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## Effects of feeding rumen-protected choline 21 days prepartum to 100 days postpartum on lactation, health, reproduction, and culling of Holstein dairy cows

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Our objective was to evaluate whether extending rumen-protected choline (RPC) supplementation from 21 days prepartum to 100 days postpartum improves lactation, health, culling, and reproductive performance in a large commercial dairy herd. Holstein cows were blocked by parity and randomly assigned to the control (CON; n = 389) or RPC (n = 385) group. Cows were fed as pen/cohort (n = 28), the experimental unit, with individual cows as observational units. The RPC group received 15 g/day prepartum (-21 to 0) and 30 g/day postpartum (0 to 100 days) of RPC (CholiGEM™, Kemin Industries Inc.), while CON only received 30 g/day for 0 to 21 days postpartum. Data were analyzed using mixed models, Cox proportional hazard models, and logistic regression in JMP. Health outcomes did not differ significantly between groups for metritis (CON = 4.9% ± 2.8% vs. RPC = 3.1% ± 2.7%; P = 0.22) or mastitis (CON = 38.0% ± 7.5% vs. RPC = 37.4% ± 7.0%; P = 0.88). However, RPC tended to reduce stillbirth incidence (CON = 8.2% ± 3.5% vs. RPC = 4.2% ± 3.4%; P = 0.10) and significantly lowered culling rates (CON = 36.5% ± 6.2% vs. RPC = 27.1% ± 6.1%; P < 0.001). Interestingly, RPC-fed cows had a delayed first estrus (CON = 34.0 ± 3.8 days vs. RPC = 41.3 ± 3.7 days; P < 0.01) but showed no differences in time to first artificial insemination (CON = 76.7 ± 2.2 days vs. RPC = 77.2 ± 2.1 days; P = 0.85) or first-service pregnancy per AI (CON = 31.5% ± 7.0% vs. RPC = 35.9% ± 6.6%; P = 0.29). Notably, more RPC-fed cows were pregnant by 150 DIM (CON = 56.8% ± 7.0% vs. RPC = 65.7% ± 6.8%; P = 0.03). For lactation up to 150 DIM, RPC supplementation improved fat-corrected milk yield (RPC = 46.3 ± 0.6 kg vs. CON = 45.2 ± 0.6 kg; P = 0.02), energy-corrected milk yield (RPC = 45.4 ± 0.6 kg vs. CON = 44.3 ± 0.6 kg; P = 0.02), fat yield (RPC = 1.74 ± 0.2 kg vs. CON = 1.70 ± 0.2 kg; P = 0.009), and protein yield (RPC = 1.34 ± 0.2 kg vs. CON = 1.31 ± 0.2 kg; P = 0.04). These findings suggest that extended RPC supplementation benefits lactation, health outcomes, culling rates, and reproductive performance in dairy cows.

**KEYWORDS:**
Fertility, estrus, survival