

# Grass tetany in cattle – treatment and prevention

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## Introduction

This Primefact is one of three Primefacts on grass tetany. This Primefact deals mainly with treatment and prevention. Primefact 420 focuses on the causes of the disorder. Primefact 785 is concerned with predicting its likelihood.

## Cause

Although low blood magnesium levels (hypomagnesaemia) are always involved with grass tetany, the disorder is complex and can occur under a variety of circumstances. Low levels of blood magnesium are usually associated with low levels of blood calcium in late pregnant cows and cows with calves at foot. These low levels mean that the muscles of the body cannot work properly, so the animal dies as it cannot breathe.

Grass tetany may not always arise from a simple deficiency of magnesium (Mg). The disorder can be quite complex and different circumstances can lead to a reduction in magnesium concentration in the blood and cerebrospinal fluid, producing signs of grass tetany as follows:

- Simple form – a deficiency of magnesium.
- Complex form – potassium is the most important factor which interferes with magnesium absorption from the rumen.

The disorder can be quite complex, with many factors contributing:

- the age of the cow – older cows with young calves are most vulnerable;
- feeding on grass-dominant pastures or young cereal crops;
- acid soils in south-western NSW;
- high-potassium soils or soils treated with inappropriate levels of potassium fertilisers;
- environmental effects such as:
  - wind, rain and exposure
  - sudden lowering of temperature.

## Low magnesium intake

Generally, young grass and cereals have lower magnesium levels than older grass and cereal crops, e.g. grazing oats. Grasses and cereal crops have lower magnesium levels than clovers and lucerne. This means that it is more risky to graze cattle on pastures that are made up mainly of grasses, or cereal crops, especially when they are young.

Pasture management, such as spraying broadleaf weeds, results in less competition to grasses. It also sets back clover growth, encouraging grasses to dominate. Heavy red-legged earth mite attacks on clover, and years where there is limited clover, may also mean grass dominance and hence a higher risk of grass tetany.

Heavy nitrogen or potassium fertiliser application reduces the amount of magnesium available to the plant from the soil and so reduce plant magnesium levels. Anything that reduces feed intake reduces magnesium intake, so unpalatable food (e.g. long, rank oats), bad weather, yarding or transport can cause outbreaks of grass tetany through reducing feed intake.



## Poor magnesium storage in the animal

Cows can store only very small amounts of magnesium in their bones and soft tissues. They lose magnesium in milk, urine and digestive secretions, and unless this is quickly replaced, grass tetany will result.

## Interference from other minerals

In the soil, and in plants and animals, other minerals such as sodium, potassium, chlorine and manganese can interfere with the amount of magnesium a cow will be able to obtain from its feed.

## Stress

Any form of stress can cause an outbreak of grass tetany once blood magnesium levels are lower than normal. Common stresses are oestrus, mustering, yarding, trucking, starvation and cold weather. The first widespread cases of grass tetany in a season are often seen after the first spell of cold, wet, windy weather or widespread heavy frosts.

## Symptoms

For most farmers, the first sign of a grass tetany outbreak is finding dead cows. Usually there is froth from the mouth and nose, and the ground is rubbed where the animal's legs moved violently before she died. Excitement and muscular spasms (tetany) are the most common symptoms.

In the mildest form, a cow may have abnormally low blood magnesium yet show no symptoms. All may be well for days or even weeks until she is stressed by, for example, yarding, mustering, trucking, and then symptoms may show. Initial signs of the disorder include twitching of the face and ears, a wary appearance and a stiff gait. Often these early warning signs are missed.

In the intermediate form, the cow is wild, her front legs 'goosestep', she doesn't like being driven, the tail is held a little high and she may appear blind. A few recover at this stage, but without treatment most will worsen and die.

