438 Hepatic insulin and antioxidant signaling are altered by rumen-protected methionine during heat stress in response to lipopolysaccharide challenge.

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The objective was to investigate the effects of rumen-protected Met (RPM) during a heat stress (HS) challenge on the response of liver tissue to lipopolysaccharide (LPS). 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 with RPM (Smartamine M; Adisseo Inc., France; 0.105% DM as top dress) or TMR without RPM (CON)] in a crossover design. The study was divided into 2 periods with 2 phases. During phase 1 (9 d), all cows were in thermoneutral conditions (TN; THI = 60 ± 3) and fed ad libitum. During phase 2 (9 d), group 1 was exposed to HS using electric heat blankets (THI = 89 ± 3). Group 2 remained in TN (THI = 61 ± 4) but was pair-fed to HS counterparts. After a 14-d 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. Fifty mg of tissue per cow was incubated with 0 or 3 μg/mL of LPS for 2 h and protein extracted. Data were analyzed using PROC MIXED in SAS. An Env × diet × LPS interaction was observed for phosphorylated (p) protein kinase B (AKT); when incubated with LPS, abundance was lower in explants from HS RPM cows compared with CON HS cows ($P = 0.01$). There was a tendency for an Env × LPS for insulin receptor (INSR; $P = 0.08$) where explants from HS cows incubated with or without LPS had a greater abundance of INSR than explants from TN cows ($P < 0.05$). An Env × Diet was observed for glucose transporter 4, pAKT and INSR ($P < 0.001$ for all); abundance of each protein was greatest in tissue from CON HS cows but did not differ with RPM ($P < 0.05$). The same Env × Diet was also observed for glutathione peroxidase 1 ($P = 0.02$). Lastly, there was an Env × Diet for cullin 3 ($P = 0.02$) where abundance was greater in HS CON cows compared with TN CON ($P = 0.01$) and HS RPM cows ($P = 0.03$). Overall, preliminary evaluation indicates that under HS RPM did not alter the response of liver tissue to LPS but may help maintain homeostasis in hepatic insulin and antioxidant signaling.

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