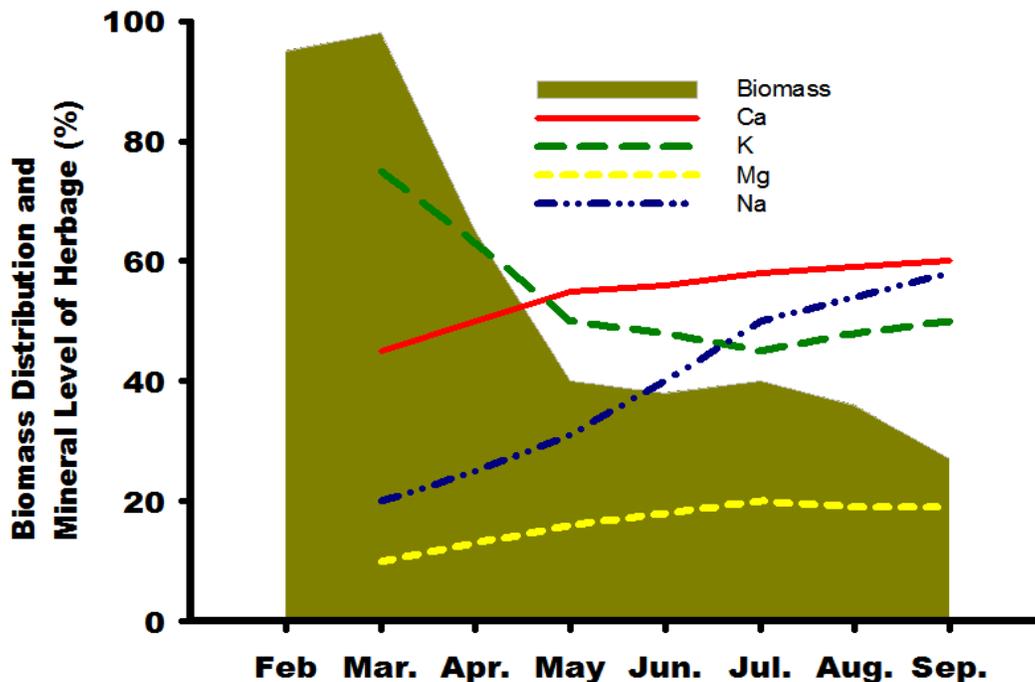




## Spring Grazing and Grass Tetany in Beef Cattle Production

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Grass tetany (also known as hypomagnesemia or “grass staggers”) is a nutritional or metabolic condition caused by low levels of magnesium (Mg) in the blood. It is most common in older beef cows that just have given birth to calves, but can affect younger cattle as well. This disorder is usually seen in the spring when livestock graze young and succulent cool-season grasses such as tall fescue, annual ryegrass, and small grains (wheat, oat, rye). Grass tetany intensifies in warm periods; especially 5 to 10 days after cool, wet, and cloudy conditions when lush, immature grass starts growing rapidly. When nighttime temperatures begin rising to 55 °F or higher, the incidence of tetany falls because grasses are more able to draw magnesium from the soil at warmer temperatures.



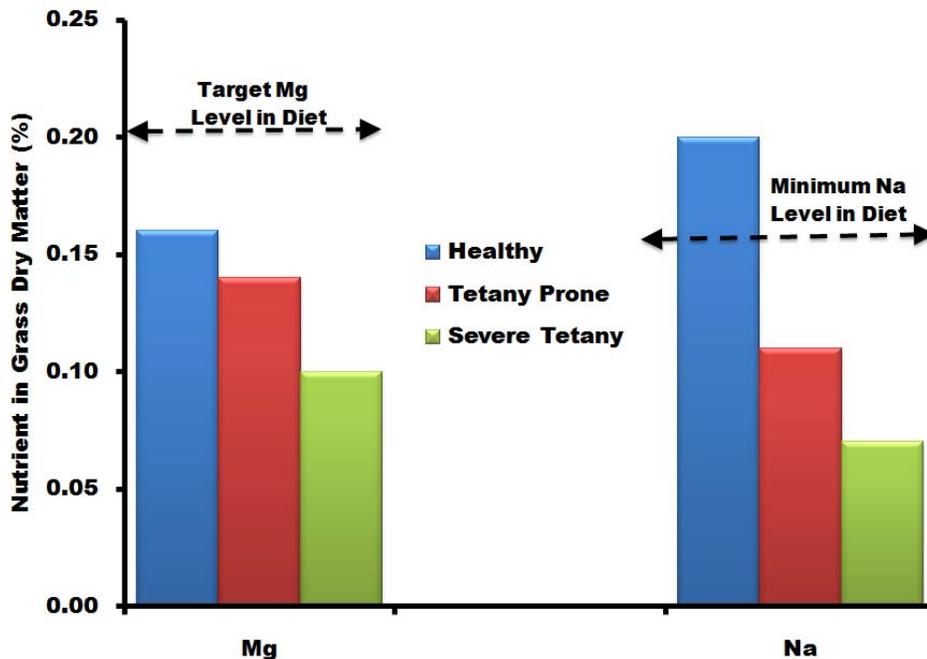
**Figure 1.** Seasonal biomass distribution and mineral uptake in cool-season grass pastures. Source: Potash Development Association, 2005.

