Common Feed Killers of Cattle

Ben Gardiner BVSc, BExp
Nandewar Animal Health Services
Barraba Manilla Bingara
• What is there that is not a poison? All things are poison and nothing [is] without poison. Solely the dose determines that a thing is not a poison. ... While a thing may be a poison, it may not cause poisoning.

• Paracelsus [Philippus Aureolus Theophrastus Bombastus von Hohenheim] (1492-1541)
• More deaths occur from inappropriate consumption of deliberately offered feedstuffs or additives than from ingestion of poisonous weeds.

• As veterinarians we investigate and treat toxicoses but we are just as commonly asked for advice on avoiding toxicoses from common feeds.

• And while it is difficult to make such advice profitable in practice, our credibility in other matters is often predicated on such advice.

• This paper seeks to briefly summarise some common risks and preventions, more than Rx.
Some Common Feed/Additive Risks

<table>
<thead>
<tr>
<th>Commonly Offered Pastures</th>
<th>Supplements/Additives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sorghums</td>
<td>• Urea/Molasses</td>
</tr>
<tr>
<td>• Legumes</td>
<td>• Various Hay</td>
</tr>
<tr>
<td>– Lucerne or clovers</td>
<td>• Silage</td>
</tr>
<tr>
<td>• Forage Oats</td>
<td>• Cotton Seed</td>
</tr>
<tr>
<td>• Rye Grass</td>
<td>• Grains</td>
</tr>
<tr>
<td></td>
<td>– Wheat, Barley, Oats, Sorghum, Corn</td>
</tr>
</tbody>
</table>

Water supplies

• Rumensin® Capsules
What’s your advice?

• Hey doc, I’ve got this paddock of Forage Sorghum but I’ve heard it can be hazardous. What do you reckon? Can I put my cows in there?

• Possible hazards?
  – Nitrates, Cyanogenic Glycosides
Nitrates

- Normal rumen metabolism of nitrates
  - $\text{NO}_3 \rightarrow \text{NO}_2 \rightarrow \text{NH}_3 \rightarrow \text{Microbes} \rightarrow \text{Protein}$
- If $\uparrow \text{NO}_3 \rightarrow \uparrow \text{NO}_2 \rightarrow \text{Methaemoglobin}$
  - Rapid Deaths $\leftarrow \text{O}_2$ starvation

Methylene Blue 5mg/kg IV
Nitrate Prevention/Risk Reduction

• Test feeds at lab (or strips) if necessary
  – should be < 1.5% (DM) Potassium Nitrate
• Beware: prolonged dull cloudy periods, wilting periods, morning > risk than afternoon
• Higher risk 10-14 days after nitrogen fertiliser
• Ensiling or processing as hay no benefit
• Sodium Tungstate 6.6mg/kg daily PO
• Increase CHO’s and mix feeds to dilute
Metabolism of Cyanogenic Glycosides

Cyanogenic Glycosides $\rightarrow$ Hydrocyanic Acid

Rumen Flora

Hydrocyanic Acid $\rightarrow$ cytochrome oxidase

Inhibits

O$_2$ suspended in blood (cherry red) $\rightarrow$ Cellular Hypoxia $\rightarrow$ Rapid Deaths

Sodium Thiosulphate IV theoretical treatment!
Preventing/Risk reduction of Cyanide

- Young plants/regrowth after stress most toxic
  - Do not feed until > 75cm tall
- Morning > risk Afternoons
- Test plants at lab
- Ensiling reduces risk. Hay does not.
- Supplementing with sulphur may help
- Sorghum spp most common source
• My cows are doing it pretty tough and I have a silo of grain but I know it can be dangerous. How can I feed this out safely?
Risks of feeding Grains

• Lactic acidosis
  – Acute, subacute, chronic
• Polioencephalomalacia
• Gas cap bloat
• Claviceps sp → Ergot
Acute Rumen Lactic Acidosis

- Grain intake
- Rumen pH
- Strep. bovis
- Lactobacilli

Severe Acidosis, Rumenitis

- Rumen pH
- Lactate

Increased Osmotic Pressure

Profuse scours

Tissue Fluids

Severe Dehydration
Acute Acidosis Treatment

• If many animals need to triage and/or euthanase
• Treatment may involve some or all of:
  – Correct acidosis NaHCO₃ IV or MgO or Mg(OH)₂ PO
  – Virginiamycin and/or Penicillin PO
  – Avoid ad lib water, feed hay to help buffer rumen
  – Empty rumen surgically (cost prohibitive beef)
  – Thiamine at 5-10mg/kg for PE
  – NSAIDS

