Meeting a Sustainable Future

Canterbury | Inspiring High Performance, Low footprint farms

Farm Systems of the Future Field Day

Coringa Park

Matt and Amanda Ward (farm owners), Josh Wardell and Louise Spowart (farm managers)

1561 Barford Road, Maronan. SN 37059

5th November 2020

Meeting a Sustainable Future – Canterbury

Inspiring High Performance, Low footprint farms

Through this DairyNZ five-year project, Canterbury dairy farmers will lead the way in showcasing how nitrogen (N) losses can continue to be reduced in order to protect local waterways.

The project focuses on how farms in Hinds and Selwyn can meet N loss limits and maintain profitable businesses under the Canterbury Land & Water Regional Plan (LWRP). Reducing N is a key focus for the project as both catchments have N reduction targets; however, this project also focusses on other aspects of environmental footprint including, Phosphorus and Sediment losses and Greenhouse Gas emissions.

This project builds on sustainable farming initiatives many farmers have already begun and on previous N loss research. It aims to give farmers confidence the limits are achievable. Many farmers have been making changes to reduce N loss for some time and this will continue to build on that.

A key aspect of this project is working alongside partner farms to identify the most appropriate solutions for them, considering their chosen production systems, goals, and aspirations. The information generated from these partner farms is being shared with other farmers and provides a good range of examples and options. In this approach we are also partnering with the rural professionals working with the farmers.

What does success look like?

- Farmers will have confidence in the options available to reduce environmental footprint and an understanding of the implications of these options on the overall performance of their production systems.
- The options will be demonstrated to other farmers as they are implemented.
- Farmers will have clarity on the most profitable options to reduce their environmental footprint in different conditions and farm systems.

How can you find out more?

Look out for more upcoming field days and talk to any of the partner farms involved in the project. We are building web profiles for our partner farms, and these can be found at https://www.dairynz.co.nz/about-us/regional-projects/selwyn-and-hinds-meeting-a-sustainable-future/partner-farms/

For more information about the project please contact Virginia Serra (021932515/virginia.serra@dairynz.co.nz) Project Lead

Farm Overview

Physical resources

Table 1: Coringa Park physical resources

<table>
<tr><th>Area</th><th>Description</th></tr>
<tr><td>Land</td><td>Coringa Park/dairy platform: Total area: 571 ha Effective area: 550 ha
Support block: Total area: 121 ha Effective area: 115 ha</td></tr>
<tr><td>Soils</td><td>Average PAW *: 75
<table>
<tr><th>Soil Types:</th><th>% of effective area</th><th>PAW*(mm)</th></tr>
<tr><td>Lism_2a.1</td><td>87%</td><td>PAW 75</td></tr>
<tr><td>Darn_7a.1</td><td>13%</td><td>PAW 69</td></tr>
</table>
*PAW_{0-60} Is the profile available water in the first 0-60cm.
** Drainage as estimated by Overseer</td></tr>
<tr><td>Rainfall</td><td>714 mm/yr (as per Overseer)</td></tr>
<tr><td>Irrigation</td><td>94% Pivot (4 pivots), 4% travelling irrigator, 1% k-line/sprinklers, 1% dryland. The farm has been operating with this irrigation infrastructure since 2015/16.
Irrigation water sourced from MHVWater, with a 7ha water storage pond on farm.</td></tr>
<tr><td>Effluent</td><td>Effluent storage equates to around 20 days. Effluent applied through mainline of pivots, and applied to entire pivot area</td></tr>
</table>

Farm system overview

Table 2: Coringa Park farm system overview

Farm System	2019/2020
Management	Matt and Amanda, with Josh and Louise day to day
Peak Cows	2,140
Breed Liveweight	Crossbred 480 kg
Stocking Rate	3.9 cows/ha
Production System	Production System 4 89% home grown feed during lactation Fodder beet used on platform in autumn, 950 kgDM/cow supplement fed in lactation New pastures resown with 2kg plantain

Farm Map:

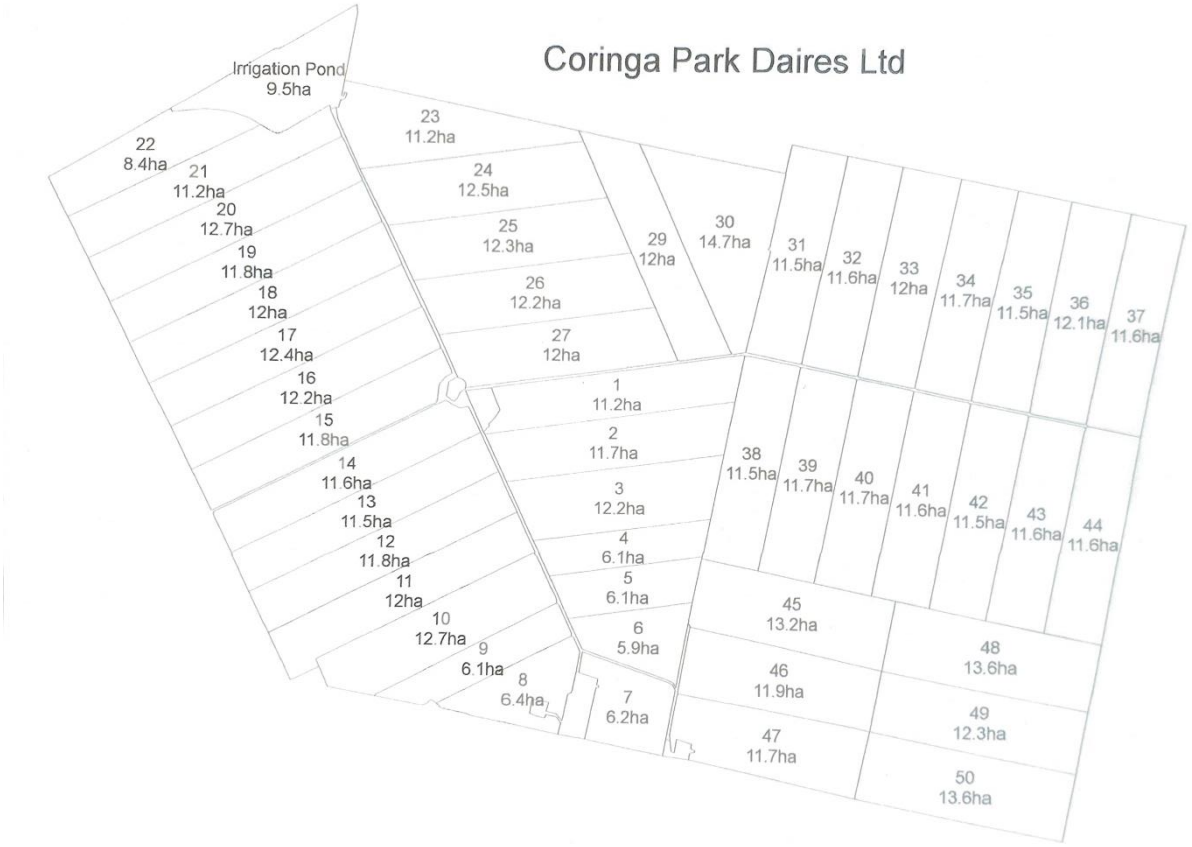


Figure 1: Coringa Park farm map

Irrigation:

