Abstract #319

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Rumen-protected methyl donors during late pregnancy: 2. Maternal Smartamine M and its association with hepatic gene expression in neonatal Holstein calves.

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The aim was to evaluate the effect of supplementing pregnant cows with rumen-protected methionine (MET) on neonatal calf liver expression of genes related to energy/lipid metabolism, insulin signaling, growth hormone signaling and inflammation. Forty Holstein calves born to cows receiving during the last ~4 wk of pregnancy MET (Smartamine M, Adisseo NA; ~2.9:1 Lys:Met; n = 20) or control (CON, ~3.35:1 Lys:Met, n = 20) were used. Immediately after birth calves were separated from the dam, fed first colostrum within 6 h (3.8 L with minimum IgG concentration of 50 g/L), housed individually and fed a common milk replacer (25% CP, 17% fat) twice daily. Liver biopsies were harvested (n = 8/group) at 4, 14, 28 and 50 (~1 wk post-weaning) d of age. Data were analyzed as repeated measures using the MIXED procedure of SAS. No maternal diet effect ($P > 0.05$) was observed on calf growth (body weight and withers height) from birth through weaning. Expression of genes related to lipoprotein metabolism (*APOB*, *MTTP*) and growth hormone signaling (*IGF1*, *GHR1A*) were not ($P > 0.05$) affected by maternal diet, but increased in expression over time ($P < 0.05$).*PCK1* and *FBP1* expression was greater ($P = 0.05$ and 0.02) in MET calves and increased ($P < 0.001$) over time in both groups. *PC* expression, however, was lower ($P = 0.007$) in MET calves and decreased ($P < 0.001$) over time in both groups. Lower ($P = 0.001$) *ACOX1* expression was observed in MET, while *CPT1A* was greater ($P < 0.001$). The insulin-signaling related genes *AKT2* and *SLC2A2* had greater ($P < 0.01$) expression in MET calves. Except for *FOXO1* and*SLC2A2*, all other genes evaluated in this pathway (*INSR*, *IRS1*, *AKT2*, *SREBF1*) increased ($P < 0.05$) expression over time regardless of maternal diet. MET calves had higher *NFKB* ($P = 0.009$) and *SOD2* ($P < 0.001$) expression, and also a trend ($P = 0.08$) for higher *SOD1*. Overall, the data suggest that maternal supplementation with MET during the last ~4 wk of gestation elicited changes in calf hepatic gene expression and, as such, might have led to functional differences in improving neonatal energy metabolism.

Key Words: fetal programming, nutrition, nutrigenomics