
Article on Importance of Potassium

<https://www.progressivedairy.com/topics/herd-health/the-unspoken-truth-about-post-freshening-recovery-needs>

The unspoken truth about post-freshening recovery needs

Nathan Upah for Progressive Dairy Published on 03 March 2020

1



The dairy industry is replete with information on the need for calcium supplementation post-freshening. However, lost in all of the calcium conversations is the discussion on insufficient overall nutrient reserves, a changing ration and the fluids lost during freshening, which leave the transition cow unprepared for a quick or complete recovery heading into the demands of lactation.

Delayed or inadequate post-freshening recovery can cost the dairy producer significantly in lost production or veterinary treatments resulting from metabolic challenges.

Nutrient support for the post-freshening cow should include a variety of sources, and research proves that complete post-freshening recovery requires more than just calcium.

Live yeast

Pre-freshening, a cow's feed intake drops up to 30% and remains low in the first 24-48 hours after calving. This reduction in feed intake, along with demands for lactogenesis, puts the cow at a significant nutritional disadvantage heading into lactation. Low dry matter intake and a change in diet to higher concentrates can negatively affect gut microbiota and spark a cascade of negative health and performance challenges well into lactation. Live yeast helps buffer rumen pH by providing beneficial bacteria that work to keep lactic acid in check, which can improve feed intake, resulting in a healthier rumen microflora environment, leading to improved health and performance.

Magnesium

Magnesium is needed to metabolize dietary-supplied calcium and therefore, critical to helping prevent hypocalcemia. This allows a cow to best utilize all sources of calcium. Since the cow's magnesium level is dependent on diet alone, a deficiency can easily occur when there is a natural drop in dry matter intake, such as when a cow is close-up or immediately post-freshening.

