Management

Why Should I be Interested in Supplementing Trace Minerals to My Cow Herd?

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Minerals play a vital role in forage digestion, reproductive performance, the immune system and the development of bones, muscles and teeth. Furthermore, an inadequate intake of minerals and vitamins may result in reduced forage intake, lower reproductive efficiency, poor disease immunity, slower daily gains and poorer feed conversion. Subclinical trace mineral deficiencies probably occur more frequently than recognized by most livestock producers. This may be a larger problem than an acute mineral deficiency, because the rancher does not see specific symptoms that characterize a trace mineral deficiency.

With a subclinical deficiency, the animal grows or reproduces at a reduced rate, uses feed less efficiently and operates with a depressed immune system.

Q: How did we discover that trace minerals were necessary for beef production?

Copper, molybdenum and sulfur:

- The necessities of copper for cattle was established in the 1930s with the discovery in Florida cattle that cattle, as a result of a wasting disease and were deficient in cobalt, iron and copper. Researchers in Northern Europe also described this wasting disease by animals having diarrhea, loss of appetite and anemia.
- Subsequent studies on the relationships among copper, molybdenum and sulfur showed:
  - Molybdenum in the presence of sulfate reduces the copper in organs and increases the excretion of copper in the urine.
  - When the copper to molybdenum ratio changes in the presence of adequate sulfate was less than 2.8 to 1, copper deficiency was evident. A copper to molybdenum ratio of no less than 3.1 has been proposed to meet the copper requirement is met.

Zinc:
- Zinc is widely distributed through the body, but animals have a limited ability to store zinc. Loss of appetite is one of the first signs of deficiency in calves. A bowing of the hind legs and stiffness of the joints is also noted.
- Additional signs of zinc deficiency include: inflammation of the nose and mouth with submucosal hemorrhages, serous appearance, rough hair coats, stiffness of the joints with swelling of the feet, front of fetlocks, cracks in skin of coronary bands around the hooves and dry scaly skin on the ears.
- In grazing animals, a marginal zinc deficiency results in subnormal growth, reduced fertility, low serum zinc values and decreased resistance to infection and stress.

Selenium:
- During the 1930s selenium was identified as the toxic element in some forages that caused animals to lose hair, nails and hooves. Consumption of foodstuffs containing both toxic and deficient concentrations of selenium presents a problem for grazing livestock.
- In 1940 an army surgeon in South Dakota described a fatal disease in horses grazing near Fort Randall. The horses exhibited extreme tenderness and inflammation of the feet, accompanied by loss of hair from the mane and tail.
- Some speculate that many horses of the US Calvary commanded by General Custer exhibited selenium toxicity during the summer of 1876.
- Selenium deficiency in livestock is called white muscle disease, a degeneration of striated muscles. Animals with it have general weakness, stiffness muscle deterioration and have difficulty standing.
- With this condition, calves may be stillborn or die within a few days after sudden physical exertion such as nursing and/or running. It is usually observed in calves between 1 – 2 months of age.
- Poor reproductive performance also is a symptom of selenium deficiency and includes retained placenta. Aborting calves are generally happens when older animals grazes forages with selenium in the range of 5 to 40 ppm. Certain selenium accumulating plants have between 100 and 9,000 ppm selenium.
- Animals suffering from selenium toxicity have loss of appetite, lack of thriftiness, cirrhosis of the liver, loss of hair, lameness and elongated hooves.

Q: What other factors can influence trace mineral metabolism in cattle?

There are many factors that could affect an animal’s response to trace mineral supplementation, such as the duration and concentration of trace mineral supplementation, physiological status of an animal (i.e. pregnant vs. non pregnant), the absence or presence of dietary antagonists, environmental factors and the influence of stress on trace mineral metabolism. Four areas deserve attention:

1. Breeding Effects:
- Although species differences in trace mineral metabolism have been recognized, only recently have differences been noted between breeds within a species. These data indicate that Jerseys and Holsteins metabolize copper, zinc and iron differently. Simmental cattle may have a higher copper requirement than Angus cattle. These different requirements may be related to differences in copper absorption in the gastrointestinal tract between breeds.

2. Gestational Status:
- Limited data have been published examining the effects of gestational status on trace mineral metabolism in cattle; but several experiments have been conducted using laboratory animals and humans that indicate plasma mineral metabolism is altered during pregnancy. Research indicates that zinc concentrations increase in bovine conception products (placenta, placental fluids and fetus) as the fetus grows. Pregnant cows and sheep absorbed and retained zinc to a greater degree than non-pregnant cows and sheep.

3. Deficiencies and imbalances of copper and zinc can alter the activity of certain enzymes and function of specific organs thus impairing specific metabolic pathways as well as overall immune function.

Stress induced by parturition, lactation, weaning and transport has been shown to decrease the ability of the animal to respond immunologically to antigens that they encounter. Furthermore, research has indicated that stress can alter the metabolism of trace minerals. Stress in the form of an infection (IBRV), a metabolic disorder (ketosis), or deprivation of feed and/or water can increase copper and zinc depletion from the animal.

4. Trace Mineral Antagonists:
- Many element-to-element interactions have been documented. These include zinc-iron, copper-iron, copper-sulfur, copper-molybdenum, and copper-molybdenum-sulfur interactions and interactions between elements and other dietary components. Similar effects have also been seen for copper absorption, with depressed copper uptake in the presence of excess dietary iron.

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Top of the Class Participants Work to Become Beef Advocates

Last month, members of the checkoff funded Issues and Reputation Management team hosted five individuals for the inaugural Top of the Class training program, a branch of the successful Masters of Beef Advocacy program. These five advocates were chosen to participate in a day-long workshop in the presence of an advocacy workshop training. The workshop, which took place at the NCRA offices in Denver, included detailed training in social media, presentations, media interviews, culinary demos and blogging. The goal of the Top of the Class program is to elevate these five chosen producer and industry stakeholders voices to a broader network of consumers and influencers. The five individuals who participated in the rigorous training:

- Jake Geis, DVM – a young veterinarian and cattle producer from South Dakota
- Chef Mike Erickson – a high school culinary arts instructor and chef in Texas who is leading his class in the production of a documentary about beef
- Sierra Blachford – a cow-calf rancher working on her Masters in Mass Communication at South Dakota State University
- Amanda Rankin Barnett – a former National Beef Ambassador who works on her family’s cattle ranch in southern California
- Suzy Strausburger – the first woman president and CEO of her fifth generation family meat business in New York City

The training sessions focused on reaching a broader audience through strategic management of various media outlets. Several of the participants are from highly populated regions and can reach an urban consumer audience with strengthened and elevated messaging. Prior to departing NCRA, each participant was tasked with developing three action items to follow through with in the coming month. These items varied from reaching out to local civic groups, to scheduling speaking engagements, to starting a blog and chatting with local journalists. Each participant has a unique quality that can aid them in their journey to becoming a visible and influential beef advocate.

The plan is to continue to work with these individuals to increase their reach and influence and to engage more consumers, including millennials, in conversations about beef. Based on the results of this program, additional Top of the Class training sessions may be held.

Inaugural members of the Top of the Class program gather with the session trainers at the commencement of the program. From front (sitting) left: Amanda Rankin Barnett, Sierra Blachford, Suzanne Strausburger. Back row (standing) left: Debbie Lyons-Smith, Mike Erickson, Joe Hansen, Daren Williams, Bill Zucker, Jake Geis and Brandi Buzzard Frobose.