Stapledon Fellowship Report

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Background

In 2022, I graduated from University College Dublin with a degree in Agricultural Environmental Science. I began my PhD research in October 2022 which focuses on the "Transition to Low nitrogen dairy systems in the Border Midland and Western region of Ireland". As my trial involves white clover research, traveling to New Zealand was an excellent opportunity to enhance my knowledge in this area. New Zealand pasture research has for years been investigating the effects of white clover incorporation into grazed swards, particularly in dairy production systems.

Fellowship overview

The purpose of this fellowship was to gain a better insight into New Zealand dairy systems and how this relates to Irish systems. Additionally I intended to enhance my skills and knowledge which I could implement in my own work as I continue my PhD research. During my fellowship I assisted with ongoing trial work at the Lincoln University Research Dairy Farm (LURDF), attended workshops and conferences, visited commercial farms, met with researchers who have experience in my field of research and presented results of my PhD on several occasions.

A large proportion of my time in Lincoln was to help with pasture and animal sampling at LURDF as part of the Low N trial. Pasture sampling involved weekly quadrat (Figure 1A) and botanical cuts, pre- and post-grazing sward heights and a weekly farm walk. I also prepared pasture samples in the lab such as separating botanicals (Figure 1B) and grinding dried samples. Animal sampling involved a monthly herd test where milk recording (Figure 1C), weighing and condition scoring and urine and blood sampling was conducted.

Figure 1. (a) Quad cut sampling, **(b)** Botanical separation and **(C)** Milk recording at LURDF

Low N systems trial

The low N project is a DairyNZ-led research programme which is investigating how combining various mitigation options can significantly reduce nitrogen (N) losses, while also meeting farm business profitability goals. The focus of this project is to provide practical solutions to farmers as they alter management systems towards reducing their N environmental footprint, ultimately leading to improved ground and surface water quality. Entering into its final phase with 13 months remaining, the Technical Advisory Group (TAG) gathered to discuss the results to date and the final steps of this project. The TAG group meet every six months through either online or in person formats. During my time at Lincoln University a TAG meeting was held in Christchurch which I was able to attend. I gained a greater understanding of the ongoing work at Lincoln and the wider area during my attendance of the meeting. Below is an outline of the meeting and the main points of discussion.

TAG Workshop – Day 1

The first day of TAG took place at LURDF where an on-site tour of the farm and the ongoing Low N trials were given. The tour began with an overview of the Low N systems. The objective of these systems was to investigate combining (stacking) various mitigation options to support farmers to significantly reduce nitrogen losses and to meet expectations around freshwater quality. The three main strategies for stacking of nitrogen (N) mitigation options for transformational improvements to freshwater quality are nitrogen optimisation, stacking technologies and stakeholder engagement. Nitrogen optimisation involves developing a real-time, milk-based indicator tool to monitor and manage excess N and reduce urinary N loss risk. Stacking technologies involve modelling, measuring and demonstrating transformational N leaching reductions (>40-60%). Finally, stakeholder engagement involves facilitating the implementation of stacked Low N systems. An overview of the stacked modelling in a Canterbury scenario is outlined in Table 1.

Table 1. Modelled effect of stacked mitigation strategies.

	Current Baseline	1. Reduced SR & Fert 80kg N/ha	2. Italian Ryegrass	3. Plantain	4. Pasture Wintering
N loss (kg/ha)	37	28	29	22	18
Farmgate N Surplus (kg N/ha)	261	205	206	203	205
Total N	614	474	489	364	308
Comparative stocking rate	84	84	84	84	82
Total GHG (kg C02-e/ha)	13,640	12,508	12,459	12,325	12,200
Operating profit ($/ha)	4,676	4,465	4,587	4,491	4,328
N loss % change (relative to baseline)	0	-23	-20	-41	-50
GHG % change (relative to baseline)	0	-9	-9	-10	-11
Operating profit % change (relative to baseline)	0	-5	-2	-4	-7

The trial began in July 2023 at LURDF which will continue for two production seasons. The study is comparing a typical Canterbury dairy farm system (Baseline or Control) with a “Stacked” farmlet that incorporates diverse pasture species (Italian ryegrass and plantain), over 50% less N fertiliser, a 6% lower stocking rate and modified wintering practices (Figure 2). The farmlet’s productivity, economic and environmental performances will be monitored and analysed against modelled expectations. The experimental design is outlined in Table 2.

