Optimising Organic Nitrogen

Practical Guide

Organic sources of nitrogen are an **important input** to agricultural systems in Scotland. When properly used they can improve **productivity**, save **money**, improve **soil quality** and provide a useful means of **recycling** organic wastes some of which would otherwise have to be land-filled resulting in unproductive and harmful greenhouse gas (GHG) emissions.

Often sources of nitrogen already in the soil as residues from previous crops or spread to land in the form of manures and organic wastes are ignored when determining application rates of nitrogen to meet crop requirements. This approach can lead to excessive nitrogen in the soil resulting in higher nitrous oxide and ammonia emissions as well as increasing the potential of losses to watercourses through runoff.

Soil management and timing of organic material applications can have a substantial impact on how effectively the organic nitrogen content is used to meet plant requirements.

Those farming in an NVZ will be aware of their organic nitrogen use through the requirement to make a Manure Plan. But the benefits of planning to optimise organic nitrogen extend well beyond NVZs as improving nitrogen efficiency helps to keep costs down, could reduce pollution risk from your land and minimise emissions of greenhouse gases.

This Practical Guide concentrates on how you can manage organic nitrogen to benefit the business and help reduce GHG emissions.

Factors affecting nutrient uptake

The amount of N available to the crop or grass following the application of organic manures depends on:

- type of organic material
- method of application
- soil type
- timing of applications
- storage and treatment

Uptake is further affected by soil temperature and by pH of both soil and the manure or slurry.

Top tips...

- have a nutrient budget for each field and each crop. Know what your crop requires and apply the **right amount at the right time**
- apply when the crop requires it - when it is **actively growing**
- Avoid application on windy days when ammonia losses are likely to be higher
- incorporate manures or slurries as soon as practical - you may need to apply less
- NOT applying in wet or frozen weather or onto saturated soils

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Lock carbon into soils and vegetation

Optimise the application of fertilisers and manures

Optimise livestock management and the storage of manure and slurry

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www.farmingforabetterclimate.org

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Websites

www.farmingforabetterclimate.org
www.sac.ac.uk/climatechange
www.farmingfutures.org.uk
www.ipcc.ch
www.agrecalc.com
www.soilassociation.org.uk
www.planet4farmers.co.uk
www.farmingandwaterscotland.org

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Key Facts...

Most emission reduction strategies for fertiliser application are aimed at reducing loss of nitrous oxide (N_2O). However, in terms of nitrogen, the losses are often much higher than those of N_2O. Large losses of N will mean big fertiliser inefficiencies.

So, tackling overall N efficiency will :

- **reduce** damaging N_2O **emissions**
- help **keep your fertiliser bills down** whilst **maintaining crop yields**
- Reduce the risk of runoff leading to pollution through **better use efficiency**
- Help to **improve the farm carbon footprint**

N_2O Risk Factors

- warm soils
- high clay content soils
- compacted soils
- wet soils
- grazed grass
- potatoes + vegetables
- poor irrigation practice
- poor drainage

Understanding Sources of Organic Nitrogen

Organic manures may be produced on the farm in the form of animal manure and slurries or supplied from other sources such as treated sewage sludges, composts, and industrial 'wastes' such as paper crumble, and food and drinks industry by-products. They differ in terms of the form, amounts, or plant availability of the nitrogen they can supply.

Understanding the nature and amounts of nitrogen being applied is important to reducing unnecessary GHG emissions.

When using manures and slurries it important to have up-to-date analysis of their nutrient content. Some organic amendments such as animal manures and slurry along with some composts can have a high amount of readily available forms of nitrogen and should be applied in the spring and summer when crop demand is high to ensure maximum plant uptake.

Regular analysis of manure, slurries, and other organic manures along with an understanding of the availability of their nitrogen content is an important requirement to ensure that excessive nitrogen is not applied.

Soil has very limited capacity to store excess organic nitrogen. Farmers need to ensure that their crop management strategy is maximising the use of organic nitrogen on an annual basis.

Manure and Slurry

Better planning and handling of slurry and manures will allow you to get maximum nutrient value. It could also reduce the risks of causing environmental pollution and greenhouse gas emissions are minimised.

Manure and slurry nitrogen content depends on a number of factors, including the number and type of livestock, the diet and feeding system, the volume of dirty water and rainwater entering storage facilities, and the amount of bedding used.

The availability of storage for slurry is important, a minimum of 6 months is generally recommended since this allows the flexibility of applying manures and slurries when soil conditions are optimal and when crop demand is the highest.

Maximising uptake through matching application to crop requirement at the right time and in the right way is key to reducing greenhouse gas emissions resulting from organic nitrogen applications.

Organic N Applications

Ammonia loss can be reduced by :

- rapid incorporation into soil - ideally within 6 hours of application
- shallow injection and band spreading rather than broadcast (these techniques also cause less sward contamination than surface broadcast applications which allows for a faster return to grazing)
- using low dry-matter slurries because of more rapid infiltration
- avoiding making applications to dry soils in very warm weather