

Nitrogen fertiliser for the Lower Murray

Why use nitrogen fertiliser?

There are many good reasons for using nitrogen (N) fertiliser on Lower Murray farms:

- To fill feed gaps where you otherwise may need to increase feeding of supplements
- To keep pasture grasses vegetative around November when they are becoming reproductive after which growth slows
- To promote healthy and vigorous pastures leading into the spring and autumn “flush” of growth
- To offset the effects of rust in ryegrass
- To aid the uptake of phosphorous on N deficient soils.

In other words, to keep the cheapest source of feed on your farm as healthy and productive as possible to maximise returns on your total investment in pasture.

Are there any dangers in using nitrogen fertiliser?

There are potential problems in using N fertilisers on Lower Murray dairy farms:

- You must **capture and re-use surface run-off** from paddocks. Allowing surface runoff immediately after applying N fertiliser not only wastes your fertiliser dollar, but impacts on water quality.
- If N is used too regularly, every 4 to 6 weeks for example, pasture quality can decline due to loss of clover

- In rare cases, stock health can be affected by regular high doses of N fertiliser
- Too low a rate of N will not return an economic response and cost you excess money in the long term
- When using urea, N can be lost if applied to dry soil.

What research has been done to support use of N fertiliser?

Trials have been conducted on the Lower Murray by PIRSA to assess the effects of the use of nitrogen fertiliser on pasture production. Various rates of N were applied throughout the irrigation season to both ryegrass/white clover and paspalum pastures and growth and clover content measured.

Increases in daily growth rate in response to different levels of applied N varied from 24–56% in the ryegrass/white clover, and from 28–53% in the paspalum pasture, over the period of the trial.

When the increase in daily growth rate is converted to kilograms of dry matter (DM) per kilogram of N applied, the highest response in pasture growth was achieved with the lowest bi-monthly rate of N on the ryegrass/white clover pasture, and with the second lowest bi-monthly rate on the paspalum pasture. In the latter, this response was only marginally better than the lowest bi-monthly rate. The lower rate may be more economic to use when the cost of transport and spreading is taken into consideration. The most cost effective rate of N was 60kgs per hectare per application of **actual N**.

It was also found that response to applied N varied significantly with time of application. Greatest response on ryegrass/white clover pasture was achieved in Spring, early Summer, late Autumn and Winter. Greatest response on paspalum was in Spring and Summer. The only months when a significant response was not achieved were February for the ryegrass/white clover and March to July for the paspalum.

Assessment of clover content in both pastures, measured at the end of the 2 year period, indicated that clover had significantly declined in the fertilised plots at all application rates. This reduction occurred for both major clover types, White and Strawberry clovers. It appears that the nitrogen improved the competitiveness of the grasses. Clover could already be disadvantaged by traditional long irrigation intervals on the river, and the grasses, which are more moisture stress tolerant, dominate the pasture when further improved by the addition of nitrogen **on a regular basis**. It should be stressed that this decline in clovers occurred after 2 years of regular application of nitrogen.

It is of particular importance to maintain soil moisture when applying N to pastures containing white clover, to help keep the clover in the pasture.

Information from Kyabram Research Institute indicates that, if urea is used, it should only be applied before an irrigation if surface run-off can be controlled i.e. on a lasered paddock watered with no run-off to minimise drainage loss. Otherwise, apply as soon as practical after watering while the surface soil is still damp. Urea will dissolve and diffuse into a damp soil. If applied to dry soil, N will be lost to the atmosphere once wetted by a heavy dew or light rainfall.

60kgs of N applied every 60 days produced an extra 10.2 kgs of feed per kg of N applied (612kgs of extra pasture dry matter per application) on ryegrass/white clover pastures in research trials. This was a 30 to 40% increase in growth.

60 kgs of N is supplied by 133kgs/ha of urea. If urea costs \$500 per tonne, then approximately \$66 worth of urea produced 612 kgs of extra pasture dry matter, or \$108 per tonne—cheap feed indeed!

So how should you use nitrogen fertiliser?

Nitrogen fertiliser should be used strategically to provide a boost to feed only when you need it or to maintain pasture health. Regular (every 4 to 6 weeks) application should be avoided where clover content needs to be maintained.

If using urea, the fertiliser should be applied as soon as you can get on a paddock after irrigation to avoid fertiliser being lost from the paddock and into the drainage system. Ammonium nitrate can also be used and is generally more stable than urea. The decision on which fertiliser type to use should be made on cost per unit of N applied.

You need to apply 60kgs/ha of actual N. To work out how much fertiliser this is, you need to use the formula:

$$60 \div N\% \text{ of fertiliser} = \text{kgs of fertiliser per ha to apply}$$

For example, urea is 45% N, so $60 \div 45\% = 133\text{kgs}$ of urea per ha to apply.

For ammonium nitrate which is 33% N, $60 \div 33\% = 182\text{kgs}$ of ammonium nitrate per ha to apply.

You can use this calculation for any other N fertiliser. Other types, such as calcium ammonium nitrate (the most stable N fertiliser of all) can be used, but tend to be very expensive per unit of N they supply.

Use 60kgs of N per ha per application, only when you need and can use the extra feed. Apply after irrigation while soil is still damp. Excess drainage means increased fertiliser costs through wasted fertiliser lost in drainage and potentially contaminating the river.

Reducing the volume of drainage, or drainage minimisation, reduces the direct and indirect cost of drainage and the impacts on the river of drainage.

Guide to the best times to apply nitrogen

Apart from using nitrogen to fill feed gaps at times when you need and can utilise or graze the extra feed grown, the following is a guide to other times of year when nitrogen can be useful in your pasture system.

- In early spring to boost the spring ‘flush’ of growth and achieve a higher peak of pasture production. You should be prepared to conserve as hay or silage the extra feed grown and feed it back as high quality fodder in summer when pasture growth slows.
- In late spring/early summer when ryegrass is starting to send up seed/flower heads. You must be able to graze, or be prepared to top, any un-grazed feed to get the best result from this application—the aim being to extend the growth stage of the

ryegrass. Topping and/or heavy grazing at this time will also help prevent rust in ryegrass—the secret to controlling rust is to keep the ryegrass vigorously growing—when growth slows rust hits.

- Early autumn to boost the autumn ‘flush’ of growth or put off to late autumn if you can’t graze all of the feed to set the pasture up for winter.
- On paspalum, only use nitrogen in the summer months when you need a feed boost.

Soil and tissue testing should be a part of any farm management program. Your fertiliser representative or farm adviser can help you to make the right decision about which nitrogen (or other) fertiliser you should be using and how responsive your pasture should be.



Before I use nitrogen

Can I control my watering and reduce run-off?

If you can’t control your run-off be prepared to under water the paddock in the irrigation after you have applied nitrogen. Apply after irrigation while soil is still wet. Nitrogen is very water soluble and is a major pollutant of rivers. Losing nitrogen in run-off costs you money and contaminates the river system.

Can I graze or conserve the extra feed I will grow?

If you can’t graze or conserve the extra feed—do you really need to grow it? High quality pasture conserved as hay or silage can be very beneficial when fed back to the herd during the summer feed shortage in place, or in conjunction with, other supplements.

Is my soil phosphorous level above 45ppm?

Have you had a soil test lately? If your soil phosphorous is lower than 45ppm you probably will not get a response to applied nitrogen. Arrange for a soil test if in any doubt. A tissue test will also be useful in determining if you will get a response to nitrogen fertiliser. For example, if a tissue test shows high tissue salinity (Na and Cl) then you may only get a limited response to nitrogen.

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