Table 2. Low N trial comparing control and stacked mitigation strategies experimental design.

	Control	Stacked
Pasture species	Irrigated ryegrass & white clover	Irrigated plantain (target 30%), Italian ryegrass, red & white clover
New pastures	3 ha (25%)	3 ha (25%)
N fertiliser	190kg N/ha/yr	80kg N/ha/yr
Milking platform (ha)	11.8	12.2
Wintering area (ha)	1.8	3.0
Remaining support land	(3.2ha) Youngstock & supplements	(2ha) Youngstock & supplements
Number of cows	40	39
Stocking rate	3.4	3.2
Winter system	Kale & baleage	Pasture & baleage
Tactical mitigations	No	Yes

The 2023/24 season results show quite significant reductions in environmental factors for the stacked treatment. Nitrogen leaching had a 39% reduction in the stacked treatment, reducing from 33 to 20 kg N/ha/yr. Total N surplus demonstrated a 27% reduction (227 to 166 kg N/ha/yr) as did greenhouse gas (GHG) emissions reducing from 14,016 kg CO2e/ha/yr in the control to 12,351 kg CO2e/ha/yr for the staked treatment (12% reduction). In terms of animal and pasture performances, a slight reduction in milk solids per cow and per hectare was observed in the stacked treatment, however this difference was not significant. There was also 0.8t DM/ha reduction in total pasture production for the stacked and therefore 5% greater supplementation was offered to this treatment. Financial performances also differed with the control incurring higher total revenue and total farm expenditure, however the control also had greater farm profit before tax than the stacked treatment (5,835 and 5,344 $/ha). A similar trend appears to be occurring for the current season (2024/25).

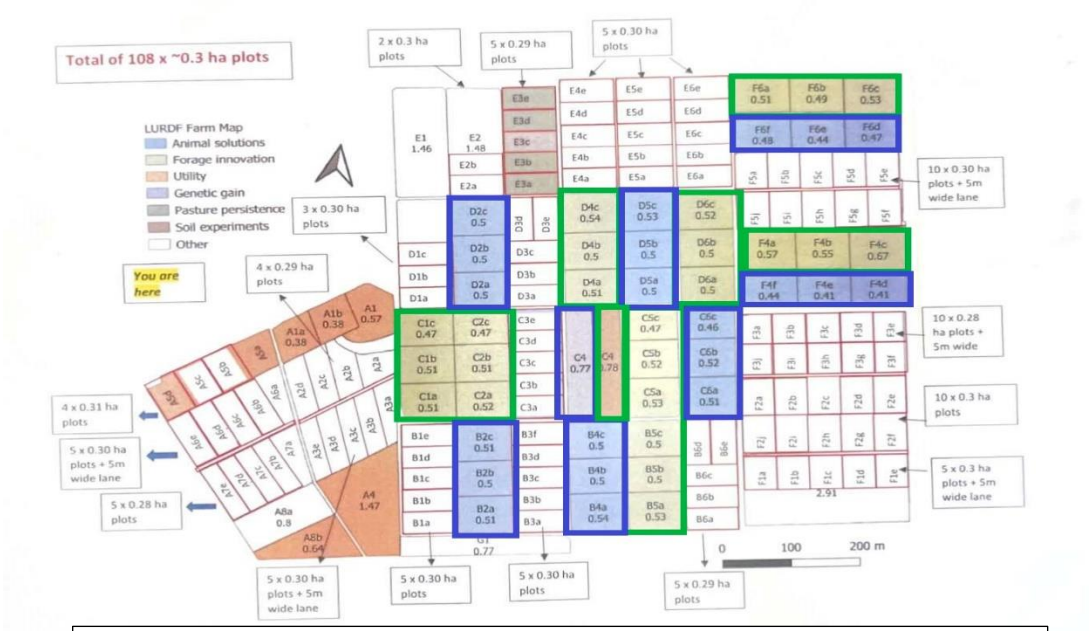

Figure 2. Farm map of LURDF – Low N paddocks identified by green (stacked mitigations; DF) and blue (baseline; DN)

