Rumevite Magnesium Capsules
Hypomagnesemia

- Also known as grass tetany and grass staggers
- Due to low Magnesium concentration in CSF (cerebrospinal fluid) and blood
- Clinically – tetany (muscle twitch / spasms) and convulsions
- Adult lactating cows most susceptible due to loss of Mg in milk. Greatest “at risk” group 4 – 6 year old cows
- Differences in breed susceptibility (Angus > Murray Grey > Shorthorn > Hereford > Jersey > Friesian > *bos indicus* (e.g. Brahman) most resistant)
- Herd “outbreaks” can affect 10 – 30% of animals
- Mg requirements must be ingested daily (no available stores); i.e. Mg homeostasis is dependant on absorption of dietary Mg.
Hypomagnesemia

- Occurs when grazing fresh, lush, rapidly growing pasture (often heavily fertilised with N and/or K) with low DM and Mg content
- Outbreaks often preceded by episode of reduced feed intake e.g. yarding, bad weather, transport
- That is; occurs when the absorption of dietary Mg is unable to meet requirements (maintenance and lactation)
  - Reduced intake
  - Reduced absorption (e.g. high K, N or low Na, P)
- Mg in feed often poorly available (bound in complexes, etc); only 15 – 20% of Mg in diet is available / absorbed by the cow
- Mg absorption takes place in the rumen (Mg$^{2+}$ is the form absorbed)
Magnesium metabolism

Fig 1. Magnesium flow and excretion in a 500kg lactating beef cow
Mg supplementation

• Cattle generally supplemented with Magnesium pre calving to prevent metabolic disease (e.g., milk fever and grass staggers)

• DairyNZ advice is 12-20g Mg to be supplemented to dairy cows each day, from 2-3 weeks pre calving until after peak lactation
  – In NZ this means Mg supplementation occurs end June to November

• BeefNZ also recommend supplementing Mg as up to 20% mortality has been recorded from hypomagnesaemia (Morris 2009)

• Methods of Magnesium supplementation include:
  – Mg Oxide top dressed on pasture, or added to silage & other feeds
    • drenching / molasses/ licks / & ‘fortified’ compound feed less commonly used
  – Mg Sulphate/Chloride added to water trough system or feed (mainly dairy, as beef farms often lack water reticulation infrastructure)
  – Mg Capsules
    • especially extensively grazed beef cows, where pasture dusting is impractical
Rumevite Magnesium Capsules

- NZ label claim - “Aid in the prevention of hypomagnesaemia in cattle”

- Mg Capsules provide 2-3g Mg per cow per day, over 9-12 weeks
  - Release rate is exponential at 1.5% per day, start point of 189g Mg
  - Mg$^{2+}$ is released from the capsule and is available at the target site of absorption (rumen)

- Mg Capsules typically used in older (4+ year old) cows
  - breeding beef cows, as lower daily Mg requirements than dairy cows
  - often used in beef cow herds where mortality, thought to be related to grass staggers, occurred in previous years
  - also typically used in late calving dairy cows (eg final 10% to calve)
Rumevite Magnesium Capsules

- Developed by CSIRO – patented technology (patent has expired)
- Two essential elements
  - Specific magnesium alloy and Conductive rubber
- Magnesium alloy
  - ~ 90% magnesium
  - Known and controlled impurities to ensure predictable release of the Mg
- Rubber
  - Acts as hinge for the capsule
  - Conductor – facilitates the erosion of the magnesium from the outer surface
- Matrix of conductive particles in the rubber act as a **cathode** and the magnesium alloy, semi-cylindrical body portions as **anodes**
- The electrolytic effect drives the dissolution of the magnesium alloy
Fig 1. Electrolytic effect driving magnesium release

Rumevite Magnesium Capsules
Rumevite Magnesium Capsules

- Magnesium release highly researched
- 1.5% loss of capsule weight / day
- Capsules contain 210g Mg alloy
- Equivalent to 189g Mg
- Initial release >2.5g/day
  Reduces over time

Graph: Exponential decline in capsule weight over time
Capsule weight decreased by approximately 1.5% per day
<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
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<tbody>
<tr>
<td>Capsule administered to individual cattle</td>
<td>Dose surety for every animal treated</td>
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<tr>
<td>Longest lasting form of Magnesium supplementation</td>
<td>Labour to supplement magnesium on daily basis is not required</td>
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<tr>
<td>Sustained Mg$^{2+}$ release for 9-12 weeks Release is exponential at 1.5% per day, start point of 189g Mg</td>
<td>Provides solution for supplementing Mg when daily pasture dusting or trough treatment is impractical, thereby reducing cow mortality risk</td>
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<tr>
<td>Research validates consistent release over time</td>
<td>Magnesium available to the cow is not dependant on feed and water availability / intake</td>
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<td>Magnesium released in rumen only in the bio-available Mg$^{2+}$ form</td>
<td>All Magnesium released is available to the cow in, the target site of absorption (ie rumen)</td>
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<td>New research with two capsules per animal</td>
<td>Confirms cattle can be treated with two animals, doubling daily Mg release to ~5g per day</td>
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