

Nitrogen (N) for 2024

The application of Nitrogen (N) fertiliser to grassland is under constant review within Ireland and the EU. Given this background, Nitrogen planning on the farm will become far more critical to pasture production and utilisation in 2024 and beyond. Fertiliser N application will more limited than previously but equally the clover plant provides an opportunity to generate Nitrogen within the farm. Within the farm gate the efficient use of organic N and the generation of N from the soil is now becoming more important. Getting the balance right in terms of fertiliser N application and its timing now is essential to ensure pasture production is optimised.

This workshop will feature John Maher (Teagasc, Grass10), Michael Egan (Teagasc, Moorepark) and David Wall (Teagasc, Johnstown Castle).

Topics will include:

- Getting the timing of fertiliser N right for optimal grass growth responses
- Making better use of organic Nitrogen
- Clover - a real opportunity to generate Nitrogen within the farm gate.
- Does fertiliser N type make a difference to grass production?

Recognition of the nitrogen (N) fixation benefits of clover pastures has led to a resurgence of interest in its use as a means of reducing the economic and environmental costs in livestock agriculture. The EU Farm to Fork strategy has increased the urgency to focus research on the use of white clover to reduce chemical N fertiliser use. Research is being undertaken at Teagasc research farms and on commercial farms through the Clover150 study on the role of white clover in our production systems. The research program to date has delivered very promising results (high N use efficiency (NUE) - close to 60%, lower N surplus and higher animal performance). There is, however, a clear challenge to ensure that grass-white clover swards are established and persist on commercial grassland farms.

The benefits of white clover tend to occur from May onwards as sward white clover content increases. The main benefits of white clover inclusion in grass swards are:

- Increased herbage quality compared to grass-only swards in the summer months.
- Higher milk production and liveweight gain.
- Nitrogen fixation – white clover fixes N from the atmosphere making it available for plant growth.
- Lower requirement for N fertiliser application in summer.

Nitrogen fixation

Nitrogen fixation is the process whereby white clover can fix N from the atmosphere and make it available for plant growth through a process called biological N fixation. This N is then available for uptake by white clover and other plants, mainly perennial ryegrass, in the sward. The quantity of N fixed by a grass white-clover sward depends on a number of factors including:

- Sward white clover content – N fixation increases as clover content increases.
- N fertiliser application rate – N fixation declines with increasing N application.

- Soil temperature - N fixation increases as soil temperature increases.
- Solar radiation (sun light) – more sunlight, more fixation.

Typically as N fertiliser application rate increases, N fixation decreases, as there is adequate N available for grass and white clover growth.

Nitrogen fertilisation strategies

White clover needs a higher soil temperature for growth than grass. Grass starts growing at soil temperatures of 5-6°C while white clover needs soil temperature of 8°C. As a result, the contribution of white clover to the sward in early spring is low. Its ability to supply N during this period is also low. As our systems have a requirement for pasture to feed animals in early spring, N fertiliser must be applied at similar rates to those used in grass-only swards. In the summer, when sward white clover content is increasing ($\geq 25\%$), N fertiliser application can be reduced. Some N fertiliser is required in autumn so N should be applied in late-August/early September (before 15th September) to ensure pasture availability in the autumn. Suggested N application strategies for 2024 for grass only swards and grass-white clover swards with average annual white clover content of 20% or greater are shown in the table 1 below.

Table 1. Fertiliser N application by rotation

Rotation/Date	Grass 225 kg/ha	Clover 150 kg/ha
February	14 (+ slurry)	14 (+ slurry)
Mid-March	35	35
April (2 nd rot)	29	29
May (3 rd & 4 th rot)	50	18
June (5 th rot)	17	9
July (6 th & 7 th rot)	34	18
August (8 th rot)	17	9
Mid-September	29	18

Alternative N fertiliser

The application of N in liquid/foliar form is also gaining some popularity. It can appear in several different N products, such as urea dissolved in water, in products that are mixtures of urea and ammonium nitrate in solution and others. These are applied using a sprayer equipped with special nozzles or dribble bars. Because N is applied with a sprayer, it allows for very uniform application, even over very wide bout widths. A particular advantage is that it allows even application without getting fertiliser into hedgerows etc. It also allows a more even application on the ins and outs, particularly where GPS-controlled sprayers are used. While liquid N can be applied with a normal sprayer, it should not be applied with 'normal' spray nozzles, so there will be cost involved with equipping the sprayer with the required dribble bars/liquid N nozzles. Specialist fertiliser sprayers

also exist and are available. Like all fertilisers, liquid N is corrosive and great care needs to be taken in washing down the sprayer after use. Initial research completed by Teagasc suggests that the response in pasture production per Kg of N applied is similar to the normal pelleted fertiliser. In summary, while there are alternatives to N containing fertiliser pellets available which may offer cost savings, farmers should familiarise themselves with the pros and cons before changing to these different type of chemical fertilisers.