



FACTSHEET

Hill Country Futures: Calcium and magnesium requirements

October 2022

Magnesium (Mg) and calcium (Ca) are both essential nutrients for plants and animals. They are present in the soil as cations (i.e. positively-charged ions), salts and minerals. Note soil pH influences the cation exchange capacity (CEC) and therefore the ability of the soil to retain cations.

🔑 Key messages

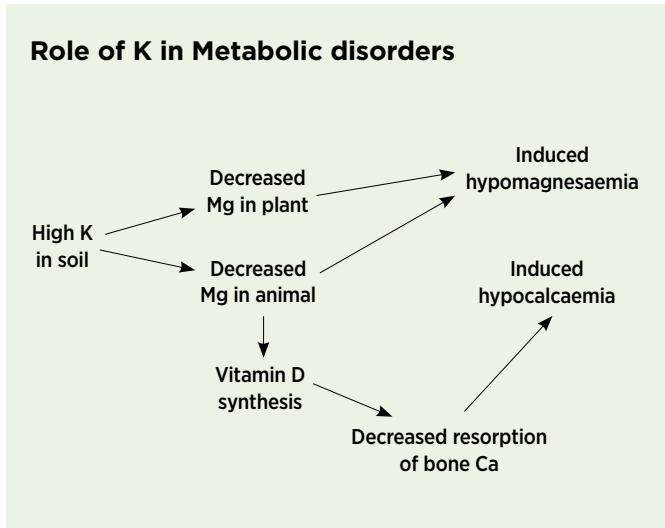
- On most New Zealand farms, pasture production is not limited by Ca and Mg levels in the soil.
- Despite adequate soil levels of these nutrients for plant growth, supplementation of cows with magnesium oxide and lime flour may be required to prevent metabolic disorders during calving. Metabolic disorders in ewes are precipitated by sudden dietary changes and/or feed restrictions and ewes do not typically require supplementation with these minerals.

Calcium (Ca) and magnesium (Mg) in New Zealand soils

Method	Calcium (Ca)	Magnesium (Mg)
Role	Within soil, Ca helps soil aggregates remain stable, which supports soil structure. For plants, Ca is essential for the growth of root tips and is part of the carbohydrate structure.	Mg is essential for photosynthesis, as it is a component of chlorophyll. It is also needed for protein synthesis in both plants and animals.
Status of New Zealand soils	Ca deficiency is rare in New Zealand, because adequate plant-available Ca levels are typically maintained as calcium applied via superphosphate and lime replaces that lost through leaching and in products leaving the farm. In addition, New Zealand soils are geologically young and have not lost as much calcium through leaching as soils in other parts of the world.	Most New Zealand soils are generally well supplied with Mg. Near the coast, up to 10 kg/ha/yr of Mg can be deposited from rainfall, with the Mg arising from sea spray. Note pumice soils of the volcanic plateau have little Mg in the parent material and so may require Mg fertiliser to overcome deficiencies.
Measuring in soil	There are no recorded deficiencies of Calcium in pasture - regardless of soil Ca test levels.	Based on a Quick Test Ca (QT Mg), levels should be maintained above 8. Low soil Mg can induce hypomagnesaemia (grass staggers). To reduce the incidence of hypomagnesaemia, soil test results of 20-30 are needed. To yield a meaningful pasture growth response from applying Mg, you need a test result of <4.
Applying fertiliser	If long-term test results show Ca levels are declining into the 5-10 range, consider switching to superphosphate or apply lime to maintain or increase soil Ca.	Soil Mg levels should be monitored by observing soil test trends over time. To maintain adequate soil Mg levels, apply 5-10 kg Mg/ha/yr. Fertiliser options to increase magnesium levels include dolomite and serpentine super - noting serp.super takes a long time to release its Mg.

Impact of potassium (K) on Ca and Mg

High soil Quick Test K (QT K) levels displace Mg from exchange sites and so reduce Mg levels in plants and animals, which can cause hypomagnesaemia (grass staggers). See diagram below. Supplementing cows with magnesium oxide before and after calving can alleviate symptoms.



High K can also restrict plant Ca uptake and absorption of Ca into the bloodstream. This has the potential to lead to hypocalcaemia (milk fever) in beef cows in late pregnancy or at calving. Avoid grazing high K paddocks or those recently top dressed with potassic fertiliser, at this time.

It is generally advised not to feed beef cows calcium supplements pre-calving – a high dietary intake of Ca in this period can interfere with the cows' ability to mobilise their own calcium stores at this time. At most, early calving beef cows may require some magnesium supplementation.

Conclusion

Metabolic issues in beef cows are most typically associated with underfeeding or sudden dietary changes – ensuring adequate feed intake should be the number 1 priority. Ca and Mg levels in New Zealand soils are generally adequate, however, high levels of soil potassium can restrict the amount of Mg uptake by plants. This can restrict the availability of these two nutrients to animals and cause metabolic disorders during spring. Therefore, cows may require Mg supplementation with magnesium oxide and/or lime flour post calving to prevent metabolic issues.

Further reading

This factsheet is part of the Hill Country Futures soil and fertiliser series. The full series can be found at www.hillcountryfutures.co.nz/resources/soil-and-fertiliser-series

“Fertiliser use on New Zealand sheep and beef farms” booklet, produced the Fertiliser Association of New Zealand booklet. Download at: www.fertiliser.org.nz/Site/resources/booklets.aspx

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