



Abstract Summary

Title: Increasing dose of prepartum rumen protected choline: Effects on milk production in Holstein dairy cows

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Objective: Investigate the effect of prepartum rumen protected choline (RPC) dose on postpartum performance

Treatments:

- Pregnant multiparous Holstein cows (n=106) were randomly assigned to receive one of the following treatments prepartum:
 - 0 g RPC (control; CTL)
 - 15 g of choline ion from RPC2 (recommended dose; RD)
 - 22 g of choline ion from RPC2 (high dose; HD)
 - recommended dose of choline ion from ReaShure
- Postpartum, cows were fed a CTL lactating diet or diet with RD of the respective RPC for 21 days followed by a common lactating diet (0 g RPC) until 100 days.

Results:

1. Feeding RPC_{2RD} during the supplementation period:
 - a. reduced or tended to reduce prepartum DMI compared to CTL and RPC_{2HD}
 - b. reduced MUN
2. During the supplementation period:
 - a. ECM was similar across treatments
3. Post supplementation period:
 - a. RD tended to increase ECM, fat yield, and protein %.
4. Supplementing RD of RPC tended to increase, and RPC_{2HD} increased, de novo proportion of total milk fatty acids.
5. Increasing prepartum RPC₂ intake had a quadratic effect on MUN during the supplementation period and tended to quadratically effect milk protein % and de novo proportion of fatty acids during the post supplementation period.

Take Home Message: Consistent with previous research, the recommended dose of RPC tended to increase ECM, even in very high producing cows.



Full Abstract

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Peripartum supplementation of rumen protected choline (RPC) is beneficial, yet the optimal supplementation rate is unknown. The objective of this study was to investigate the effect of prepartum RPC dose on postpartum performance. Pregnant multiparous Holstein cows (n=106) were randomly assigned to 0g (control; CTL), 15g (recommended dose; RD), or 22g (high dose; HD) of choline ion from a concentrated RPC prototype (RPC2; Balchem Corp.) or the RD of choline ion from an established product (RPC1; ReaShure, Balchem Corp.; positive control). Treatments (trt) were mixed into the TMR and cows had ad libitum access via Insentec feeders (Hokofarm Group; 4 feeders/trt) which allowed quantification of individual intake. Postpartum, cows were fed a CTL lactating diet or diet with the RD of their respective RPC product for 21d (supplementation period; SP) and a common lactating diet (0g RPC) thereafter until 100d (postSP). Milk yield was recorded daily and composition analyzed weekly. Mixed models analyzing categorical trt effects and continuous effects of actual dam RPC2 intake were performed in PROC MIXED, SAS 9.4. Differences were significant at $P < 0.05$, and tendencies at $0.05 < P < 0.1$. Feeding RPC2RD reduced ($P < 0.01$) or tended to reduce ($P = 0.09$) prepartum DMI compared to CTL and RPC2HD. During SP, energy-corrected milk yield (ECM) was similar across trt but postSP, the RD tended to increase ($P < 0.1$) ECM (54.8, 56.9, 55.8, 56.7 kg; CTL, RPC2RD, RPC2HD, RPC1RD), fat yield (+0.08kg), and protein % (+0.08%). Feeding RD tended to increase ($P < 0.09$), and HD increased ($P < 0.05$), de novo proportion of total milk fatty acids. Increasing prepartum RPC2 intake had a quadratic effect ($P = 0.02$) on MUN during SP and tended to have a quadratic effect ($P < 0.10$) on MUN, protein %, and de novo proportion of fatty acids during postSP. ECM yield was increased with both RD, consistent with previous research, despite higher levels of production across trt in this study compared to past experiments. In contrast, no additional yield improvements were observed with HD in this study and RPC2 dose intake models suggest an optimal dose below HD at this level of production.

Keywords: Transition cow, fatty acid