• Be prepared to discuss cutting losses
  – Client often not grateful large bill dead cattle!!
Claviceps spp – ergot toxicity

• Hyperthermia and nervous signs more common than lesions from dermal vasoconstriction
• No treatment but remove source
• Test for or buy Claviceps spp tested-free grains
  – Esp if the harvest season had prolonged wetting
  – No treatments to reduce ergot, dilute feed
Prevention of Acidosis

- Gradual introduction of grain ration over 2-3 weeks, fibre (eNDT) >32% of TMR, 80% forage
- Risk = Wheat>Barley>Sorghum>Oats>Corn
- Virginiamycin - 20ppm, 90%DM diet, 2.5% BW DMI
  - Exclusively targets gram positives (S. bovis, Lactobacilli)
- Bentonite – a benefit during introduction
- Monensin,
- Need to ensure awareness of sub-acute acidosis and chronic acidosis, not just the “emergency”
Silage

- Botulism
- Aflatoxins
- Listeria
- Little effect on Nitrates? May reduce Cyanide?
- Test samples for possible problems?
Legumes - Frothy bloat
Frothy Bloat Treatment

- Oils, Tympanyl® by stomach tube – ntuiac*
- Trocar – ntuiac*
- Stab – left flank, needs to be commensurate with imminence of death
- Need A/B +/- suturing
Frothy Bloat prevention

• Mixed pastures cf monoclonal legumes
• Mature pastures (but declining quality)
• Ensile or process as hay
• Avoid hungry opportunities eg following yarding
• Rumensin® capsules - 80-90 days
• Oral penicillin — 5ml procaine penicillin PO = 14 days
• Bloat blocks
• Bloat oils on pastures, water
Ionophores – Rumensin® Capsules

Every capsule contains a lethal dose of Monensin – cardiac toxicity
More frequently we are called to remove capsule from pharynx!
Cotton Seed - Gossypol

• Causes cardiomyopathy
  – All associated CHF signs or sudden death

• Impacts on semen
  – Largely neutralised by calcium chelates in grazing situations

• May be sporadic deaths going undiagnosed (Chris Bourke)
Urea Metabolism

$\text{CO(NH}_2\text{)}_2 \xrightarrow{\text{Microbes}} \text{NH}_3 + \text{CO}_2$

Amino Acids $\rightarrow$ Proteins

Liver

Rumen pH increases

If Excessive NH$_3$

Increased Volatile NH$_3$

Toxicity at 13-20µg NH$_3$/ml plasma

Death at 50µg NH$_3$/ml plasma

Occurs if intake of 0.4 – 1.5 g/kg bw
Urea Considerations

• **Signs include:** abdominal pain, tympany, dyspnoea, hypersensitivity, aggression, salivation, muscle tremors, weakness, convulsions and often vocalisation

• **Samples:** Plasma (need to freeze immediately as volatile)
  - Rumen – stabilise with battery acid

• **Treatment:** Vinegar up to 12 litres with copious cold water
Urea Toxicity Prevention

• Urea is fed with molasses, in dry licks, blocks, stock water supplies
• Prilled urea is more soluble so a more uniform mix in molasses
• Concentrations of >8% are usually self-limiting
• Lower concentrations more risk of engorgement
• Avoid intermittent supply, excess hunger eg from periods of yarding
# Quick Guide to Common Feeds Risks

<table>
<thead>
<tr>
<th></th>
<th>Acidosis</th>
<th>Nitrate</th>
<th>Ammonia</th>
<th>Cyanide</th>
<th>Ergot</th>
<th>Bloat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Forage Sorghum</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Rye Grass</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Urea/Molasses</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Silage</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>??</td>
<td>NO</td>
</tr>
<tr>
<td>Oats</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Hay</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Legumes</td>
<td>NO</td>
<td>YES</td>
<td>?₁</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Ammonia toxicity reported with lupins – contain urease - promote conversion to NH₃
Treatment v Prevention

• Many emergency toxicoses of production animals are exciting events but risky veterinary investments ie Can we arrive in time, diagnose and cost-effectively treat an episode of toxicosis? Need good preparedness and a dose of luck on being immediately available.

• Beware going over the top in response if prognosis is limited. May lose respect from otherwise valued client. Conversely an efficient effective response can win much credibility.

• If all animals already dead many clients choose not to incur expenses on investigations. Collaborate with LHPA on more complex episodes since accurate diagnoses will more likely avert recurrent losses, and may also save costs directed to solve non-existing problems.