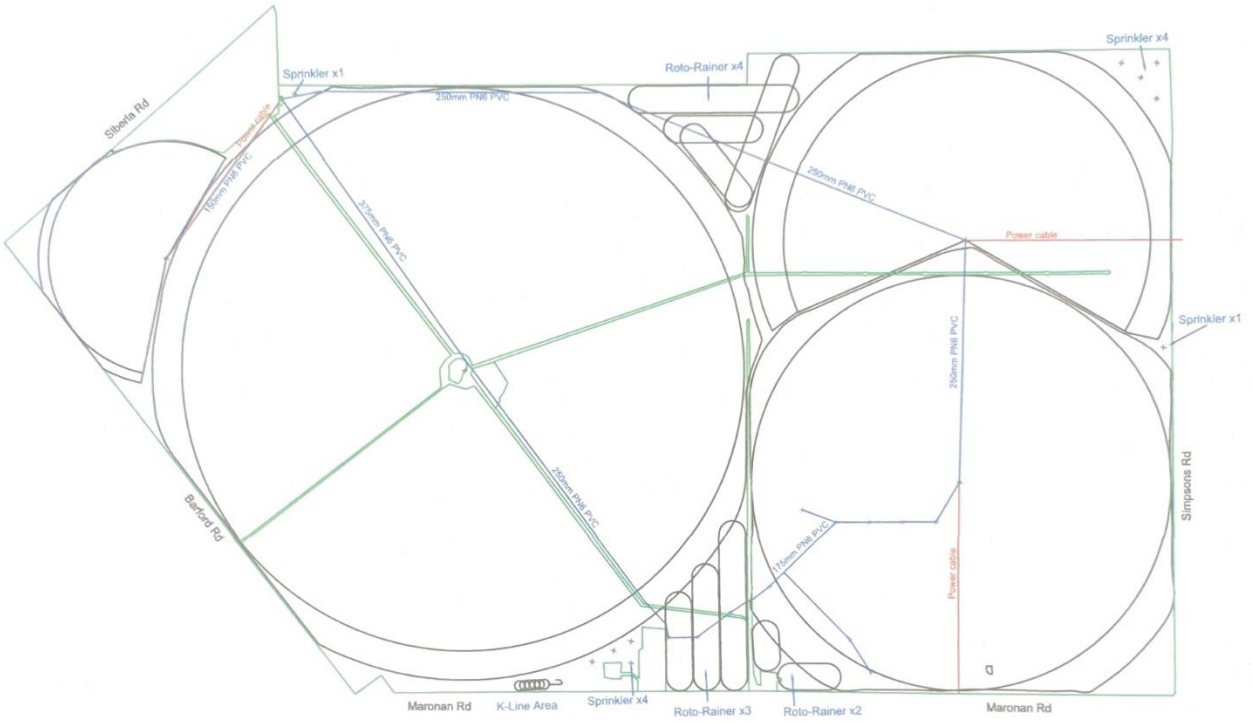


Figure 2: Coringa Park irrigation map

Physical Performance:

Table 3: Coringa Park physical performance with benchmark comparison

	Coringa Park 2017/18	Coringa Park 2018/19	Coringa Park 2019/20	Canterbury DairyBase benchmark 2019/20
Milking Platform (ha)	550	550	550	257
Peak Cows milked	2120	2130	2140	965
Liveweight /ha	1,812	1,840	1,868	1,820
BW	81/45	88/44	125/51	-
PW	117/63	128/52	159/51	-
Kg N applied /effective ha	320	236	252	223
Kg MS/ha	1,824	1,848	2,047	1,795
Kg MS /cow	473	477	526	478
MS as % liveweight	101%	100%	110%	99%
Days in milk	275	280	275	269
Pasture and crop eaten (t DM/ha)	15.8	16.5	16.8	16.0
Imported Supplements (t DM/ha)	2.8	2.1	3.3	2.3
Dry cow Feed (t DM/ha)	2.9	3.3	3.0	2.7
Total Feed Eaten (t DM/ ha)	21.4	21.9	23.1	21.0
Coringa Park information from DairyBase. Canterbury average benchmark from DairyBase, sourced October 2020, 29 farms averaged to produce this benchmark.				

Financial Performance

Table 4: Coringa Park financial performance with benchmark comparison

	Coringa Park 2017/18	Coringa Park 2018/19	Coringa Park 2019/20	Canterbury Owner Operator DairyBase 2019/20
Gross Farm Revenue ($/ha)	$13,292	$12,770	$15,227	$12,333
Operating Expenses ($/ha)	$7,359	$7,726	$8,088	$8,319
Operating Profit ($/ha)	$5,933	$5,044	$7,189	$4,014
Operating Expenses ($/kg MS)	$4.03	$4.18	$3.95	$4.91
Canterbury average benchmark from DairyBase, sourced October 2020, 29 farms averaged to produce this benchmark. Coringa Park 17/18 and 18/19 from DairyBase, with 2019/20 calculated from cashflow actuals (Jun 30 balance date) and using DairyBase non cash adjustments. *Gross Farm Revenue includes adjustment for changes in stock numbers from opening to closing.* *Operating Expenses include change in feed on hand, non cash labour adjustment, owned support block adjustment, and depreciation.*				

Environmental Performance

Coringa Park is part of MHV Water and comes under their environmental management and the scheme's land use consent. The requirements for the farm are to be achieving an A grade or working towards one and operating at good management practice. Coringa Park's last audit was an A grade in March 2020.

Farm Characteristics

As seen in Table 1, Coringa Park has relatively similar soils and $PAW_{0\text{-}60}$ (average 75) across the property, making management relatively simple compared to some farms that have much more varied soils. Irrigation infrastructure of predominantly pivots means that irrigation management can be optimised and drainage minimised. The irrigation infrastructure on the property has been stable since the 2015/16 season.

Nitrogen loss

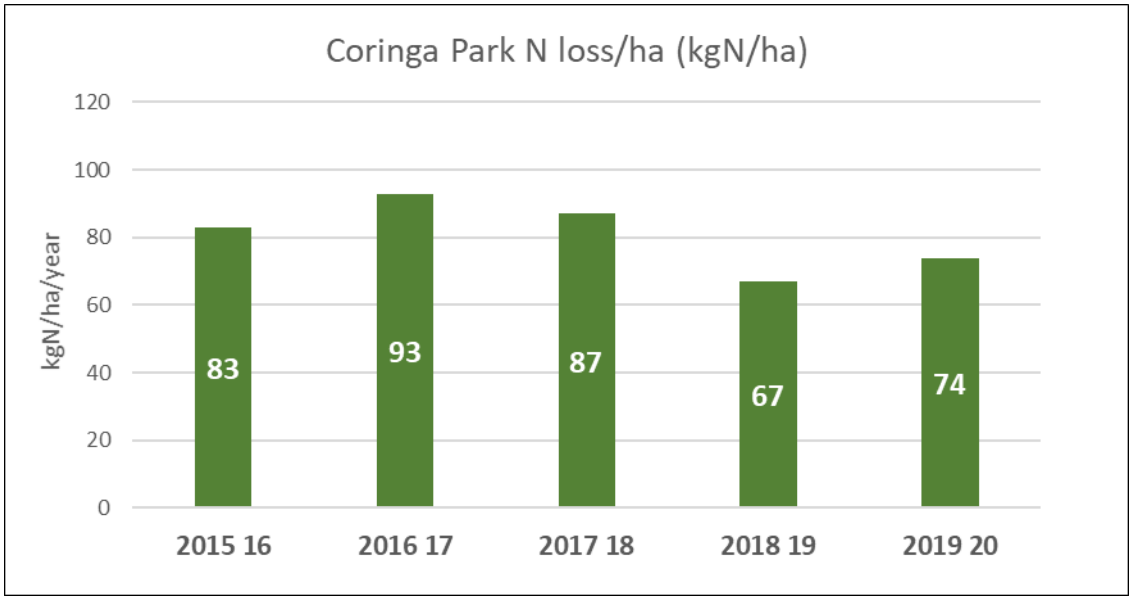


Figure 3: N loss over time as estimated by OverseerFM 6.3.4 (kg N/ha)

Drivers of N loss

Each farm has unique characteristics that will influence its nitrogen (N) loss risk. These can be physical factors such as soil type and climate (especially rainfall); infrastructure such as effluent and/or irrigation systems; or farm management factors such as feed demand per ha, culling policy, fertiliser and supplement use, pasture types and off-paddock animal management.

