Magnesium in Ruminants

**Bioavailability:** Biological availability (bioavailability) of Mg is tested in vitro or in lab by observing the rate of solubility of magnesium compounds in rumen fluid or in a weak acid solution. This method is common and popular because they are less time consuming and much less costly than in vivo method which is extensive and longer process.

Absorption of Mg in ruminants occurs throughout the digestive tract but primarily in the rumen and reticulum, provided the Mg is readily soluble.

Sources: Common sources of Mg are feed grade Mg-salts. As example: MgO, Mg(OH)₂, MgSO₄, Mgcl. Among them, first three are more bioavailable.

Factors affect Mg utilization: There are many factors affecting the absorption of Mg from the gut. The following factors need to be considered to ensure optimum utilization of Mg.

- Imbalance of other minerals, such as Ca, P and K. Excess amount of these minerals may decrease Mg absorption.
- Fat: Fat has tendency to bind with Mg, resulting formation of soap. Thus Mg availability is reduced.
- Ionophore, such as monensin and lasalocid may increase Mg absorption.
- Age: the younger the better to mobilize Mg
- Particle size: particle size of Mg-salts is highly correlated with the solubility. The finer the particle, the higher the solubility.

<table>
<thead>
<tr>
<th>Particle size</th>
<th>Fine</th>
<th>Medium</th>
<th>Coarse</th>
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<tbody>
<tr>
<td>Solubility (Meq/l)</td>
<td>157.26</td>
<td>128.08</td>
<td>86.01</td>
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- Calcination temperature of Mg: 800 °C - 1100 °C has higher Mg availability, less than 605 °C is worst and above 1300 °C has also negative effect on availability.
- Palatability: magnesium sulphate and magnesium chloride are less palatable than magnesium oxide

Excess Mg: excessive amount of Mg can cause damage in rumen wall. As a result, diarrhoea, lethargy, reduced appetite may be observed.

Dose: It is recommended that dry cows should receive a diet containing 0.35% Magnesium, and lactating cows 0.28% Magnesium.

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
References:


Comparison of Methods to Determine Relative Bioavailability of Magnesium in Magnesium Oxides for Ruminants R. O. VAN RAVENSWAAY et al Journal of Dairy Science Vol. 72, No. 11, 1989

Magnesium – getting the right amount into your cows DairyNZ Spring Survival Guide 2011 www.dairynz.co.nz

Magnesium supplementation Farm Fact 3-1, DairyNZ, www.dairynz.co.nz October 2009