

Controlling Grass Tetany in Livestock

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Revised by Chris Allison, Range Management Specialist

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Grass tetany, sometimes called grass staggers, wheat-pasture poisoning, lactation tetany and hypomagnesemia, is a metabolic disorder of livestock. It occurs primarily in ruminant animals; lactating cows are the most susceptible. Older cows are more susceptible than those with their first or second calves. Also, cows that are herded or worked may be more susceptible to tetany.

Recognition of Grass Tetany

The exact mechanism of poisoning is not well understood. A deficiency of serum magnesium is generally associated with tetany, frequently accompanied by a less-marked decrease in serum calcium. Normal levels of blood magnesium are around 2 mg per 100 ml of plasma. If the level drops to approximately 1 mg per 100 ml, it is referred to as hypomagnesemia; if it drops below 1, tetany can be expected to occur. However, a test for serum magnesium level is not a good indicator of grass tetany. Immediately preceding the occurrence of visual symptoms, plasma magnesium is low, but as tetany begins, plasma magnesium usually increases to a near-normal level and is no longer a diagnostic symptom. Since the kidneys apparently start conserving magnesium when the serum level reaches about 1.8 mg per 100 ml, one of the better aids in diagnosing hypomagnesemia is low urinary magnesium (less than 20 parts per million of magnesium).

Quite often, clinical signs are not observed, and the only evidence is a dead cow. In mild cases, milk yield is decreased, and the animal is nervous. These signs may indicate the need for preventive measures.

Animals affected by acute grass tetany may suddenly stop grazing, appear discomforted and show unusual alertness, such as staring and keeping their heads and ears in an erect position. Also, they may stagger; have twitching skin, especially on the face, ears, and flanks; and lie down and get up frequently. At this stage, they are easily disturbed and any stimulation may lead to startling reactions, such as continuous bellowing or running. Sooner or later, a staggering gait develops and is followed by collapse,

stiffening of muscles and violent jerking convulsions with the head pulled back. Animals lie flat on one side; the forelegs pedal periodically; the eyes and ears twitch; and chewing motions produce froth around the mouth.

Between convulsions, the animal may appear relaxed. During this period, a noise or touching the animal, as when administering treatment, may result in violent reactions. These produce an increase in body temperature and respiratory rate. Heart sounds become audible. Animals usually die during or after a convulsion unless treatment is given.

Subacute and chronic grass tetany generally are slower to develop and muscular affection may be limited to twitching, a clumsy walk or exaggerated motions, but convulsions may occur if animals are driven or handled roughly. Both are characterized by loss of appetite, suppressed milk flow and dullness.

Symptoms of milk fever in lactating cows are quite similar to grass tetany, except animals become paralyzed rather than show violent muscular response. Serum calcium is low in animals with milk fever, which it may or may not be with grass tetany. Calcium deficiency may cause sluggishness in animals, instead of the nervousness they have with magnesium deficiency.

Nitrate toxicity and grass tetany may occur at the same time on some pastures. In cases of nitrate toxicity, the blood usually is a chocolate brown color. Also, there is a grayish to brownish discoloration of white areas on the skin and on nonpigmented mucous membranes of the mouth, nose, eyes and vulva.

Conditions of Poisoning

Grass tetany usually occurs when animals are grazing lush pastures in the spring, but it can occur in the fall and winter. It is a worldwide problem with sporadic and unpredictable occurrence for any given area. Animals on one farm or ranch may be affected, while those on neighboring ranches may have no problems.

