



Grass Tetany (Hypomagnesemia) in Beef Cattle

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The Grass Tetany Problem

Grass tetany has been the main cause of deaths of adult beef cows on farms in south-eastern Australia over the past 40 years. Seen mostly in lactating cows in winter and early spring, the disorder is associated with low levels of magnesium in the blood (hypomagnesemia) and cerebrospinal fluid around the brain, and is characterised by nervous signs including initial excitement, bellowing, muscle spasms, tetany, convulsions and sudden death.

The cause is complex, involving animal, nutritional, climatic and management factors.

The incidence of grass tetany varies between seasons and locations, affecting up to 2% of cows in an area in bad grass tetany years, and up to 30% of cows in particular herds. Most clinically affected cows die.

Why do losses continue to occur?

Losses from grass tetany continue to occur because -

- Lactating cows are very sensitive to changes in the input-output balance of magnesium in their bodies because they have no readily available magnesium reserve. This is compounded by the low and variable proportion of dietary magnesium that is absorbed from the rumen (between 5% and 30%). For a 600 kg cow to meet a maintenance requirement of 1.8 gm magnesium/day and lactation requirement of 0.85 gm magnesium/day (5 litres of milk contains 170 mg magnesium/litre), the required intake of magnesium is between 9 gm and 53 gm/day. Grazed pastures between April and September may not provide this requirement.
- Grass tetany has a short clinical course and high fatality rate. Cows are often simply found dead.
- There is no practical way for farmers to objectively assess when cows are at risk of grass tetany.
- No single preventive strategy is applicable to all farms. Differences in animal, nutritional and climatic circumstances may mean that some methods of prevention are inappropriate and not cost-effective.

- Traditional grass tetany prevention, by feeding hay and magnesium oxide (Causmag) daily during the danger period, is time-consuming, messy and difficult to do when paddocks are wet. Many producers wait until they have lost cows, or hear of others losing cows, before they commence feeding supplements.

What type of grass tetany occurs on your farm?

The key to cost-effective prevention is to know what cows are affected and what are the underlying circumstances.

The Cause

The magnesium status of cows depends mainly on the balance between the amount absorbed from the rumen and that lost in the milk. Any excess magnesium absorbed is excreted in the urine.

Hypomagnesemia results when the output of magnesium exceeds the input. However it is only when hypomagnesemia is pronounced and the level of magnesium in the cerebrospinal fluid also fails that signs of grass tetany occur.

Magnesium intake depends on the level of magnesium in the feed and the amount of feed consumed.

Cows are at risk when herbage contains less than 0.2% magnesium (dry matter basis) or when the availability of pasture is less than 1000 kg dry matter/hectare. Grass tetany can occur when pasture availability is low, even though the magnesium concentration in the pasture is within normal limits.

Generally, young grass and lush cereals have lower magnesium levels than older grass and cereal crops. Grasses and cereal crops have lower magnesium levels than legumes eg clovers and lucerne.

The absorption of magnesium is reduced by a high potassium intake (more than 3.5% dry matter). This is common when cows graze vigorously growing pastures on soils naturally high in potassium or fertilised with potassium. Low magnesium absorption can also occur when rumen potassium levels are raised by salt (sodium) deficiency, fasting or sudden changes in intake from dry feed to lush pasture. The effect of high potassium levels in the rumen on magnesium absorption is increased by

phosphorus deficiency, and is added to by high ammonium ion concentrations in the rumen caused by high plant nitrogen or protein levels.

Not all cows with hypomagnesemia develop low cerebrospinal fluid magnesium levels and grass tetany. Low cerebrospinal fluid levels can be triggered by low blood calcium concentration (hypocalcemia) or as an additional effect of high dietary potassium intake.

Susceptibility to grass tetany varies with the age, body condition score and breed of cows, as well as milk yield. Over 80% of beef cows affected with grass tetany are older than six years. These cows are more prone to overfatness at calving and to hypocalcemia. Fat cows have less available magnesium in body fluids, and if they calve in autumn and lose body weight while lactating heavily on short, grass-dominant pasture in winter, the risk of grass tetany is high. Cows younger than six years become affected when factors other than feed or magnesium intake are involved. High potassium intake or low sodium or phosphorus nutrition is likely to be involved.

Bos taurus (British and European) breeds are more susceptible to grass tetany than *Bos indicus* (Brahman, Santa Gertrudis) breeds. There are also differences in susceptibility between individual cows and families. Not all of these differences are associated with milk yield.