Implementing "good management practices" in all aspects (soil management, irrigation, effluent, fertilisers etc.) is crucial to reduce N in waterways, independently of the N loss number obtained from OverseerFM, as when modelling a farm in OverseerFM it is assumed that "good management practices" are applied.

Some of the critical aspects that contributes to N loss are:

- Drainage (water lost from the soil profile and out of the root zone taking nutrients with it)
- Annual N Surplus (N in outputs – N in Inputs)
- Timing of when mineral N is available in the soil and when drainage happens. For example, when N in urine parches is deposited at a time of the year when plants cannot uptake it and there is risk of drainage e.g. autumn and winter.

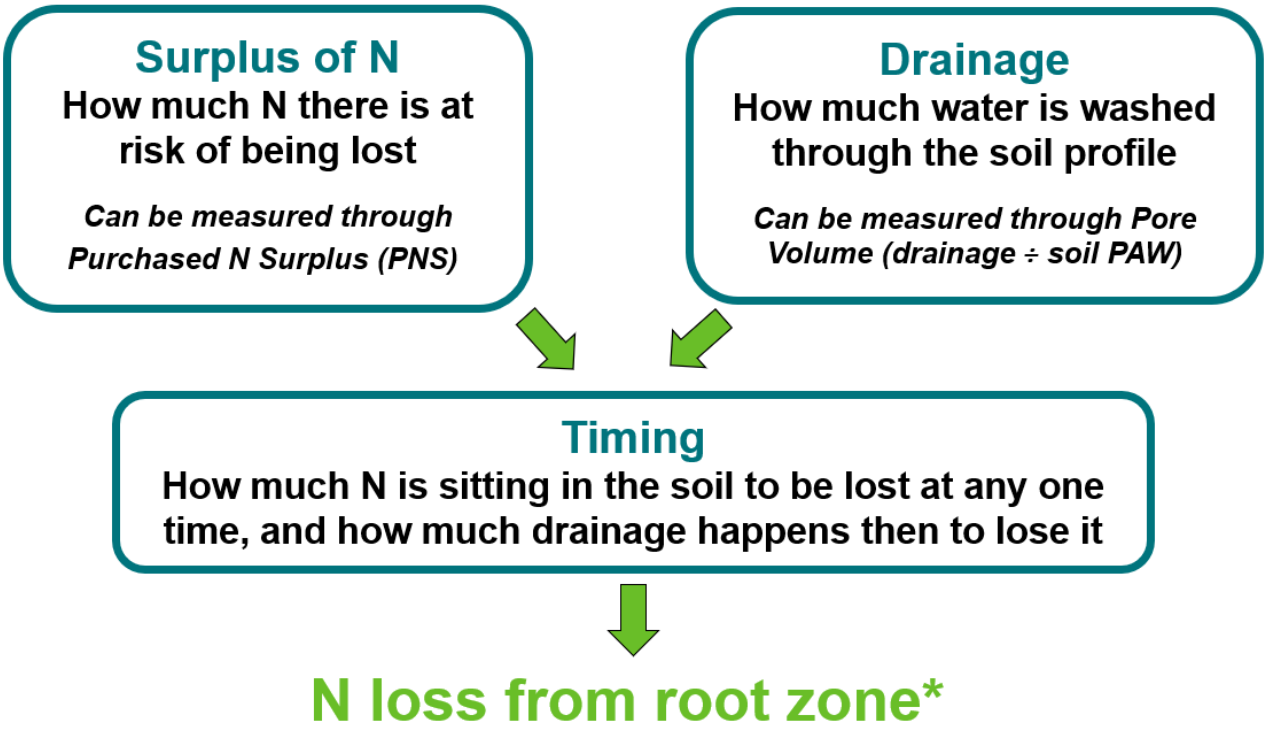


Figure 4: Drivers of N loss

** N lost from root zone has previously been known as 'N leached' or 'N loss to water'. The updated terminology is to reflect that not all N lost from the 0-60cm soil profile will end up in groundwater. 'N loss' is the shortened term often used.*

Purchased N Surplus

Purchased N Surplus (PNS) is a KPI that is strongly correlated to N loss, and less complex than the Overseer N Surplus. It can be calculated through getting the following inputs from your nutrient budget in Overseer, or Fonterra suppliers can use the PNS supplied on their Environmental Report. PNS includes the inputs and outputs directly under management control.

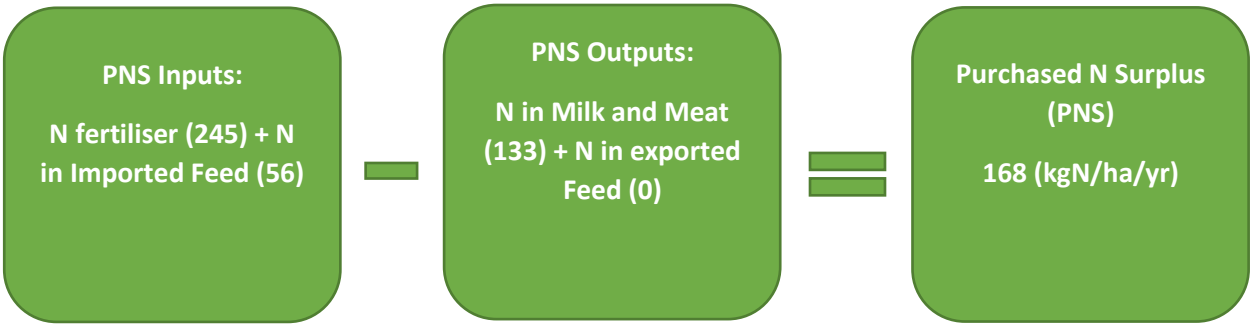


Figure 5: Purchased N Surplus (PNS) for Coringa Park 2019/20

Coringa Park has lowered PNS in the past two years, with this change mostly coming from a reduction in N fertiliser use, and a slight increase in product out (milk and meat).

