Magnesium supplementation (3-1)

Why supplement cows with Magnesium?
Magnesium (Mg) deficiency in dairy cows was recognised in New Zealand in the 1970s and supplementing with Magnesium in late pregnancy and early lactation has become routine on most farms. Magnesium supplementation will reduce animal health problems, and potentially increase milk production.

However, the magnesium requirement of the modern dairy cow has increased, partly due to increased use of nitrogen (N) and potassium (K) fertilisers and partly due to an increase in cow genetic merit. All cows are to some extent deficient in Magnesium in late pregnancy and early lactation. High producing cows are more deficient.

Hence the old recommendation of 10 - 12 gm Magnesium per cow per day is no longer appropriate.
Other factors that increase Magnesium requirements of cows during the winter/spring period are:
- Low Magnesium levels, high K levels, and/or high crude protein levels in spring pasture.
- Cold wet weather in spring depressing grass growth and cow intakes.
- High cow demand for Magnesium over calving and early lactation.

Magnesium and Milk Fever
Magnesium plays an important role in milk fever prevention (calcium deficiency). Magnesium is required for the production of hormones that are important for the absorption of calcium (Ca) from the gut and the mobilisation of Ca from bones. Supplementing with magnesium for two to three weeks pre-calving will reduce the risk of milk fever, however it does not build up a store of magnesium.

Magnesium deficiency and Grass Staggers (Grass Tetany)
Although cows have significant stores of Magnesium, none of these stores are available to the animal. Therefore the cow is dependant of what Magnesium is supplied in their diet and from supplements. Blood and urine tests can confirm Magnesium deficiency. Consult your vet.

The initial symptoms of magnesium deficiency are nervousness, ears pricked, nostrils flaring, eyes alert and head held high. Movement is stiff, like walking on stilts, and cows stagger when forced to move quickly. Cows suffer loss of appetite and reduced milk production. Death results from a “Tetany” where the muscles contract uncontrollably including the heart.

Magnesium requirements
It is recommended dry cows receive a diet containing 0.35% Magnesium, and lactating cows 0.28% Magnesium.

Table1. Desired dietary Magnesium concentrations and the quantity of supplementary Magnesium required (grams/cow/day) for different size animals.

<table>
<thead>
<tr>
<th>Mg requirement (% of diet)</th>
<th>Supplementary Mg (g/cow/day)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Jersey</td>
</tr>
<tr>
<td>Dry 0.35%</td>
<td>12</td>
</tr>
<tr>
<td>Lactating 0.28%</td>
<td>15</td>
</tr>
</tbody>
</table>
Table 2. Different quantities (grams) of alternative Magnesium sources to supply the required amounts of pure Magnesium (down the cow’s throat).

<table>
<thead>
<tr>
<th>Magnesium source (%Mg)</th>
<th>Example product</th>
<th>Magnesium required (grams/cow/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12 gm</td>
</tr>
<tr>
<td>Mg Oxide (55%)</td>
<td>CausMag</td>
<td>22</td>
</tr>
<tr>
<td>Mg Sulphate (10%)</td>
<td>Epsom salts</td>
<td>122</td>
</tr>
<tr>
<td>Mg Chloride (12%)</td>
<td>Mag chloride</td>
<td>100</td>
</tr>
</tbody>
</table>

If dusting CausMag on pasture, double the above to allow for field losses. E.g. Crossbred cows need 16 grams Magnesium, or 29 grams CausMag, or 60 g/cow/day dusted, or 6 kg per 100 cows per day.

Table 3. Amount (grams) of CausMag dusted on pasture (assuming 50% field losses).

<table>
<thead>
<tr>
<th>Magnesium source (%Mg)</th>
<th>Product</th>
<th>Magnesium required (grams/cow/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>12 gm</td>
</tr>
<tr>
<td>Mg Oxide (55%)</td>
<td>CausMag</td>
<td>44</td>
</tr>
</tbody>
</table>

Magnesium pre-calving

Research by Dexcel showed that supplementing with Magnesium sulphate or Magnesium chloride before calving is more likely to prevent milk fever than using Magnesium oxide. However it can be difficult to supply cows with enough Magnesium when using either Magnesium sulphate or Magnesium chloride. Therefore dust pastures with Magnesium oxide as well, to ensure the cows receive enough magnesium, not just the correct type.

One way to achieve the required dietary Magnesium concentration pre-calving is to add 60 grams of Magnesium chloride or Magnesium sulphate into the water trough and dust pastures with 50 to 70 grams of Magnesium oxide per cow per day as well.

Method of supplementation

Begin supplementing with Magnesium two to three weeks before calving and continue until there is enough Magnesium in the diet – i.e. when cows are not being challenged with high N and K diets, inclement weather, and high milk production. This can be in early November and generally is before Christmas. With high producing cows the need for Magnesium supplementation may continue into the summer.

The following methods are listed in order of effectiveness; consult the tables above to determine what quantities are required depending on your cow type and the source of Magnesium that you are using.

- **Drenching**
  Magnesium sulphate, Magnesium chloride or Magnesium oxide. Magnesium oxide is the cheapest form of Magnesium. However it is poorly soluble in water causing difficulty with some drench systems. Additives (e.g. Comag) can reduce drenching problems.
• **Pasture dusting**
  Magnesium oxide. Wind and rain result in field losses of dusted Magnesium oxide. For this reason, required levels of magnesium oxide are doubled when dusting. Pasture can be dusted up to three days in advance, weather permitting. In very wet weather it may pay to dust more than once per day, preferably when cows are given a new break.

• **Hay treatment**
  Magnesium oxide. Apply a slurried mixture of Magnesium oxide to hay - no more than 15 cows to one Magnesium treated bale. This can be used in conjunction with pasture dusting. Molasses can make this slurry more palatable.

• **Water trough**
  Magnesium chloride or Magnesium sulphate. These can be used if no supplement is being fed or pasture is too short for dusting. They can also be used along with drenching or pasture dusting during periods of greatest risk. Use a dispenser; watch the concentration; introduce Magnesium gradually over two to three weeks.

• **Magnesium bullets**
  There are Magnesium bullets available for dairy cows. However, these only provide 2-3 g Mg/cow/day e.g. a 170 g Magnesium bullet that releases over 9-12 weeks will supply approximately 2-2.7 g Mg/cow/day. This is well short of the requirements for cow pre-calving and in early lactation.