Wintering

Dairy systems in New Zealand utilise outdoor wintering of cows, unlike the Irish system of indoor housing. This common practice regularly sees cows grazing kale or fodder beat in addition to silage. However, this practice can have significant effects on N leaching which has detrimental effects to watercourses. As a result a second element to the Low N trial investigated the overwintering of the stacked treatment on pasture in replacement of kale. The objective of this study states that a diverse pasture with silage supplementation has been modelled to reduce N leaching from the winter platform by up to 70%, compared with kale and silage wintering. The aim is to demonstrate a reduction in N leaching risk in the stacked treatment while maintaining similar BCS and post-calving milk production to the control treatment.

Figure 3. Oat catch crop prior to harvesting.

The assumed benefits of stacked mitigations to reduce N leaching include lowering stocking density on pasture will increase urine patch distribution and could decrease the chance of overlaps occurring leading to lower soil N loading. Pasture will continue to uptake N after being grazed, retaining N in organic form in the plant, while fallow kale will be more vulnerable to N leaching despite the mitigation practice of an oats catch crop (Figure 3 and 4). Additionally, animal diets will have lower surplus protein leading to lower urinary N excretion as well as the diversity of plantain in the pasture causing a dilution effect in urine.

Although N leaching cannot be directly measured under wintering paddocks, indirect methods such as soil, herbage and animal measurements are utilised to gain indirect results. Soil measurements involve ammonium and nitrate N pre/post/re-growth soil sampling of four soil layers to 60cm depth. Soil surface scoring is also being conducted involving pooling, gumboot scoring and mud depth which links to cow comfort. In terms of herbage measurements, herbage and silage quality as well as N content will be analysed. Various animal measurements are implemented such as urine N and urea concentrations, blood urea concentration, BCS and live weight change, and the first 60 day milk production and milk composition.

The preliminary results of the trial show significantly higher urine urea concentration in the kale treatment, particularly in mid-June when kale treatment urine concentrations were double that of the pasture treatment (200 mmol/L compared to 100 mmol/L). Analysis of N distribution in the plant and soil show substantially higher organic N content in the plant of pasture swards than kale but higher soil mineral N was observed in kale compared to pasture.

Figure 4. Oat catch crop post harvesting.

TAG Workshop – Day 2

The second day of the TAG workshop was held in Christchurch with a full day of in-depth presentations relating to regulations and policies for freshwater quality, low N trial, modelled impacts of the low N trial and N deposits from urination.

Under new government, the National Policy Statement for Farming Management (NPSFM) and National Environmental Standards for Farming (NESF) are under reform with an ambitious completion year of 2026. The primary focus of the new legislation involves; 1) enjoyment of property rights, 2) management of material environmental effects, 3) enable urban development and infrastructure, 4) strengthen and clarify the role of environmental limits and their development, and 5) greater use of national standards to reduce the use of consents in regional plans.

Figure 5. Cows grazing pasture from stacked treatment at LURDF.

In the meantime, DairyNZ are developing their own NPSFM which will consider water quality from a holistic viewpoint. This includes ecosystem health while also ensuring that outcome is a key driver. The key drivers for such commitment involves; 1) fostering collective action to improve ecosystem health in the pastoral sector, 2) address waterway health, biodiversity and climate resilience in an integrated manner, 3) focus on restoration efforts (e.g. riparian zones, wetland restoration, pest control, fish passage), 4) track and communicate success, 5) align the outcomes-based approach to freshwater policy, and 6) promote nature-positive driver to support public perception. These new regulations proposed will allow expansion opportunities for low N dairy farms. Additionally N reduction targets will remain the same for 2025.