Excitement, galloping, bellowing and staggering are common in the worst form of the disorder. The cow soon goes down on her side, with her legs outstretched, stiff and thrashing backwards and forwards (leg paddling). Her head arches back slightly and she froths at the mouth. If the animal is down and has survived an attack, any disturbance (especially if she is touched) may start a new attack of leg paddling. The animal may die within minutes of being seen staggering, especially if she is driven or stressed in any way.

## Treatment

As explained earlier, grass tetany may not always arise from a simple deficiency of magnesium. Straight magnesium supplements are therefore sometimes ineffective as a sole treatment.

A veterinarian will usually inject calcium and magnesium intravenously (i.e. into the vein) followed by a subcutaneous (i.e. under the skin) injection of magnesium. Injecting these solutions intravenously requires extreme caution, as an injection given too quickly, or at too large a dose, will kill the cow.

Farmers will often have to treat their animals themselves, such is the seriousness of the situation. If you have to do this, do not disturb the animal until you are ready to start the treatment. Generally, calcium and magnesium solutions from one to two commercially available plastic packs are injected under the skin, followed by 60 to 200 mL of 50 per cent magnesium sulfate solution, also injected under the skin.

Warm the plastic packs to body heat (approximately 38°C) in a bucket of hot water. This makes the solution easier to administer, causes less upset to the cow and gives a quicker uptake of calcium and magnesium.

Needles should be sterile, and the two solutions should be injected into different sites. Follow-up injections of magnesium sulfate (20 to 60 mL of 50 per cent solution) are often required for a day or two.

Sixty grams of magnesium oxide – MgO (Causmag<sup>®</sup>) – should be fed daily after recovery to ensure that the cow's magnesium requirements are met (see the next section on prevention).

## Prevention: supplementation of magnesium

The most effective supplement is hay treated with magnesium oxide (Causmag).

Daily Causmag requirement for cattle is 60 g/head/day, but up to 100 g/head/day may be necessary in some circumstances.

After you start feeding, it takes 2–3 days before stock are protected. Protection ceases as soon as this supplementation is stopped.

Providing too much Causmag is expensive and can cause scouring.

## Magnesium blocks

Blocks are not recommended because of their high cost (\$850/t, or \$5300/t of Causmag) and

the difficulty in ensuring that all animals get the correct dose. However, there are blocks available containing around 16 per cent Causmag.

### Looselicks and homemade recipes

Variable consumption of looselicks by cows leads to insufficient levels of magnesium in some animals. However, in situations where no more effective means can be employed to deliver the Causmag, they can be of some use.

Recipes are as follows.

Mix No. 1 – Looselick	
Causmag	30%
Salt	30%
Lime	20%
Molasses	20%

Salt supplies sodium (Na) and counteracts the effects of potassium (K).

Lime (stock grade) supplies calcium which is also involved in counteracting grass tetany.

Some recipes include Epsom salts (magnesium sulfate) instead of Causmag; however, this is two to three times the price of Causmag and contains less magnesium.

Mix No. 2 – Homemade block	
Molasses	40%
Causmag	15%
Salt	10%
Lime	10%
Protein meal, or grain	25%

The objective is to get cows to consume around 120 g of Causmag every 2 days. This means 200 g/head/day of mix No. 1 (looselick), or 400 g/head/day of mix No. 2 (block).

Increase the salt level in the mixes if cattle are consuming too much, and reduce the level if they are consuming too little.

Causmag costs around \$500/t bagged – less in bulk. Mixes 1 and 2 will cost around \$280/t and \$240/t respectively, compared with \$850/tonne for commercial preparations. At recommended rates, these mixes cost 5.5 cents and 9.5 cents/head/day respectively. Mix No. 2 will also provide some protein if cottonseed meal or lupins are used, and this will be advantageous to lactating cows.

### Causmag-treated grain

Work at Rutherglen Research Station in Victoria suggests that providing Causmag-treated grain is an easier, cheaper and more effective method of supplementing cattle in order to prevent grass tetany.

**Rations.** Oats is used as the carrier and is mixed in both rations in a concrete mixer. Each of these rations will provide a supplement for 100 cows for one day.

