



SOUTHERN DAIRY HUB

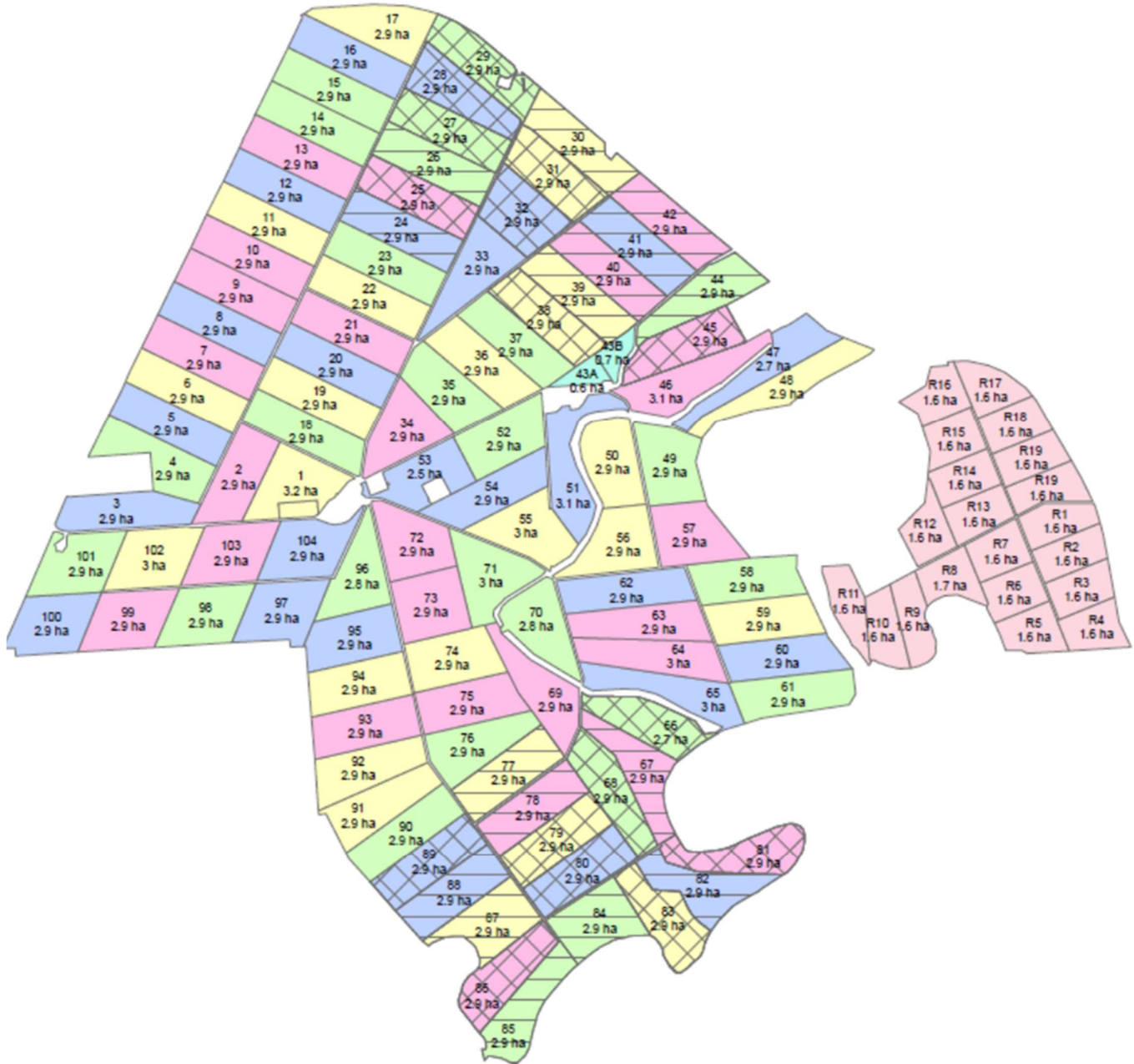
October Field Day 2021



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Farm Map



Covid-19 Information:

- All attendees must maintain 1 metre physical distancing at all times
- Good health and hygiene standards must be maintained throughout the event and use of a face mask is compulsory for all attendees
- Attendees must record their attendance to enable contact tracing and scan the COVID QR code upon arrival
- Please do not attend this event if you are unwell or suspect you may have been exposed to COVID-19

Please note: The above requirements may be subject to change in accordance with COVID alert levels and Government requirements at the time of the event.

Visitor Health and Safety Requirements

Entry onto property by permission and appointment only.

