

Protected Urea

What is protected urea?

Protected urea is a urea nitrogen (N) fertiliser made safe from ammonia loss through the addition of a urease inhibitor.

Why change to protected urea now?

Protected urea is the technology that has the potential to give the largest and quickest reductions in greenhouse gas (GHG) and ammonia emissions within agriculture, and will grow more grass than either CAN or urea.

How does it affect grass growth?

While the quantity of grass grown by using CAN, protected urea and urea was similar across all fertiliser types in short-term Teagasc trials, in a long-term trial at Johnstown Castle, Co. Wexford, protected urea grew 13% more grass on average compared to standard urea.

The relative yield of grass from using protected urea compared to urea and CAN in long-term trials



Urea = 100



CAN = 109



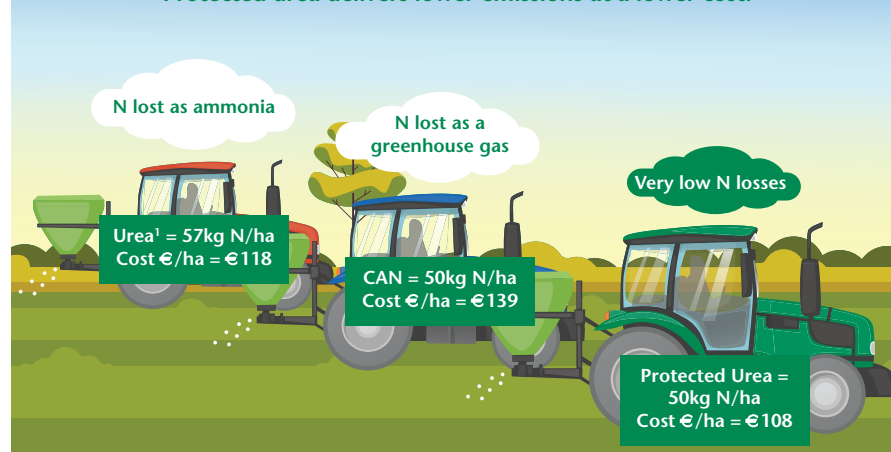
Protected urea = 113

How much does it cost?

Protected urea is cheaper than CAN per kg of N. While it is more expensive than standard urea (on a per tonne basis), it will give the same "effective N" for the plant as standard urea, at a 12.0% lower spreading rate. The N losses from standard urea are significantly higher.

Protected urea is the cheapest option. The value of retaining N (in protected urea) that had previously been lost as ammonia has increased dramatically in line with increased fertiliser costs. Also, in a situation where N application rate is limited (in terms of kg of applied N), it makes sense to use less of a more effective product.

Protected urea delivers lower emissions at a lower cost.



¹ Urea must be applied at a 12% higher spreading rate due to higher N losses. Note: Cost per tonne: urea = €950/t; protected urea = €1,000/t; and, CAN = €750/t.

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When do you use protected urea?

The big advantage of protected urea is that farmers can use it from late January to early September. It will work as effectively as urea in spring in damp conditions and, due to the inclusion of the urease inhibitor, it releases N slower and more effectively than CAN in the summer.

What protected urea products are available on the market?

There are over 20 protected urea products available from at least six companies. There are standard N options, N plus sulphur (S) options, as well as N plus potassium (K) plus S options.

If in doubt check
<https://www.teagasc.ie/crops/soil--soil-fertility/>



What compounds should I use with protected urea?

Straight phosphorus (P) and K fertilisers or blends such as 0-7-30 or 0-10-20 are needed to achieve a 100% switch, or alternatively, farmers would need to use an application or two of high P-K products such as 18-6-12 plus S based on nutrient need, which opens the opportunity for more straight N slots where protected urea with or without S is a good fit.

What does it do for farm emissions?

78%
lower
ammonia

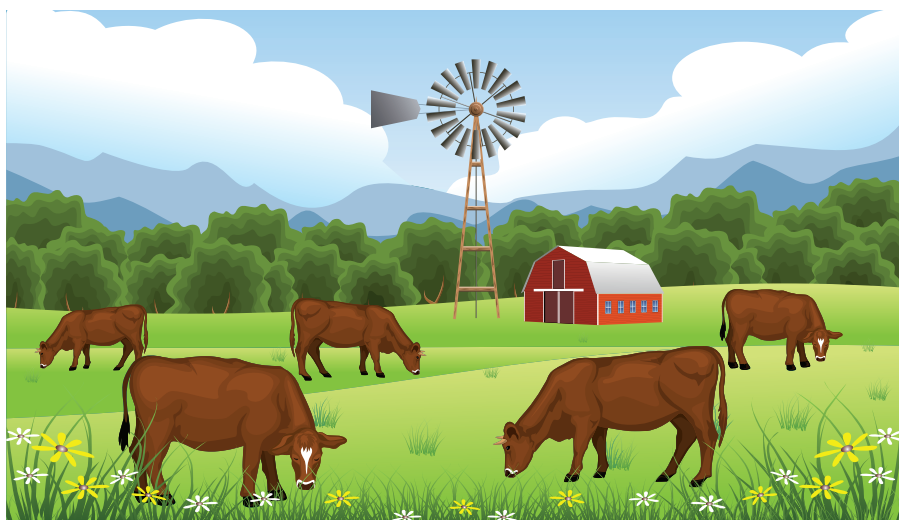
"Protected urea has 78% lower ammonia emissions relative to standard urea."

