FACT SHEET

Nitrate/Nitrite poisoning

stock sense
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Victorian Farmers Federation

WHAT IS NITRATE/NITRITE POISONING?

Nitrate/Nitrite poisoning is a common plant poisoning, occasionally resulting in large losses.

Nitrates normally occur in plants at low levels, but under certain conditions, and in some plants, nitrates can accumulate to dangerous levels. This can cause deaths, with naive hungry animals being most susceptible.

Nitrates accumulate in soil during drought; with large outbreaks occurring after a drought has broken.

Nitrate accumulates in plants with moisture stress, reduced light, low temperatures, nitrogenous fertilizer and some herbicides like 2,4-D and MCPA.

WHEN DOES NITRATE POSIONING OCCUR?

Nitrate poisoning most commonly occurs the first week after drought breaking rains. However, it can also occur after the autumn break; with animals being more at risk when spray grazing is used on capeweed paddocks.

Nitrates are normally converted to nitrites and then to ammonia which is utilised by the microflora in the rumen. Nitrates can cause irritation to the gut; however, nitrite is much more toxic. Nitrite, when absorbed into the blood stream, converts "red" oxygen carrying protein, haemoglobin, to a "brown" protein, methaemoglobin, incapable of transporting oxygen.

Nitrates accumulate in soils during drought because of the decomposition of organic material and reduced uptake by plants and leaching. Nitrate also amasses with the use of nitrogenous fertiliser and increased nitrogen from urine around stockyards. Anything that disrupts photosynthesis, like a cold or cloudy day or the use of phenoxy herbicides like 2,4–D and MCPA, can cause an increase in plant nitrate levels.

The type of plant and stage of growth is also critical. Many crops and weeds, like capeweed, variegated thistle and pigweed, are well known nitrate accumulators. Nitrates are usually higher in young plants and are concentrated in the bottom third of the stalk.

Weeds	Crops pastures
Capeweed, thistle, pigweed, marshmallow, fat hen	Wheat, oats, barley, maize, canola, soybean, millet, lucerne, sub clover,

Cattle are more susceptible than sheep, as sheep are more efficient at converting nitrite into ammonia. Nitrate poisoning in sheep is commonly reported after using wethers to crash graze MCPA treated capeweed paddocks.

Figure 1. Capeweed

WHAT ARE THE SIGNS?

Nitrates cause signs that are attributable to the direct caustic action of the gut and include diarrhoea, salivation and abdominal pain.

Nitrite reduces the ability of the red blood cells to transport oxygen and signs are consistent with oxygen starvation. Signs include panting, trembling, staggering and difficulty breathing.

The affected animals' blood is dark brown in colour, but this returns to a normal colour a few hours after death.

DIAGNOSIS

A blood sample with the characteristic dark brown colour is strongly suggestive of nitrate poisoning. Plant tissue samples can be taken with levels of 1.5% /dry weight considered potentially dangerous.

Post mortem changes can show small haemorrhages on the heart and wind pipe with general congestion. Rumen and tissue samples may be taken within a few hours of death for nitrate level analysis.

TREATMENT

If you suspect nitrate poisoning urgent veterinary attention is required. Animals that appear unaffected can be moved to safer pastures or fed hay to dilute the nitrate. Do not try to move animals that may be affected.

PREVENTION

Animals can cope with gazing high nitrate pastures if intake is limited and controlled. Avoid putting hungry stock on to high risk capeweed dominated pasture or crops such as oats. Capeweed or marshmallow in yards are a risk as they usually have high nitrogen content in the soil and stock may be hungry.

Before putting stock on high risk pastures, fill them up with hay or a lower risk grass dominated pasture and move the stock onto the paddock in the afternoon when the nitrate level is likely to be lower.

TAKE HOME MESSAGES

- Nitrate poisoning occurs in sheep and cattle on high risk pastures and crops.
- The first few weeks after the break of a dry period are high risk.
- Capeweed treated with MCPA is high risk.
- Prevention is aimed at reducing the number of hungry stock that graze high risk pastures, crops or weeds.

For further information, contact Stock Sense on 1300 020 163 or stocksense@vff.org.au.

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FURTHER LINKS

Nitrate Poisoning of Livestock, Agriculture Victoria
http://agriculture.vic.gov.au/agriculture/livestock/beef/feeding-and-nutrition/nitrite-poisoning-of-livestock a

Nitrate and nitrite poisoning in livestock, Department of Primary Industries New South Wales
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/111003/nitrate-and-nitrite-poisoning-in-livestock.pdf

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