

Prolonged Colostrum Feeding to Improve Calf Growth and Health: A Promising Practice?

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Abstract

The aim of this article was to highlight the potential benefits of prolonged colostrum feeding in newborn calves for improving gut health and integrity. After birth, calves are exposed to a variety of bacteria, viruses and protozoa, while their immune system is undeveloped. At this time, calves depend on the immunity transferred by colostrum. Feeding high quality colostrum during the first hours of life is a mandated practice to improve defense mechanisms of young calf against pathogens. High quality colostrum should be fed for the first 3 days post-calving as usually recommended. However, is that enough or not? Can colostrum feeding be prolonged? Colostrum contains critical immunity molecules that act in both the systemic circulation and locally in the intestinal lumen. The IgG is the main immunoglobulin in colostrum absorbed from the small intestine and acts in systemic circulation. The colostral IgA also known as secretory IgA mainly competes with pathogens for epithelial cells receptors in the gut lumen to prevent enteric diseases such as diarrhea. As a result, prolonged feeding of colostrum during the first two weeks of age when calves are threatened by a wide range of harmful microorganisms can be a promising strategy to prevent the incidence of diarrhea and septicemia.

Keywords: Newborn Calf; Colostrum; Diarrhea; Prevention

Philosophy and Discussion

The aim of this article was to underline the possible effects of prolonged colostrum feeding to newborn calves on gut integrity and health. Calves are born with undeveloped immune functions which can predispose them to a variety of infectious diseases [1]. Newborn calves are exposed to many environmental pathogens. According to the NAHMS report (2007), national pre-weaned calf mortality rate was approximately 8 - 10%. Interestingly, however, previous studies [2,3], had reported 5 - 6% calf mortality rate in the pre-weaning period, indicating an increased calf mortality over years. It has been widely accepted that diarrhea is the primary cause of calf loss (56 - 60% of calf death) worldwide and many organisms (bacteria, viruses and protozoa) are involved in the pathogenesis of diarrhea. The microbial composition of digestive tract in early stage of life has an important role on gut immunity and host calf health [4]. The enteric infections may be prevented by decreasing the interference of pathogenic organisms with the epithelial layer of gut. Therefore, manipulation of the gut microbial ecosystem through dietary strategies (colostrum management, milk feeding methods, pre- or pro-biotics use) may have benefits on gut health and disease control.

Colostrum, the initial secretions of the mammary glands after calf delivery, is an ample source of different types of immunoglobulins (A, D, E, G and M) that function as anti-infection agents in newborn calves via a process known as "passive immunity" [5]. The biologically

active components in colostrum including growth factors, oligopoly saccharides, lactoferrin and other molecules may have anti-bacterial and anti-inflammatory effects [5]. For instance, the transforming growth factor is an anti-inflammatory cytokine in bovine colostrum and milk which promotes barrier function and integrity of intestine [1]. Therapeutic and preventive effects of colostrum against enteric infections was observed in a study [6] in which children infected by shiga toxin producing *E. coli* could be treated using immunoglobulins extracted from colostrum. In another study [7], authors indicated that anti-rotavirus immunoglobulins of bovine colostrum possess an efficient role in control of rotavirus diarrhea in children. It has been demonstrated that the bovine colostrum-derived components such as lactoferrin and lactoperoxidase possess protective effects against gastrointestinal disorders in farm animals or even humans [8].

Providing high quality colostrum in appropriate amounts for new-born calves during the first 24 hours of life is a routine way to receive immune factors. It seems that in addition to IgA, the main immunoglobulin involved in the protection of intestine epithelium, IgG has also a key role in gut immunity [7]. It is, therefore, important to note that additional growth and health benefits have been achieved by extended feeding of normal or IgG supplemented colostrum in dairy calves [9,10].

Conclusion

Microbial colonization is a key factor in determining gut health and integrity that has been investigated in recent years. Because microbial population of the gastrointestinal tract may be affected by dietary and management strategies in early life, supplementing milk with colostrum in the first weeks of age can potentially alter microbial composition, and thus, improve the integrity and health of the gastrointestinal tract and host newborn calf.

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