

Optimising organic nitrogen

National Advice Hub

T: 0300 323 0161

E: advice@fas.scot

W: www.fas.scot



This guide concentrates on how you can manage organic nitrogen to benefit the business, help reduce greenhouse gas (GHG) emissions and comply with new slurry application regulations. Those farming in an nitrate vulnerable zone (NVZ) are required to make a Manure Plan. But the benefits of planning to optimise organic nitrogen extend well beyond NVZs.

Understand the benefits

Organic sources of nitrogen include:

- Slurry
- Manure
- Sewage sludge
- Anaerobic digestate

These are all valuable fertilisers when applied to land at the right time and in the right quantities, forming an **important input** to agricultural systems in Scotland.

They can improve **productivity**, save **money**, improve **soil quality** and provide a useful means of **recycling** organic wastes.

Determining application rates

Sources of nitrogen already in the soil as residues from previous crops or spread to land in the form of manures and organic wastes need to be accounted for when determining application rates of nitrogen to meet crop requirements. Accounting for these sources of nitrogen can

- Prevent excessive nitrogen in the soil
- Reduce nitrous oxide and ammonia emissions
- Help protect watercourses from nutrient runoff
- Help keep your fertiliser bills down whilst maintaining crop yields

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.

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.

Understanding sources of organic nitrogen

Organic manures differ in terms of the form, amounts, or plant availability of the nitrogen they can supply. 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.

When using manures and slurries it is important to have up-to-date analysis of their nutrient content. Some organic manures such as cattle and pig slurry, poultry manure, and composts can have a high amount of readily available nitrogen and should be applied in the spring and summer when crop demand is high to ensure maximum plant uptake and reduce the risk of nitrogen being lost to the environment.

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.

New General Binding Rules (GBRs) on slurry - what's changed?

- GBR 18 requires precision equipment to be used by:
 - » All spreading contractors
 - » Dairy farmers milking more than 100 cows
 - » Beef farmers with more than 200 livestock units
 - » Pig farmers keeping more than 800 sows or fattening pigs
 - » Anyone applying liquid digestate on land
- Slurry application using raised splash plate or rain gun not permitted after 1st Jan 2023

- From Jan 1st 2027: **all Scottish livestock farmers producing slurry** must use precision equipment for the application of slurry
- Cattle livestock units: animal 2 years and older = 1 unit, animal under 2 years old = 0.5 unit



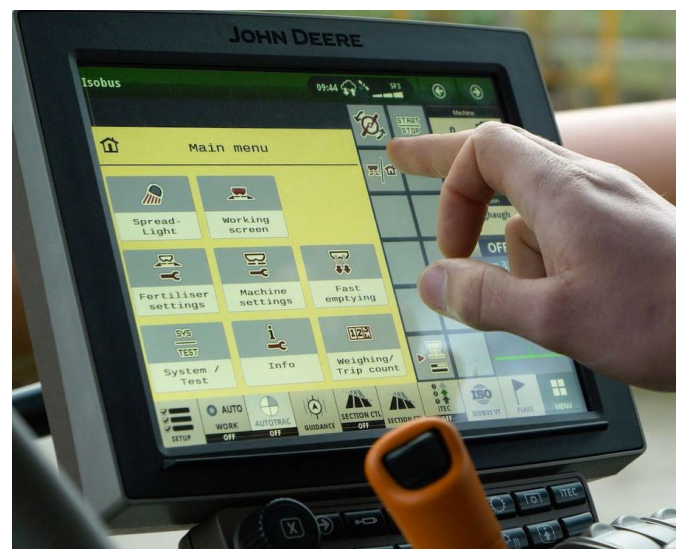
What is precision equipment?

Precision equipment application of slurry gives more control over application and minimises runoff and emissions. These techniques also cause less sward contamination than surface broadcast applications which allows for a faster return to grazing.

Equipment capable of low emissions spreading include:

- Dribble bar
- Band spreader
- Training hose
- Trailing shoe
- Direct injection

As an example, the use of a trailing shoe can enable an emissions reduction of between 30 and 60% compared to broadcasting. If you're looking for the greatest mitigation potential, look into direct injection.



Tips for applying organic nitrogen

- Know what your crop requires and do not exceed crop requirement for nitrogen
- Have a nutrient budget for each field and each crop (PLANET Scotland)
- Prepare a Risk Assessment Map for manure and slurries
- Soil test every 3 - 5 years. Soil testing will indicate if some fields need work to adjust soil pH, or may need more or less nutrients than are being currently applied
- Take account of the nutrient value in slurry and manures. Sample at the time of spreading and factor analysis results and % available nitrogen to the following crop into your nutrient budget
- Apply when the crop requires it - when it is actively growing
- Avoid application on windy days when ammonia losses are likely to be higher
- Do NOT applying in wet or frozen conditions or onto saturated soils
- Avoid applications to dry soils in very warm weather
- Incorporate manures or slurries into the soil as soon as practical (ideally within 6 hours of application) to reduce the time they are exposed to the air and so reduce nitrogen losses
- Use precision equipment for the application of slurry and maintain equipment in a good state of repair
- Take account of NVZ Action Programme rules if you are within an NVZ area

Tools such as **PLANET Scotland** can help you to plan and maximise both organic and inorganic nutrient use on the farm.

Using Technology To Maximise The Value Of Slurry:

Real time nutrient analysis and variable rate application of slurry:

- Technology such as real time NIR (Near Infra-Red) can be used to analyse nutrients in slurry and other liquid manures during application
- Once a target N application rate has been set, fluctuations in slurry analysis are then compensated by altering the forward speed of the tractor
- Takes account of nutrient variability on the day

Links

[PLANET Scotland \(www.planet4farmers.co.uk\)](http://www.planet4farmers.co.uk)

[Fertilisers \(www.farmingandwaterscotland.org\)](http://www.farmingandwaterscotland.org)

[Technical Note \(TN 736\): Optimising the Application of Livestock Farmyard Manures and Slurries](#)

[Technical Note \(TN 731\): Nitrogen Recommendations for Cereals, Oilseed Rape and Potatoes](#)

[Technical Note \(TN 726\): Fertiliser Recommendations for Grass](#)

[Slurry Storage and Management \(www.fas.scot\)](http://www.fas.scot)

Updated by Heather Stuart, SAC Consulting (September 2025)