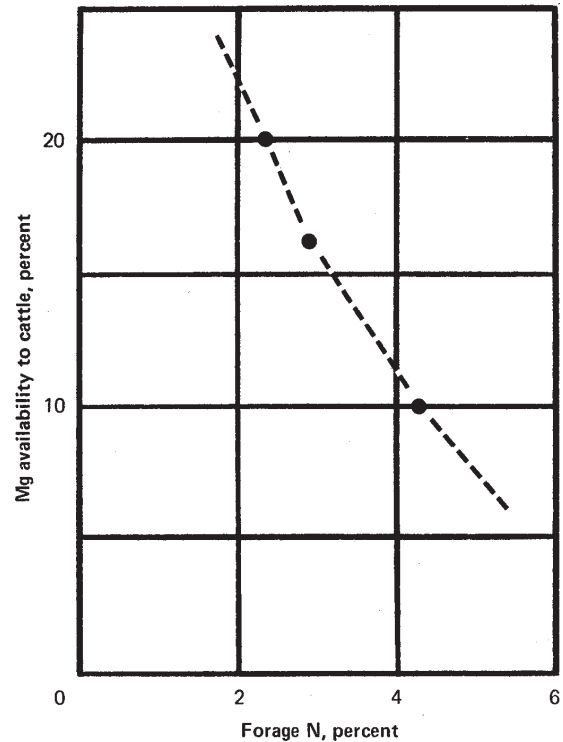
Grass tetany is common during cool, cloudy and rainy weather and often occurs when cool weather is followed by a warm period. Animals get grass tetany



Figure 1. Crested wheatgrass (*Agropyron cristatum*) occurs primarily in northern New Mexico and can cause severe outbreaks of grass tetany.

most often while grazing cool-season grasses or small-grain pastures in spring or fall. Rapidly growing, lush grasses are the most dangerous. Grass tetany has occurred on orchardgrass, perennial ryegrass, timothy, tall fescue, crested wheatgrass, bromegrass, and winter annuals, such as cheatgrass. The small-grain pastures include wheat, oats, barley and rye. Grass tetany also occurs when livestock are wintered on low magnesium grass hay or corn stover. It is not usually a problem on legume pastures or in animals wintered on legume hay.

Figure 2. Relationship between total nitrogen content of forage and “availability” to cattle of forage magnesium.



Source: H. F. Mayland and D. L. Grunes, “Grass Tetany,” *McGraw Hill Yearbook Science and Technology*, McGraw Hill Book Company, Inc. Information was originally published by A. J. Matson et al., in “Chemical Composition of Pastures in Relation to Grass Tetany in Beef Breeding Cows,” *N. Z. J. Agr. Res.*, 9:410-436, 1966.

Grass tetany is most likely to occur on pastures grown on soils that are low in available magnesium and high in available potassium. The state soil testing laboratory, through county agricultural Extension agents, can provide information on the danger of tetany on pastures and can recommend corrective fertilization or dolomitic liming practices.

High rates of nitrogen and potassium fertilizer are sometimes associated with increased grass tetany. Forages should be analyzed when a grass-tetany hazard is suspected. Forage containing less than 0.2 percent magnesium and more than 3 percent potassium and 4 percent nitrogen (25 percent crude protein) are

especially likely to cause tetany. Forage that is high in potassium and nitrogen also should have at least 0.25 percent magnesium. When an animal is on high nitrogen forage, the rumen produces a large amount of ammonia. Under these conditions, dietary magnesium may be converted to the relatively insoluble hydroxide, thereby lowering availability to the animal's tissues.

Prevention

Stockmen who have not seen animals with grass tetany should consult a veterinarian, county agricultural agent or other person who has had experience with the problem. Where grass tetany has been a problem, one or more of the following practices may be useful.

I. Applying magnesium fertilizer and dolomitic limestone to the soil may increase the magnesium concentration in plants. The effect of magnesium fertilizer or dolomitic limestone is generally greatest on coarse-textured acid soils that are low in potassium. Local recommendations should be obtained before fertilization.

II. Dusting pastures with magnesium oxide (MgO) as finely powdered calcined magnesite helps increase the intake of magnesium by cattle. Rates of 15 to 30 pounds of MgO per acre are recommended, with the lower rates for pastures where cattle are moved every two or three days.

