

Agricultural Greenhouse Emissions Project

Emissions: Nitrous Oxide

What and Why: Nitrous oxide

Nitrous oxide (N₂O) is a powerful greenhouse gas. One kilogram of nitrous oxide has the same global warming potential as 310 kilograms of carbon dioxide, meaning that even small amounts of nitrous oxide can have large greenhouse impacts.

Most of Australia's nitrous oxide emissions (around 60%) come from agricultural soils, particularly

following the application of nitrogen fertilisers to crops and pastures.

Nitrous oxide emissions from agriculture

represent around 4% of Australia's total greenhouse gas emissions.

Plants commonly use less than 50% of applied nitrogen, with much of the remainder being lost to the environment. Losses may occur through ammonia volatilisation, nitrate leaching and runoff to waterways, nitrification and denitrification which results in emissions of nitrous oxide.

Adopting management practices that improve the efficiency of nitrogen use can generate benefits for farm profitability, while also reducing greenhouse impacts and improving environmental sustainability.

(Farming for the Next Generation – Guidance for Managing Greenhouse Gas Emissions, 2008)

Best Practice Measures:

Avoid excess nitrate in the soil – Do you need it?

Before each nitrogen application compare the cost of the extra pasture produced to the cost of other feed options.

Only apply nitrogen when pasture is actively growing and can utilise the nitrogen.

Avoid heavy stock numbers on a single paddock

when soils are water-logged, as this will result in significant urinary deposition in a small area, with pugged soils being typically anaerobic thus producing more nitrous oxide.

Avoid high nitrogen fertiliser rates. **Do not apply above 50kg (N)nitrogen/ha in any single application** and aim for a maximum of 300 kg nitrogen/ha/year. **Do not apply nitrogen closer than 21 to 28 days apart, (and not more 30 kg N/ha in spring)** as this will increase nitrogen losses dramatically.

Avoid high nitrogen rates on waterlogged soils, particularly if soil temperatures are above 10 °C, as this will increase losses through denitrification.

While soils are near field capacity (July to September) avoid applying nitrogen fertiliser before heavy rainfall and for at least 2 to 5 days after heavy rains depending on how readily the soils drain. If nitrogen must be applied, then apply lighter rates of nitrogen and use urea rather than a nitrate containing nitrogen fertiliser.

Avoid applying nitrate sources of nitrogen to wet soils. Urea is currently the cheapest straight source of nitrogen and DAP the cheapest mixed source of nitrogen. These sources should result in less denitrification and leaching in cold, wet and waterlogged soils.

Look out for new products such as coated nitrogen and half nitrogen fertilisers.

Avoid applying N fertiliser near streams/riparian zones and over drainage lines within a paddock. (Dr Richard Eckard, 2008)

Further Information:

www.greenhouse.unimelb.edu.au

www.dairyingfortomorrow.com

www.nitrogen.unimelb.edu.au