1):69
Goff and Horst, 2012. J. Dairy Sci. 95(Suppl. 1):444
Rodriguez et al., 1999. J. Dairy Sci. 82(Suppl. 1):68