

Effects of calf starter, weaning, and butyrate supplementation on hindgut development in Holstein calves

S. G. Sayles¹, A. E. Mark¹, R. L. Hiltz², D. E. McCurdy², S. Moreland³, K. Klanderma³, A. H. Laarman^{1,2}

¹University of Alberta, Edmonton, Alberta, Canada T6G2P5; ²University of Idaho, Moscow, ID, USA 83844-2330; ³Adisseo USA Inc., Alpharetta, GA, USA 30022. Email: sayles@ualberta.ca.

The objectives of this study were to determine the effects of calf starter intake, the weaning transition, and butyrate supplementation on hindgut health of dairy calves. Thirty-six Holstein bull calves (age = 10.7 ± 4.1 d) were fed up to 1,200g/d of milk replacer and assigned to one of four treatments: 1) Pre-weaning groups fed only milk replacer (**PRE-M**), or 2) Pre-weaning group fed milk replacer, hay, and calf starter (**PRE-S**); 3) Post-weaning groups fed milk replacer, hay, and calf starter (**POST-S**); or 4) Post-weaning group fed milk replacer, hay, and calf starter supplemented with 1% wt/wt butyrate (**POST-B**). Both PRE-M and PRE-S were harvested at 48 days of age. Both POST-S and POST-B groups were weaned over 14 days, with milk replacer provision being reduced to 75% on day 49, 50% on day 56, and 0% on day 63. Both POST-S and POST-B groups were harvested at 10 weeks of age. Blood samples were collected on weeks 3, 5, and 7. At harvest, tissue samples of cecum, proximal colon, and distal colon tissue were collected and analyzed for genes involved in hindgut development, gut permeability, and immune responses; analysis of stress marker protein HSP70 was also conducted. Immune markers IL17A, TLR4, and TLR10 were upregulated in PRE-M calves, independent of tissue type. Additionally, these markers were upregulated in the cecum, regardless of dietary treatments. Hindgut development markers MKI67 and PCNA gene expression, as well as HSP70 protein content were higher in proximal colon than any other gut region. Gut permeability markers CLDN1 was highest in proximal colon, while OCLN was highest in the cecum. Serum amyloid-A concentrations decreased from week 3 to week 5.

Take home message: These data suggest that the cecum appears to be more immunologically active than the rest of the hindgut. Additionally, calf starter intake decreases inflammatory responses in the hindgut preweaning, and immune responses and epithelial development are dependent on hindgut region.

Linking farm management to dairy farmer mental and physical well-being

H. Tambadou¹, B. Zwick¹, A. Le Heiget¹, B. Hagen², A. Jones², J. Kinley¹, J.C. Plaizier¹, K. Ominski¹, C. Winder², E. Pajor³, and M. King¹.

¹University of Manitoba, ²University of Guelph, ³University of Calgary. Meagan.King@umanitoba.ca

Our objective was to understand how farm environment, housing type, milking system, and other farm-level factors are associated with farmers' mental and physical well-being. Dairy farmers (n=86) in Western Canada and Ontario completed an online survey that included questions on management practices, work and social environments, finances, cow welfare, and validated psychometric scales to assess stress, anxiety, depression, and resilience. Of the 86 farmers surveyed, 87% reported moderate stress and 13% reported high stress levels, and 31% and 22% of farmers reported mild and severe anxiety, respectively. There were 39% and 20% of farmers with scores indicating mild or severe depression, respectively. Analyses using t-tests and univariate linear models found that mental health scores did not differ based on gender, milking system, housing type, personal finances, time spent working alone, or animal welfare concerns. It was found that farmers who were most concerned about farm finance, feed costs, milk prices, workloads, and how much consumers valued them had higher levels of anxiety and stress ($P<0.05$). The highest depression scores were associated with concerns about farm finances, feed costs, and workload ($P<0.05$). Farmers who demonstrated greater resilience were less stressed by their workload. As for physical well-being, 84% of farmers experienced injuries and health problems while working on the farm. There were no differences in physical well-being based on milking system, housing type, or time spent working alone. However, the number of work-related injuries and health problems among men was greater than among women.

Take home message: Dairy farmers appear to have similar well-being in different production systems, but financial constraints, including high interest rates, inflation, and loan restrictions are key stressors. Financial support or other support resources may be needed for farmers to better understand and manage work stressors, to reduce stigma associated with mental well-being, and to instill compassion in consumers.