A Comprehensive Look at Grass Tetany
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The abundant production of lush, green spring forage is a sight that can make any producer smile. It signals the end of a long winter and the accompanying supplementation program. However, for those producers not prepared these “lush” pastures will be high in moisture and have diluted mineral contents, potentially leading to “grass staggers” also known as grass tetany.

Soil and Forage Magnesium

It has long been noted that lush spring grasses have lower than desired levels of both Calcium (Ca) and Magnesium (Mg). These reduced levels in the forage are caused by either soil conditions or nutrient relationships within the plant itself. Although mostly associated with spring grasses, this condition can occur in fall and winter as well. Common grasses of caution are wheat, rye, oats, triticale, annual ryegrass, fescue, and even bromes (cheat). To fully understand the risks of grass tetany in our forages, we should first understand the conditions that cause Mg deficiency within the plant.

Low soil test Mg levels are of greatest concern and can directly restrict the growing forages Mg uptake from the soil. If this low Mg soil is also low in pH, applications of dolomite or dolomitic limestone (compounds of MgCO$_3$) can help alleviate the problem by both increasing pH and adding available Mg. Fairbourn and Batchelder (1980) found that direct applications of Mg fertilizer did not increase forage Mg in spring pastures. Therefore, one might conclude that raising pH of the soil is a more consistent way to reduce tetany potential when compared to direct Mg applications. If dolomitic lime is available in your area, it definitely would be a better option compared to common aglime when soil Mg levels are low.

To further compound the problem, when soil test also indicate an increased level of potassium (K), or worse when coupled with nitrogen (N) applications, even sufficient Mg soil levels may not be “useable” by the plant. This can be described by a ratio of K: (Ca + Mg), where K dictates the availability and uptake of the other two nutrients. One study found that as soil test K increased, Mg and Ca tissue concentration decreased accordingly (Peters et al., 2002). Therefore, anytime that K in the soil is high or manually applied on tetany prone pastures, Mg supplementation becomes the better option (see below). This same study also found that by increasing pH to an optimum level with lime, plant uptake of Mg and Ca increased while tissue K concentration remained the same.

Many have also noted that applications of manure or broiler litter seem to increase the incidence of tetany in early spring forages (McClain and Blevins, 2009). This is due to the application of both N and K from those manure sources, but is also apparent where applications of a complete commercial fertilizer such as 19-19-19 are used. The N stimulates a fast, nutrient diluting growth of the plant while the high K levels further inhibit Mg uptake. The take home message is to get a soil test and maintain pH in the optimum range, especially under high K or N fertility.
Other factors that have been proven to decrease Mg in forages are: cool spring weather followed by a warming trend, waterlogged soils and even low soil phosphorus levels. Many soils throughout eastern Oklahoma fit into these criteria in the early spring months when these cool season forages are at their fastest growth. Therefore, it is in the producers’ best interest to use soil testing and an understanding of their forage base to effectively manage for low Mg forages.

**Physiology, Symptomology & Treatment**

It is thought that grass tetany (hypomagnesaemia tetany) is caused by a deficiency of Mg in the blood; however not all animals with low Mg levels will develop grass tetany. Although all cattle are susceptible, not all are at equal risk. Older cows are at greater risk than young cows and weaned calves or yearlings are at even less risk. This difference between age groups is due to the reduced ability of older cows to pull magnesium from their bones. Cows nursing young calves, under four months of age, are at higher risk than cows nursing older calves or dry cows. Therefore, a conscience effort should be made to closely monitor those classes of animals that are at higher risk. The early signs of grass tetany are excitement and uncoordinated gait, or staggers. This stage is soon followed by convulsion, coma, and death. Cattle are commonly found dead with no illness being observed. When death is caused by grass tetany, however, there will be signs of thrashing near the dead animal.

If affected cattle are found and treatment started early in the course of the disease, injections of sterile magnesium sulfate administered subcutaneously may be beneficial. It is important to handle the cattle calmly and quietly because excitement caused by driving or roping can result in sudden death. In more advanced stages your veterinarian may choose to administer drugs to calm the cow and then administer a solution of calcium and magnesium intravenously. This treatment should only be given by trained persons because if it is not administered correctly it may suddenly induce cardiac arrest. If animals recover from the acute phase they should be removed from the pasture and only fed hay and/or grain. Recovered animals have an increased chance of suffering the condition again later in the grazing period or in following years. It is a good idea to consider culling recovered animals when they have weaned their calf.

**Prevention Is the Key**

Prevention of grass tetany starts with forage grazing management. By simply deferring grazing until the forage becomes more mature, incidence of tetany will decrease. This is due to the fact that forages allowed to reach a 6 inch growth stage will have higher Mg levels than very immature forages. The incorporation of legumes into these cool season grasses is also a good option, since legumes are typically much higher than grass in both Mg and Ca. Finally, grazing the less susceptible members of the herd (heifers, dry cows and stockers) first will reduce the incidence of tetany on high risk pastures. Since legume establishment takes prior planning and proper soil
fertility, and sometimes the entire cowherd has to be turned onto lush pastures, supplementation of Mg might be a better option for many operations.

Supplementation of magnesium oxide (MgO) is a great way to supply additional Mg. Mixing MgO with salt and feeding it ad libitum will increase the palatability of the MgO and increase the sodium level in the blood. It is recommended to be mixed at 75% salt and 25% MgO. There are several commercial minerals available that are “High Mag” minerals. These minerals are formulated to provide a given amount of Mg through an estimated amount of intake. The ability to modify the intake of Mg using these minerals are limited and there is a chance some animals are not consuming enough mineral to supply adequate amounts of Mg. Supplying Mg through the water supply may provide another avenue to administer Mg to your animals. MgO is insoluble in water and cannot be used for that purpose. Magnesium acetate, magnesium chloride, and magnesium sulfate (Epsom salts) are soluble and can be used in the water supply. Beef cattle do not have a problem with Mg toxicity. The maximum tolerable levels of Mg are estimated at 0.4% of dry matter intake. Higher limits can be fed but extremely high levels (>1%) can lower feed intake, weight gain, and cause scours.

In summary, grass tetany is a serious problem that affects many cattle producers across the state every year. Frequent soil testing and monitoring of pH, proper grazing management practices and supplementing magnesium to the herd are all proven practices to reduce your risks of grass tetany. Following these guidelines will allow the use of a highly productive and nutritious cool season grass stand. Producers will find the benefits of these forages outweigh the risk, and are easily realized through the reduction in wintering costs of the cowherd.