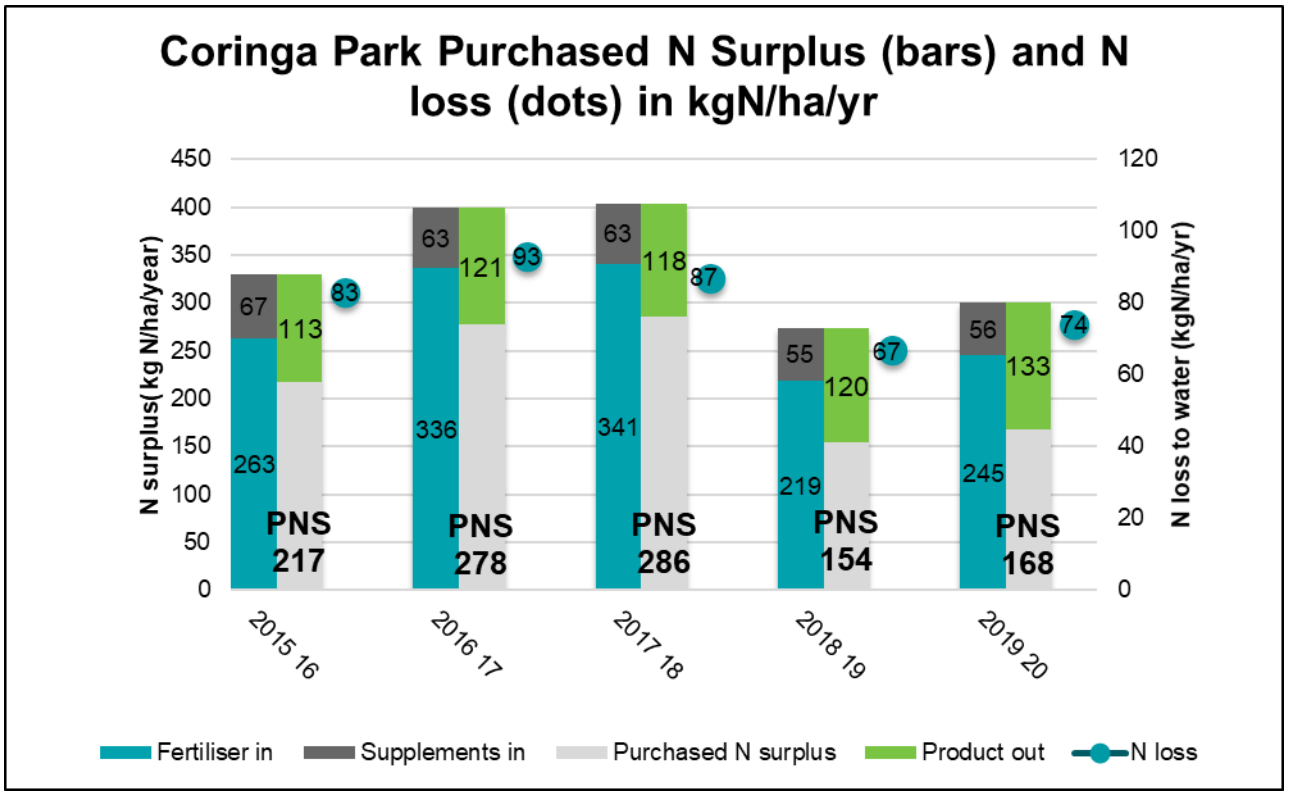


Figure 6: Coringa Park Purchased N Surplus over time

Drainage and N Loss

Along with N Surplus, there is a high correlation between N loss to water and drainage. The higher the drainage the higher the risk of N loss given all other conditions are the same. Drainage is mainly driven by rainfall and irrigation. On irrigated farms drainage can be reduced by improving irrigation efficiency. Soil type has a big influence, especially on Profile Available Water (PAW). For farms with similar annual drainage but lighter soils (lower PAW), the N loss will be higher.

Drainage (0-60 cm root zone) = Rainfall + Irrigation – Run off – AET (actual Evapotranspiration)

Another way of thinking about the impact of drainage on N loss is the concept of Pore Volume which is the relationship between drainage and the PAW of the soil. It represents how many times the soil is likely to 'flush' during the year. The higher the Pore Volume number the higher the risk of leaching N from the soil profile. Coringa Park has improved Pore Volume over time – this has come from irrigation management improvements, as irrigation infrastructure has been constant over this time.

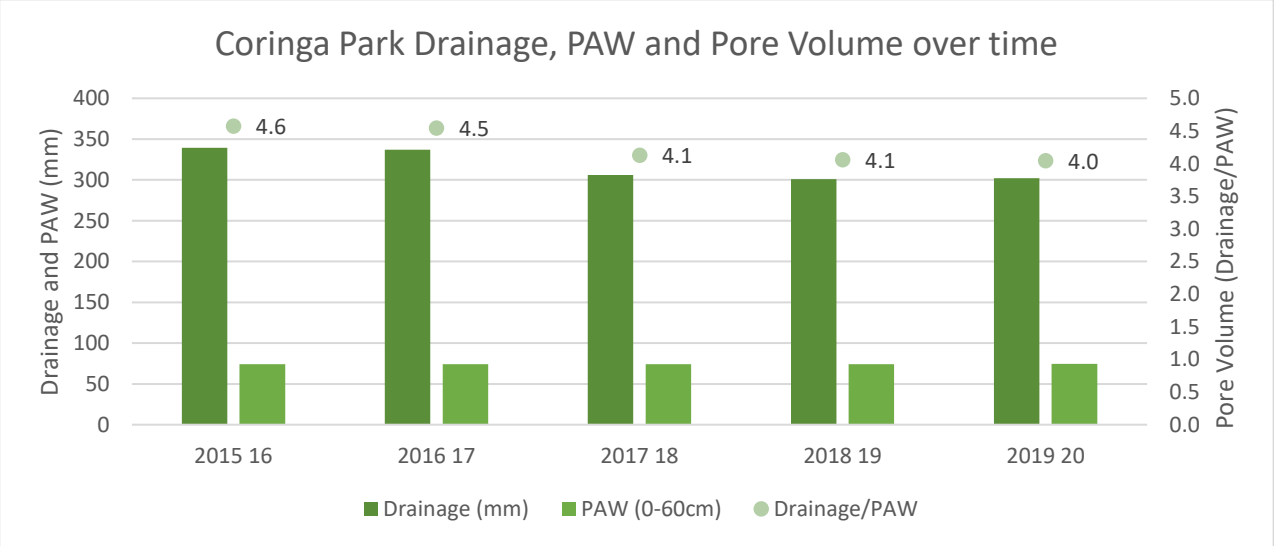


Figure 7: Coringa Park Pore Volume over time

N Fertiliser Use

Table 5: N fertiiser use planned to January 2021

Month	Fertiliser plan to January 2021, prepared by Matt and Ballance	Planned nutrients/ha per application N-P-K-S
Aug & Sep	Follow cows with 99 kg/ha PhaSedN QuickStart, along with 1kg/ha Nutrimax selenium	31-0-0-17
Oct	DAP at 200 kg/ha	35-40-0-2
Nov	Sustain 25K at 125 kg/ha	29-0-31-0
Dec	Sustain at 40 kg/ha, may skip some paddocks grazed twice	18-0-0-0
Jan	PhaSedN at 75 kg/ha	19-0-0-21

Figure 8 shows Coringa Park used a total of 231 kgN/ha in 2018/19 and 243 in 2019/20 - as shown in Precision Farming. To the end of October, this season 58 kgN/ha has been used, compared to 66 kgN/ha in 2018/19 and 70 kgN/ha in 2019/20. Note all numbers are average per effective ha.

