

# Heat-Treated Colostrum Feeding Promotes Beneficial Bacteria Colonization in the Small Intestine of Neonatal Calves

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The feeding of heat-treated colostrum increases passive transfer of immunity and decreases enteric infections in calves. However, its influence on gut microbial colonization has not been well studied. The present study investigated the impact of heat-treated colostrum feeding on the bacterial colonization in calf small intestine, within the first 12 hours of life. Holstein bull calves ( $n = 24$ ) were fed with either fresh colostrum (FC) or heat-treated colostrum (HC) soon after birth, and small intestinal samples (proximal jejunum, distal jejunum, ileum) were collected at 6 and 12 hours, following euthanasia. Quantitative real time PCR analysis revealed that total bacterial density, the prevalence of lactobacilli, and bifidobacteria were not different among three small intestinal regions. The colonization of total bacteria decreased numerically with HC feeding regardless of time point; however, it increased with time irrespective to the colostrum type fed to calves. Moreover, HC feeding had no impact on the colonization of lactobacilli in calf small intestine. Conversely, the feeding of HC had strong impact on the prevalence of small intestinal tissue-attached, but not digesta-associated bifidobacteria. Bifidobacteria colonization increased drastically in HC calves at 6 hours and maintained stable within the first 12 hours, while the feeding of FC exhibited gradual colonization of bifidobacteria over the time. The prevalence of tissue-attached bifidobacteria was 3.2-fold higher in HC calves than FC calves at 6 hours. In contrast, bifidobacteria in FC calves increased by 3.2-fold at 12 hours, comparing to 6 hours. However, there was no different in bifidobacteria prevalence between FC and HC at 12 hours. Thus, the present study suggests that feeding of HC enhances the colonization of bifidobacteria on small intestinal tissue immediate postpartum compared to that of FC, which may prevent the colonization of enteric pathogens, and thereby decrease enteric infections in neonatal calves.

Implications: Feeding of heat-treated colostrum soon after birth alters gut colonization via promoting the colonization of beneficial bacteria.