Introduction

Lucerne (*Medicago sativa*) is a deep-rooted, nitrogen-fixing perennial providing highly digestible pasture rich in energy, protein, vitamins and minerals. Rotational grazing with rest periods (to replenish crown and root reserves) is necessary to ensure stand persistence and optimum dry matter production.

Unfortunately there are a number of potential health issues associated with grazing Lucerne stands.

This Land Fact is one in a series of information sheets that will discuss the advantages, disadvantages, dos and don’ts when grazing pasture systems.

Lucerne – vitamins and minerals

Lucerne is a rich source of calcium, magnesium, potassium, sulphur, iron, cobalt, manganese, zinc and vitamins (particularly vitamin A). However, interactions between some of these minerals may interfere with mineral availability or absorption.

Following is an overview of vitamins and minerals available in Lucerne, potential health issues and management recommendations when grazing Lucerne pastures.

Vitamin A

- Needed for normal bone growth and development, regulation of cell growth, maintaining ‘normal’ epithelial (surface cells on organs etc.) tissue and light transmission to the brain (‘night blindness’).
- Deficiency may lead to a lowered resistance to infection.
- Produced via conversion of carotene (pigment in plants).
- Lucerne pasture and hay are good sources of vitamin A.

Vitamin E

- An antioxidant with a role in maintaining cell membranes. Lucerne pasture and hay are good sources of vitamin E.

Vitamin D

- Obtained via irradiation (sunlight) and feed.
- Acts as a hormone to regulate the calcium/phosphorus balance (helps with calcium absorption).
- Sun cured Lucerne hay is a good source of vitamin D.

Vitamin B12

- Needed for cell growth, glucose and wool production.
- Cobalt (thought to stimulate appetite) is converted to B12 in the rumen. In cobalt
deficient soils, young lambs (rumens not fully developed) and sheep on high energy rations such as Lucerne, may benefit from B12 supplementation.

- Rate of B12 absorption is enhanced by slow gut flow but inhibited if rumen or small intestine is damaged (e.g. worms). Lucerne’s high digestibility tends to promote rapid gut flow with pure stands of Lucerne causing the greatest concern.

Minerals

Lucerne is rich in major and minor (trace element) minerals.

Estimated daily mineral requirements (sheep and lambs) and the average mineral content of Lucerne are shown in Figure 1 below.

Note that although Lucerne is a rich source of calcium, potassium and magnesium, interactions between these minerals may negatively impact on availability and absorption by grazing livestock. These interactions are covered under Potential health issues below.

<table>
<thead>
<tr>
<th>Minerals</th>
<th>Needed (as % of DM)</th>
<th>Lucerne ¹ (Average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>0.20-0.82</td>
<td>1.3</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.16-0.38</td>
<td>0.26</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.50-0.80</td>
<td>2.46</td>
</tr>
<tr>
<td>Sodium</td>
<td>0.09-0.18</td>
<td>0.14</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.12-0.18</td>
<td>0.33</td>
</tr>
<tr>
<td>Zinc</td>
<td>20-33 ppm</td>
<td>27 ppm</td>
</tr>
<tr>
<td>Copper</td>
<td>7-11 ppm</td>
<td>12 ppm</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.1-0.2 ppm</td>
<td>0.1 ppm</td>
</tr>
<tr>
<td>Iron</td>
<td>30 ppm</td>
<td>20 ppm</td>
</tr>
</tbody>
</table>

Figure 1. Estimated daily mineral requirements (sheep and lambs) and average mineral content of Lucerne.

Magnesium (Mg)

- An enzyme co-factor involved in metabolism of carbohydrates, calcium, fats and protein. It is important for nerve conduction and muscle contraction.
- Approximately 70% of the animal’s magnesium is stored in the skeleton but it is poorly mobilised.
- Lucerne is a reasonable source of magnesium but excess potassium and calcium may affect availability.
- High intakes of:
  - K, Ca, P and organic acids decrease Mg availability.
  - Sodium (Na) and carbohydrates increase availability.

Potassium (K)

- Important for enzyme functions, muscle contraction, nerve impulse transmission, electrolyte, acid/base and water balance.
- Lucerne is a rich source of potassium but this may reduce Mg absorption and lead to hypomagnesaemia (commonly known as grass tetany) or transit tetany unless supplemented.

Cattle grazing Lucerne

Grazing Lucerne - Recommendations

Provide additional roughage

During early growth (vegetative stages) Lucerne has low dry matter (DM) contents. Increasing DM intake through providing low to medium quality hays:

- reduces the risk of bloat, nitrate poisoning, red gut and scouring,
- reduces the rate of gut flow increasing vitamin B12 absorption,
• improves Mg availability and absorption,
• provides additional vitamin D, and
• provides a source of ‘effective fibre’ which will stimulate cud chewing and saliva production (low saliva production may lead to a reduction in natural buffer production and acidosis).

