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Calf Note #11 – Timing of Colostrum Feeding

Introduction. Newborn calves must absorb immunoglobulins (Ig) from colostrum without degrading them to acquire passive immunity. The time after birth at which colostrum is first fed is critical to determining if the calf will acquire adequate passive immunity and its ability to resist disease. The timing of colostrum feeding is important for two reasons - loss of absorptive sites in the intestine and bacterial colonization of the intestine.

Loss of absorptive sites in the intestine. Maturation of the intestine begins shortly after birth. When the cells in the intestine mature, they lose their ability to absorb the antibodies (also called immunoglobulins or Ig) without degrading them into their component amino acids. Current theories suggest that intestinal epithelial cells lose their ability to absorb intact macromolecules after about 24 hours due to maturation of the cells and development of the cellular digestive apparatus; however, this maturation begins shortly after birth. Rajala and Castrén, in a 1995 Journal of Dairy Science article, reported a decline in serum IgG concentration of 2 g/L if colostrum was fed at 30 min after birth. Researchers at The University of Tennessee found a decline in the efficiency of IgG absorption within 1 hour of birth. Clearly, there is a compelling reason to feed calves **as soon as possible after birth** to maximize the acquisition of passive immunity.

In addition to maturation of intestinal cells, secretion of digestive enzymes in the abomasum and intestine of the calf may reduce the efficiency of IgG absorption (called apparent efficiency of absorption or AEA) by degrading IgG prior to absorption. At birth and for a limited period thereafter, the secretion of digestive enzymes remains limited to allow macromolecules such as IgG to escape digestion. However, by about 12 hours, enzyme secretion becomes more marked, thereby reducing the ability of IgG molecules to reach the peripheral circulation.

Bacterial colonization of the intestine. The intestinal tract of the newborn is sterile at birth; however, within a few hours bacteria from the environment begin to colonize the intestine. This colonization can be hastened by an environment that promotes the growth of pathogens (i.e., a dirty environment). If a calf is born into an environment containing large numbers of pathogenic bacteria, the chances of colonization by pathogenic bacteria is increased. This may lead to septicemia, leading to severe morbidity and, often, mortality. Dr. Robert James and coworkers at Virginia Tech reported in 1981 that the presence of bacteria in the intestine may actually speed closure, thereby reducing the acquisition of passive immunity.

Logan and coworkers in 1977 studied the effects of early colonization of pathogens on neonatal calves. Calves were fed colostrum and challenged with *E. coli*. The first group was fed colostrum, then challenged; group 2 were challenged, then fed colostrum. Nearly all calves in the second group became morbid, and about 75% of the group died. Conversely, calves fed colostrum prior to *E. coli* challenge did not become sick and none died.

The bottom line is this - feed your calves high quality colostrum as soon as possible after birth. As the calf's intestinal tract matures, the ability to absorb IgG is lost. Early colostrum feeding means healthier calves!

**Written by Dr. Jim Quigley (7 May 1997).
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