

Practical Steps to Reduce Chemical Nitrogen

Cutting chemical nitrogen use

The Government's Climate Action Plan 2021 sets out a target to reduce greenhouse gas emissions from Irish agriculture by 22-30% by 2030. To achieve this target reduction, a suite of measures has been identified. One of the targets is to reduce chemical nitrogen (N) fertiliser use by 20% to 2030.

Base year (2018)
Chemical N
408,000 tonnes

Target (2030)
Chemical N
325,000 tonnes

Table 1: Impact of reducing chemical N fertiliser use.

How does reducing chemical N fertiliser use reduce greenhouse gas emissions?



Nitrous oxide (N₂O) is a potent greenhouse gas. Chemical N fertiliser emits N₂O when applied to land. Reducing chemical N fertiliser use will reduce N₂O emissions. Reducing chemical N use reduces carbon footprint and total emissions.

Impact at farm level



Improvement in farm profitability when measures are taken to compensate for reduced chemical N fertiliser use, including improving soil fertility (particularly pH), optimising use of organic manures, incorporating clover, and reducing waste.

Practical Steps to Reduce Chemical Nitrogen

Actions for reduced chemical N fertiliser use



1. Know how much chemical N fertiliser is used on the farm



You can't manage what you don't measure! It is only by knowing how much fertiliser is being applied that a farmer can figure out potential savings. Keep a record of all fertiliser use on the farm.

The PastureBase Ireland app has a facility to record the quantity of fertiliser spread on each paddock throughout the year, even if you are not measuring grass.

2. Know the soil fertility status of your farm

Target soil

Optimum soil pH 6.3+

Phosphorus (P) and potassium (K) Index 3

The starting point to reducing chemical N fertiliser use is to know the fertility status of your farm. Soil sample every two years or more often, and complete a nutrient management plan. This will help you to target fertiliser use where best results can be achieved in terms of grass/crop growth and subsequently avoid waste. Key tasks arising from soil sample results:

- identify areas of the farm that require lime;
- identify fields with high and low P and K soil fertility;
- target manures to fields with low P and K fertility (Index 1 and 2);
- soils with Index 3 P and K fertility – apply maintenance levels of P and K;
- ensure that nutrient-demanding crops (e.g., silage) receive sufficient nutrients to drive growth and replace offtakes; and,
- Index 4 soils should not require additional fertiliser.

3. Spread sufficient lime on the farm

Why?

Improves soil pH, which:

- increases grass production annually;
- releases up to 80kg N/ha/year; and,
- unlocks soil P and K and increases the response to freshly applied N, P and K.



Return on investment

€6-10 for every €1 invested in lime

Table 2: Target soil pH for different crops.

Crop type	Target soil pH
Grassland (mineral soils) grass-only swards	≥6.3
Grassland (mineral soils) with clover	6.8 to 7.0
Grassland (peat soils)	5.5 to 5.8
Cereals	≥6.5
Beet/beans/peas/oilseed/maize	6.8 to 7.0
High molybdenum (Mo) soils	6.0 to 6.2

Practical Steps to Reduce Chemical Nitrogen

4. Optimise organic fertiliser N usage



Use low-emission slurry spreading (LESS) equipment – Teagasc research shows that using a dribble bar/trailing shoe will increase the N content of your slurry by three units/1,000 gallons compared to using a splash plate.



Spread slurry in spring when you get the most value from it. Research shows that there is an extra three units of N/1,000 gallons available in spring compared to summer spreading. Calibrate the tanker.



Knowing the quality of your slurry can help you make decisions on application, ensuring its use is optimised and not wasted. It can be analysed in a laboratory or using a hydrometer. Using a hydrometer is a low-cost way to get the true value of your slurry on your farm.



Maximise the use of slurry on silage ground as 3,000 gallons of slurry/acre makes up the majority of P and K requirements, as well as up to 30kg N.



To reap the benefits of optimising the use of the slurry on the farm, it is important to reduce chemical N fertiliser application rates to allow for N applied in slurry.

5. Incorporate clover into grassland swards

Did you know?

Incorporating white clover into grassland will reduce the level of chemical N fertiliser needed on the farm by up to 100kg/ha, hence reducing the greenhouse gas emissions.



Target

100% of paddocks with 20-25% white clover in the sward.

Blueprint

1. Put a clear plan in place.

2. Select paddocks that are best suited due to their soil fertility/perennial ryegrass content/weed content.

3. Take a multi-year approach:
year 1: reseed ~10% – oversow ~ 20%;
year 2: reseed ~10% – oversow ~ 20%;
year 3: reseed ~10% – oversow ~ 20%;
and,
year 4: reseed ~10% – oversow any paddocks with poor/low levels of clover.

5. Use small (sheep)/medium (cattle) leaf varieties (recommended list).

4. Ongoing process to maintain while clover in swards.

Practical Steps to Reduce Chemical Nitrogen

Optimum soil fertility for white clover

Soil pH
>6.3

Soil P
Index 3+

Soil K
Index 3+

6. Measure grass yield and use available data on growth rates to make informed decisions

Table 3: Making informed decisions.

- Walk your farm weekly during the growing season to measure how much grass is available.
- Use the information to identify surpluses and deficits in grass supply and to make appropriate adjustments to N fertiliser applications.
- By measuring grass, informed decisions can be made about the level of fertiliser to spread on particular paddocks. If paddocks are not growing adequate grass – why spread high levels of N on them when it could be a liming problem or a P or K issue?
- Use PastureBase Ireland as a decision support tool to manage grassland and N fertiliser application.



Visit PastureBase Ireland at:

www.teagasc.ie/crops/grassland/pasturebase-ireland/.

Use available data on grass growth. Make best use of information, such as weather forecasts (www.met.ie) and grass growth predictions to inform decisions around N fertiliser applications.

7. Are you wasting fertiliser on your farm?

Key areas to avoid wasting fertiliser on your farm include:

1. Calibrating fertiliser spreader.
2. Calibrating slurry spreader.
3. Adhering to buffer zones – a buffer zone is a no-spread area, which is used for the protection of water against pollution.
4. Avoiding spreading too close to hedgerows or at roadways or gateways.
5. Use GPS technology to improve the accuracy of fertiliser spreading.

8. Do your fodder budget

Know how much feed is needed on your farm for the winter, including a reserve of 20% extra for the difficult years. Match fertiliser N application rates to the demand for fodder. Use PastureBase Ireland to record the fodder budget for your farm.

9. The four Rs

Right product



Select the correct products to deliver a balanced supply of N, P, K and S.

Right rate



Assess soil supply and crop requirements and apply sufficient nutrients for high crop yields.

Right time



Apply nutrients when crops can utilise them efficiently.

Right place



Ensure nutrients are applied accurately and evenly.

The Signpost Programme is a collaborative partnership of farmers, industry and State agencies, working together for climate action. For more information please visit: www.teagasc.ie/signpost.