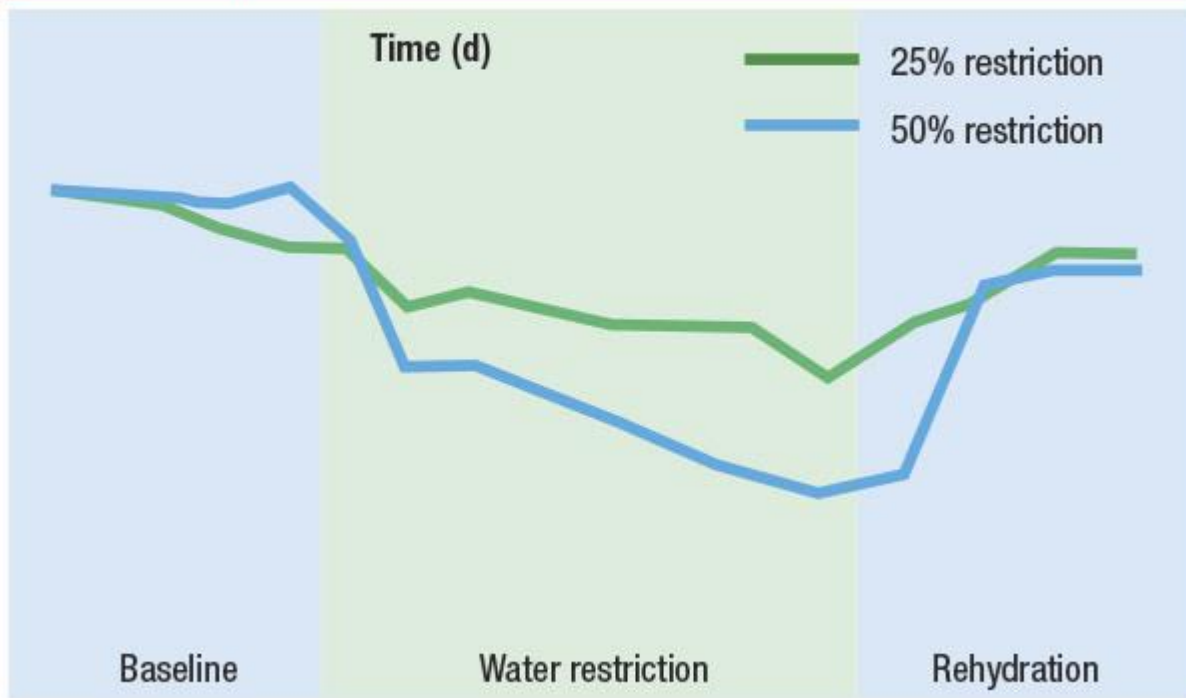
Potassium

Cows do not have the ability to manage potassium levels in their bloodstream and therefore, rely on diet input, along with urine and fecal output, to regulate. Due to the tight homeostatic regulation of potassium, stores can quickly be exhausted post-freshening, leading to metabolic disorders like ketosis. Potassium is the primary electrolyte responsible for intracellular energy mobilization and utilization. In addition, it is responsible for the fluid balance within cells and for proper body function. In fact, the absence of adequate amounts of potassium (hypokalemia) affects smooth muscle contractions, which can lead to issues related to retained placentas and potentially displaced abomasum (DA). The combination of low feed intake and dehydration post-freshening leave the cow deficient and therefore, supplementation is required to ensure recovery and sufficient support for cell activity.

Don't overlook hydration

Challenges related to reduced feed intake pre- and post-freshening are well documented. What many producers tend to overlook is the fresh cow's water intake and the negative effect dehydration has on post-fresh cows. Research shows that water intake helps improve feed intake. However, prior to freshening, feed and water intake are both shown to decline, leaving the cow somewhat dehydrated even before she freshens. In this condition, extracellular fluids are lost as well – up to 14 gallons according to studies. Add to this the fact that fluid and tissue loss during freshening can equal the weight of the calf, and she now has an immediate demand to produce milk. This rapid loss in volume leaves an internal void, potentially allowing the rumen to move, resulting in a DA. Immediate water consumption not only rehydrates the cow, but also helps to add weight to the rumen, stabilizing it. **Figure 1** shows the variation in milk yield when the cow is dehydrated versus rehydrated. Water content is about 65% of the dairy cow's bodyweight and 87% of fluid milk output.

FIGURE 1 Effect of dehydration on milk yield



Source: Am J Physiol Regul Integr Comp Physiol 280:R418-R427, 2001

When calculating replacement fluids, it's important to consider maintenance requirements, environment, production needs and fluid losses due to calving, heat stress, sweat, sickness or other challenges. By way of example, to maintain normal cellular functions, a 1,500-pound cow requires 18 gallons (144 pounds) of water daily during thermal neutral conditions. Some of this water comes from feed ration (10%-30%) and the balance from daily water volume intake (usually 8%-9% of their total bodyweight). For a lactating cow, each 10 pounds of milk produced requires an additional gallon of water over maintenance requirements.

The rumen serves as a reservoir that releases consumed water to the body via osmotic pressure. As cells require fluid for metabolism, electrolytes and other nutrients exert osmotic pressure in order to continuously supply the cells with fluid for normal functions. If the body does not have enough fluids, then the amount of nutrients transferred to the cells (for metabolism, etc.) is greatly reduced. Therefore, managing the water content in the rumen is important for maintaining both normal rumen fluid volume, as well as other body fluid reserves.

Osmolytes

Dehydration is problematic as fluid loss associated with freshening can be equivalent up to what a cow would normally drink in an entire day, and most cows do not drink well in the hours pre-freshening. Osmolytes are compounds that affect cellular water-holding capacity and fluid regulation. Osmolytes function to help maintain cell volume and fluid balance, thereby improving cellular energetics (assist transport of electrolytes). They also help cells maintain protein synthesis and cell division and help maintain gut integrity.

Economic impact

A successful transition period is accomplished by a well-orchestrated nutrient repartitioning. However, any miscues surrounding the transition cow can cost the dairy producer hundreds, if not thousands, of dollars in either health-related issues or long-term production losses. In fact, 70%-80% of veterinary costs are incurred one to three weeks post-freshening, and it is estimated that any incident that decreases milk production by 1 pound at peak lactation will decrease milk production by 500-1,000 pounds throughout lactation. Additionally, any incident that decreases milk production by 2-5 pounds at peak lactation will have a proportionally greater decrease in milk production throughout lactation.

The transition period should be the dominant area of focus for a dairy producer. With proper understanding of the relationship between transition cow physiology and proper nutrition, a dairy can realize big savings on treatment interventions, culling or lost production. Getting fresh cows back on feed quickly is important to recovery, optimizing

lactation potential and warding off many metabolic issues. Bottom line – physiology of the fresh cow changes dramatically at freshening, and calcium alone doesn't answer all nutrient demands these changes dictate. To optimize recovery outcomes, producers need to be sure to meet all the physiology demands with more nutrients than commonly discussed. ↴