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Effect of Prepartum Dietary Cation-Anion Difference on Periparturient Feed Intake and Milk Yield

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The objectives of the current research were to determine if dietary cation-anion difference (DCAD) and source of anions influence periparturient feed intake and milk production in the subsequent lactation. Thirty-five multiparous and 19 primiparous Holstein cows were blocked by calving date 4 wk prior to expected calving date and assigned to one of four prepartum diets in a 2 x 4 factorial arrangement of treatments. Diets differed in DCAD (cationic or anionic) and anionic supplement (Bio-Chlor®, Fermenten®, or fertilizer grade anionic salts), and were control (DCAD +20 mEq/100g), Bio-Chlor® (DCAD -12 mEq/100g), Fermenten® (DCAD -10 mEq/100g), and salts (DCAD -10 mEq/100g). Cows were group housed and fed individually via Calan® doors. All cows received a common diet at calving through 3 wk postpartum. Variables measured were urine pH, DMI, milk production, total plasma Ca, plasma non-esterified fatty acids (NEFA), plasma β-hydroxybutyrate (BHB), and liver triglyceride (TAG). Data were analyzed using the MIXED procedure of SAS. Cows receiving an anionic diet prepartum responded similarly across anionic supplement. Therefore, anionic diets were pooled and compared to control. Prepartum urine pH was lower for cows that consumed an anionic diet compared to control (6.4 vs 8.0; $P < 0.01$). As expected, prepartum DMI was greater for multiparous compared to primiparous cows (14.2 vs 11.9 kg/d; $P < 0.01$) and diet did not affect prepartum DMI. Postpartum DMI and milk yield were similar for primiparous cows receiving an anionic prepartum diet compared to control. However, postpartum DMI (19.1 vs 17.1 kg/d for anionic and control, respectively) and milk yield (43.1 vs 36.6 kg/d for anionic and control, respectively) were greater ($P < 0.01$) for multiparous cows fed a prepartum anionic diet versus control. Diet had no effect on prepartum plasma Ca of all cows and postpartum plasma Ca of primiparous cows. Multiparous cows receiving an anionic diet during the prepartum period tended ($P < 0.09$) to have greater plasma Ca during the postpartum period compared to control (8.8 vs 8.4 mg/dL; $P < 0.09$). Prepartum NEFA differed for parity (268 vs 73 µmol/L for multiparous and primiparous, respectively; $P < 0.01$). Although diet did not affect prepartum NEFA, cows receiving an anionic diet prepartum had lower NEFA postpartum (460 vs 614 µmol/L for anionic and control, respectively; $P < 0.01$). Liver TAG was greater for multiparous cows at 3 wk postpartum (7.9 and 3.6% of wet weight for multiparous and primiparous, respectively; $P < 0.01$). Diet had no effect on liver TAG. Prepartum BHB was greater for multiparous cows (5.8 and 4.8 mg/dL for multiparous and primiparous, respectively; $P < 0.01$). There was a tendency for multiparous cows fed an anionic diet prepartum to have lower BHB postpartum (7.7 and 11.3 mg/dL for anionic and control, respectively; $P < 0.06$). For primiparous cows, postpartum BHB was lower ($P < 0.01$) for cows fed a prepartum anionic diet (5.4 mg/dL) compared to control (7.9 mg/dL). **Results indicate that feeding multiparous cows an anionic diet (DCAD ≈ -10 mEq/100g) the last 3 wk of gestation increases postpartum DMI and milk production, and decreases fat mobilized during early lactation. Although postpartum performance of primiparous cows was not improved by prepartum anionic diets, results do not show that prepartum anionic diets have deleterious effects on parameters measured in this study.**

This abstract was part of the results of an extensive study conducted at Oregon State by (now) Dr. Michael DeGroot. His Ph.D. defense is over and was accepted (so it is considered published) and he is now going to publish papers in the Journal of Dairy Science.

Because of space limitations in the abstract, you are only seeing a small portion of the results. .These results are only related to the effect of negative DCAD prepartum.

The trial set-up was that there were 4 diets prepartum (control with a DCAD of +20; DCAD of -10 using anionic salts: DCAD of -10 using BioChlor; and DCAD of -7 using FERMENTEN). All diets were equivalent in all nutrients except DCAD components and were transition diets formulated on CPM without the bacterial correction factors for FERMENTEN/BioChlor. All cows received the same postpartum ration.

It just happened that because of the forages and other ingredients used at Oregon State, the DCAD of the FERMENTEN and BioChlor diets were too close to discern a difference.

For the abstract, we combined all of the negative DCAD diets and compared them to control:

1. Across all negative DCADs, there was no effect on prepartum DMI compared to control
2. DMI and milk production in the first 21 days postpartum was significantly higher for cows fed anionic diets prepartum by **2 kg/d for DMI and 6.5kg/d for milk.**
3. Cows fed anionic diets prepartum had higher blood calcium, lower liver triglyceride (fat) and lower blood ketones in the postpartum period.
4. primiparous cows showed few of these effects that the muliparous cows showed but the critical point is that there were NO NEGATIVE EFFECTS OF NEGATIVE DCAD ON PRIMIPAROUS COWS.

When I get the thesis we will show the milk responses. There you will see that BioChlor and FERMETNEN cows produced more milk than the cows fed anionic salts.

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