Contact either:


General Manager [Louise Cook 027 564 5595](tel:0275645595) or

Farm Manager [Charlie McGregor 027 207 6012](tel:0272076012)

All visitors required to sign in and out accepting farm rules

A farm map will be provided showing any general hazards on the farm; the manager will instruct you of any new hazards

General Rules

- Communication – sign in and out
- Children on farm – must be under constant adult supervision and only with express permission of manager
- Reporting – Please notify manager immediately any accidents or near miss events/hazards
- Drive to the conditions – Max speed of 30km/hr  strap done up at
- Farm bikes – trained operators only, helmet with
- Vehicles – no one to operate farm vehicles without manager's permission

- Water ponds/troughs – Keep a close eye on children around water sources – do not drink from farm taps, troughs, water ways
- In emergency – Please report back to farm manager at Assembly point in front of cowshed
- Fire extinguishers – found in farm houses, dairy shed, vehicles, and woolshed
- No smoking in cowshed, buildings, or vehicles
- Firearms – only with approval of farm manager, must hold current licence

Biosecurity Requirements for Southern Dairy Hub (SDH)

All visitors must comply with the Biosecurity Requirements when visiting the SDH

- All footwear must be disinfected with materials supplied, upon arrival at and departure from the SDH farm site.
- Protective footwear may be borrowed from the SDH upon request, and must be cleaned thoroughly before its return. People wearing inappropriate (or no) footwear will not be allowed onto the SDH premises.
- All visitors are expected to wear clean protective clothing, including wet weather gear if necessary when on the farm(s).
- No farm visits will be allowed, under any circumstances, from anyone within five days of their arrival in New Zealand from Central or South America, any part of Asia or any part of Africa. Further restrictions may be applied at any time, dependent upon international disease status.
- On farm, visiting vehicles must be parked in designated visitor parking areas. Approved vehicles may only access the farm after washing the undercarriage. This may be repeated prior to departure but this is up to the operator concerned.
- SDH retains the right at any time to refuse access to any person or persons deemed not to be complying with these requirements.

SDH 2021- 2022 Season To Date Summary

Feed supply and growth rates

This season was quite a challenging one for sticking to the spring rotation planner due to the wet conditions and variable pasture growth rates. Systems differ in their area used at the start depending on which farmlet springer paddocks are grazed first and where the mixed colostrum mob grazes. We ended up finishing the first round approximate 1 week early than planned (Figure 1).

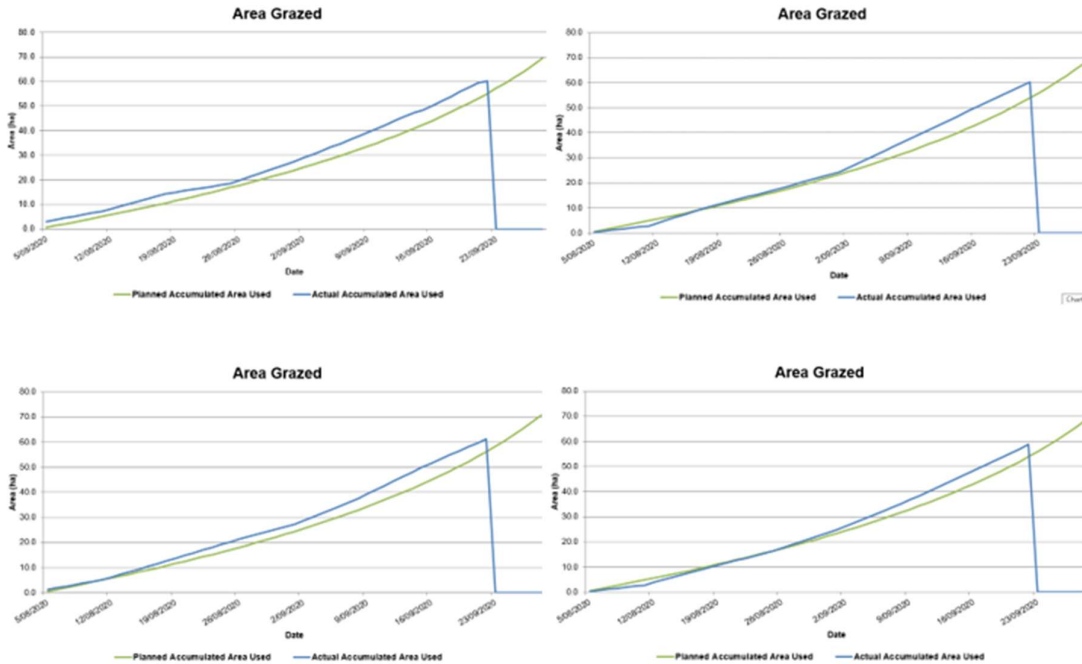


Figure 1: Area grazed compared to the SRP allocation (Std kale: top left, Std FB: bottom left, LI kale: top right, LI FB: bottom left)

