

Effect of delayed colostrum feeding on stress response and gut microbiota in neonatal calves

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The neonatal stage is challenging for dairy calves due to postnatal development of the immune system and gastrointestinal tract as well as susceptibility to high mortality and morbidity.

It is well known that cortisol plays important roles in physiological homeostasis, regulation of the immune system and postnatal development of neonate in first a few days postpartum. The changes of gut microbiota have been reported to associated with varied host response and our previous research also suggests that colostrum feeding promotes the growth of probiotic *Bifidobacterium* sp, as well as the passive transfer of immunoglobulins. However, there is limited understanding about the effect of delayed colostrum feeding on concentrations of cortisol, gut microbiota and overall development of neonatal dairy calves. In the current study, we investigated whether delayed colostrum feeding affected fecal cortisol concentration and abundance of digesta-associated *Escherichia coli*, *Bifidobacterium* sp and total bacteria in the gut of neonatal calves. Holstein bull calves were randomly assigned into three groups: 0 hours delayed feeding, n = 7; 6 hours delayed feeding, n = 8; and 12 hours delayed feeding, n = 8; of 2L of pooled colostrum as the first meal. Our results showed that 12 hours delayed feeding significantly ($p < 0.05$) reduced concentration of fecal cortisol compared to 0 hour and 6 hours delayed feeding, while colon digesta-associated bacterial groups were not significantly affected by delayed feeding, showing no relationship detected between fecal cortisol concentration and colon bacterial abundance.

Findings from this preliminary study contribute to better understanding of host microbial interactions and the role of cortisol in neonatal development, which may help dairy industry to establish effective feeding management for neonatal calves.