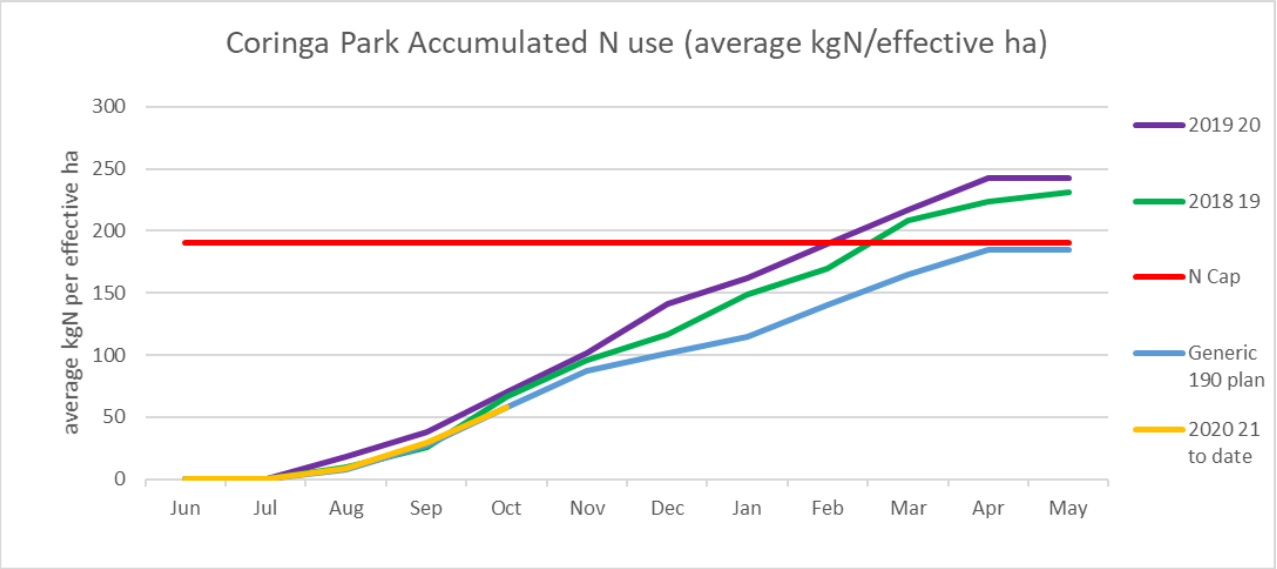


Figure 8: Coringa Park fertiliser use and incoming 190 N cap comparison. Information sourced from Precision Farming

On an individual paddock basis, Coringa Park's highest paddock was over 300 kgN/ha, and lowest under 200 kgN/ha. However the majority of the paddocks were relatively consistent at 230-260 kgN/ha over the season.

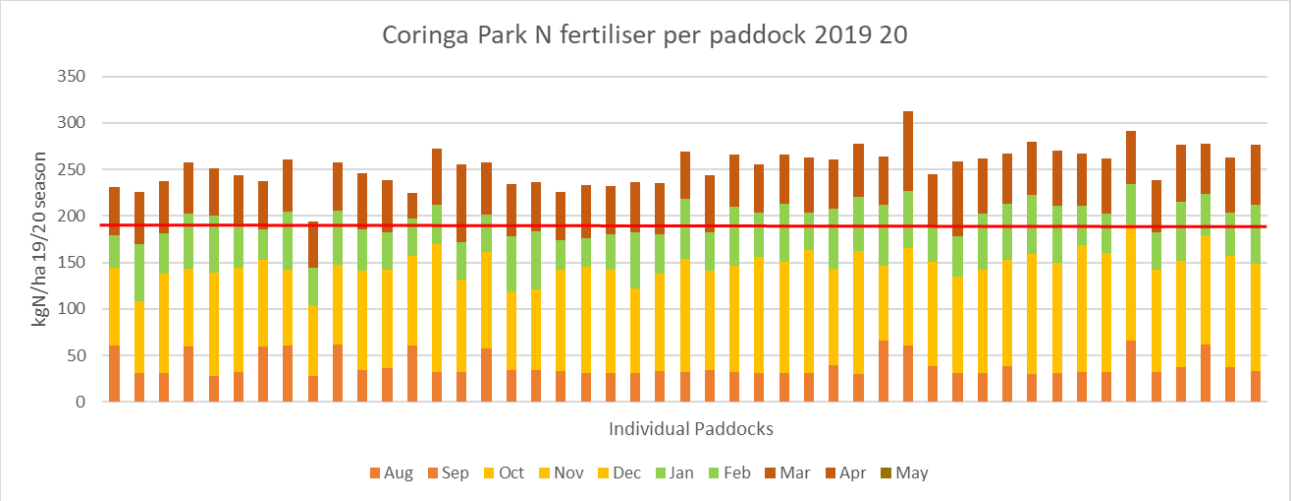


Figure 9: Coringa Park 2019 20 N fertiliser for individual paddocks

Greenhouse Gases

The following graph shows Coringa Park Greenhouse Gas (GHG) profile over time. While there is no current pricing around GHG, it is important to be aware of the profile of your farm.

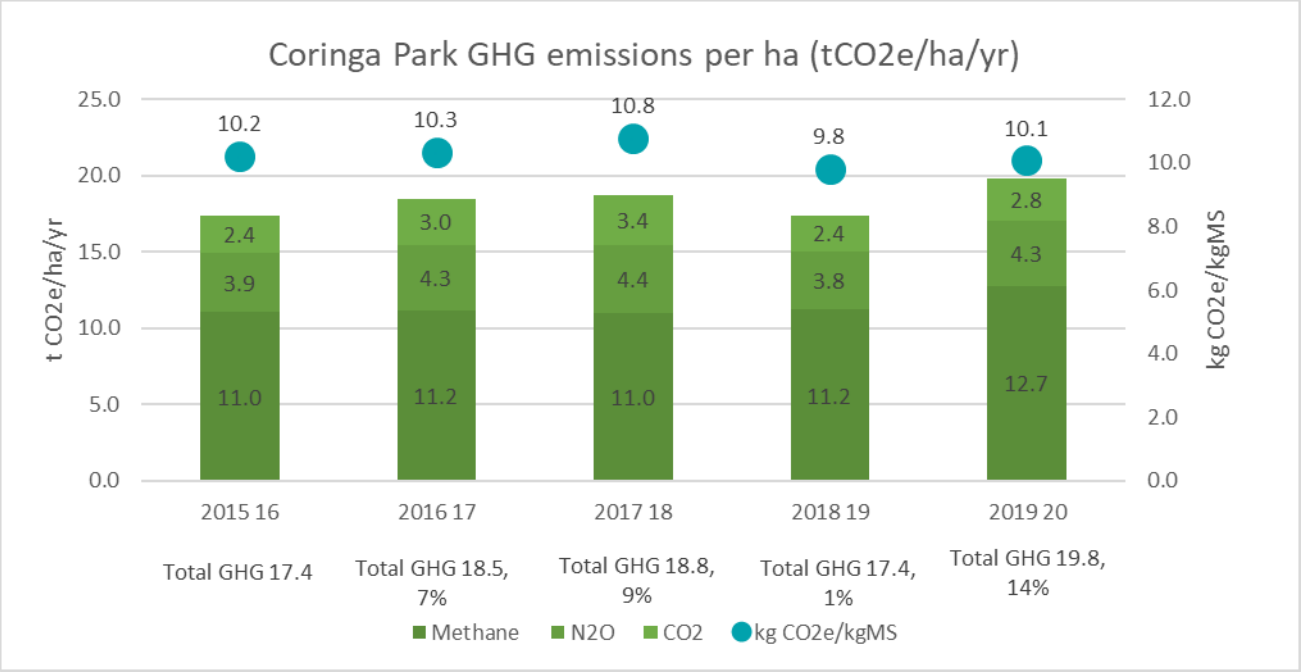


Figure 10: Coringa Park GHG emissions over time

The main contributor in a dairy farm of GHG is methane which in turn is driven by dry matter intake (DMI). This is directly related to total feed eaten.

The other major GHG that farmers can influence in nitrous oxide (N2O). The main driver of N_2O is N surplus and N intake, hence N fertiliser and N in supplement are important factors.

