

Precision slurry application and the 'Lynx Effect'

There are important changes to slurry spreading rules for derogation farmers from 15 June

Joe Kelleher
Teagasc, Newcastle West, Co Limerick

Anyone with young male offspring will be familiar with the Saturday night "Lynx effect". The lingering aroma indicates that a good fraction of the aerosol propelled deodorant has missed its target. It's a bit like that with splash plate slurry application. But the consequences of propelling ammonia willy-nilly into the environment are a lot more serious. In both cases, a more effective delivery system will benefit us all.

Low-emission slurry spreading techniques have become increasingly popular. The Green, Low-Carbon, Agri-Environment Scheme (GLAS) started it off in early 2015 when it included the low-emission slurry spreading (LESS) option as part of the scheme. This was swiftly followed in late 2015 when the low-emission slurry spreading equipment grant scheme opened for applications as part of the Targeted Agricultural Modernisation Scheme II (TAMS II) programme by the Department of Agriculture, Food and the Marine.

To further reinforce the issue, a law was introduced in late 2017 prohibiting derogation farmers from spreading slurry with a splash plate after 15 June annually from 2018 until 2021.

Why the need for LESS?

As part of the Paris agreement (an agreement between 197 countries aimed at combatting global climate change), Ireland signed up to reducing its greenhouse gas (GHG) emissions by 20% by 2020 and 30% by 2030. As agriculture accounts for one-third of all GHG emissions in Ireland, it was inevitable that agriculture was

going to be asked to contribute to the reduction.

There are many types of GHGs including carbon dioxide, sulphur compounds, methane and many more. But as far as cattle slurry is concerned, ammonia is the main one that we are concerned with. Agriculture accounts for 98% of ammonia emissions in Ireland and land spreading of slurry accounts for almost half of this total.

Spreading slurry with a trailing shoe, dribble bar or injector system can reduce the ammonia emissions up to 97% of those emitted with a splash plate.

The trial work

To investigate the effect of application technique and climate on ammonia emissions, Teagasc Johnstown Castle carried out trial work spreading cattle slurry (dry matter at 8.3%) at 30t/ha (2,500 gallons/acre) grassland plots, using either the trailing shoe or splash plate methods. On average, the ammonia emissions were lower using the trailing shoe.

Six hours after slurry application, ammonia emissions were 58% lower with trailing shoe compared with splashplate application. However, because the trailing shoe applies slurry in lines/bands it dried out more slowly and emitted ammonia over a longer period. Therefore, a week after application, the emission reductions delivered by trailing shoe had decreased to 28.4%.

The percentage reduction in total ammonia emissions delivered by the trailing shoe compared with splash plate also varied with the timing of application. In May, during sunny days, with high temperatures and windspeed, the trailing shoe reduced emissions by over 47% compared with splash plate. By contrast, April application (near impossible this year anyway), on days when conditions favoured low ammonia volatilisation (cloudy days with some rain), there was no significant difference in application method on emissions.

Other benefits

There are substantial additional benefits to using the LESS techniques for all farmers, regardless of whether



Agriculture accounts for 98% of ammonia emissions in Ireland and land spreading of slurry accounts for almost half of this total. More effective LESS systems will help.

they are participating in the schemes listed above or not;

- Switching from a splash plate to a trailing shoe or band spreader application process will increase the N value by approximately three units per 1,000 gallons.
- Improved flexibility with application as a result of reduced contamination of herbage, leading to a quicker return to grazing.
- The opportunity to apply slurry onto swards with larger grass covers.
- The odours released during and after application are also usually reduced when using a trailing shoe or band spreader method compared with a splash plate.

The challenges

One of the major challenges faced by farmers was the limited availability of these machines. There have been over 1,500 applications submitted under the TAMS II LESS scheme to date, meaning that these pieces of equipment should be readily available in almost all parts of the country.

Another obstacle is cost. Where slurry is spread using one of the LESS technologies in tandem with the umbilical system, then the cost of spreading slurry can actually work out cheaper (depending on distance from yard and paddock sizes). Hourly rates for spreading slurry with LESS attachments mounted on the back of vacuum tanks are generally higher, but when the extra nitrogen available to the grass plant is taken into account, the cost differential closes somewhat.

Summary

LESS techniques are here to stay. The national herd has been increasing steadily since milk quotas were abolished in 2015. To offset the extra gases emitted by these additional animals, all techniques that will contribute to reducing our overall GHG emissions from agriculture have to be adopted. The use of LESS equipment appears to be a very effective way in achieving these reductions.

Summary of low-emission slurry systems

Dribble bar/ band spreading/slurry spike

The dribble bar is the simplest low-emission method, and can be used in both grassland and arable crops. The slurry is deposited by pipes that are situated above the crop.

The ammonia losses and sward contamination compared with splash plate are reduced as the slurry is deposited in lines. The slurry spike is a relative newcomer to the market and operates the same way as the dribble bar except that it spikes the ground at the same time.

Trailing shoe

The trailing shoe is an adaptation of the band-spreader whereby each pipe has a "shoe" coulter attached at the base of the pipe.

These shoes separate the sward canopy and apply slurry at the soil surface. The advantage of this application method is that sward contamination, compared with the splash plate in particular, is minimised, thereby facilitating application to taller grass swards with minimal effects on grass quality due to herbage contamination.

The opportunity for spring application to grassland may be increased as a result.



Shallow injection

The shallow injection method involves discs that cut slits into the soil. The slurry is then placed into these slits. This is the best method for reducing ammonia losses, as the exposure of slurry to the weather is minimal.

However, shallow injection may not be suitable to all Irish soils due to the soil variability of texture, stone content and topography. The shallow injection method also requires greater tractor power to pull the injection unit through the soil.

Umbilical systems

The umbilical slurry application system requires two tractors. One tractor operates a pump situated at the slurry storage tank. This pump sends slurry via a flexible pipe to an application unit (operated by the second tractor) in the field.

Umbilical systems help reduce soil compaction as heavy tankers full of slurry are not required. Slurry can be pumped to distances of up to 1km or more.

Umbilical systems can be fitted with either splash plate or low-emission application units.



Summary of Department of Agriculture, Food and the Marine schemes

GLAS

Option: low-emission slurry spreading

- Farmers paid €1.20 per cubic metre of slurry per year.
- Must spread all slurry produced and/or imported using LESS techniques.
- Must provide documentary evidence to confirm.
- Must submit annual declaration identifying parcels where slurry was spread.

TAMS II

LESS equipment scheme

- Grant of 40% (60% for eligible young farmers) available to purchase LESS equipment.
- Investment of up to €40,000 (€60,000 for eligible partnerships) eligible for grant aid.
- Grant applies to umbilical systems or new tankers fitted with dribble bar, injectors or trailing shoe. Retrofitting of dribble bar to existing tanker also eligible

Nitrates derogation

Applies to all derogation farmers from 2018 to 2021

- 50% of all slurry produced on a derogation farm must be applied by 15 June.
- After this date, slurry may only be applied using low-emission equipment.
- If all slurry is spread before 15 June there is no need for LESS equipment.
- Soiled water can be spread using splash plate. However, soiled water mixed with slurry is defined as slurry.