



## Dairy Pipeline

Department of Dairy Science

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### Spring is here! Don't release the cows too soon!

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Spring has sprung and right around the corner come the hot summer months. Taking advantage of lush, green pasture growth is on everyone's mind, but timing is key. Timing dictates when to allow animals on growing pastures, on grazing newly established pastures, and knowing when to pull them off pastures. This is also a good time of year for setting up a plan for fall stockpiling.

Here in Virginia, this year's dry winter and cool spring nights have resulted in delayed spring growth for pastures and hay production—many areas across the state are dry. With a new season, the key is pasture management. The most important things to understand are proper grazing management and how to maintain a hardy pasture, thus allowing animals to receive the greatest benefit. Establishing grazing protocols will allow the most efficient utilization of grazing pastures. Before sending cattle out to pasture, ask yourself a few questions--starting with quality and quantity.

First, is the pasture ready for a season of grazing? Did you prepare in the fall correctly? Soil testing is very important, especially with the increased cost in fertilizers, don't overpay for products your land may or may not need. The land will utilize what is needed, over application can have the opposite effect.

Second, do you have a plan in place for weed control? What pre-emergent and post-emergent applications for weed control will your operation require? Weed identification is beneficial, as

knowing what weeds are growing and what to treat with will help prevent resistance. Quality and quantity can be greatly hindered if weeds are allowed to overtake.

Another big question is *why* does your business use pasture grazing? Is the plan to help offset costs associated with buying feed? Will the pasture be used to help decrease the demand on stored forages? Is it to assist in alleviating shortages until harvest? Are you a seasonal grazing operation, or using it to allow for exercise while still feeding a total mixed ration?

Stocking rate is incredibly important. One of the first questions to ask yourself before proceeding is "Does your operation provide the cows with enough acreage to continuously move from one pasture to another without overgrazing?" It is vital to know the number of animal units that will be on pasture. Next, estimate how many acres will be needed throughout the entire grazing season, and estimate the size and number of individual paddocks needed for optimal grazing.

The key to any pasture management program is to prevent *overgrazing* while meeting the animal's nutritional needs with the available forages. Every operation is different and if you want a successful grazing program on your farm, knowing your animals, plants/weeds, and soil is of the utmost importance. The type of plants and soil quality can greatly affect the number of days that animals can be left grazing and the length of time between pasture rest periods. Weather conditions play a huge role in both quality and quantity of available pasture. Grazing months can have both pros and cons. During the spring growth is rapid with higher quality, but can allow for greater waste. Summer months mean decreased yield, lower quality, and more time-consuming movement.

Viewpoints differ on when to rotate cattle from

one paddock to another. Some producers rotate based on forage length, allowing animals to graze until a predetermined stubble height. Others graze based on number of days. Knowing the type of forages or legumes in your pastures is crucial in determining when to return animals to a grazed field, best practice is to allow the pasture to rest for 21 days between grazing.

After evaluating your pasture quality and quantity, if you feel pasture-based farming is right for your business, contact your local Virginia Cooperative Extension office. Our staff can answer questions and address concerns, providing the information and the expertise to assist in developing a grazing program suited for your cows.

## **Serotonin aids in the prevention of postpartum hypocalcemia in dairy cows**

*Authored by Haylee Hanling, Ph.D. Candidate with Associate Professor Ben Corl, Department of Dairy Science, Virginia Tech; [bcorl@vt.edu](mailto:bcorl@vt.edu)*

Hypocalcemia, also known as milk fever, is a common and pervasive disease in the dairy industry. Around calving, the cow's mammary gland undergoes an extensive cellular development and an abrupt demand for calcium. When a cow's blood calcium is too low to meet lactational requirements she becomes hypocalcemic. Subclinical hypocalcemia is defined as a blood ionized calcium level of 1.4 - 2.0 mM. Clinical hypocalcemia occurs when blood calcium concentrations drop below 1.4 mM. The cow then shows signs of discoordination leading to the inability to stand and loss of consciousness. Without treatment, the cow will likely die. Although, the disease is easily treated with intravenous calcium, hypocalcemia can cause detrimental long-term effects in early lactation. Hypocalcemia is immunosuppressive, which increases the risk of metabolic diseases like retained placenta,

displaced abomasum, metritis, and ketosis. It can also cause a 13% loss of stored calcium in bone in early lactation. Current preventative measures include negative dietary cation-anion difference diets in the close-up dry period and calcium boluses after calving. A novel method using serotonin may be the key to preventing postpartum hypocalcemia through its pivotal role in calcium homeostasis during lactation.