The second session of the day focused on the modelling aspects of the stacked N mitigation measures for the low N trial using Overseer (a farm nutrient budgeting and environmental modelling tool). The sensitivity and uncertainty analysis predicted, under a target plantain content of 30% that the stacked N mitigation measures proved more cost effective for reducing N leaching compared to the baseline. Proposed during this discussion were tools for scaling up the model to implement at a catchment scale. These include the dairy sector pathway (DSP) which looks at the simulation population of cows and operating profit, and catchment accounting framework (CAF) which focuses on the amount of N that will be reduced in the catchment.

When implementing this proposed model into the actual farmlet trial at LURDF the practicality of these stacked mitigations were assessed. The pre-modelling expectations of the Italian ryegrass, clover and plantain sward type were outlined. These included changes to pasture growth (i.e. improved over winter growth), reduced urinary N per day, reduced urinary N concentration per urination and reduced milk urea. FarMax was used to model farm financial performance while Overseer was used for modelling environmental performances. The transfer of N was monitored by evaluating the N in herbage, N inputs and N outputs in milk. Analysis on bulk milk urea for the 2023/24 season observed fluctuations throughout the year with a notable divergence in April/May. The baseline control treatment had higher bulk milk urea during this time likely due to high crude protein (CP) content in the pasture. Measured results showed an average plantain content of 8% for the year with an average of 19% for the autumn period. These averages are well below the targeted 30%. Additionally average clover contents were poor at 6% in the stacked farmlet which is insufficient to replace the reduction in chemical N to support the same level of pasture production. However, when comparing both experimental treatments, the stacked treatment had 10% greater fixation by clover compared to the baseline. The model also reported a 39% reduction in N leaching, 27% reduction in N surplus and a 12% reduction in greenhouse gases (GHG) for the stacked treatment.

Conclusion

This workshop provided me with a greater understanding of the project at hand and as I had just arrived in New Zealand when this meeting was held. It also gave me a good baseline of the current dairy systems particularly in the Canterbury region. The workshop highlighted the immense efforts that each component of the project has contributed since the trial commenced. It is also commendable to note the successful collaboration that several agricultural industries, intuitions and departments have made and in return greater progress of this project has been achieved.

Conference attendances

Grasslands

The annual New Zealand Grassland Association (NZGA) conference took place in Oamaru, North Otago from November 5-7th. The NZGA is one of New Zealand's largest science societies with more than 800 members. This organisation provides a forum for grassland farming and the promotion of research and its application. Members of the organisation follow the vision of "fuelled by science and tempered by experience". The theme of this year's conference was "Dust to Dollars".

Day 1

The first day of the conference commenced with the opening address followed by an overview of North Otago's agricultural history and where its performance is today. Topics for discussion ranged from legumes to animals and genetics.

Field trip

The latter part of the day was a field trip to Mt Pleasant to the farm of Rogan and Michelle Borrie. Mt Pleasant is an inland rolling to hilly sheep and beef farm of 880ha in North Otago. The farm was purchased in 2017 and is part of a larger farming operation comprised of four dairy farms, two dairy support farms, a bull beef farm, and sheep breeding and finishing farm. Development has been a major focus on the farm such as fencing, irrigation infrastructure, stock water system, roadways and pasture renewal.

Farm design

The 880ha farm is divided into six land management units consisting of 100ha irrigation, 326ha cultivatable dry land, 74ha top block, 228ha steeper tussock gullies, 25ha pine trees and 110ha ungrazed riparian. Irrigation water is sourced from the Kauru River and the North Otago Irrigation Company. A central roadway was developed through the middle of the farm for ease of stock movement and access. Additionally, 20km of fencing has been installed as well as a new stock water scheme. The farm is located along the Kauru River with steeply sloped land left to regenerate with native bush.

Livestock policy

The sheep enterprise consists of 2,900 breeding ewes with 840 ewe replacements kept and 4,300 lambs finished. Hoggets are currently being mated to a Southdown ram and Coopdale ewes are mated to a Romney ram or terminal sire. The cattle enterprise had 430 yearling Friesian bulls wintered on fodder beet this winter and 100 replacement heifers were wintered on pasture. Two year old bulls grazed pasture to avoid soil damage. Current cattle policy being reviewed following the purchase of a new farm holding intended to finish bulls.