#### Ration A

Ration A	
Oats	35 kg
Causmag	6 kg
Water	2 L
Molasses	3 kg

Make a slurry of water and molasses. Add the Causmag, then the oats. This will keep for at least 10 days.

#### Ration B

Ration B (useful where higher grain supplementation is necessary)	
Oats	120 kg
Causmag	6 kg
Water	10 L

This ration must be fed the day it is mixed, as the Causmag dries and separates from the grain.

### Causmag-treated hay

Experience to date shows that the most effective supplement is Causmag-treated hay. Use the same slurry as for rations A and B above, but without the oats. The aim, as with the other supplements, is to have each adult consume 60 g Causmag per day. In some cases up to 100 g Causmag will be required.

#### Method 1

Mix a slurry of Causmag, molasses and water. The slurry of the prepared Causmag can be administered by pouring the mixture onto the biscuits or rolled-out bale.

Causmag is abrasive, so don't pump the mix – pour from a container.

#### Method 2

Dampen hay bales with water, then shake dry Causmag onto the cut bale face.

#### Method 3

Feed out hay with Causmag already introduced to baled hay. Some work has been done with this technique but again the Causmag is abrasive on the baler parts and bearings.

## Other methods of administering magnesium

### Magnesium bullets

These are relatively expensive but provide protection for 80 to 90 days. The bullets are about 5 cm in diameter, 15 cm long and weigh about 250 g. They need to be installed down the throat into the rumen at least a week before the high-risk period starts. The release rate is 2 g/day which is only a marginal supplement of doubtful efficiency. The requirement of a cow producing 20 L of milk is 15 g/day (a recommended daily allowance takes into account the requirement and the availability of magnesium from feeds). Magnesium bullets may not give sufficient protection when magnesium absorption is being affected by high dietary potassium (K).

The cost of the bullets is just under \$9 each (10 to 11 cents/head/day).

### Medicated water troughs

Providing soluble magnesium salts – magnesium sulfate (Epsom salts) or magnesium chloride – in water troughs at a rate of 3 g/L can be effective. This method is not appropriate where surface water is available to cows.

### Management strategies

In the longer term, producers must look to soils and pastures to prevent acidification, as it is evident that acid soils and high potassium (K) levels are synonymous with grass tetany incidence (see Primefact 420 *Grass tetany in cattle*).

#### *Beef cattle management*

Following is a summary of management strategies that can alleviate potential problems.

- Time of calving. Spring calving cows will be less susceptible than autumn/winter calving cows.
- Mustering and transport.
  - Keep to a minimum and never transport cows in the last 6 weeks of pregnancy.
  - Do not run or stress animals.
- Sudden changes of feed and feed quality.
  - Leave the gate open to a fresh paddock so animals can move quietly to the new pasture or oats but are able to return to their old grazing till they get used to the new pasture.
  - Keep hay for the cows and calves, and give the steers the green crop. The best hay is

legume hay because legumes supply nutrients which help reduce grass tetany.

- Starving of fat cows and heifers. Sudden starvation can lead to a reduction of magnesium available to the body system. If body condition is to be reduced, it should be carried out well before calving, and the cattle dieted, not starved.
- Other stresses. Any stress on the cow at the critical time may be enough to trigger grass tetany, such as:
  - first oestrus after calving;
  - unnecessary handling and movement;
  - high fat and protein in the diet, which can depress magnesium uptake.

### Summary

Grass tetany is probably one of the least understood metabolic diseases. Many factors contribute to this most complex disorder. Good cattle management is essential to combat grass tetany but sometimes this is not enough to stop cows from dying.

### Further information

For further information on grass tetany, see Primefact 420 *Grass tetany in cattle* and Primefact 785 *Grass Tetany in cattle – predicting its likelihood*

### References

Prof Ivan Caple – Former Dean, Veterinary Medicine, Melbourne University

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