

Ways to Reduce Nitrate Leaching

Understand the risk in your catchment

- Examine the nitrate levels, patterns and trends and the age of water in your own catchment and aquifers.

Understanding your soils, climate and farm system

- Undertake an overseer analysis and understand the risk factors for your different soil types on the farm, climate for nitrate leaching and manage blocks differently based on this knowledge.
- Use a model like E2M to optimise inputs and stocking rate to maximise profit and get reductions in nitrate outputs from stock.
- Model potential changes in your farm system and practices to estimate likely impacts on nitrate output and leaching.

Farm systems approaches

- Consider options for reducing stocking rates and increasing per-cow production.
- Consider having less stock on farm during late autumn and winter when leaching is greatest (change calving dates, dry off earlier, winter off cows off farm in low risk catchments).

Use GMP for nitrogen fertiliser use

- By regular soil testing, ensure that soil pH and other nutrients levels are adequate for high pasture growth rates.
- Only use nitrate fertilizer when a real feed deficit has been identified and application is profitable.
- Apply nitrate to actively growing plant (water not deficit, >6°C soil temperature) so DM response is optimised.
- Apply nitrate at rates <50 kgN/ha, one application preferably <30 kgN/ha and trend down annual nitrate use.
- Leave an unfertilised strip next to creeks and drains to avoid spreading nitrate fertiliser directly into them. This will minimize adverse environmental effects on surface water.
- Operate your fertiliser spreading machinery to obtain an even spread at the required rate. Apply in moist conditions but not when heavy rain is forecast.
- Don't apply in drought conditions and high temperatures.
- Don't apply nitrate after drought breaks when large amount of accumulated OM is mineralized.
- Consider nitrate products that improve efficiency of nitrate use and reduce losses.
- Ensure there are no other rate limiting nutrients, so nitrate uptake of plants is at best possible.
- Consider a nitrate soil test (potentially mineralizable nitrate) when cropping.
- Use lower nitrate imported or grown feeds (maize silage), grow low nitrate feeds (root crops) to lower crude protein of overall diet (reduce grass intake and substitute with low nitrate feeds, ensure meeting nitrate requirements for rumen) especially in late summer, autumn, winter when nitrate leaching risk is highest .

Pasture species

- Promote legume growth as an alternative to nitrate source for pastures.

- Include long rooted plants that can take up nitrate from deeper in the soil horizon and who grow more actively through summer (eg chicory).
- Incorporate plantain into pastures.
- After grazing crops, use catch crops like winter active annual grasses or grain crops that can use the accumulated nitrate from crop grazing.

Maintain or increase health of soil and its ability to hold nitrogen

- Use direct drilling (or oversowing) rather than cultivation to minimize losses during OM mineralization.
- Increase the organic matter or carbon of the soil.
- Return organic matter to the soil whenever possible.
- Don't compact or pug soils.
- Consider more diverse pasture species.
- Use appropriate crop rotations to ensure nitrate is captured. Minimise the time when soil is left bare.

On off grazing

- Reduce time grazing on pasture when nitrate leaching risk is high in autumn and winter.
- Consider using stand down pads.

Good effluent practice

- Spread effluent over larger areas.
- Apply effluent at rates that prevent ponding and movement of effluent through large macropores.
- Apply effluent when drainage through soil is low (have good effluent storage capacity).

Apply irrigation using GMP to minimize excessive drainage through the profile

- Monitor soil moisture.
- Do not apply water faster than infiltration rate of the soil.
- Do not apply more water than the water holding capacity of the soil.
- Use variable application rate irrigation systems.

Remove Nitrate from drain pipes, open drains and small streams

- Consider using bioreactors or filtering systems.
- Create or enhance wetlands.

Consider Nitrate Source Tracking

- Consult with an expert who can explain how Isotopes in water and nitrate, as well as other tracers, can identify the locations and points in time that cause high nitrate concentrations.
- Consider whether sources of high nitrate are useful to test for. These may include sources such as urine, urea or effluent on coarse textured soils, high nitrate fertilisation rates, or abandoned septic systems or landfills.
- If appropriate plan an initial source tracking study on top of regular concentration testing to determine if the method suggests sources that can be mitigated or studied in more detail.