Improving farm efficiency using low Ammonia-N emission technologies

Patrick Forrestal[1] and William Burchill[2]

[1]Teagasc, Soils, Environment and Land Use Department, Johnstown Castle, Co. Wexford; [2]Teagasc, Moorepark, Fermoy, Co. Cork

Summary

- Low emissions slurry spreaders retain an extra three units of nitrogen per 1,000 gallons of slurry compared to splash-plate spreaders.
- Low emissions slurry spreaders reduce grass contamination, widening spreading windows to target low soil test P and K paddocks.
- Protected urea grows the same amount of grass as CAN while being very cost competitive and reducing emissions.

Introduction

The production and utilisation of grass is a key driver of farm profitability. Irish grasslands respond strongly to nitrogen (N) so it is important to make the most of available N on farms. Two important N resources on farms are purchased N fertiliser and slurry N. Nitrogen fertiliser type and slurry application technique affects N efficiency. Nationally, it is estimated that 15.5% of the N applied as urea is lost as Ammonia-N gas, Teagasc research shows that protected urea reduces this loss to low levels. Measurements at Johnstown Castle found that slurry broadcast by splash-plate tankers can lose up to 83% of the readily available N, which could have grown grass. Holding on to this Ammonia-N to grow grass and to reduce mineral fertiliser expense makes sense.

Benefits of low emissions slurry spreaders (LESS)

LESS machines e.g. trailing shoe and dribble bar retain more N on farm to grow grass, reducing fertiliser N expense. A LESS spreader will retain an extra three units of N per 1,000 gallons (gals) of slurry vs. splash-plate, which is a 30–50% improvement in the slurry N values due to lower ammonia-N emissions. Low emissions slurry spreaders allow slurry to be spread on higher covers increasing the window to target slurry nutrients to fields with low soil test P and/or K.

Teagasc have shown that cows prefer to graze LESS spread pastures due to lower grass contamination (Figure 1). Another benefit is allowing the interval between slurry spreading and grazing to be reduced. Low emissions slurry spreaders are a capital expense cost for farms. Depending on herd size and available labour, the use of a contractor with one of these machines may be a way to access these machines and free up labour for other farm tasks. Where a trailing shoe or dribble bar with an umbilical system is practical and available, lower compaction is an additional benefit.

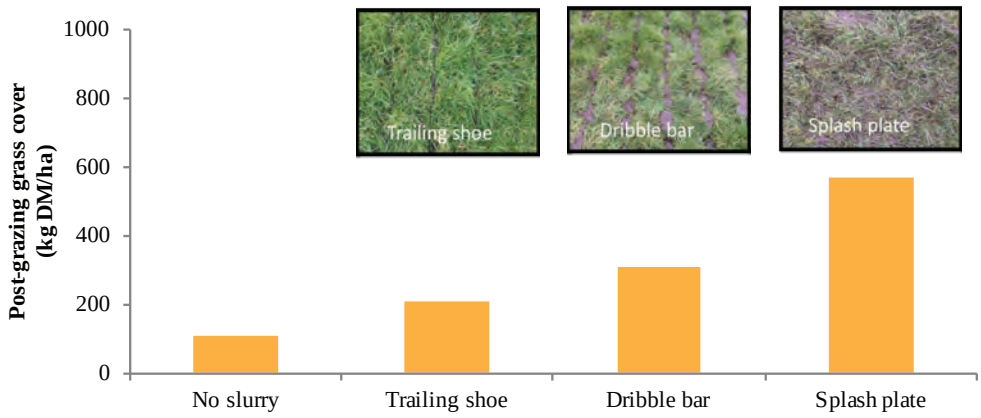

Figure 1. *Post-grazing covers as affected by application method. Cover of 1,100 kg DM/ha at spreading, grazing occurred three weeks after slurry spreading*

Benefits of using Protected Urea

Nationally, it is estimated that 15.5% of urea-N applied is lost to the air as Ammonia-N. Protected urea (urea + NBPT, urea + 2-NPT or urea + NBPT + NPPT) cut this loss to low levels. Teagasc research has shown that protected urea grows the same amount of grass as CAN. It is also cheaper than CAN per unit of N at current fertiliser prices (Figure 2). Protected urea reduces greenhouse gas and ammonia emissions substantially compared to CAN and Urea, respectively. This presents an opportunity for agriculture to meet current and future emissions commitments without affecting production.

Fertiliser N type	N content	Cost €/kg N	Annual grass yield	GHG emissions	Ammonia emissions	Nitrate leaching Spring
Urea	46%	0.85	✓	✓	✗	✓
Protected urea	46%	0.95	✓	✓	✓	✓
CAN	27%	1.05	✓	✗	✓	✗

Figure 2. *Comparison of Urea, Protected urea and CAN fertiliser N in terms of cost, grass growing ability and environmental efficiency*

Conclusions

Using low emission slurry spreaders on farm makes sense as they improve the N value of slurry, add flexibility around spreading slurry into higher grass covers and shorten the interval between slurry spreading and grazing. They increase the window for targeting slurry to low soil test P and/or K paddocks. Protected urea ensures ammonia-N is retained to grow top yields of grass while reducing greenhouse gas losses cost effectively.