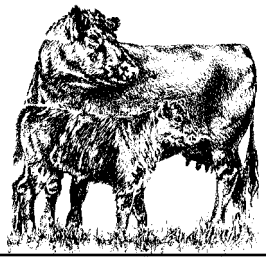

Western Beef Resource Committee *Fourth Edition*

Cattle Producer's Handbook

Animal Health Section 627

Grass Tetany in Beef Cattle

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Grass tetany (Hypomagnesemic Tetany or HMT) is a metabolic disease of cattle usually associated with grazing lush pastures. This condition occurs worldwide and can affect cattle and other ruminants. Many times the cattle are simply found dead and, therefore, obtaining an accurate diagnosis is important. Low blood magnesium concentration (hypomagnesemia) is the most constant finding and the most important cause of this condition.

Factors Leading to HMT (Grass Tetany) and Other Hypomagnesemic Conditions

Several factors are important in causing grass tetany and other hypomagnesemic conditions, some of which are listed below:

- Low magnesium (Mg) content of rapidly growing grasses and pastures.
- High potassium (K) content of rapidly growing grasses and pastures.
- High crude protein content of grasses and pastures.
- Bad weather, storms, stress, etc., that cause cattle to be "off feed" for 24 to 48 hours.
- Lactation: losses of Mg and calcium (Ca) in the milk.
- Ammonia fertilization of pastures or grasslands.
- Various combinations of the above factors resulting in low blood Mg and Ca.

Cattle Require Mg in Their Diet

Magnesium is a required mineral for all cattle. Magnesium requirements for growing cattle are 0.1 percent of their diet (on a dry matter basis or DMB) and for lactating beef cattle 0.2 percent of their diet DMB. Additionally, most of the Mg is absorbed in the rumen, not in the lower intestine, as is the case with most minerals. So if the plants have a low Mg content, which is common in rapidly growing range plants and pasture plants, the cattle may not have enough Mg in their diet to meet their needs. The absorption of Mg in the rumen can be interfered with by potassium (K). Since rapidly growing plants have a high content of K there is considerable interference with Mg.

Another interference problem exists with high levels of crude protein in the diet. As proteins are metabolized in the rumen, ammonia NH_4^+ is released, and this molecule also interferes with Mg absorption. Ammonia can also interfere with Mg absorption by the plants themselves, so ammonia fertilization can lower the Mg content in the plants.

Also, ammonia fertilization increases plant growth and crude protein content of the plant. Thus, ammonia fertilization can interfere with Mg uptake both at the plant level and at the animal level.

Just as the requirements for Ca increase during lactation, so do the requirements for Mg. Therefore, lactating cattle are at increased risk of hypomagnesemic tetany (HMT). The heavier milkers are at greater risk of HMT. Also, if the cows are short on Ca they are more likely to have grass tetany because low Ca and low Mg combine to cause more severe disease. Commonly, the cattle will have low Mg levels for several days to a few weeks before becoming clinically ill.

Stress or fasting decreases both Ca and Mg levels, so bad weather (storms), trucking, and other stressors that cause cattle to stop eating can precipitate HMT in several cows in the herd at one time. Fall calving herds in the foothill ranges of California and southern Oregon can experience HMT as early as December in the southern regions. In other parts of the western U.S. HMT is more common for spring calving herds with disease occurring in the spring or early summer. Depending on rainfall, temperatures, and other factors producers can't predict, cattle can die rapidly due to this condition.

Signs of Illness and Diagnosis

Cattle are often found dead with evidence that they may have struggled. This is most commonly seen as grass and dirt moved away from their feet and head where they thrashed about. If found alive, the cattle can be observed to have convulsions (tetany), weakness, disorientation, or they can become belligerent and attack people or inanimate objects. These central nervous system signs or symptoms of HMT can be confused with rabies or Listeriosis. Other diseases that cause sudden death would include anaplasmosis, Redwater (bacillary hemoglobinuria), or anthrax.

The diagnosis of HMT has been made easier by research done at land-grant universities in the West during the past few years. One diagnostic problem that has existed for some time is the accurate diagnosis of HMT in dead animals. Many cattle are simply found dead, and tissue and serum Mg levels usually return to normal at or near death. However, it has been shown that the Mg concentration of fluid within the eye does not increase near death, so this material can be collected for many hours after death and analyzed for Mg content. The Mg concentration of this fluid can be easily interpreted to determine if the animal died of HMT.