71%
lower
nitrous oxide

"Protected urea has 71% lower nitrous oxide (N₂O – greenhouse gas) emissions relative to CAN."



Dairy farm: switching to 100% protected urea – reduces total emissions by 7-8%



Beef farm: switching to 100% protected urea – reduces emissions by 1-2%

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Testimonials

"It was probably one of the easiest fertilisers to calibrate in the spreader, and that is taking into account that my machine can be hard to get right. Also, I got a lot further with a full spreader. And it is also cheaper per unit of N than CAN."

Sam Pierce, suckler beef farmer, Wexford

"After hearing about protected urea at discussion group meetings, we decided to try it out and we have been happy with the results. Protected urea, low-emission slurry spreading (LESS) and reducing chemical N use are the low-hanging fruit when it comes to GHG emissions. These tools are a great initial step in reducing our carbon footprint as an industry."

Cathal and Des McHugh, dairy farmers, Roscommon

Does protected urea have a role to play on tillage farms?

Consider protected urea as an N source for tillage crops. Research in spring

barley shows that protected urea produced on average 0.3t/ha extra grain yield compared to either CAN or ordinary urea. Protected urea helps reduce fertiliser N costs in the region of ~20% per kg of N applied.

Factors to consider when spreading urea

1. Choose a product that has larger and stronger particles.



2. Avoid spreading on very windy days.



3. Ensure the correct fertiliser settings and bout width are used.



5. Use simple tray tests to verify the spread pattern.



4. Use the spreader manual, phone app or online resource to determine the bout width capability and the spreader settings (disc, vane, hopper height/angle, etc.) necessary for good spreading.

Spreading resources available at: www.teagasc.ie/crops/soil--soil-fertility/fertiliser-spreaders/, or scan the QR code.



Table 1: Protected urea comes out on top.

	Protected Urea	CAN	Urea
Highest grass growth	✓		
Lowest ammonia emissions	✓	✓	
Lowest GHG emissions	✓		✓
Lowest GHG and ammonia emissions	✓		
Lowest cost €/kg of N			✓
Lowest cost €/kg of effective N	✓		

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Table 2: Frequently asked questions on protected urea.

Question	Answer
Can it be applied after lime?	Where protected urea is being applied, trial work indicates that it is safe to apply to fields that have been limed recently.
Why use protected urea in the first or second round of fertiliser in the springtime?	It is low cost, reduces N losses, is a safer form of N in terms of leaching and denitrification, and is the number one technology to help Ireland reach ammonia targets.
Will it work as fast as CAN or standard urea?	Yes
Will protected urea give the same performance as CAN fertiliser applied in dry conditions?	Yes, the Irish trial results show no significant yield or N recovery difference between CAN and urea protected with NBPT (urease inhibitor).
Is protected urea more corrosive on fertiliser spreaders?	It is more hygroscopic than other fertilisers, causing it to draw moisture if the spreader is not washed out.
What's the shelf life of protected urea?	Manufacturers recommend to use within six to 12 months depending on product type.
How stable is the urease when mixed with other nutrients?	Protected urea is most stable when bagged as a straight N product. Its stability in storage may differ when bagged with other nutrients as follows: <ul style="list-style-type: none"> ■ with P: not stable/breaks down in days (residual acidity from the P breaks down the urease inhibitor quickly); ■ with S: stable but depends on the quality of the ammonium sulphate (if dusty); and, ■ with K: stable/little impact on urease inhibitor.
Will protected urea affect soil microbes?	Initial trial work conducted at Johnstown Castle indicates no negative impact on soil microbes (grassland plots that have received protected urea for over six years). Trials show positive impacts on soil biological communities compared to controls.
Will protected urea affect water quality or get into waterways?	No, protected urea is less likely to be leached through soil compared with CAN, but farmers still need to adhere to good practice guidelines.
Is protected urea regulated?	Protected urea is regulated by the EU and Irish regulatory bodies.
Is there a risk of the NBPT getting into the food chain?	Irish and international studies have demonstrated that no residues were found in the milk of cows grazing pastures fertilised with protected urea.

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.