Hepatic gluconeogenesis in dairy cows as affected by dietary starch level and supplementation with monensin during early lactation. M. M. McCarthy*[1], T. Yasui[1], S. H. Pelton[1], C. M. Ryan[1], G. D. Mechor[2], and T. R. Overton[1], *[1]Cornell University, Ithaca, NY, [2]Elanco Animal Health, Greenfield, IN*.

The objectives of this study were to determine the effects of postpartum dietary starch level and supplementation with monensin (M) on rates of in vitro hepatic gluconeogenesis and oxidation from propionate. Primiparous (n = 17) and multiparous (n = 37) Holstein cows were fed a high starch (HS) or low starch (LS) early lactation diet with 0 or 450 mg/d M by topdress in a 2 (starch) × 2 (M) factorial arrangement. Prior to parturition all cows received a common controlled energy diet ad libitum with a daily topdress of either 0 or 400 mg/d M, depending on early lactation treatment assignment. From parturition until d 21 cows were fed HS TMR (26.2% starch, 34.3% NDF, 22.7% ADF, 15.5% CP) or LS TMR (21.5% starch, 36.9% NDF, 25.2% ADF, 15.4% CP) with a daily topdress of 0 or 450 mg/d M. Biopsies were obtained on d 7 (± 4) postpartum and liver slices used in an in vitro incubation system to determine liver capacity to convert [1-^{14}C]propionate to CO_2 and glucose. Interactions of starch × M were not significant. There was no effect of starch or M treatment on liver capacity to oxidize propionate to CO_2, and effects of starch on gluconeogenesis were not significant. Cows fed M tended (P=0.14) to have greater capacity to convert propionate to glucose than controls. Primiparous animals had greater capacity for oxidation and gluconeogenesis from propionate than multiparous ani- mals (P = 0.04 and 0.01, respectively). In vitro incubation with insulin (10 nM) tended to decrease propionate oxidation to CO_2 (P = 0.10) but had no effect on propionate conversion to glucose. The ratio of rates of conversion of radiolabeled propionate to glucose and CO_2 provide an index of the efficiency of propionate utilization for gluconeogenesis; M supplementation increased the ratio of glucose to CO_2 (P = 0.05), which indicates that cows fed M have a greater propensity to convert propionate to glucose. Overall, primiparous cows had greater capacity to both oxidize and convert propionate to glucose than did multiparous cows and M increased hepatic capacity to convert propionate to glucose relative to CO_2.

Key Words: early lactation, gluconeogenesis, monensin