

# Effect of Delaying Colostrum Feeding on Passive Transfer and Intestinal Bacterial Colonization in Neonatal Male Holstein Calves

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Dairy calves are born without an active immune system, and therefore rely on good-quality, adequate volumes of colostrum to ensure the passive transfer of IgG. Despite this knowledge, poor colostrum management still occurs on farm, with one of the main reasons for failure of passive transfer being due to feeding colostrum more than 6 hours after birth. The objective of this study was to investigate how delaying the first colostrum feeding can impact the passive transfer of IgG, as well as bacterial colonization in the distal intestine of neonatal dairy calves. Twenty-seven male Holstein calves were randomly assigned to 1 of 3 treatments at birth: calves were fed colostrum at 45 minutes after birth (0hr, n=9), at 6hr after birth (6hr, n=9), or at 12hr after birth (12hr, n=9). Calves were fed pooled colostrum containing 62g/L of IgG at their respective feeding times at 7.5% of birth body weight, and fed milk replacer at 2.5% every 6hr thereafter. Blood samples were taken every three hours using a jugular catheter. At 51hr of life, calves were euthanized and tissue and digesta of the distal jejunum, ileum and colon was collected. Calves fed colostrum at 0hr of life had significantly higher ( $P<0.001$ ) serum IgG concentration (g/L;  $24.77 \pm 1.91$ ) when compared to 6hr calves ( $17.13 \pm 0.91$ ) or 12hr calves ( $16.88 \pm 1.50$ ). However, there were no differences in IgG concentration between 6hr and 12hr calves throughout the study. In addition to increased passive transfer, calves fed colostrum at 0hr had greater ( $P<0.05$ ) *Bifidobacteria* (copy number of 16S rRNA gene/g;  $3.39 \pm 1.48 \times 10^7$ ) attached to colon tissue compared to those fed at 6hr ( $5.74 \pm 8.44 \times 10^6$ ) and 12hr ( $5.74 \pm 1.44 \times 10^6$ ), respectively. In addition, calves fed colostrum at 0hr tended ( $P<0.10$ ) to have a higher abundance of total bacteria (copy number/g;  $2.27 \times 10^8 \pm 4.28 \times 10^7$ ) attached to the distal jejunum. In contrast, there were no differences ( $P>0.05$ ) in *E. coli*, *Clostridium*, and *Faecalibacterium* colonization among treatments in the digesta or tissue of the distal intestine. These findings suggest that feeding dairy calves colostrum immediately after birth can increase the passive transfer of IgG and the colonization of beneficial bacteria in the colon; both of which are hypothesized to assist in protecting the calf from enteric infections during the pre-weaning period.