

Wise Use of N-Fertiliser on Hill Country Pastures

WiseN Up!

Special points of interest:

- Four of the properties in the programme are undertaking water quality measurements
- The first three 'Frequently Asked Question' sheets on nitrogen issues accompany this newsletter. If you have not received them, please contact your facilitator.



Get up to Speed with Nutrient Budgeting

Focus farm facilitators and their local Regional Council reps are being encouraged to participate in a new course for industry groups called 'Sustainable Nutrient Management in New Zealand Agriculture'.

The course was developed by Massey Agriculture through the Fertilizer & Lime Research Centre and NZ Fertiliser Manufacturers' Research Association and focuses on fertiliser recommendations, nutrient budgeting and environmental protection in pastoral and arable agriculture.

Recent concerns over fertiliser use prompted the development of this course which provides attendees with a working knowledge of the assessment of nutrient requirements of a range of agricultural systems; including a consideration of best practices for environmental protection.

The course is very comprehensive and has 9 distinct information modules covering everything from nutrients and nutrient cycles,

"I recently completed the Massey University "Sustainable Nutrient Management" short course with Malcolm Todd, (the Horizons Regional Council representative involved with the Kimbolton Focus Farm). It was an excellent course, and was a fantastic way to upskill and strengthen the working relationship with Malcolm at the same time. I would encourage other N-project facilitators to complete the course and try to persuade your Council reps to attend with you. It's well worth the effort."

John Stantiall
Focus Farm Facilitator

to complying with the Code of Practice for Fertiliser Use.

Case studies are conducted to familiarise attendees with:

- The theory and current practice of determining nutrient and fertiliser recommendations (with extensive use of the Overseer® nutrient budgeting software),
- Estimating nutrient losses from agriculture and their impacts on the wider environment,
- The influences of fertilisers on soil quality,
- Recording the sustainable use of nutrients through the NZFMRA Code of Practice for fertiliser use,
- Indicators used to assess nutrient status in soil, plants, water and atmosphere.

Those consultants who have already completed the course view it as a further way of adding value to their existing services. Farm consultants wishing to participate in this course are invited to contact Clare Johnston.

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A Word From Fert Research

Fert Research (New Zealand Fertiliser Manufacturers' Research Association) was established more than 50 years ago and represents the two main fertiliser companies in New Zealand; Ballance Agri-Nutrients and Ravensdown Fertiliser Co-operative. Providing about \$1million research funding each year, Fert Research-funded projects aim to improve nutrient use efficiency and deliver results that contribute to sustainable and profitable farming practices.

In 1998 Fert Research developed the Code of Practice for Fertiliser Use. This was updated in 2002 and is currently undergoing a comprehensive review to meet today's nutrient management needs. Acknowledged as a world-leading example, the Code is today used in a range of quality assurance schemes, is part of regional plans and is used as a tool when developing fertiliser recommendations.

Fert Research believes funding for the Wise Use of Nitrogen Fertiliser on Hill Country Pastures project is important for determining productivity gains but equally for identifying any adverse environmental effects and if necessary, formulating remedial practices.



“New Zealand agriculture must constantly strive to increase productivity on an annual basis in order to be competitive in world food and fibre markets. Part of the productivity equation is increasing input efficiency and fertiliser nutrients are inputs which represent a major expenditure item. In addition, farm practice and its impact on the wider environment is coming under ever increasing scrutiny by the public at large. Resource Managers have, in the main, relied on voluntary compliance by farmers to minimise the adverse effects of farm practices on the environment. Best Management Practices, when based on the current state of best science knowledge, are designed to ensure the most profitable use of expensive nutrients and to minimise the inevitable ‘leakages’ of nutrients outside the farm boundary.”

Dr Ants Roberts
Chief Scientific Officer,
Ravensdown Fertiliser Co-op Ltd

Are you Using ‘Best Management Practices’?

Are you making sensible decisions about where, when and how you apply nitrogen? Review the following BMPs and put your systems to the test.

1. Avoid single dressing, high application rates by applying nitrogen at rates of 20 kg N/ha – 50 kg N/ha.

Rates of nitrogen application of 20-40 kg N/ha in single applications are most efficient and minimise leaching loss. Rates can be increased up to 50 kg N/ha in rapid growth periods.

