

Calcium is an essential mineral that is required for the basic function of many tissues and physiologic processes. For example, calcium is required for bone formation, muscle contraction, nerve transmission, blood clotting, and has a role in the transmission pathway for many hormones. Due to its complex involvement, low calcium levels (hypocalcemia) is referred to as the 'Gateway Disease' making it increasingly important to understand its role in transition cow nutrition. Cows are able to balance calcium supply and demand effectively a majority of the time, but it becomes a challenge during the weeks leading up to calving and the first few days following calving. In the weeks leading up to calving, calcium requirements begin to increase due to the synthesis of colostrum and after calving the requirement greatly increases. In fact, in early lactation cow's calcium requirements increase by 65%. In order to meet these demands, cows initiate homeostatic mechanisms to restore blood calcium levels – a process that is facilitated by parathyroid hormone (PTH) and 1,25-dihydroxyvitamin D. When a cow experiences low blood calcium, PTH is stimulated and activates the kidney to release vitamin D and decrease calcium excretion. Vitamin D activation further increases calcium absorption in the small intestine and helps to restore blood calcium levels. Several strategies have been put in place to assist the cow's natural homeostatic processes. One of which involves feeding an anionic diet, or a negative DCAD diet. This strategy results in lower blood pH which promotes an acidic metabolic state and enhances the cow's natural homeostatic mechanisms for maintaining calcium balance. An alternative solution is to feed a calcium binder, thereby purposefully lowering calcium levels and forcing the activation of PTH which will then initiate the release of calcium into the blood. Initiating this process in the dry period can help cows adapt to the sudden and dramatic demand for calcium that they will experience upon calving. Regardless of method, maintaining proper calcium levels in the dry cow diet is crucial to minimizing milk fever on farm, and I strongly recommend working with your nutritionist if milk fevers are a problem on your herd. Stay tune for next month when I talk about the role of phosphorous in the diet!