Generally, cool-season grasses have high protein and potassium levels, which can worsen the problem, and low levels of magnesium. Low blood magnesium can be due to low levels of magnesium in lush spring grass, but it also is caused by mineral imbalances like high potassium (K) and nitrogen or low calcium (Ca), sodium (Na), and phosphorous (P). These



nutrients are able to interact and tie up Mg in the soil, lowering their availability in the forage or even if adequate levels of Mg are present. This can be a problem in cool-season forages fertilized with high rates of broiler litter. Wet soils, low in oxygen could also prevent grasses from taking up Mg regardless of the soil Mg levels. Pastures with high levels of potassium in the soil often have more cases of tetany; however, it can occur in pastures of all soil types.

Where mineral disorders are a problem, take biomass samples when grass is actively growing (e.g. February to April) to check on K, Mg and Na status (**Fig. 1**). Other forage mineral concentrations have been implicated with the disease in addition to Mg. These include a forage Ca concentration less than 0.4% and/or a forage K level above 3.0% DM. The recommended forage Mg concentration is 0.20% for cattle (**Fig. 2**) and this is increased to 0.25% for lactating cows or greater depending upon the concentrations of other nutrients that may limit its availability the Mg concentration in the forage to reduce the risk of tetany may be increased if the forage content is high in N [ $>4\%$  (25% crude protein)] and K ( $>3\%$ ).



**Figure 2.** Magnesium and sodium mineral contents of healthy and tetany prone pastures. Source: Potash Development Association, 2005.

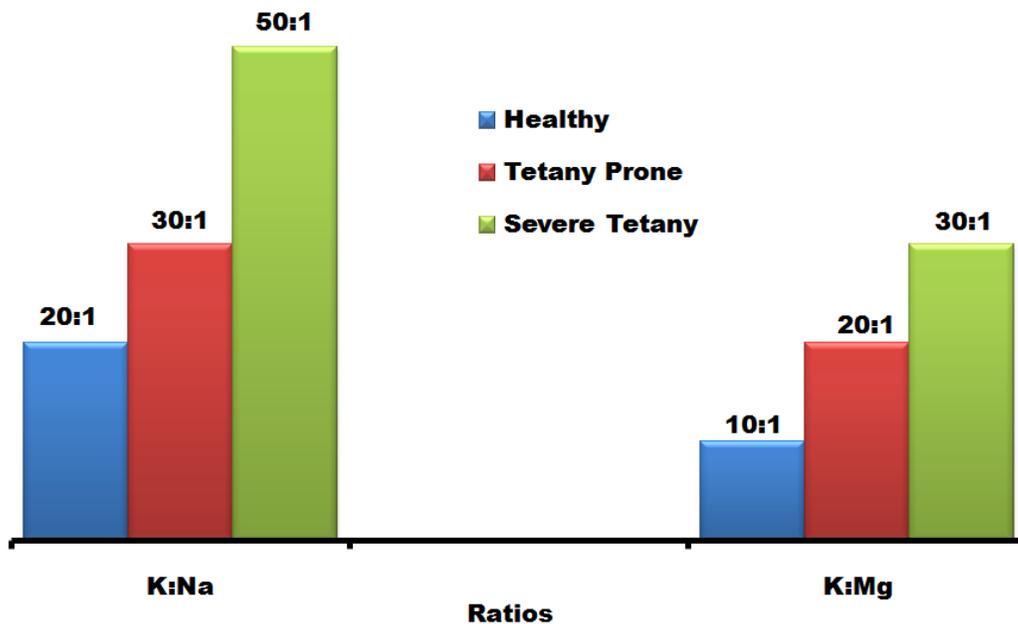
Nutrient balance is important in avoiding mineral disorders and it has been shown that there is less risk of grass tetany when potassium, magnesium and sodium levels in herbage result in K:Na and K:Mg ratios of between 10 and 20:1, respectively (**Fig. 3**). The greater risk of grass tetany occurs at K:Mg ratios greater than 10:1 and K:Na ratios greater than 20:1. Much of the sodium consumed by cattle and sheep is used in the production of saliva which is secreted into the rumen to maintain a constant pH by neutralizing acids formed by bacteria in the rumen fluid. If the sodium content of forage is too low, the animal automatically substitutes potassium for sodium as an alternative buffer in the saliva and diverts sodium to maintain blood Na level as



first priority. The resulting increase in K:Na ratio in the rumen leads to reduced re-absorption of Mg through the rumen wall into the blood ; therefore placing the animal at risk of grass tetany.