2. Reduce fertiliser application rates in wetter conditions.

Under wetter conditions the risk of nitrogen loss due to direct leaching from the fertiliser is increased.

3. Avoid applying fertiliser when the soil is saturated (i.e. above field capacity).

When soils are saturated or waterlogged growth responses tend to be small and the risk of nitrogen loss is high.

4. Avoid applying nitrogen when pasture height is less than 25mm or 1000 kg DM/ha.

Plants are slow to respond to applied fertiliser when height is less than 25mm due to insufficient plant leaf area for photosynthesis.

5. Avoid applying nitrogen when soil temperature is less than 6°C and falling.

At soil temperatures below 6°C plant uptake of nitrogen is slow and the risk of loss due to leaching is increased.

6. Match nitrogen applications to plant growth to increase N

“The research component of the Wise Use of N project (funded by Fert Research) is looking at the short and long term environmental effects of nitrogen fertiliser use on hill country. It is important to undertake this in a controlled research situation to ensure the results are scientifically sound. By doing this, future nitrogen use by farmers will be economically and environmentally sustainable and will be based on best management practices.”

Dr Hilton Furness, Technical Director of Fert Research

uptake by plants.

Nitrogen uptake increases during periods of active plant growth.

7. Avoid applying nitrogen during dry (drought) periods.

Dry periods reduce plant growth and hence the ability to take up nitrogen.

8. Avoid applying nitrogen after a dry (drought) period until sufficient regrowth has occurred after rain.

This will ensure that applied nitrogen is not lost prior to plants actively growing and able to take up nutrients.

9. Ensure applied nitrogen is in proportion to other nutrients, according to plant requirements.

Applying nitrogen will increase plant growth and the uptake of other nutrients. If excess nitrogen is applied relative to other nutrient requirements, plant growth will be restricted thereby reducing the efficiency of nitrogen use.

10. Consider the use of nitrification inhibitors especially on camp areas.

In areas where animal urine is deposited, the use of nitrification inhibitors will reduce nitrate leaching and increase the amount

of nitrogen available for plant uptake. The overall effect is to reduce nitrogen loss (NO₃ to groundwater and N₂O to the atmosphere) and increase dry matter production.

11. Ensure that soil fertility and pH levels are at economic optimum for the farm before embarking on a high nitrogen use strategy.

Increased nitrogen use will increase the uptake and export of other nutrients and may result in pH changes. Soil tests and nutrient budgets should be used to ensure that soil fertility and pH levels are optimum.

12. Ensure that your farm system and infrastructure allow the full utilisation of extra pasture growth.

To obtain the benefit of increased nitrogen application, any increased pasture growth must be fully utilised.

If you have any questions, please contact Clare Johnston on 06 324 7033.



Focus Farm Feature

Castlepoint Community Group, Castlepoint

Farm Profile

Castlepoint Station was purchased by Anders and Emily Crofoot in 1998. The 2952 ha (2794 ha effective) property is traditionally summer dry and receives an average of 924 mm rainfall per annum. An extensive development programme has been underway since the Crofoots took over the property and the

strategic use of nitrogen has been part of the improvement process since 2000.

The farm policy at Castlepoint Station revolves around a high performing sheep breeding unit supported by a cattle policy that incorporates flexibility and promotion of pasture quality. The property

has been involved in the Pasture Plan project for the past three years and pasture cuts are being taken at four sites every two weeks.

The operation's stock policies and feed budget are monitored through the PMS bureau provided by Baker & Associates – Masterton.



Castlepoint Station owners Anders and Emily Crofoot with farm Manager Brendon Daly

Nitrogen Demonstration

The demonstration will run from set stocking (5th August) through to weaning (early December) and will be concentrated on an area of north facing hill country (forty percent of the property has this aspect) and a similar area of south-facing country. The goal is to determine if N can be used to grow more grass during September to prevent underfeeding lactating ewes. It should also allow higher stocking rates to help maintain pasture quality. This should all lead to higher lamb weaning weights.

