

Early Nitrogen for Spring Grassland

On grassland farms, having enough grass available for livestock to graze is crucial to ensuring a profitable enterprise. In springtime, applying nitrogen (N) fertiliser will help to provide enough grass as livestock are turned out from winter housing. The timing and rate of fertiliser N application are key decisions to ensure sufficient supply of grass. The challenge is to achieve maximum returns from applied fertiliser N without having negative impact on water quality. Nitrate in the soil is both soluble and mobile. In free draining soils, nitrate loss can occur when available nitrate in the soil that is not recovered during grass growth in spring or autumn is removed by percolating water. If soils become saturated or are subjected to heavy rainfall, this nitrate is more likely to leach down through the soil profile. Once nitrate travels below the root zone, it will be lost to groundwater where it can have a negative impact on water quality.

The times of the year with highest risk of nitrate leaching are early spring and autumn / winter. This is due to the fact that grass growth rates are low and rainfall levels are at their highest. Any nitrate applied during times of low grass growth rate and high rainfall is at greater risk of leaching and careful application of fertiliser N is critical to reduce this risk.

Benefits of Improved Spring Nitrogen Use

- N applied in suitable conditions will help improve Nitrogen Use Efficiency
- Better grass growth response to nutrient applied
- Reduction in the level of nitrate leached to groundwater
- Reduced negative impact on water quality
- Improved financial return from fertiliser investment
- Potential to reduce fertiliser N rate required and reduce fertiliser costs on farms

TIPS WHEN APPLYING EARLY SPRING NITROGEN

- » Only spread if fields are suitable for tractor work, when water is drained sufficiently and where heavy rainfall is not forecast. Apply fertiliser N when soil temperature is greater than 6°C and rising. Typically this occurs around the end of February however, this will vary across the country and from year to year.
- » Target fields for early N that are most likely to respond to an early N application: fields at optimum soil fertility (pH, P and K), perennial ryegrass swards, recently reseeded or with a grass cover of greater than 400 kg DM/ha or 5 cm grass.
- » Match chemical N applied to grass growth rates as this varies across the country. Apply up to 30kg N/ha (24 units N/ha) maximum in 1st split and avoid fields that have received an application of cattle slurry
- » Applying slurry in spring - 25 m³/ha (2,500 gals/ac) by low emission application will supply ~25 kg/ha (~20 units/ac) of available N. It is important to reduce your chemical N application rates accordingly.
- » To ensure efficient and accurate application of fertiliser, calibrate fertiliser spreaders and use GPS equipment where available
- » Use protected urea for early N applications as this will help reduce the risk of nitrate leaching



Protected Urea

1. Protected urea allows a farmer to spread urea based nitrogen throughout the growing season without needing to worry that substantial levels of N will be lost.
2. CAN is 50% ammonium and 50% nitrate. After spreading CAN, nitrate is available to grass in the soil. However, this negatively charged nitrate is open to being leached to water if heavy rainfall occurs.
3. Protected urea initially converts to the positively charged ammonium form of nitrogen when applied to soil. Ammonium is more stable in soil than nitrate and less susceptible to leaching due to its positive charge.
4. Soil microbes convert ammonium to nitrate almost like a steady conveyor belt; plants take up both nitrate and ammonium as required for growth. This process greatly reduces the risk of nitrate leaching and ammonia losses.

Nitrate Leaching Risks

1. Weather conditions greatly impact nitrate losses to waters. Chemical N should not be applied where heavy rainfall is forecast. Also, in drought conditions where grass growth is impacted, N application should be adjusted downwards in accordance with Soil Moisture Deficit (SMD). Contact your adviser for assistance.
2. Early N application should be delayed until grass is actively growing. Nitrate loss can occur when available nitrate in the soil is greater than grass growth demand and is potentially at greater risk of leaching to groundwater.
3. If using organic manures, apply in the spring to coincide with increasing grass growth rates. Adjust subsequent chemical Nitrogen application downwards to take account of nutrients applied in these organic manures.
4. CAN based products are at greater risk of leaching. It is recommended to use protected urea as part of your farm fertiliser programme
5. Apply fertiliser N in accordance with the regulations and observe closed periods for chemical fertiliser application. Adhere to the relevant the 2m buffer margin along all surface water drains and watercourses.



Summary

There is a high risk of nitrate leaching from free draining grassland fields in early spring and the autumn/winter period of the year due to low grass growth rates and high rainfall levels. Farmers can help reduce these losses by carefully managing fertiliser applications and using good Nutrient Management Planning practices.

Improved utilisation of chemical nitrogen on grassland will improve the financial return to the farmer but also reduce the risk to water quality.

For more information please visit www.teagasc.ie/water-quality