## Symptoms

Lactating cows demand high nutrient intake, including magnesium and calcium. Grass tetany primarily affects older, heavy milking cows or sheep, but young stock also can be affected. Magnesium enables a cow's nervous and skeletal system to function properly. Cattle or sheep affected by tetany often graze away from the herd, eat less, are irritable, show muscle twitching around the face and ears, grinding teeth, excessive urination, staggering, and are somewhat wide-eyed and staring. They may also appear uncoordinated and walk with a stiff gait. When severe, the animal will collapse, thrash around, throw its head back, lapse into a coma, and possibly die. The onset of symptoms usually is quite rapid and affected animals simply may be found dead in the pasture. Oftentimes, when animals are found dead, there will be signs of a struggle nearby, the grass and dirt will be disturbed, where the animal's head and feet thrashed about.



**Figure 3.** Risk of grass tetany based on potassium: magnesium and potassium: sodium ratios. Source: Potash Development Association, 2005.

## Preventing Grass Tetany

There is always concern for the prevention of grass tetany, particularly in early spring and late fall when lush pastures are available. Treatment for grass tetany is generally not an option, since the animal is usually dead when found, and most treatments administered while the animal is still alive are both difficult to administer, and usually not successful. Therefore,



prevention is the best option. To prevent grass tetany, it is recommended not to start grazing until grass has reached six to eight inches in height. Graze less susceptible animals on problem pastures. Dry cows, heifers, stocker cattle and cows nursing calves more than 4 months old are less susceptible than cows in heavy lactation. Another grazing management is to increase the legume content in your pastures with species such as clovers since they have high magnesium levels to compensate for the lack of it in lush grass. Apply potassium and phosphorous in the spring based on soil test recommendations to avoid “luxury consumption” (plant will take more than can utilize increasing concentrations in the tissues). Pastures deficient in Mg should be limed with dolomitic limestone, not calcitic limestone. If your soil is low in Mg and your soil test does not call for lime, Mg deficiency in cattle can be prevented by feed supplements. However, application of Mg oxide (60% Mg) at 250 lbs/ac or 1200 lbs/ac of dolomite (13% Mg) will add 150 lbs of Mg without adverse effect on soil pH. If the pasture has low soil Mg, do not apply heavy rates of nitrogen, potash or manure in early spring. Instead, make fall or late spring applications. Early spring applications of phosphorous will cause no problems on soils with normal Mg levels and phosphorous is needed to enable the plant to take up Mg. Monitor your nutrient balance by soil testing. By soil testing in the fall, sites with potential Mg deficiency can be diagnosed early and corrective measures implemented.

**Table 1.** High magnesium salt-mineral mixtures for reducing grass tetany.

	Mixtures			
	Mix 1	Mix 2	Mix 3	Mix 4
	----- % -----			
<b>Feeds</b>				
Dicalcium phosphate	25	25	35	30
Dry molasses	--	--	--	10
Ground corn	25	30	20	--
Magnesium Oxide	25	25	25	30
Salt	25	20	20	30
<b>Mineral Content</b>				
Calcium	6.0	6.0	8.5	8.0
Magnesium	13.5 – 15.0	13.5 – 15.0	13.5 – 15.0	13.5 – 15.0
Phosphorous	4.5 – 5.0	4.5 – 5.0	6.5 – 7.0	6.0 – 6.5

Source: Guyer et al, 1984; Herring and Bolte, 2005.

It is also recommended to replace a mineral that is 1 to 2% potassium (K) with a mineral higher in magnesium level (10 to 15%). This will allow livestock to have 10 to 25 grams of Mg per head per day. If using this type of approach, mineral supplementation should start at least 30 days before the spring grazing period. There are several commercial mineral mixes or soft molasses blocks containing Mg that could be used to address this issue. A home-made salt mineral mix containing magnesium oxide is one the cheapest sources to provide levels of magnesium needed. A mix containing equal parts of magnesium oxide with dical, salt, and ground corn can provide adequate levels of magnesium when livestock consume about a pound of the mix per head per week (Table 1). Intake on these mixes should be closely monitored, since added Mg can result in decreased palatability, and decreased consumption, which means that the animal may not be consuming the adequate amount of the minerals needed. It is highly



recommended that regular forage samples should be obtained for analysis. This simple procedure will provide valuable information for mineral supplementation to optimize livestock nutrition, production, and performance. Knowing the mineral composition of your forages will allow a more strategically planning for your feeding expenses and potentially save money, by cutting out the “extras” that are not needed. Check your minerals and be sure your herd is protected during late winter and spring.

## Summary

Grass tetany can be a serious cattle grazing problem. Low blood magnesium may be caused by 1) a diet low in magnesium, 2) a diet with nutrient imbalances that interfere with magnesium metabolism, or 3) higher levels of milk production. Environmental conditions and management factors combine to result in pastures with low magnesium levels. Cool and wet soil conditions reduce the plant's ability to utilize available magnesium, as well as high nitrogen and potassium levels from chemical fertilizers or manure. Do not apply heavy rates of nitrogen, potash, or manure in early spring. Instead, make late spring, summer, or fall applications of potash or manure when correcting low soil potassium levels. Additionally, forage samples should be obtained on a regular basis to determine mineral content, which can help dictate which minerals to supplement in the feed. Because an outbreak of grass tetany can be so costly, prevention is the best course.