Stress or excitement causes adrenaline release that can trigger hypomagnesemia. Cows in oestrus are at risk, as are those subjected to severe weather conditions or yarding. Some herds only experience losses from grass tetany when cows are taken off paddocks for a day at calf marking.

The worst months for grass tetany are from June until August. During these months many cows are in mid lactation and losing condition. Pasture is often short, grass dominant and has a chemical composition unfavourable for magnesium and calcium absorption. Climatic stress (severe chill, driving rain or strong wind) can be high.

Clinical Signs

The first sign may be that cows are found dead in the paddock. Usually, there is froth from the mouth and nose, and the ground is rubbed where the animal's legs thrashed backwards and forwards (paddling) before she died.

Other cows may show nervous signs when disturbed or being yarded. Initially the cow may walk stiffly, or gallop madly or bellow loudly, before going down and becoming unable to rise. The cow has an exaggerated response to sight, sound or touch, and may begin convulsing, with muscle spasms (tetany), kicking, rolling of the eye-balls, head arched back and frothing at the mouth. Death can occur within half an hour.

Milder cases may show a wild facial expression and exaggerated or unsteady leg movements for 3-4 days, before recovery or the development of more severe signs.

Treatment

Rapid treatment to restore blood magnesium is essential.

Injection of a magnesium solution into the jugular vein produces the best results but can be dangerous and should only be done by a veterinarian. Farmers should only treat affected cows by injection under the skin. Solutions that contain calcium as well as magnesium should be used to guard against possible hypocalcemia.

Oral treatment with 100 gm Causmag or Epsom salts should also be given as relapses can occur after a few hours. Start feeding the cow hay and Causmag as soon as possible after she recovers to improve magnesium absorption from the rumen.

Prevention

Prevention has two aspects.

The first is damage control in a crisis (A), when cows at risk receive hay and/or magnesium supplements and any obvious feed problems or causes of stress on cows are rectified.

The second involves planning to avoid a crisis (B) while maintaining a focus on enterprise productivity and profitability.

A. Handling a Crisis

Sudden deaths in lactating cows in winter can be caused by bloat, mastitis, milk fever, clostridial diseases and other causes besides grass tetany. **Be sure of the diagnosis.** When one or more cases of grass tetany have occurred in a herd, immediate consideration should be given to -

Providing magnesium supplements

Causmag

Hay treated with Causmag is the most common supplement. The daily requirement of Causmag is 60 gm/cow/day. After supplementation commences, it takes 2-3 days before cows are protected, and protection ceases as soon as supplementation is stopped.

Administration is by making a suspension of Causmag in water (600 gm in 2 litres), pouring it onto the cut edge of a small bale and feeding at a rate of one bale/10 cows/day.

Feeding grain eg oats can be used as a carrier medium for delivering Causmag to cattle. Add 600g Causmag to a slurry of 200ml water and 300g molasses poured over 3.5kg oats to supplement 10 cows /day. This mix will keep for at least 10 days. Alternatively 600g Causmag with 1 litre water poured over 12 kg oats to 10 cows / day. This last ration must be fed the day it is mixed, as the Causmag dries and separates from the grain.

Magnesium salts in water

Adding magnesium salts (Epsom salts) to water troughs at a rate of 3 gm/litre can be effective if cows drink the water. It is usually an unreliable method because water intake by cows is generally low when they are grazing lush tetany-prone pastures, especially when other water sources are available.

Magnesium licks

Magnesium licks are useful but will not provide 100% protection because some cows do not use the licks. More cows accept licks if they have previously been exposed to licks. Most commercial magnesium licks and blocks contain up to 80% molasses because magnesium salts are not highly palatable. Licks and blocks should be placed near stock camps or watering points. Crusts which develop on licks should be removed, and licks should be moistened before cows are allowed access.

Magnesium capsules

Magnesium capsules are marketed as an aid to the prevention of grass tetany in cattle. They are inserted into the rumen and, after a stabilising period of one week, release magnesium for about 80 days. It is recommended that cattle receiving these devices are also fed hay as a feed supplement and to improve absorption. Capsules do not guarantee protection but are useful insurance, especially in valuable or high-risk cows.

Correcting feed problems

The most common type of grass tetany occurs in old, usually fat, lactating beef cows that are underfed and losing weight in winter. Weight loss can be prevented by feeding about 4 kg hay a day, and this will also usually prevent grass tetany unless there are complicating factors.

