Effects of maternal nutrient restriction during late gestation on preweaning beef calf circulating metabolites

A. R. Sanders¹, A. R. Rathert², L. G. Wichman², C. A. Redifer², and A. M. Meyer² ¹Department of Animal Sciences, The Ohio State University, Columbus, OH ²Division of Animal Sciences, University of Missouri, Columbia, MO Presented on July 29, 2021

Blood metabolite concentrations can be used to assess the nutritional status of beef cattle, indicating how maternal nutritional plane effects offspring postnatal metabolism. To determine the effects of late gestational nutrient restriction on preweaning calf circulating metabolites, primiparous fall-calving crossbred beef heifers (BW: 451 ± 28 [SD] kg; BCS: 5.4 ± 0.7) were individually fed either 100% (n = 12) or 70% (n = 13) of NASEM net energy and metabolizable protein requirements for maintenance, pregnancy, and growth from d 160 of gestation to parturition. Calves only had access to their dam's milk through d 147 of age. Calf jugular blood was obtained at 7, 14, 21, 42, 63, 84, 105, 126, 147, 168, 189, and 210 days of age to determine plasma glucose and serum urea nitrogen concentrations using commercially available kits. Samples were run in duplicate on a 96 well-plate and analyzed with a UV-visible light microplate reader. Data were analyzed as repeated measures with nutritional plane, day, nutritional plane x day, calving date, and calf sex (when P < 0.25) as fixed effects. There was no effect of nutritional plane (P = 0.15) or a nutritional plane x day interaction (P = 0.11); however, there was an effect of day (P < 0.0001). Plasma glucose concentrations increased from d 7 to d 14 ($P \le$ 0.001) and decreased from d 14 to d 105 ($P \le 0.08$). Glucose concentrations increased between at d 147 and d 189 (P = 0.06) and decreased from d 189 to d 210 of age (P = 0.02). Serum urea nitrogen concentrations are still being analyzed. These data suggest that nutrient restriction did not have an effect on preweaning calf circulating metabolites. They also suggest that over time, glucose concentration decreases, which may indicate the development of the calf's rumen.

Keywords: developmental programming, preweaning, serum chemistry