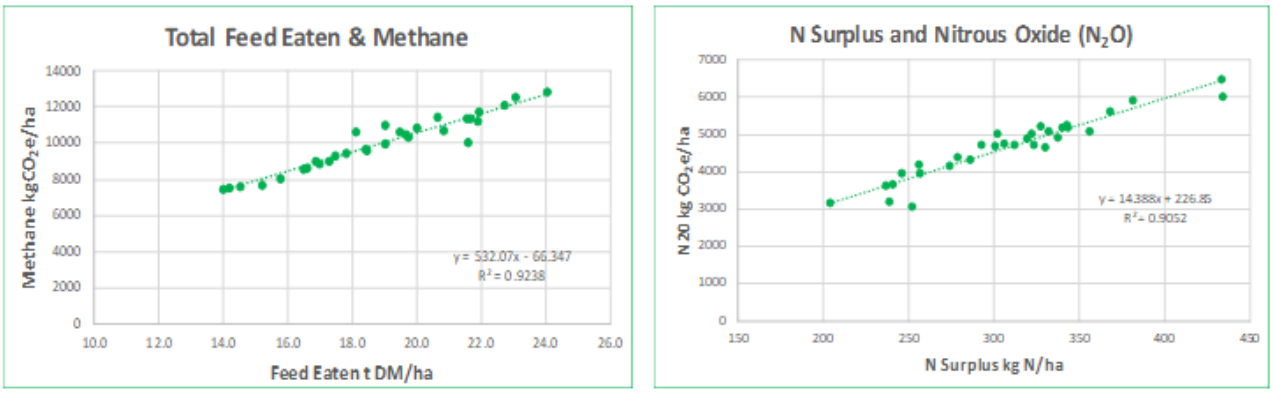


Figure 11: Relationship between Total feed eaten and Methane, and N Surplus and Nitrous Oxide. Figures derived from Meeting a Sustainable future - Selwyn/Hinds' partner farms in Overseer v6.3.2.

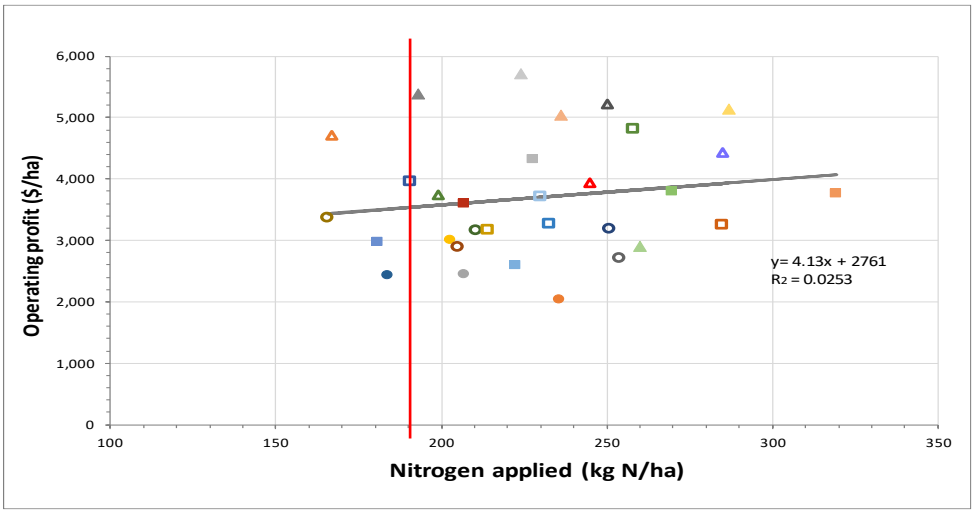
Appendix 1: Farming under a N Fertiliser Cap

Central Government's new freshwater regulations came into law on September 3, 2020, including a cap on synthetic nitrogen fertiliser use. Regional councils are charged with implementing and monitoring the rules. The details on how they plan to do that will become clearer as they work their way through the changes. For more detailed information on all aspects of the regulation visit *www.dairynz.co.nz.*

Nitrogen use, pasture harvested and profit

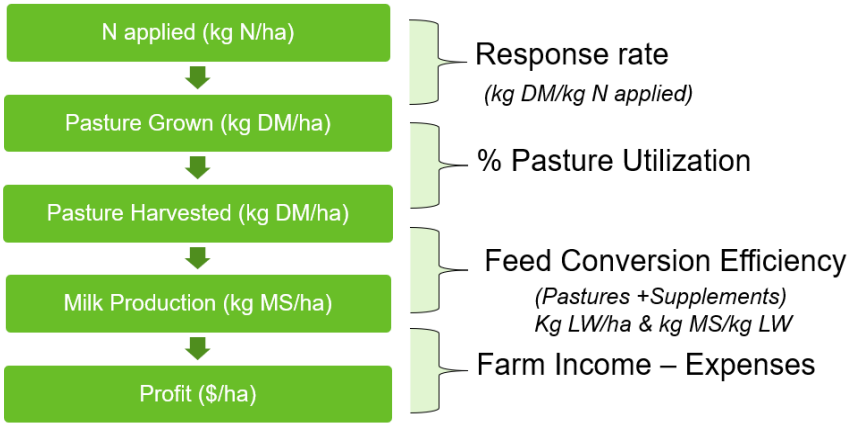
The correlation between nitrogen applied and profit is shown in Graph 8.

Graph 1: 2018-19 Operating Profit vs N applied (Canterbury Owner Operators -DairyBase)



Lower N fertiliser use is likely to reduce pasture growth, however how pasture is managed and utilised can minimise the impact on milk production and profit.

Figure 1: N fertiliser use and profit



For the same amount of N fertiliser used there are several factors that will influence how much pasture is grown and harvested. Some of these factors are:

- Nitrogen use efficiency affected by timing of N fertiliser, rate of applications and environmental conditions influencing pasture growth (soil temperature, soil moisture, other nutrients etc.)

- Time available for N response (timing between N application and grazing)
- Clover content on the pasture and its management
- Effluent block management
- Factors affecting the release of N in the soil (e.g. cultivation)
- Pasture management and monitoring that can affect pasture utilization

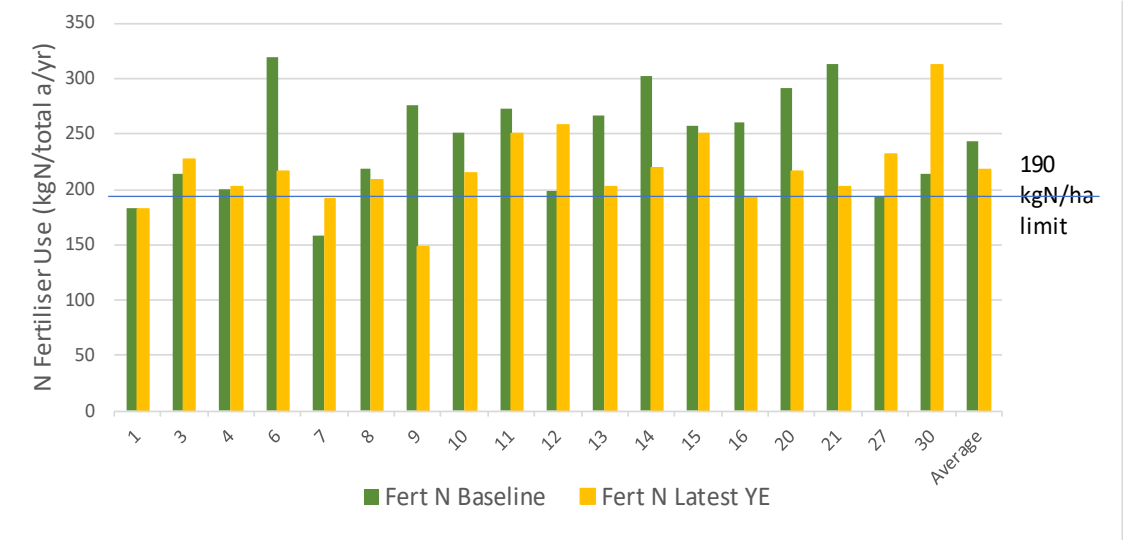
Similarly, how pasture harvested will translate into profit will depend on several factors including:

