

# Urgent Nitrate Testing

## Laboratory timelines

ARL receives fresh pasture and feed samples for nitrate testing from 8.00 am to 5.00 pm on weekdays. Samples received until 12.00 pm shall be reported on the same day by either a phone call or email. Samples received later than 12.00 pm shall be reported on the next day and those received on Fridays will roll over to the Monday.

## Fate of nitrate in plants and animals

Nitrate taken up by plants is converted through the steps outlined below to plant protein. Conversion from nitrate to nitrite is facilitated by the nitrate reductase enzyme. In response to stress conditions plants have reduced reductase activity. Drought and cool overcast conditions decrease the activity of the nitrate reductase system. Despite stress conditions the plant continue to take up nitrate that then accumulates in the plant to potentially toxic levels.

Nitrate → Nitrite → Ammonia → Amino Acids → Plant protein

What happens to nitrate in the plant follow the same order as above in the gut of the animal and is facilitated by microbes. Nitrate is much less toxic than nitrite and when high levels of ingested nitrate is converted to nitrite it accumulates landing up in the blood stream. Subsequently blood pressure is lowered, and hemoglobin converted to methemoglobin that is unable to carry oxygen.

## Interpretation of test results

When discussing nitrate levels in feed, we need to be clear on reporting terminology. There are three different ways of expressing the result in terms of plant dry matter (DM):

- Potassium nitrate (KNO<sub>3</sub>) - % of plant DM
- Nitrate nitrogen (NO<sub>3</sub>-N) - concentration (mg/kg) of plant DM
- Nitrate ion (NO<sub>3</sub>-) - concentration (mg/kg) of plant DM

## ARL report nitrate nitrogen in mg/kg DM

POTASSIUM NITRATE (DM BASIS)		INTERPRETATION (VETERINARY LABORATORIES)
< 1% DM		Generally safe to feed
1 - 2% DM		Can cause problems; feed with caution
> 2% DM		Potentially toxic; do not feed
NITRATE NITROGEN (NO <sub>3</sub> -N)	NITRATE ION (NO <sub>3</sub> -) EQUIVALENT	INTERPRETATION (ARL)
< 1,500 mg/kg DM	< 6,750 mg/kg DM	Safe
1,500 - 2,200 mg/kg DM	6,750 - 10,000 mg/kg DM	Low risk
2,200 - 3,000 mg/kg DM	10,000 - 13,500 mg/kg DM	High risk
> 3,000 mg/kg DM	> 13,500 mg/kg DM	Toxic

## Actions

Follow up testing should be performed after a few sunny days if excessive nitrate levels were reported following cool overcast days. Stock can be given access to the tested feed once nitrate levels reported fall within the safe zone. Stock could be given access to feed in the risk zones but only upon consultation with animal health professionals.

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