Pasture and cropping programme

Approximately 20-25ha of fodder beet is grown for grazing by yearling bulls, while 16-18ha has swedes planted for wintering ewes. Kale is grown on the farms upland block as a summer crop for lamb finishing and wintering for hoggets. Pasture management varies throughout the farm, ranging from ryegrass and white clover irrigated pastures in the lower parts of the farm to dry tussock in the uplands. The upland block is the final area to be cultivated since the farms' purchase which will be double cropped before returning to pasture. The grass varieties utilised as Ultra Ryegrass on dryland and Base on irrigated areas.

Day 2

The second day of the conference consisted of a number of presentations relating to agronomy, diverse pastures and economics.

Similarly to day 1 of the conference, a field trip was held in the afternoon, this time to Invernia Holdings. This is one of four dairy farms owned by Russell and Cathy Hurst. The total land area of all four farms is 2,461ha which is divided up as follows;

- Runoff: 300ha of dryland
- Dairy 1: 351ha with 1100 cows
- Dairy 2: 195ha with 600 cows
- Dairy 3: 197ha with 550 cows
- Dairy4: 180ha with 600 cows
- Support land: 1,239ha for grazing young stock, nurse cows, sheep and walnut plantation

Dairy 1

The field trip was held at dairy one, the original family farm, which is now operated by Russell's son Henry. This farm recently underwent major development with the installation of a new 90 bail rotary parlour. Currently milking 1,100 cows the plan is to increase this to 1,500 over the coming years. In addition to the parlour, substantial progress has been made in terms of paddock structure, roadways and the installation of a large central pivot irrigator.

Livestock policy

The farm is split into two herds; the main herd consisting of 650 cows consisting of second lactation animals upwards and cows at optimal condition, the second made up of first lactation and any underperforming cows. Majority of the cows are purebred Friesians with some Jersey cross animals included. Mating using artificial insemination (AI) is conducted for six weeks followed by three weeks of mopping up with Friesian stock bull. The top 300 bodyweight heifers are selected for AI for the first three weeks followed by the stock bull for three weeks. The remaining heifers are mated with the bull for the entire mating season. Selection for polled animals has been ongoing for several years and now one third of heifers born are polled. Nurse cows are made up of in-calf cull cows from the dairy herd and low bodyweight heifers. Whether hoggets are purchased annually and are kept for approximately 8-10 years.

Pasture and cropping programme

Traditionally kale was used as the wintering crop on the farm but since the new irrigation system has been installed there has been a shift towards fodder beet. However this is only on the platform and kale is still utilised on the support land. New focus on sward renewal on farm with mainly tetraploid species used on the milking platform and diploid on the support block.

Day 3

The final day of the conference focused around technologies to improve farming efficiencies relating to pasture measurement and grazing livestock. These discussions received much interest amongst the audience as pasture production on commercial is poorly recorded in New Zealand and data collection prove an essential tool moving forward into future agricultural systems.

The final sessions looked at future prospects of New Zealand agriculture. It incorporated animal and agronomy systems as a whole and focused on the broader picture of achieving environmental sustainability while also maintaining profitability and productivity for farmers.

Conclusion

Attending this conference gave me a greater understanding of the Otago region, particularly North Otago, and how farm systems differ compared to the Canterbury region. It also provided me with the opportunity to meet and network with numerous researchers in my field. Attending this conference has provided me with a foundation to network and maintain contact with numerous individuals as I continue my own research.

Australasian Dairy Science Symposium

The ADSS conference was held from 25-28th Nov in Christchurch which was themed "20 Years of ADSS: Timeless Practices, Invention, and Future thinking".

The first day of the conference involved a field trip to Beaumaris Dairies owned by Tony Dodunski and to LURDF. Tony operates a 630 dairy herd located in the Te Waihora/Lake Ellesmere catchment which is of huge cultural importance to the local Maori community. He is also the CEO and founder of AgAssist which is an online marketplace connecting New Zealand's food and fibre sector. It enables farmers to book casual staff to complete tasks such as milking cows, fencing, etc. at short notice on a once off or regular basis. As this service is still relatively new, there is still some trial work to be done in terms of subscriptions. However, there seemed to be a positive uptake to date of the app which indicates a promising future for this service. The details of the Low N trial has been previously discussed in this report.

