



## **Minerals and Their Role in Grass Tetany**

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Grass tetany, a disorder that most commonly occurs in the spring, is often noted when animals move with a stiff gait and/or staggers, cows can not get up, may be found having convulsions, and ultimately die if left untreated. Researchers determined that grass tetany is a result of either a mineral imbalance or low forage magnesium concentrations [Mg]. The problematic issue is that grass tetany can be lethal and immediate intervention is necessary to save the animal. Prevention is the key and one should understand the disorder to prevent it from impacting your herd.

This disorder is most prevalent in the spring during the period of lush new pasture growth and most common in lactating beef cows with high milk production. A vast amount of research has been conducted in this area to attempt to understand what causes the disorder and what preventative actions can be implemented. Animals with grass tetany were found to have low blood magnesium levels and hence the disorder often is termed hypomagnesemia ("hypo-" meaning low versus "hyper-" meaning high or above normal). The neural system is Mg dependent in which magnesium is involved with neural signal transmission. Interruption of the central nervous system is what leads to the mobility problems and a slight decrease of the cerebral spinal fluid [Mg] can trigger convulsions. Additional symptoms may include a wild stare, erect ears, easily irritated, convulsions, head thrown back, and most commonly death. The most common prevention practice is offering a mineral that contains magnesium oxide prior to spring turnout and continuing through the spring flush.

Hypomagnesemia can occur at any time of the year. The common cause for the disorder is due to consumption of forages low in Mg or decreased Mg availability. This may be caused by high forage nitrogen, potassium (K), aluminum, and/or lowered rumen sodium level and decreased calcium (Ca) intake can also predispose animals to tetany. Thus, it may not be a single factor resulting in hypomagnesemia. The recommended forage Mg concentration is 0.20% for cattle and this is increased to 0.25% for lactating cows or greater depending upon the concentrations of other nutrients that may limit its availability. For example, the Mg concentration in the forage to reduce the risk of tetany may be increased if the forage content is high in N (>4%) and K (>3%). Fertilizing grass pastures with nitrogen will result in an increase in the concentrations of phosphorus (P) and K with a subsequent decrease in Mg and Ca. If Mg is borderline or low in the forage, nitrogen fertilization will tend to increase its ability to induce tetany if the soil K content is high. It was found that the ratio of  $K/(Ca + Mg)$  when expressed in milliequivalents is a good indicator of the tetanic potential of forage.

During 2003 and 2004, UWEX agricultural agents from various counties across Wisconsin obtained hay samples from a variety of beef operations. A total of 71 samples were analyzed that included a variety of forages and mixtures. Approximately 17% of the samples obtained were found to have Mg concentrations of less than 0.20%.

However, none of the hay samples contained in excess of 3% K or 4% N (25% crude protein). When looking at the “tetany ratio” of K/(Ca + Mg), it was noted that 5.6% of the samples had a ratio greater than 2.2. Forages with a tetany ratio greater than 2.2 are thought to have a greater risk of inducing hypomagnesemia. Feeding hays with a tetany ratio greater than 2.2 can lead to winter tetany given the length of winter hay feeding in the northern states especially if the Mg and Ca levels in the forage are low.

Another factor that can increase the risk of hypomagnesemia is inadequate sodium intake. The recommended daily requirement of sodium is 0.06-0.10% and varies depending upon stage of production. It is known that forages alone often do not meet the daily requirement and 24/53 samples analyzed from the 2004 Wisconsin hay samples were below the recommended daily needs illustrating a need for supplementation. Inadequate sodium intake results in an increase of salivary [K] which is believed to further reduce the uptake of Mg.

Feeding forages with marginal Mg levels over the winter could predispose them to hypomagnesemia at spring turnout. Researchers offered cows either fescue hay plus access to mineral without Mg, fescue hay with Mg-fortified mineral, or corn silage and ¼ lb of magnesium oxide for a 45-day window before the spring turnout. Cows were then switched to the same tetanic pasture (Mg <0.2%) with access to a mineral supplement without Mg. Grass tetany was observed in 27% of the cows following turnout to pasture regardless of previous winter feeding program. Tetany was observed during a period of time in which forage samples tetany ratio was near 2.2. The authors suggest that winter Mg supplementation provided limited protection following turnout and Mg supplementation was required on these pastures with low Mg (<0.2%), high N and K. Older animals have a reduced ability to significantly increase mobilization of reserves and the notion of building reserves over winter would appear not to be a reliable prevention method.

Few producers appear to struggle with hypomagnesemia in Wisconsin. Our forages tend to contain appropriate proportions of Ca, Mg, and K resulting in a tetany ratio that is less than 2.2. This is largely because many of our pastures and hay fields have a grass/legume combination. Legumes tend to contain higher concentrations of Ca and Mg than grasses aiding in reducing the risk of hypomagnesemia.

Grazing winter cereal crops such as wheat or rye can increase the risk of grass tetany. Wheat pasture poisoning was the common term used to describe tetany in cows grazing winter wheat pastures. Oklahoma researchers observed that the tetany ratio increased from around 2.2 to over 3 corresponding to a time in which tetany was observed which also corresponded to wheat samples containing greater than 4% K and less than 0.2% Mg. They go on to state however that no single factor may be responsible for hypomagnesemia.

Grass tetany is an example of a disorder that shows the complexity of mineral interactions. It further supports having a forage analysis conducted on one's hay to assist in developing a mineral supplementation strategy to avoid winter tetany. Prevention is

simple and effective through offering a mineral with increased levels of magnesium if forages are marginal or deficient.