Supplement
Supplement by providing dry lick/powder supplements with salt (for sodium) and Causmag, Dolomite, Acid Buf etc (for magnesium). Supplementary grain will further improve energy intakes, growth rates and magnesium availability.

Vaccinate/drench
It is important to vaccinate/drench prior to allowing stock entry to lush Lucerne pastures. Producers should administer a booster of 5 in 1 or 6 in 1 vaccine (2 weeks prior to commencement of grazing), a vitamin A, D, E and consider a B12 vaccination.

Controlling worms is essential to ensure good health and productivity. The use of an effective broad spectrum drench as required, is also recommended.

Potential health issues

Acidosis/Laminitis
• ‘Sugar’ acidosis may occur on rapidly growing pastures high in sugar but low in effective fibre such as Lucerne in early vegetative stages.
• With rapid fermentation lactic acid is produced, the rumen pH drops leading to acidic conditions.
• Symptoms include dehydration, scouring, abdominal pain and death.
• Laminitis (similar to ‘founder’ in horses) may occur due to increasing blood flow and pressure leading to blood vessel damage and swelling within the hooves.

Bloat
• Cattle are more susceptible to bloat than sheep.
• Frothy bloat may occur due to high levels of fermentation of easily degradable fodder in the rumen. Methane gas forms and animals are unable to remove it through belching. Stock may die from asphyxiation due to gas build up and pressure on heart and lungs.
• Bloat risk is highest:
  o in winter and spring, and/or
  o when Lucerne is fresh,
  o on immature stands, and
  o if livestock are hungry when introduced to the stand.
• Minimise risk by increasing energy intake, fill animals on hay before introduction into the paddock and supply ad-lib roughage. Restrict grazing time and/or time of grazing (introduce into high risk paddocks in afternoon rather than morning). The use of bloat oil in water supply (troughs) and anti-bloat blocks/licks can reduce the risk.

Fertility Issues
• In some grazing conditions the Lucerne may be high in levels of coumestans reducing the ovulation rate in ewes. High levels are exacerbated by plant stress due to:
  o leaf disease
  o insect damage
  o moisture stress
• Trials have shown 20%+ increases in expected lamb numbers in ewes grazing Lucerne prior to joining compared to ewes on dry, mature pasture. Results are likely to be due to:
  o improved body condition,
  o increased ovulation rates,
  o reduced dry ewe numbers and (possibly),

Multiple deaths from bloat. Photo courtesy of Shaun Slattery, North West Local Land Services
Grazing Lucerne – Health and Disease Issues

- A by-pass protein effect similar to improvements found when ‘flushing’ ewes with lupins prior to joining.

- Recent findings however, suggest that Lucerne may also reduce progesterone production during the first few weeks of pregnancy. Progesterone ‘maintains’ pregnancy and there is some suggestion that single bearing ewes grazing Lucerne may abort fetuses due to a reduction in this hormone. Fortunately twin bearing ewes appear to produce enough progesterone to maintain the pregnancy. Minimise the use of fresh Lucerne stands by ewes during joining if possible.

Prolapse
Stock grazing Lucerne may be predisposed to a higher risk of rectal and/or uterine prolapse if females are over fat and/or in late stages of pregnancy. Grazing high energy, high moisture feeds such as Lucerne may lead to constipation, straining and prolapse.

- Provide additional fibre and limit high risk stock grazing fresh Lucerne stands to minimise prolapse risk.

Pulpy Kidney
- A clostridial disease that often occurs with a sudden change in diet, particularly if an energy and protein rich pasture like Lucerne.
- Symptoms include sudden death, tremors, frothing at the mouth, convulsions, and teeth grinding.
- Always provide a 5 in 1 or 6 in 1 booster.

Red Gut
- May occur on lush, high protein, highly digestible feed such as Lucerne with rapid gut flow. Process causes bowel twisting or displacement.
- Similar symptoms as pulpy kidney (bloated, rapid decomposition).
- Reduce risk by providing low protein roughage, vaccinating with A,D and E or alternate grazing.

Scouring
- Can be caused by a number of factors other than roundworms.
- Acidosis, low effective fibre (low dry matter, high moisture feeds), excess protein to small intestine and excessive Mg – all commonly found in Lucerne pastures - may also cause scouring.
- Provide additional dry matter to minimise the risk and intensity of scouring if grazing Lucerne stands.

For a complete list of Northern Tablelands Local Land Services Land Facts, please visit our website at www.lls.nsw.gov.au/northerntablelands

More information
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Resources
Mineral Content of Common Ruminant Stock Feeds, Crops and Pastures

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For updates go to www.lls.nsw.gov.au