2335W: Effects of feeding 2 rumen-protected choline sources during the transition period on Holstein dairy cows performance and blood metabolites

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INTRODUCTION

- Supplementation of rumen-protected choline (RPC) to peripartum dairy cows has been of interest due to the consistent improvements in milk performance and reduction of postpartum metabolic incidences[1].
- Choline is a methyl donor that may increase hepatic phosphatidylcholine synthesis and triglyceride secretion during the peripartum[2,3].

OBJECTIVE

Evaluate the effect of two sources of RPC supplemented from 21 d pre- to 35 d postpartum on production performance and blood metabolites.

APPROACH

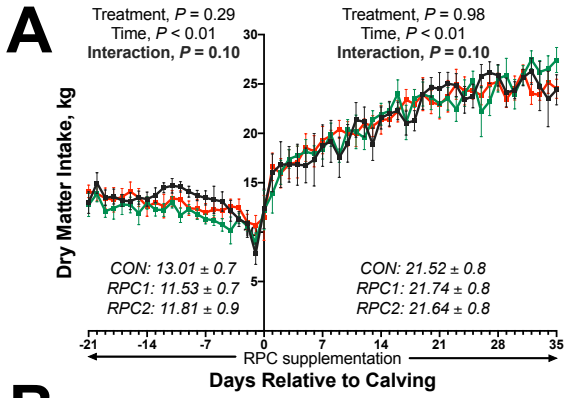
- Twenty-four multiparous Holstein dairy cows (248 ± 4.9 days caring calf, 3.6 ± 2 parity, 2.7 ± 0.3 BCS) were randomly assigned to 1 of 3 groups (n = 8).
- Cows were fed a corn-silage based total mixed ration formulated to provide 2.38 (pre-) and 2.19 (postpartum) Met as % of metabolizable protein and top-dressed with the following treatments:

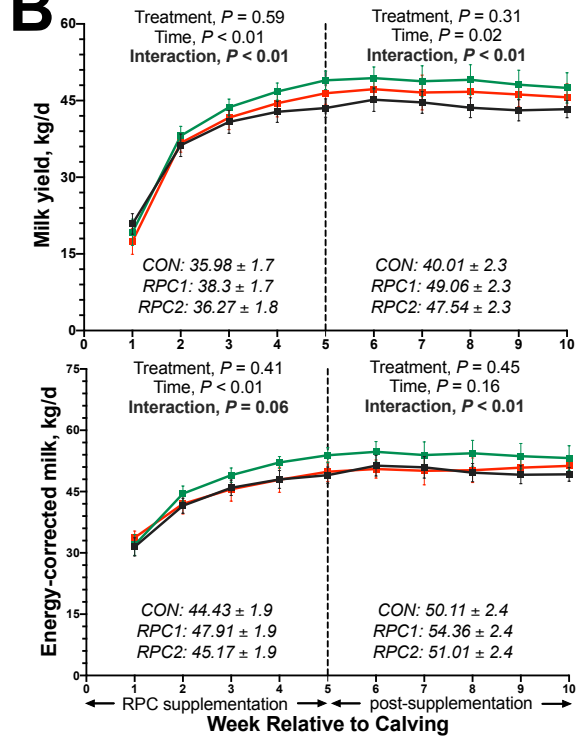
  CON = unsupplemented.

  RPC1 = 60 g/d of Ruprocol®, Vetagro S.p.A., Italy, a lipid-microencapsulated product containing 25 % choline chloride (CC).

  RPC2 = 25 g/d of Reashure® XC, Balchem Corp., USA, a lipid-encapsulated product containing 60% of CC.
- **Either RPC supplement provided 15 g/d of CC.**
- Cows were fed once and milked twice daily. Dry matter intake (DMI), milk yield and components were recorded daily.
- Blood metabolites were determined by an automated biochemistry analyzer (ILAB 650; Instrumentation Laboratory, Lexington, MA) in accordance with methods already described by Calamari et al., 2016[4].
- Data were analyzed under a mixed model with the random effect of cow and the fixed effects of parity and days in milk (DIM), treatment and their interaction.

RESULTS





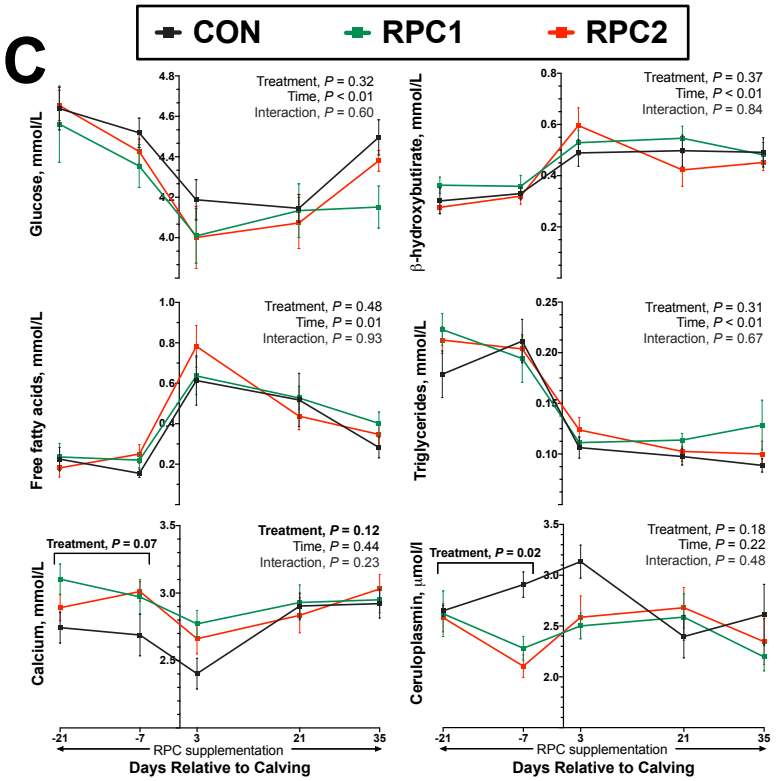


Table 1. Milk solids (kg/d) during RPC supplementation (week 1 to 5).

Milk solids, kg/d	CON	RPC1	RPC2	*P* value Treatment	Time	Interaction
Fat	1.79	1.92	1.80	0.30	<0.01	**<0.01**
Protein	1.25	1.37	1.30	0.51	<0.01	0.24
Lactose	1.95	2.11	2.03	0.37	<0.01	0.08

Table 2. Efficiency of pre-partum DMI relative to MY and ECM during RPC supplementation (week 1 to 5) and post-supplementation (week 5 to 10). Calculations based on Holdorf et al., 2022[5].

Efficiency, kg/kg	CON	RPC1	RPC2	Treatment, *P* value
RPC supplementation MY/pre-partum DMI	2.7	3.4	3	0.06
Post-supplementation MY/pre-partum DMI	3.3	4.2	3.9	0.07
RPC supplementation ECM/pre-partum DMI	3.3[b]	4.1[a]	3.6[ab]	**0.03**
Post-supplementation ECM/pre-partum DMI	3.7	4.7	4.2	0.06

CONCLUSIONS

- Interestingly, even if all cows were fed ad libitum during the trial, **RPC cows showed a numerical reduction of -1.35kg/d in pre-partum DMI relative to CON** (Interaction *P* = 0.10; Figure A).
- Blood glucose, β-hydroxybutirate, free fatty acids and triglycerides results support that RPC **cows were not in a different metabolic status** compared to CON (*P* > 0.10; Figure C).
- CON cows had lower blood calcium levels (*P* = 0.07) and higher blood ceruloplasmin (*P* = 0.02) around parturition relative to RPC cows. This findings could indicate that **feeding RPC might contribute to the resolution of calving-related inflammation**.
- Although no treatment effects were detected on MY, energy-corrected milk (ECM) or milk solids, an interaction treatment x time is suggesting that feeding RPC increased MY (*P* < 0.01), ECM (*P* = 0.06) and milk fat yield (P < 0.01) over time during RPC supplementation (Figure B and Table 1). This is probably due to numerically **greater milk solids, specially for RPC1** compared to CON and RPC2 (Table 1).
- Same interaction during post-supplementation period was observed on MY and ECM (*P* < 0.01; Figure B).
- **RPC groups had a greater pre-partum DMI efficiency relative to MY and ECM during RPC supplementation** (week 1 to 5) **and post-supplementation** (week 5 to 10) compared to CON (*P* ≤ 0.07). In particular, **RPC1 was more efficient on ECM** during week 1 to 5 compared to CON and RPC2 (*P* = 0.03; Table 2).
- These preliminary results would suggest that **RPC has an effect on energy and nutrient utilization**, not only while supplemented but also later on over the lactation. In this study, **RPC1 is showing a more pronounced response compared to RPC2**.

SUPPORT

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