To help keep rain from washing the MgO off the plants, a water slurry containing 10 percent MgO and 1.5 percent bentonite can be applied with a suspension fertilizer applicator. Where forage yields are low, as in many arid regions, dusting or spraying pastures with MgO is not practical.

III. Animals can be fed a supplement of special high magnesium mineral blocks or mineral salt mixtures. Also, magnesium may be added to a protein supplement, silage or liquid supplement.

Assuming a 20 percent availability, the cow's magnesium requirement for maintenance and lactation would be from 13 to 15 grams per day.

However, situations may require at least 36 grams to prevent development of tetany in herds. Lactating ewes should receive about 3 grams of magnesium (5 grams MgO) per day.

Magnesium supplements (table 1) include:

A. Good legume hay.

B. Mineral mixtures, such as:

1. 30 percent salt (with iodine and cobalt), 30 percent bone meal or dicalcium-phosphate, 30 percent magnesium oxide, and 10 percent dried molasses. This mixture provides about 18 percent magnesium.

2. 75 percent salt and 25 percent magnesium oxide.

Table 1. Magnesium content of various magnesium salts.

Name	% Mg	Pounds of mineral required to supply the same amount of Mg as 30 lbs of MgO
Magnesium oxide (Magnesia) (available in light and heavy grades; heavy is more stable and easier to mix)	60.32	30.0
Magnesium hydroxide	41.69	43.4
Magnesium carbonate (Magnesite)	28.8	62.8
Magnesium carbonate hydroxide	27.0	67.0
Magnesium sulfate (Epsom salts)	20.2	89.6
Potassium magnesium sulfate (Langbelinite)	11.6	156.0
Magnesium acetate (Cromosan)	11.34	159.6 lbs

C. Concentrate mixtures, such as:

1. For self feeding (with adequate available water and forage containing 10 percent protein), 65 percent ground grain (corn, oats, milo, etc.), 20 percent magnesium oxide, and 15 percent salt.

2. For self feeding (with adequate available water and low protein forages), 65 percent cottonseed meal and 35 percent MgO.

3. For hand feeding of supplements, use C.1. or C.2. but omit salt.

IV. Use grass-tetany hazard pastures for steers and dry stock, and use legume hay or high-legume pastures for lactating cows. A 1,000 pound lactating cow should consume approximately 30 pounds of dry matter per day. If the forage is lush and contains only 20 percent dry matter, the animal must eat 150 pounds of feed per day to meet the requirements. Under these conditions, it may be

profitable to feed hay, especially to cows who have previously had grass tetany.

Treatment

Early treatment by, or on the advice of, a veterinarian is very important. Cattle down for more than 12 hours are prone to suffer muscle damage extensive enough to make them unable to rise and support themselves. These “downer” animals rarely recover.

Cows in the early stages of grass tetany should be handled gently, producing the least stress and exertion possible. Driving, roping or anything producing excitement will frequently cause sudden death.

Injected under the skin, 200 cubic centimeters (cc) of a saturated solution (50 percent) of magnesium sulfate (epsom salts) gives a high level of magnesium in the blood in 15 minutes. This can be administered by ranchers and under range conditions.

Any solution injected into an animal should be sterile, otherwise an infection may be introduced. Therefore, cattlegrowers interested in using magnesium sulfate solution should contact a veterinarian.

Some veterinarians use intravenous injections of chloral hydrate or magnesium sulfate to calm excited animals and then follow with a calcium-magnesium gluconate solution. Intravenous injections should be administered slowly by a trained person, because there is danger of heart failure if they are given too rapidly.

As a follow-up treatment, the animal should be removed from the tetany-producing pasture and fed hay and concentrates. Also, 30 grams* of magnesium sulfate should be given daily. Force feeding of magnesium may be necessary, but after a week, the amount can be greatly reduced.

Cows that have tetany are likely to get it again later in the season or in later years. Yet, these animals may continue to be high producers.

*30 grams of magnesium sulfate ($MgSO_4$) equal approximately 1 ounce and 6 grams equal about 1 level teaspoon.