Most veterinarians can take this sample or can give the cattle producer simple verbal instructions for obtaining this sample. A new 3 ml syringe with a new 16, 18, or 20-gauge needle can be used to remove fluid from the inner part of the eye. This sample should be refrigerated until analyzed. Veterinarians can also collect cerebrospinal fluid in cases where the eyes are not available due to predation (birds that remove the eye) and these samples can also be analyzed for Mg content.

If live cattle are thought to be at risk for HMT, serum samples can be collected and analyzed for Mg. However, if HMT is highly suspected, cattle producers and veterinarians should plan carefully for the collection of these blood (serum) samples, as the simple act of running the cattle through a chute can precipitate life-threatening convulsions. By either method, appropriate samples can be collected, analyzed, and accurately interpreted to decide if HMT is the cause of the problem.

Hypomagnesemic tetany can also occur in young cattle (stockers, etc.) on cereal grain pastures (wheat pastures, barley pastures) in the spring. These plants have high K levels and high crude protein levels along with low Mg concentrations. The K and NH_4^+ interfere with Mg and cause HMT. Also, cattle being fed low quality forage (straws, etc.) with low Mg content can develop HMT.

Treatment

In cases where an outbreak of HMT might occur, the best course of action is to immediately make available for the cattle good quality alfalfa. Cattle producers should not move or stress the cattle to accomplish this if at all possible. The alfalfa has ample amounts of Ca and Mg and will help prevent further cases of HMT.

For individual animals affected with HMT, treatment is usually accomplished by intravenous solutions of Mg and Ca. Treatment of sick animals can be frustrating, as relapses are common, and recovery does not occur in all cases. After an animal has been treated and can walk without assistance, livestock handlers should move her (and her calf) to a barn or corral. There she can be fed alfalfa hay, Mg and Ca supplements, and be observed for a possible relapse.

In addition to intravenous therapy, cattle producers can administer 2 ounces of magnesium chloride or magnesium sulfate 200 ml warm water as an enema. The blood Mg levels will increase 20 minutes after the enema. This can be particularly helpful in cows that are down and convulsing or belligerent.

To prevent relapses in cows treated under range conditions it has been recommended to give oral slurries of 3 ounces of magnesium oxide plus 3 ounces of dicalcium phosphate and 1 ounce of salt in 12 gallons of water. This can be difficult, because many of these cattle are not cooperative patients.

Also, several Mg and Ca gel preparations can be helpful in treating these animals. These products come in tubes that fit into a caulking-gun device that facilitates use. It is important to carefully administer these products to prevent introduction into the windpipe (trachea). If the animal does not swallow this material it may be inhaled and cause a pneumonia that is not responsive to treatment. Producers need to discuss with their veterinarians any treatment decisions before implementation as individual products vary widely with respect to effectiveness and safety.

Prevention of HMT

Prevention is the key to successfully handling this condition, as therapy is time consuming and often unrewarding. The main goals of prevention are to achieve increased consumption of Mg and Ca through supplementation. This can be accomplished several ways. Salt-mineral mixes and molasses licks or blocks are the most common methods that are successful.

Molasses used in the West often contains a large percentage of beet molasses, which is relatively high in Mg. Some of the molasses supplements are excellent sources of Mg and aid in the prevention of HMT. However, some molasses supplements contain urea that breaks down to NH_4^+ in the rumen and will increase the risk of HMT.

Producers need to be absolutely certain the molasses supplement they buy will help the situation, not make it worse. Also, several homemade recipes can work well for prevention and are listed below:

1:1 proportion of magnesium oxide:dried molasses (free choice).

1:1:1:1 proportions of magnesium oxide:salt:dicalcium phosphate:corn meal (linseed meal, soybean meal, cottonseed meal, or other palatable materials can be substituted). Consumption should be 4 ounces per head per day, minimum. If consumption is too low, add more corn meal (soybean meal, etc.).

The main dietary goal is to supplement a minimum of 1 ounce of magnesium oxide (or other Mg equivalent) and 1 ounce of dicalcium phosphate or other calcium source per animal per day. Any method that will accomplish this goal is a good method. The statement that "an ounce of prevention is worth a pound of cure" certainly holds true for HMT.

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