Antibody Absorption

It is generally accepted by the scientific community that a newborn's resistance to disease is partly a consequence of the timing of colostrum intake. Sooner is always better than later.

In the most general terms we know that calves can absorb antibodies (and any other large molecules and/or whole cells) through their gut wall. And, **the efficiency of antibody absorption is higher the closer the colostrum feeding is to the birth of the calf.**

In order to move antibodies from maternal colostrum into the circulatory system a special category of cells, enterocytes, have to absorb the macromolecules, transport them across the cell and deposit them into the lymphatic system. This absorption process, pinocytosis, has been shown to decrease through day 7. (Blum, 2006). This relationship is curvilinear with one-third of the absorptive ability lost within 6 hours. At 24 hours only 11 percent of this ability remains. (Heinrich et al.)

It is hypothesized that this decrease is due to both the replacement of enterocytes by more mature intestinal cells (gut maturation) and the exhaustion of pinocytotic capability. (Blum, 2006 and Weaver,n.d.) Or, more plainly, the calf runs out of functional enterocytes.

The transfer process that takes place within enterocytes is relatively slow. And once the IgG molecules are released into the lymphatics they still must move into the thoracic duct through which they gain access to the entire circulatory system.

Therefore, IgG concentrations in blood do not start to increase until roughly 4 hours after colostrum feeding. Then IgG levels rise rapidly over the next 12 hours before reaching a plateau where the rate of increase is quite slow. Due to ongoing transport of IgG across the enterocytes, small increases in IgG levels may continue for about 32 hours after the first colostrum feeding (Weaver, n.d.)

Another factor favoring the early ingestion of colostrum is that the gastrointestinal environment at birth favors the survival of intact protein molecules. This environment changes rapidly, virtually by the hour, and by 24 hours most protein molecules are being digested and are no longer available for absorption.

If the oral ingestion of macromolecular material is delayed the decline in pinocytosis may be delayed as long as 36 hours. In practical terms in on-farm circumstances virtually every calf ingests some macromolecular material from her environment (unfortunately this often is adult cow feces) within minutes after birth, thus triggering the "countdown" or gut closure process.

Sam Leadley, Calf & Heifer Management Specialist
smleadley@yahoo.com www.atticacows.com
For Calves with Sam blog go to dairycalfcare.blogspot.com