- How efficient pasture and supplement used are converted to milk production.
- Proportion of feed going into maintenance and milk production
- Cost of nitrogen, feed and overall operating expenses
- Milk price

Strategies to Reduce N fertiliser use successfully

Graph 9 compares N use in the baseline period (2009-2013) with the latest years available for nineteen of the partner farms involved in the Hinds and Selwyn project. The average N use for the latest year ends available was 218 kg N/ha compared to 244 kg N/ha during the baseline period (11% reduction). Four of these farms had increased N use compared to the baseline period. The year ends (yellow bars) represent the latest year end available for each farm.

Graph 2: Hinds and Selwyn Partner farms- Kg N applied /ha: Baseline Period & Year end.



Please note that the data from the partner farms presented in this document comes from Overseer which calculates N fertiliser used divided by the total area of the farm and not effective area as it is calculated in DairyBase.

Transition to lower N use

330 – 280 kg N

Most farms could take this step without major impact

280 – 230 kg N

Good planning and management is required

230 – 190kg N

Last 40 kg N could be challenging

- Significant reductions (+ 60 kg N/ha) will require time to adapt to new system
- Successful transition better to do in stages rather than in one blow
- Clover needs time to re-establish and be actively fixing N

Strategies to Reduce N use (Farmers' experiences)

The following recommendations are based on experiences from Canterbury farmers who have reduced N fertiliser rate successfully and without compromising pasture harvested or profit. The farmers have been involved with the Forages for Reduced Nitrate Leaching research programme and the Hinds and Selwyn Project. Many of these strategies are supported directly by science and some are based mainly on farmer experience.

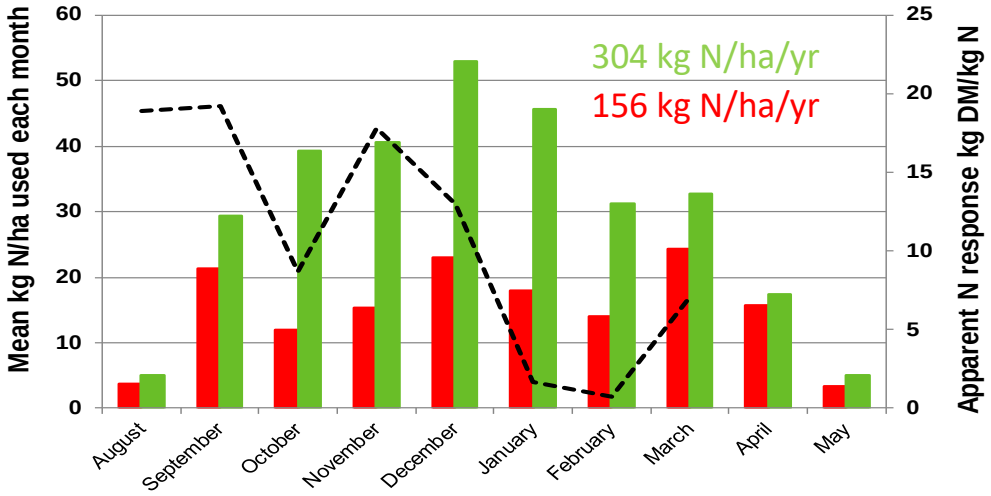
1. Application rates

Moving to lower application rates of no more than 40 kg N/ha in early spring and then to 0.8 kg N/ha per day of round length. N applications of 40kg N/ha are most beneficial when filling a genuine feed deficit (e.g. early spring). Mixing with other nutrients can reduce the N rate applied if other nutrients are needed. e.g. mix with Potash, DAP, Sulphate of Ammonia. Costs do increase, however there are advantages to applying nutrients like potassium and sulphate Sulphur in small amounts where there is a risk of these nutrients being lost from the root zone from rain causing drainage.

2. Timing of Applications

Not applying N in January/February when soil mineralisation rates are high, and clover is fixing N. Mineral N is available and N is not likely to be the limiting factor for growth. To gain confidence and to check what is limiting pasture growth take herbage samples. One farmer reports pastures looking N deficient, however herbage analysis showed K was deficient, not N. Graph 10 shows that the apparent N response rate to N applied is quite low over the January/February period.

Graph 3: (Pastoral21 Lincoln Farmlet trial N Use)



Red bars: monthly application rates low N system (156 kg N/ha/yr)
Green bars: monthly application rates high N system (304 kg N/ha/yr)
Dotted line: apparent N response (extra kg DM grown / extra kg N applied)

3. N fertiliser and pasture management

Increasing the round length to ensure grazing at 2½ to 3 leaf stage to grow more grass compared to grazing at 2 leaf or shorter where yield is significantly compromised. In Canterbury this is between 22- 24 days during the spring/summer period (generally from October-February). Where the farm traditionally has been following the cows with N, increasing round length will reduce the total number of grazings per year and 'automatically' will reduce the number of N applications. A longer round length will also reduce the N content in pasture and therefore reduce urinary N excretion.

Optimizing conditions for clover growth, ensuring good soil fertility (pH, P, K and Mo) and grazing management to avoid continuous shading of clover. Plan also for good clover establishment when renewing pastures. Clover will fix N and compensate to some extent the lower N from fertiliser.
Addressing other factors that may be limiting pasture growth such as, soil fertility, pH, weeds, irrigation, pasture species, drainage etc. Paddock scale soil tests (P, K, S and pH) have been successfully used by several farmers for a more targeted approach to soil nutrients and requirements.
Pasture walks and "feeding the wedge" i.e. only applying N if a genuine feed deficit is forecasted. Especially hold back in late autumn when pasture response can be slow and N loss risk is high due to drainage from autumn/winter rain. Any application of N needs to ensure that the extra pasture grown is not lost through increasing residuals or topping.

4. Placing of N fertiliser

Applying less N fertiliser on effluent areas, targeting times when effluent N is sufficient. If effluent areas are consistently getting effluent, they may only need N fertiliser in early spring and possibly autumn. The N content of effluent can be variable, therefore testing may be required. Applying different amounts of N fertiliser on the effluent area may not be practical where only parts of the paddock get effluent or effluent is not spread on the paddock often.
Avoiding areas of higher fertility within paddocks (e.g. first 20-30 meters into a paddock, area around the trough, stock camps) and areas of the farm likely to have low response to N, e.g. dry areas, poorer species. Identify "no go areas" on the spreading map.
Skipping a few paddocks from routine applications when pasture growth rates are high and silage making is not wanted/needed. A weekly farm walk and constructing a feed wedge will help with these decisions.