Figure 6. Presenting my PhD research at ADSS.

The remaining three days of the conference consisted of presentation sessions held in Christchurch. The topics for the sessions held ranged from celebrating dairy scientists, farm systems, young stock re-invention and the future. During this conference I gave a presentation on the "Transition phase" of my research which received a positive response (Figure 6). Following this presentation I networked with many researchers from both New Zealand and Australia. The general consensus is that clover research needs a resurgence in New Zealand as much of the work done here was conducted 20-30 years previously and clover contents on farm tend to be below optimal for fixation as chemical N applications continue to reduce. It was very encouraging to receive such engagement from my work and connections with fellow researchers which I will keep in contact with as I continue my research and pursue my career in the future.

North Island

During my time in New Zealand I also got the opportunity to travel to the North Island where I visited two research facilities: Massey University in Palmerston North and DairyNZ in Hamilton. This visit took place from 5-10th Dec.

Massey University

During my visit to Massey I was given an insight into the ongoing research focusing on adopting regenerative agricultural management practices while maintaining pasture and animal performances. This project is known as Whenua Haumanu – nurturing the land through pastoral farming. Whenua Haumanu is overseen by the Ministry for Primary Industries and is supported by the Sustainable Food and Fibre Futures Fund.

This project collaborates with universities including Lincoln University, Crown Research Institutes and industry partners as they work towards developing sustainable regenerative agricultural practices to suit New Zealand production systems. This is a seven year project which is now in its fourth year.

Whenua Haumanu takes a holistic approach at the whole farm system perspective, investigating how different sward types and management practices impact a broad range of aspects. These include soil chemical, physical and biological properties, pasture production, nutrient leaching, methane and nitrous oxide emissions, carbon storage, and animal performances. This research is exploring modern and regenerative farming practices for both conventional and diverse pastures.

Prof Danny Donoghue is the project lead and it was a great pleasure to meet with him to discuss the ongoing work. I also got to meet Dr Andrew Cartmill who is the pasture research lead and provided me with a further insight into the pasture research element of the trial. He also gave me beneficial advice for my own research which I hope to implement into my work as I continue my trial. In addition, I also met with PhD students to discuss their research within the Whenua Haumanu project.

DairyNZ Hamilton

My visit to DairyNZ involved discussions with Dr Claire Phyn and Dr Kate Fransen on the Low N project which is led by Claire and the Plantain Potency trial led by Kate. This meeting allowed me to gain a further understanding of the scale and prospects of the research. I also met with PhD student Jessica Dalton who showed me her ongoing methane research at Lye farm. She provided me with a brief overview of other research ongoing on the farm, ranging to calf studies to pasture production. My day concluded with a meeting with Dr Elena Minee who talked about her background and the work she is working on currently and future proposals for projects to develop mechanisms to maintain farm production within a changing climate. It was really beneficial meeting with Elena as we also got to discuss my own research and how it compares to the need to regenerate legume proportions in pastures.

Farm Visits

Debbie Geddes – Ashburton

Farm system: 250ha spring calving dairy farm milking 650 cows. Milking parlour is a 54 cow rotatory and cows are milked twice daily for the full season. The herd consists of HF and JX, however there is a shift towards Norwegian red due to its lower intakes. Cows currently offered 21kg of dry matter daily. The herd is divided into two mobs; the main herd and a smaller herd of heifers and under conditioned cows. Concentrates are constantly fed with 4-4.5kg per cow fed daily. Plan to change the concentrate formulation from palm kernel and other supplements to home grown barley and molasses. This potentially could save $50,000 in feed costs which currently costs $900,000 - $1 million annually. Mating ongoing on farm for another four weeks. Target replacement rate is 20% annually. About 30 beef stock are kept for finishing which are mainly Belgian Blue and Herefords. Winter on pasture with oat silage and kale as supplementation. Previously wintered on fodder beet but had a lot of metabolic issues leading to cow losses. Consider themselves as bio farmers with a big emphasis on soil fertility. Soil was sampled in 2020 and will be sampled again this year. Results meant a greater focus was placed on areas lacking in particular nutrients. Entire farm is lacking molybdenum, which has been prioritised. Strategic fertiliser applications are used on a paddock-by-paddock basis. Liquid nitrogen is used along with fish and homicide additive to nourish the soil. Milking platform soils are poorly drained in parts with some freely draining stoney areas. Highly reliant on irrigation when dry. Planning to install a pivot irrigation system in the coming years. About 10% of the platform is reseeded annually with perennial ryegrass and red or white clover at the rate of 25kg PRG and 10kg WC per hectare. Oversowning of WC also conducted annually.