Calcium is an essential nutrient for bodily functions like muscle contraction and neural signaling. During lactation, calcium is used to package casein proteins for export from mammary cells into milk. The parathyroid gland regulates calcium homeostasis through two key hormones: calcitonin and parathyroid hormone (PTH). Calcitonin is responsible for storing excess blood calcium. PTH mobilizes calcium from storage sites such as bone and muscle, decreases calcium excretion from the kidneys, and increases calcium absorption in the small intestine.

Serotonin is a hormone and neurotransmitter responsible for many physiological processes such as mood regulation, cardiovascular function, appetite regulation, and bowel motility. It is synthesized in the brain, but 90% is stored in the gastrointestinal tract. Serotonin causes two key functions in the mammary gland. Firstly, it increases the flow of calcium from the blood into milk, which causes hypocalcemia. Secondly, serotonin induces the synthesis and secretion of parathyroid hormone related protein (PTHrP). PTHrP works similarly to PTH by moving calcium out of storage sites and into blood, which can resolve hypocalcemia.

Researchers from the University of Wisconsin – Madison have extensively explored the role of serotonin in calcium regulation during lactation. Serotonin has a short half-life, meaning that it degrades quickly in the blood. Therefore, researchers infuse intravenous 5-hydroxy-L-tryptophan (5-HTP), the immediate precursor to

serotonin to study its effects on hypocalcemia. Once in the blood, 5-HTP is quickly converted into serotonin. In multiple studies, 5-HTP did not affect milk yield, vital signs, feed intake, or body weight in multiparous dairy cows. Repeatedly, 5-HTP caused increased serotonin and decreased calcium levels in blood during intravenous infusion. In early lactation cows, serotonin concentrations remained elevated for up to 2 weeks after cessation of 5-HTP treatment.

When administered daily for 1 week prior to expected calving date, 5-HTP caused increased levels of blood calcium up to 12 days after calving in Holstein cows. This is the desired effect of the drug because it led to lower rates of postpartum hypocalcemia. Surprisingly, the opposite effect occurred in Jersey cows. They displayed lower postpartum blood calcium levels and higher serotonin levels. The Jerseys' milk was also richer in calcium. This could be because Jersey milk generally has more protein, which is packaged with calcium phosphate in the mammary gland. Serotonin may play a bigger role in transferring calcium into milk in Jerseys compared to Holsteins.

Researchers aimed to discover whether 5-HTP could be effective when fed as a supplement rather than administered intravenously. They infused 5-HTP directly into the rumen of 4 cannulated Holstein cows. However, even high doses administered intraruminally could not achieve the same effects of 5-HTP infused into blood. Intravenous 5-HTP resulted in significantly higher blood serotonin concentrations compared to any dose infused into the rumen. Further research needs to be completed before 5-HTP can be commercially used on farm as a feed supplement to prevent hypocalcemia.

In summary, when administered prior to calving, 5-HTP can induce a temporary state hypocalcemia prepartum and creating a resistance to the disease postpartum. The body

responds to 5-HTP infusion by releasing PTH and PTHrP to raise blood calcium above the normal level. The cow is then adequately prepared for the abrupt onset of lactation and demand for calcium at calving. This then reduces the chance of postpartum hypocalcemia. Without hypocalcemia, the cow is also at reduced risk for other early lactation metabolic diseases like metritis, ketosis, and mastitis.

## Upcoming Events

### **Hokie Cow Classic**

May 16, 2022

### **Fitting & Showing Workshop-Rockingham Co.**

June 16, 2022

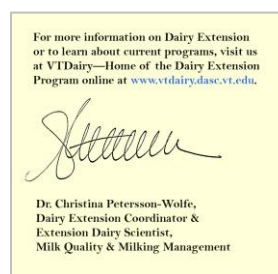
### **Franklin Co. Youth Livestock Show with Dairy**

June 18, 2022

### **Franklin County DHIA**

June 23, 2022

If you are a person with a disability and require any auxiliary aids, services or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.



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