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Rumen-protected methionine supplementation during the transition period under heat stress: impact on cow-calf performance

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Dairy cows exposed to heat stress (**HS**) during the dry period produce less milk and milk protein in the next lactation and give birth to smaller calves. Rumen-protected methionine (**RPM**) has been shown to modulate protein, energy, and placenta metabolism, suggesting RPM may be a nutritional intervention to mitigate adverse HS effects. We examined the effects of RPM supplementation to transition cows under HS induced by electric heat blankets (**EHB**) on cow-calf performance. Fifty-three Holstein cows were housed in a tie-stall barn 6 weeks before expected calving and fed a control diet (**CN**, 2.2% Met of MP) or a CN diet with Smartamine®M (**MT**, 2.6% Met of MP, Adisseo Inc., France). Four weeks pre-calving all MT and half CN cows received an EHB. The other half of the CN cows were left at thermoneutrality (**TN**) resulting in: CNTN, CNHS, MTHS (n=17-19). Respiration rate (**RR**) and skin temperature (**ST**) were measured thrice weekly. Post-calving body weights (**BW**) and BCS were recorded weekly. Daily milk yield was recorded, and components were analyzed every third day. Calf birth weight and stature were measured, and apparent efficiency of absorption (**AEA**) of immunoglobulins was calculated. Data were analyzed using the MIXED procedure of SAS with 2 orthogonal contrasts: CNTN vs. the average of CNHS and MTHS (**C1**) and CNHS vs. MTHS (**C2**). The use of EHB increased RR (C1: 39.0 vs. 51.9 ± 1.4bpm) and ST (C1: 31.2 vs. 34.4 ± 0.1°C), relative to TN (P<0.0001). Post-calving BW, BCS, and milk yield were not impacted by the EHB (P≥0.36), however, protein % was reduced by EHB (C1: 3.3 vs. 3.2 ± 0.04%, P=0.07) but SNF was not (C1: 9.2 vs. 9.2 ± 0.06%, P=0.6). Protein % (C2: 3.1 vs. 3.3 ± 0.05%) and SNF (C2: 8.9 vs. 9.4 ± 0.07%) were significantly lower in CNHS, relative to MTHS (P≤0.005). Calf birthweight (C1: 42.7 vs. 39.5 ± 0.96kg) and AEA (C1: 53.8 vs. 38.9 ± 5.2%) were reduced by HS (P≤0.02), and wither heights tended to be shorter in CNHS (C1: 78.6 vs. 77.4 ± 0.6cm; P=0.13; C2: 76.5 vs. 78.2 ± 0.7cm; P=0.09),

compared to MTHS heifers. Overall, RPM supplementation to transition cows reverts the negative impact of HS on milk protein and calf wither heights.

Adisseo Message:

As climate change occurs, heat stress will continue to cause losses for the livestock industry. Supplemental methionine during the peripartum period has been increasing on commercial farms due to the beneficial effect of methionine on milk production, health, and metabolism, as well as on the developing fetus. This study aimed to further understand the beneficial effects of methionine during the peripartum period by examining the effects of rumen-protected methionine supplementation during exposure to heat stress in late gestation and early lactation. The results underscore the negative effects of heat stress on milk protein production and birth weight of calves. However, consistent with previous work using late-lactation cows (Pate et al., 2020), methionine supplementation helped to mitigate the negative effects of heat stress on milk protein.