Lohara Farm Limited – Hamilton road, Fairlie

Farm system: 260ha spring calving dairy farm milking 840 cows (Figure 6). Milking parlour is a 54 cow rotatory and cows are milked twice daily for the full season. The herd consists of Holstein Friesian (HF) and Jersey X (JX) cows which are divided into two mobs; the main herd and a smaller herd consisting of heifers and under conditioned cows. Minimal concentrates fed but some included at each end of the season. Mating is ongoing with four weeks remaining for AI, followed by stock bull to mop up. Operate a 20% heifer replacement rate on farm. Cows are wintered on fodder beet. Clover is plentiful in most paddocks with plantain also incorporated in some areas. Very dry farm so irrigation is essential and operates constantly during the season. This is achieved using two large pivot irrigators and sprinklers.

Figure 7. Lohara Farm Limited.

Brent Geddes – Burnham

Farm system: 260ha spring calving dairy farm milking 860 cows. Calve down 890 cows and cull 30 each year. Milking parlour is a 60 cow rotary and cows are milked twice daily for the full season. The herd consists of HF and JX cows which are divided into two mobs (based on the same criteria as previously outlined). Mating is ongoing and runs for six weeks, however a Hereford stock bull is introduced from the beginning to help bring on heat. Beef stock are also bred and kept until approximately 150kg in weight, then sold. The breeds used are Charolaise, Hereford and Speckled Park. Winters on fodder beet and straw. Good management practices has resulted in no major metabolic issues so is happy to continue feeding. Currently not self-sufficient so also winters on neighbouring land. However the farm has recently gained an additional adjoining 40ha which will help improve on-farm self-sufficiency. A pivot irrigation system is in place with the addition of sprinklers. The Rakaia River provides most of the water for irrigation but the farm can be further supported by ground water irrigation should conditions get very dry. Considered a relatively dry farm but areas can become challenging to manage at each end of the season. Restrictions in chemical N fertiliser applications has meant the farm has had to reduce from 330kg N/ha to 190kg N/ha annually which has impacts on pasture production. Poor clover contents in paddocks have become more obvious as a result and the goal is to enhance these in the future. Plantain has also been planted but little benefit has been observed as persistency is very poor (no longer than 2 years).

Fellowship outcomes

This fellowship has allowed me the opportunity to gain first-hand experience of New Zealand dairy systems and ongoing research at numerous research facilities. It also enabled me to network with fellow researchers in my field which allowed me to better understand white clover research in grazing systems. As white clover research has long been established in New Zealand there was numerous opportunities to engage in discussions and assist with field work surrounding this topic. The outcomes of the fellowship has broadened my knowledge which I will implement in future publications and my literature review.

Acknowledgements

I would sincerely like to thank the Stapledon Trust Fellowship for allowing me the opportunity to travel to New Zealand. It has provided me with a greater understanding of New Zealand dairy systems and an insight into the commendable research ongoing there. This fellowship has given me the opportunity to network with researchers in my field, allowing me to gain valuable skills and knowledge as I continue with my PhD research. I would also like to thank Teagasc, particularly Dr Brendan Horan, and Prof Karina Pierce (UCD) for providing encouragement and support during my time away. Also to Lincoln University, especially Dr Racheal Bryant, for hosting and allowing me to learn and engage with numerous researchers during my visit.