Holbrook Landcare Network

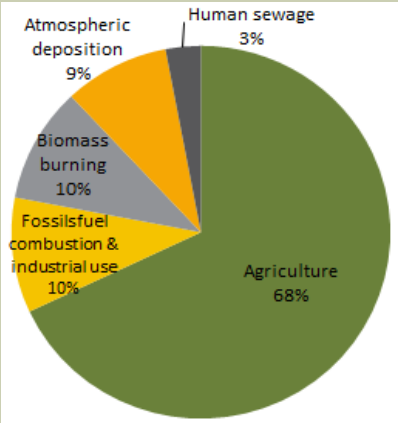
carbon farming and your business

Greenhouse Gas Factsheet Series

Nitrous oxide (N_2O)

This factsheet has been produced by Holbrook Landcare Network to provide land managers in this region with information about the issues of nitrous oxide.

Sources of global N_2O emissions (IPCC, 2007).



Agriculture emissions account for 68% of global N_2O emissions and has 310 times the impact of CO_2 on global warming.

In grazing systems, 60% of nitrogen applied to pastures is lost to the atmosphere.

Adopting farming practices that lower nitrous oxide emissions is likely to deliver economic benefits, with the potential to create offsets under Government initiatives.

WHAT IS NITROUS OXIDE?

Nitrous oxide (N_2O) is a greenhouse gas that has a global warming potential 310 times that of carbon dioxide. Most of the N_2O emissions from agricultural systems are a product of:

- Denitrification (breakdown of nitrate) and leaching of fertiliser in wet soils,
- Volatilisation (release of gas) of ammonia (NH_3) from urea in dry soils.

Nitrous oxide in the atmosphere has risen from pre-industrial levels of 270 parts per billion (ppb) to current levels of 325 ppb.

Agricultural use of nitrogen is very inefficient. In grazing systems, 60% of the nitrogen is lost to the atmosphere and 30% out of cropping systems—this is your money disappearing into the atmosphere.

WHY DO FARMERS NEED TO BE AWARE?

The majority of Australia's N_2O emissions come from agriculture, mainly from inefficient use of fertilisers, livestock waste and burning crop stubble. There is real management actions available now that can minimise emissions and that make sound economic sense.

HOW CAN FARMERS REDUCE THEIR N_2O EMISSIONS?

The first step to reduce N_2O emissions on the farm is management of fertiliser application. Management of livestock can also have an impact on emissions.

Fertiliser management

- Applying fertiliser more efficiently by managing rates, timing, source and type (see overleaf).

Managing livestock for better feed conversion efficiency

- Ensuring a balanced protein and energy diet and sufficient salts.

These approaches also have potential productivity benefits to the farmer.

FUTURE OPTIONS

Plant breeding - breeding plants for more balanced energy to protein ratio and that require less nitrogen.

Animal genetics - improving the feed conversion efficiency of the animal through genetic selection so they are more nitrogen efficient.

Ongoing research is contributing to our knowledge about best practice and this will continue to develop.

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MANAGEMENT OF NITROGENOUS FERTILISERS

The application of nitrogenous fertilisers accounts for the majority of N_2O emissions in agriculture. By making good decisions around fertiliser application you are benefiting your business as well as reducing N_2O emissions.

Fertiliser rate

- Matching the fertiliser rate to the plant requirements - using soil testing, in-crop monitoring, local yield data, etc. to inform your decisions.

Timing of the application of nitrogenous fertiliser to prevent waste through denitrification and volatilisation

- Apply nitrogen when the plant requires it and can utilise the additional nitrogen applied (i.e. in the growing season).
- As a general rule, urea causes much lower emissions than ammonium nitrate.

Fertiliser source and formulation

- Select ammoniated nitrogen sources (eg. Urea) during the wet season.
- Controlled release fertiliser are chemically or physically treated fertilisers that reduce its rate of release to be more aligned with plant needs.
- Urease inhibitors reduce NH_3 volatilisation (eg. Agrotain®, Green Urea™).

Fertilisers containing nitrification inhibitors are available (eg. DCD, Nitrapyrin, DMPP)

- Reduces N_2O and NO_3 leaching.
- Need to be careful as they are temperature sensitive.

MANAGING LIVESTOCK

The actions for reducing nitrogen emissions from livestock are similar tor educing methane emissions.

Manage livestock diet

- Balancing the energy and protein content in the diet to reduce excess nitrogen being excreted.
- With more salt in the diet animals drink more water and urinate more frequently, thus spreading the urinary nitrogen over a larger area.

Herd management actions

- Choosing genetics for better food conversion efficiency.
- Managing fertility and life cycle for maximum animal productivity - produce more beef on the same pasture reduces your emissions per unit.

REDUCE & MANAGE WATERLOGGING

Wet soils can cause denitrification or leaching of nitrous oxide. In irrigation areas, managing irrigation schedules and improving drainage are important.

It is important to avoid nitrogen inputs (fertilisers) into waterlogged areas - under the anaerobic conditions, the N is lost to N_2O very quickly.

To manage waterlogged soils in pasture systems, reduce grazing impact through rotational grazing practices and avoid grazing when the soil is wet.

Compaction of soil causes them to become anaerobic so animal access to excessively wet areas should be restricted.

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