5. Special products/technology:

Coated urea (N-Protect, SustaiN) reduces volatilisation (the conversion of N in urea to ammonia gas, lost to the air). When using coated urea and conditions for volatilization are present (hot, dry and windy or moist soils in cooler situations) N applied can be reduced by 10% to grow the same amount of pasture than when applying uncoated urea.
Gibberellic acid (GA) is a growth hormone found in plants that promotes stem elongation and tiller size but is not a substitute for N fertiliser. When applied with N fertiliser good responses can be expected in early spring and autumn. Many farmers are using GA with N fertiliser specially in the autumn as a way of achieving a higher response to the N fertiliser applied.
Fertigation (injection of fertiliser into an irrigation system) and urea applied as a liquid can be used to reduce rates and get even distribution of the N. Fertigation trials have not shown a higher response rate to applying N in a liquid form compared to N in a solid form (i.e. the form of N does not affect the pasture response). However, if it allows lower application rates and more precise management at an acceptable return on capital, it is a tool that can be used well on farms that are suited to the set up.

Farmers' lessons of what to avoid:

- Inadequate and/or inaccurate monitoring and recording of N fertiliser applications leading to higher N used than expected at the end of the season.
- Routinely following each grazing with N fertiliser and not responding to a genuine feed deficit. This can be particularly wasteful if on fast grazing rounds.
- Needing N fertiliser to meet a feed deficit generated by following fast grazing rounds. When grazing on fast rounds (< 21 days) pasture is grazed before the 2½ leaf stage (compared to a longer grazing round and grazing at between 2½ and 3 leaf stage) missing out on the period of highest accumulation of growth. This will result in a lower response rate to N fertiliser.
- Using high N fertiliser rates each time that cannot be fully used by plants increasing the risk of the surplus N being lost from the root zone.
- Inadequate pasture monitoring and recording to inform decision making

- The extra N boosted grass grown is poorly utilised, e.g. increase in residuals or excessive pre-graze mowing or topping.
- Harvesting more silage than required due to too high N applications in the previous six weeks.

For more information https://www.dairynz.co.nz/about-us/regional-projects/selwyn-and-hinds-meeting-a-sustainable-future

What are the rules on synthetic nitrogen fertiliser use?

Central Government's new freshwater regulations came into force on September 3, 2020, including a cap on synthetic nitrogen fertiliser use. Regional councils are charged with implementing and monitoring the rules. The details on how they plan to do that will become clearer as they work their way through the changes. For more detailed information on all aspects of the regulation visit the Dairynz website.

- What are the rules on synthetic nitrogen fertiliser use?
  The amount of synthetic nitrogen fertiliser applied to land **in pastoral land use** will be capped at 190kgN/ha/year from 1 July 2021.

    - There are two limits (both of 190 kg N/ha/year):
    - a. An absolute limit per hectare on pastoral land (i.e. grazed land) not used to grow annual forage crops (i.e. pasture/grass)
    - b. An averaged limit across pastoral land on the farm
    - It is possible to put more than 190kg N/ha/year on forage crops but only if offset by applying lower amounts on pasture.

Pastoral land use means the use of land for the grazing of livestock. It doesn't include the grazing on the stubble of a crop that has been harvested after arable land use.

The nitrogen cap applies to a **'contiguous land holding'**. This is 'one or more parcels of land within a farm'. So, if there is a support block contiguous (joined) with the milking platform, it is all subject to the same N-cap. If the run-off is separate, both blocks must separately meet the N-cap.

Recording and reporting: All dairy farmers will need to record the tonnages of all synthetic nitrogen fertiliser applied on farm and the area it was applied to. Farmers will then have to report to their regional council on the amount used each year.

Farmers that exceed the N cap could apply for a resource consent. Two options are available:

1) Consent for a non-complying activity requiring a **synthetic N reduction plan** that demonstrates how the farm will reduce their use of synthetic N by **1 July 2023**
2) Consent for a non-complying activity requiring the farm to ensure that the rate at which N may enter water as a result of their application of synthetic N fertiliser does not exceed the rate that would enter water if 190kg N/ha/year was applied. This will be granted for a **maximum term of 5 years.**

Regional councils are still working on the details on how this will be implemented at a regional level.

What do I need to do now?

1. **Understand the new regulations** and how they would apply to your farm. Discuss what it means for you with your trusted advisor.
2. **Know how much synthetic N fertiliser was applied last year** over each hectare of the farm. It is important to accurately identify the size of the reduction required.
3. **Have good systems in place for recording** the tonnages and the area it was applied to of all synthetic N fertiliser applied on farm. Ensure all sources of synthetic N are accounted for.
4. **Review your current N use strategy** to identify potential areas to improve N use efficiency.
    a. How much N fertiliser was applied and when? Was the N fertiliser applied to the paddocks/areas of the farm targeted? Some farmers have reported significant discrepancies between planned and actual N use.
    b. How much N fertiliser was applied on the effluent and non-effluent areas?
    c. How many applications, how often and at what rate (kg N/ha/application)?
    d. What type of N fertiliser was used?
    e. Has the N boosted grass been used to fill a genuine feed deficit?
5. **Create a plan to meet the 190 kg N/ha cap**. If you are currently using more than 190 kg N/ha of synthetic fertiliser over any area of the farm you need to take some actions now to comply with the new requirements. If a significant reduction is required (>50 kg N/ha), targeting half of the required reduction now (2020/21 season) and the other half next season can help ease into the new system with less N fertiliser used.

Options to reduce N fertiliser use

Options to reduce N fertiliser and maintain pasture growth	Doing already	Consider	Considerations and/or learnings	Impact (high, med, low)
Lower application rates per application				
Removing or reducing applications in Jan/Feb				
Optimise clover conditions (optimal nutrients, grazing management, pasture establishment)				
Address non-N limitations to pasture growth (moisture, other nutrients, pH)				
N decisions based on feed surplus or deficit				
Reducing N on effluent areas				
Exclusion zones within paddocks (front areas, troughs, beside lanes)				
Reducing number of applications (Skipping paddocks from routine application or limiting to one application per month)				
Coated urea				
Gibberellic Acid				
Fertigation				
Other:				

Key Messages

1. Know the N loss numbers for your farm – Baseline if applicable, and current system
2. Understand your regulation requirements
    a. Consents (land use, water take, and effluent)
    b. Audit
    c. Nutrient limits e.g. Hinds 15% reduction in N loss by 2025
    d. Incoming Freshwater Regulations regarding N fertiliser use and wintering
3. Understand the key drivers for your farm for N loss. For N, is drainage or Purchased N Surplus the area you have the most room to move, or is there opportunity in both?
4. Explore your options and understand the reduction in N loss of each mitigation, and then how they interact together in your farm system
5. Develop a plan when you have identified the changes selected for your farm to be compliant by deadline as:
    a. Investments take time to plan, finance and implement
    b. Changes in farm system (e.g. stocking rate and N fertiliser use) need time to be embedded
6. Stay focused on profit, as profit is essential to having a sustainable business to:
    a. Be able to make changes to reduce environment footprint and
    b. Meet your goals
7. Know your N use in detail – per paddock rate, what months are your high use months, where could you best reduce N use if needed. Transition to 190 kg N/ha cap in 2021/22 by developing a plan and trialling it this season. If over 230 kg N/ha work on starting to reduce use this summer/autumn.
8. Effluent - System needs to meet consent. Use effluent N as a fertiliser to reduce N loss (recycling of Nitrogen) and N fertiliser use.
9. With GHG on the horizon know your:
    a. GHG CO2 eq. /ha
    b. GHG CO2 eq./kg MS
10. Know the numbers for the key drivers of GHG for your farm
    a. Dry matter intake (as calculated by overseer) and
    b. Overseer N Surplus or Purchased N Surplus

Actions:

Action	By who	By when