Oxalates

Oxalic acid

Acid potassium oxalate

Calcium oxalate

Sodium oxalate
# Oxalate Toxicosis

<table>
<thead>
<tr>
<th>Types of Oxalate</th>
<th>Formula</th>
<th>pH</th>
<th>Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium oxalate</td>
<td>C-O-O - Na</td>
<td>sap pH 6-7</td>
<td>Halogeton</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>C-O-O - H</td>
<td>sap pH 3-4</td>
<td>Rumex</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kikuya grass</td>
</tr>
<tr>
<td>Ammonium</td>
<td>C-O-O - NH₃</td>
<td></td>
<td>Grasses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convert to Toxin</td>
<td>C-O-O\ Ca\ C-O-O/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Toxic Syndromes

1. Hypocalcemia
   Calcium in blood replaces ion on oxalic acid to form Ca-oxalate crystals, resulting in ionic imbalance and shock.

2. Uremia
   Oxalate crystals damage tubules in kidneys – buildup of urea cause poisoning.

3. Disrupt energy metabolism
   Interfere with succinic dehydrogenase and lactic dehydrogenase in Krebs Cycle.
Oxalate Toxicology

1. Oxalates increase over the growing season – max in fall (20-36% dw plant)

2. Oxalate level > 18% potentially dangerous

3. Poisoning occurs when oxalate level exceeds the animals ability to detoxify.

   1. Oxalates are readily degraded by rumen microbes. Microbes adapt over 3-4 days to detoxify 75% more.
   2. Oxalates attach to Ca in rumen and excreted in feces.
   3. Oxalates are absorbed.
      a. Flushed out in urine
      b. If reach blood stream, cause damage
         Hypocalcemia
         Uremia
         Energy metabolism
Signs of Poisoning
Acute, Rapid Death

1. Depression
2. Anorexia – lack of appetite
3. Weakness
4. Incoordination
5. Recumbency
6. Blood tinged nasal discharge
7. Coma
8. Death
Treatment of Poisoned Animals

1. Flush with water - excrete oxalates in urine.

2. Di-calcium phosphate drench -
   Ca combine with oxalate in rumen.
   Ca supplement not sufficient to prevent poisoning

3. Intravenous injection of calcium gluconate.
   Maintain blood Ca, but crystals damage kidneys.

4. Recommendation – prevent poisoning
The Distribution of Halogeton in North America

Fig. 1. The distribution of Halogeton glomeratus in 1954 (black zones) and 1980 (black and grey zones). The grey zones are the areas to which halogeton has apparently spread since 1954. This map shows the occurrence of halogeton by county (the level of the survey) and does not intend to imply that halogeton occurs on all range sites within these counties.
Catastrophic Losses

1942 – Wells NV – 160 sheep
1945 – Twin Falls ID – 275 sheep
1945 – Raft River Valley ID – 750 sheep
1945 – Raft River Valley ID – 1620 sheep
1952 – Park Valley UT – 1200 sheep

Life Magazine “Stock Killing Weed of the West”

Halogeton Act 1952
1. Detect presence of Halogeton
2. Determine its effect on livestock
3. Control, suppress and eradicate it
Prevent Poisoning

1. Never turn hungry sheep onto halogeton.

2. Introduce sheep gradually to allow rumen microbes to adjust. Graze shadscale first (low oxalates) to allow microbes to build up.

3. Don’t overgraze – maintain range in good condition to prevent invasion.

4. Re-seed infested sagebrush sites. Halogeton can’t compete with vigorous perennial grasses and shrubs.