An alternative to feeding hay is to place the at-risk cows into a new paddock containing more legumes, mature herbage or dry, standing residues.

Note that topdressing pastures with magnesium fertilisers is not cost-effective.

Reducing stress

Provide at-risk cattle with a sheltered paddock, and avoid unnecessary yarding or running them around.

B. Strategic Planning

The primary goal of making money by improving pasture, increasing stocking rates and breeding cows for higher milk yields should not be discarded to reduce the risk of grass tetany, even though achievement of these objectives could increase the risk of this disorder. Grass tetany should be regarded as a cost of production, to be reduced cost-effectively while maximising enterprise productivity. Steps to achieve this are -

Establish the size and type of the grass tetany problem that occurs on your farm.

Tabulate the cases that have occurred in the last five years and the age profile of affected cows. Assess the size of the problem from the percentage of cows affected and their value. The type of problem is assessed from the age of affected cows.

When only cows older than five years have been affected, the cause is usually a low intake of magnesium combined with loss of body weight that can be rectified by feeding hay (say 4 kg/cow/day), with or without Causmag.

When cows less than 5 years old are affected, additional factors likely to be involved are hypocalcaemia and high potassium levels in soil (more than 300 mg/kg) or pasture (more than 3.5% dry matter). Magnesium supplements have to be given in these situations.

Cases among first-calf heifers are uncommon and probably complex. The service of an expert consultant is recommended.

Identify high-risk factors

- Is the percentage of old cows in the herd high? Few cows should be more than nine years old.
- Are old autumn-calving cows becoming too fat in spring or summer? Fat scores of 3.0 to 3.5 should be the target.
- Are cows milking "off their backs" (ie losing weight) in winter?
- Are soils naturally high in potassium or low in phosphorus or sodium?
- Are potash fertiliser applications pushing soil and pasture potassium levels too high in winter?
- Are pastures grass-dominant in winter, containing plant species low in magnesium and high in potassium?
- Are cows handled, stressed or unprotected from inclement weather during winter?
- Are high-risk cows not matched with low-risk paddocks?

Examine options to manage high-risk factors

- Reduce the percentage of old cows in the herd by joining more heifers than normally required as replacements, calving heifers down at two years of age and culling all non-pregnant old cows.
- Make sure you know the age of all cows.
- Prevent over-fatness in old cows by adjusting the stocking rate. Aim for a fat score 3.0 to 3.5 at calving.
- Prevent excessive loss of condition by lactating cows in winter by the use of supplementary feeding or fodder crops, or by sowing winter-growing pasture species.
- Correct soil phosphorus deficiency and improve pastures by applying phosphorus fertilisers.
- Use salt blocks (sodium chloride) where sodium intake is low (high rainfall areas away from the coast without access to saline bore water).
- Avoid the excessive use of potash fertilisers by basing application rates on soil tests (soil potassium levels should not exceed 140 mg/kg).
- Avoid grazing pastures soon after they are fertilised with potash. A high potassium intake can result from adherence of the fertiliser to pasture and high levels of absorption by plants through the roots.

- When applying potash, ensure that pasture growth (especially legume growth) is not being retarded by other plant nutrient deficiencies.
- Consider improving pastures with winter-growing plants, especially legumes, that have a low predisposition to cause grass tetany.
- Consider establishing shelter belts to reduce climatic stress as part of the property management plan.
- Place non-lactating cattle or young lactating cows in high-risk paddocks between April and September, saving low-risk paddocks for high-risk cows.
- Supplement cows with magnesium according to degree of risk as assessed from animal, pasture and seasonal conditions.

Seek professional assistance to:

- **Solve complex problems**
When the principles outlined above cannot explain losses or there is a need for an economic cost/benefit analysis, the services of an experienced, paid consultant should be sought.
- **Plan pasture improvements**
High-input grazing systems may be necessary to improve farm productivity, causing grass tetany to

increase on high potassium soils. This could be overcome by sowing more suitable pasture species.

- **Examine changing the breed of cows**
Breeds such as Santa Gertrudis and Brahman are less susceptible to grass tetany than more traditional breeds. However changing the herd breed structure to reduce grass tetany should be considered only as part of a wider review of farm management and production objectives.
- **Stay abreast of local situation**
Local farm management groups are an excellent venue to exchange knowledge, experience and locally-relevant strategies, and provide warnings of risk.

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