

Effects of Medium Chain Fatty Acid Supplementation on Dairy Cow Performance and Rumen Fermentation

M. Burdick, and M. Oba

University of Alberta, Canada; Email: burdick@ualberta.ca

Medium chain fatty acids (MCFA) are fatty acids with chain lengths between 6-12 carbons. Human research suggests that MCFA may affect energy partitioning and prevent obesity, but effects of MCFA supplementation in diets of lactating dairy cows have not been extensively studied. The objective of this study was to evaluate the effects of MCFA supplementation on performance, digestibility, and rumen fermentation of lactating dairy cows. Thirty ($n = 8$ primiparous, $n = 22$ multiparous) Holstein dairy cattle in mid lactation (637 ± 68.5 kg of body weight, 98.5 ± 27.4 days in milk; mean \pm SD) were used in a crossover design with 25-d diet adaptation and 3-d data collection periods. Cows were supplemented with MCFA at 0.25% of dietary dry matter (TRT) or additional dry ground corn replacing MCFA (CON). No differences were observed in dry matter intake, total tract nutrient digestibility or body weight between TRT and CON. However, there was a tendency towards a negative correlation between pre-trial milk yield and animal response to TRT in BW change ($P = 0.06$), where high producing cows increased BW to a lesser extent when fed MCFA. Milk yield did not differ between treatment groups but primiparous cows decreased lactose yield in TRT compared to CON (1.45 v. 1.51 kg/d; $P < 0.01$). Fat and protein yield did not differ between treatments. However, a negative correlation was found between pre-trial milk yield and animal responses to TRT in protein yield ($P = 0.04$), in which TRT decreased milk protein yield in higher-producing cows, but not in lower-producing cows. Minimum rumen pH tended to be higher in TRT compared to CON (5.66 v. 5.54 ; $P = 0.08$), whereas duration of acidosis (<5.8 , min/d) did not differ between treatment groups. Total rumen volatile fatty acid concentration and its profile did not differ between treatment groups. These findings suggest that inclusion of MCFA in diets of lactating dairy cows may not increase production performance but may decrease risk of rumen acidosis.

Heifers with Short Anogenital Distance have Better Fertility than those with Long Anogenital Distance

J.E. Carrelli*, M. Gobikrushanth†, M. Corpron‡, I. Rajesh*, W. Sandberg‡, M.G. Colazo§*, A. Ahmadzadeh‡, M. Oba*, and D.J. Ambrose§*¹

*University of Alberta, Canada; †University of Saskatchewan, Canada; ‡University of Idaho, USA; §Alberta Agriculture and Forestry, Canada; Email: carrelli@ualberta.ca

In today's environment, when replacement heifers are in oversupply, a reduction in age at 1st calving could improve profitability by reducing rearing costs up to \$3.25/hd/d. Anogenital distance (AGD, the distance from the anus to the clitoris in cattle) is a phenotype determined by exposure to male sex hormones during fetal development. Earlier studies with limited numbers of cows and heifers have shown that those with long AGD are less fertile than their short AGD counterparts. This expanded study was to determine if the same negative relationship exists between AGD and fertility measures in a larger group of maiden Holstein heifers. AGD was measured in 1,692 heifers where mean (\pm SD) age at measurement was 13.9 ± 1.5 mo. AGD was normally distributed with a mean of 107.3 ± 10.5 mm (range, 69 to 142 mm). Heifers were categorized into short (≤ 110 mm) and long (> 110 mm) AGD groups based on the optimum threshold AGD predictive of pregnancy to 1st AI (P/1stAI), and associations with fertility were determined. Heifers with short AGD required fewer services per conception (1.5 ± 0.1 vs. 1.7 ± 0.1 ; $P < 0.01$), conceived earlier (14.9 ± 0.2 vs. 15.1 ± 0.2 mo; $P < 0.01$), and had greater P/1stAI (58.3 ± 3.0 vs. 49.6 ± 3.1 %; $P < 0.001$) than those with long AGD. Moreover, heifers with long AGD had reduced pregnancy risk up to 15 mo than those with short AGD (hazard ratio: 0.59; $P < 0.001$). In summary, heifers with short AGD were more fertile than those with long AGD when services per conception, age at conception, P/1stAI, and cumulative pregnancy risk up to 15 mo of age were considered. These findings strengthen the potential for AGD to be used as a fertility trait and management tool in future selection programs.

Take Home Messages: (1) Heifers with short AGD have improved fertility compared with heifers with long AGD (2) Heifers with short AGD may offer an economic advantage through reduced rearing costs.