436 Rumen-protected methionine during heat stress alters hepatic cystathionine β-synthase and methionine adenosyltransferase activity.

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The objective was to investigate the effects of dietary rumen-protected Met (RPM) during a heat stress (HS) challenge on antioxidant status and enzyme activity in one-carbon metabolism. Thirty-two multiparous, lactating Holstein cows (184 ± 59 DIM) were randomly assigned to 1 of 2 environmental treatments, and 1 of 2 dietary treatments [TMR (CON) or TMR with RPM (Smartamine M; Adisseo Inc., France; 0.105% DM as top dress)] in a crossover design. The study was divided into 2 periods with 2 phases. During phase 1 (9d), all cows were in thermoneutral conditions (TN; THI = 60 ± 3) and fed ad libitum. During phase 2 (9d), group 1 was exposed to HS using electric heat blankets. Group 2 remained in TN, but was pair-fed to HS counterparts. After a 14d washout, the study was repeated (period 2). Environmental treatments were inverted relative to phase 2 in period 1, while dietary treatments were the same. Liver biopsies were performed at the end of each period to measure cystathionine β-synthase (CBS) and methionine adenosyltransferase (MAT) activity and glutathione (GSH) concentrations. Data were analyzed using PROC MIXED in SAS and Pearson correlations were performed between CBS, MAT, GSH, milk yield (MY) and dry matter intake (DMI) in HS cows. There was an Env × Diet effect for CBS (P = 0.01); activity was lower in RPM vs. CON cows during HS (P = 0.01) and CON cows tended to have greater activity during HS compared with TN conditions (P = 0.09). An Env × Diet effect was observed for MAT activity (P = 0.02), with RPM cows having lower activity than CON during HS (P = 0.02). Additionally, while MAT increased in CON cows during HS vs. TN (P = 0.06), RPM cows tended to have greater activity during TN vs. HS (P = 0.10). During HS CBS tended to be positively correlated with MY (r = 0.31; P = 0.08). Concentrations of GSH were positively correlated with DMI (r = 0.37; P = 0.05), MY (r = 0.37; P = 0.04) and MAT activity (r = 0.46; P = 0.01). Overall, preliminary observations suggest that RPM may help maintain homeostasis in onecarbon metabolism during HS. Increases in CBS activity during HS may help support antioxidant and milk production.

Key Words: amino acid, lactation