Historic pasture growth measurements and observations of the north facing country, have found that it significantly underperforms throughout the year against the

south-facing and flat country. The demonstration will consist of three stocking rates of twinning ewes and cattle, set stocked across three rates of nitrogen (0kg N, 60kg N and 120kg N).

For the following reasons, urea will be applied in a single application two weeks prior to set stocking (ewes are set stocked on the 5th August).

- Cost in applying differential applications of urea over small areas with a helicopter.
- The feed pinch occurs from the end of August through to October (30-60days). After this, soil moisture is likely to become the limiting factor to growth.

- Any urea application after this may impact on pasture quality in the late spring.

Twinning ewes will be set stocked on pasture covers of 1400kgDM/ha with the intention that the covers will not drop below 1200kgDM/ha throughout the trial. The stocking mix in these paddocks will comprise 30% cattle,

as historically this is the magnitude of the de-stocking that has to occur in late spring.

“With the use of nitrogen in farming systems being such an emotive topic, we feel that it is imperative to get objective trial data from a later winter application of nitrogen on summer dry northerly faces. In working to be responsible stewards of the land, Castlepoint Station is committed to quantifying the balance between production gains and environmental impacts.”

*Anders and Emily Crofoot
Castlepoint Station*

The Environmental Measures

Due of the cost and complexity of measuring actual leachate from pastoral sites, very little objective data is available on the quantity of nutrients leaching under different farming systems. Most of the work completed to date has been on dairy pastures on relatively fertile lowland soils. Very little work has been undertaken on hill country prop-

erties with high sheep ratios and/or in summer-dry environments. Castlepoint will be undertaking some of these measurements.

The key objectives are:

- To measure nitrate leaching from the 3 nitrogen fertiliser application treatments on Castlepoint Station using mini-lysimeters for three years and extend information through the ‘Wise Use of N-

Fertiliser on Hill Country’ programme and the monitor farm network.

- To calibrate “Overseer” nutrient budgeting software and other nutrient balancing models on dry east coast hill country.

This is an excellent opportunity to provide some objective data on leaching issues on hill country.

Sound Bites

Ted Taylor, Section Leader, Resource Investigations, Wairarapa Division, GWRC

“The Greater Wellington Regional Council works with hill country farmers to promote and assist in sustainable land management. The N-use project at Castlepoint Station adds another dimension to our understanding of this type of farming and links in to our overall need to understand the relationship between nitrogen application (land use) and environmental effects.

We are happy to assist the project in three ways; by providing “legs” to collect, assemble and dispatch water samples obtained from the lysimeters, by initiating a water quality survey on a catchment stream and by providing a small financial contribution.

We are looking forward to having robust data that we can use to assess the sustainability of nitrogen applications so that any decisions we make as a council are founded on fact.

We appreciate the opportunity to work with Anders and Emily and the team involved in the project.”

For further information, contact:
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 Palmerston North

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Ted Taylor, GWRC



Open Days This Quarter

Focus Farm	Date	Contact
Waitomo	22nd Sept	Darren McNae 07 349 4333

AGRESEARCH SCIENTIST PROFILE: David Stevens

AgResearch Scientist David Stevens is currently working with N-project facilitator Richard Stuart at Russell and Janeen Drummonds property in Western Southland .

‘The N-project has a lot of potential as it can help break down some of the current barriers in spring and autumn pasture production, thus improving the nutrition of livestock at key times of the year. Better feeding of livestock in winter and spring will improve farm profitability through the higher performance of each animal.’, David says.

‘Furthermore, it is important that as farming

practices are intensified, farmers are aware of the potential impacts of their farming practices on soils and the quality of water leaving the farm. The N-project will provide a forum for presentation of underlying principles, and research and on-farm demonstration results, that facilitate open discussion about these issues’.

David works as a nutrition and farm systems scientist with the AgResearch Deer Systems research team at Invermay. He has been researching for 20 years into topics including fertiliser and grazing management require-

ments of pasture species in hill country.

He trained in animal nutrition in the USA and is now involved in farm systems research aimed at improving the productivity and sustainability of sheep, deer and dairy farming in New Zealand.

David is based at AgResearch Invermay, Mosgiel.



AgResearch Scientist, David Stevens

The Project Team again wishes to acknowledge the sponsors:

