Abstract Summary

Title: Increasing dose of prepartum rumen protected choline: Effects of *in utero* exposure on growth and feed efficiency in Holstein dairy calves

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Objective: Investigate the effect of late gestation rumen protected choline (RPC) dose on growth and health in calves.

Treatments:

- Multiparous Holstein cows pregnant with female Holstein calves (n=50) 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
- Calves were fed one gallon of colostrum after birth from dams within the same treatment and thereafter fed an accelerated milk replacer program and offered ad libitum access to calf starter.

Results:

1. Abomasal bloat affected 36% of calves, but no difference in bloat or health were observed across treatments.
2. Increasing RPC2 dose linearly increased average daily gain and feed efficiency during the first 2wk of life.
3. No effects of RPC were observed on blood fatty acid, BHB, or blood urea nitrogen concentrations.
4. All RPC treatments increased blood glucose.
5. Blood lipopolysaccharide binding protein was quantified at 7d in CTL and $RPC2_{RD}$ calves and tended to be decreased by feeding $RPC2_{RD}$.

Take Home Message: The increased average daily gain and feed efficiency, taken together with the LBP and glucose responses, suggest that *in utero* exposure to RPC2 may have reduced inflammation and spared glucose for growth.

Full Abstract

Increasing dose of prepartum rumen protected choline: Effects of *in utero* exposure on growth and feed efficiency in Holstein dairy calves

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Feeding pregnant cows rumen protected choline (**RPC**) has potential to impact the growth and health of their calves. The objective of this study was to investigate the effect of late gestation RPC dose on growth and health in calves. Multiparous Holstein cows pregnant with female Holstein calves (n=50) 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. Calves were fed colostrum after birth from dams within the same trt and then fed an accelerated milk replacer (**MR**) program and offered ad libitum access to calf starter. Jugular vein blood samples were collected and BW was measured at 7, 14, 28, 42, and 56d. 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 $P \leq 0.05$, and tendencies at $0.05 < P \leq 0.1$. No differences ($P \geq 0.12$) in measures of health were observed across trt; however, some calves across trt experienced abomasal bloat (36%). Increasing RPC2 dose linearly increased ($P \leq 0.03$) average daily gain (**ADG:** b = 0.0059kg/d per g choline ion) and feed efficiency (**FE:** +0.032% per g choline ion**)** during the first 2wk of life. No effects of RPC were observed ($P \geq 0.16$) on blood fatty acid, beta-hydroxybutyrate, or blood urea nitrogen concentrations. All RPC trt increased ($P \leq 0.03$) blood glucose. Blood lipopolysaccharide binding protein (**LBP**) was quantified at 7d in CTL and $RPC2_{RD}$ calves and tended to be decreased ($P \leq 0.09$) by feeding $RPC2_{RD}$. The increased ADG and FE, taken together with the LBP and glucose responses, suggest that in utero exposure to RPC2 may have reduced inflammation and spared glucose for growth and should be further examined.

Keywords: Inflammation, methyl donor, glucose