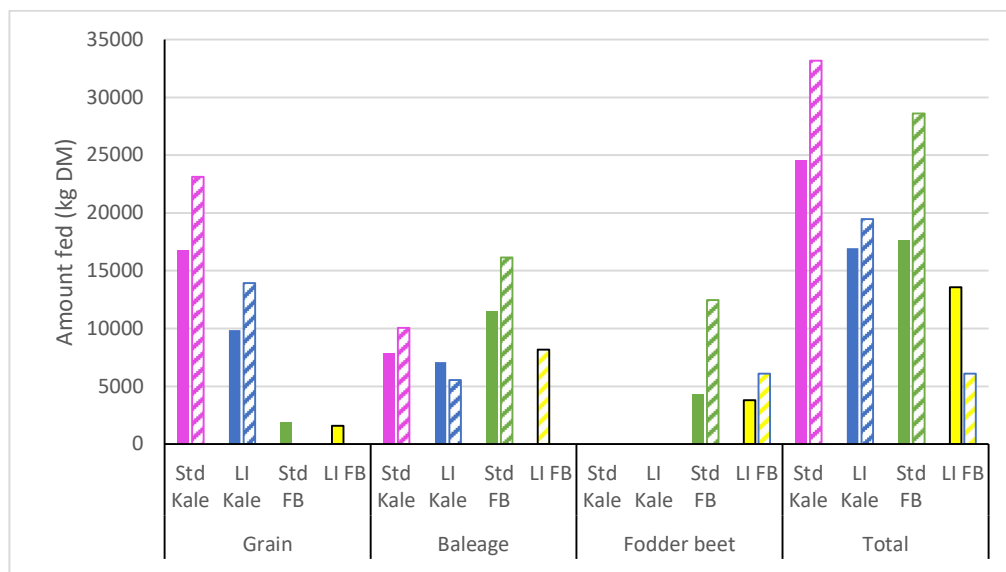


Figure 2: Feed budget summary – solid columns are supplement fed, hatched columns are supplement predicted (to 30th September 2021)

Supplementary feed used in the early part of spring was less than predicted from the feed budgets but the decision to hold a longer round through late September and early October increased the requirement for supplements (Figure 2).

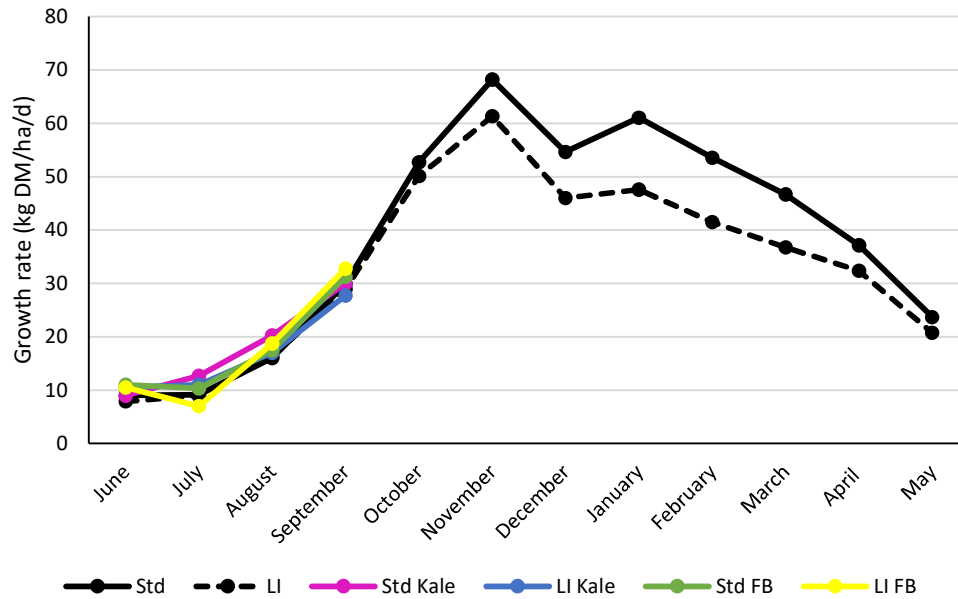


Figure 3: 2021-2022 Average monthly growth rates compared with average Standard and LI growth rates from the previous two seasons

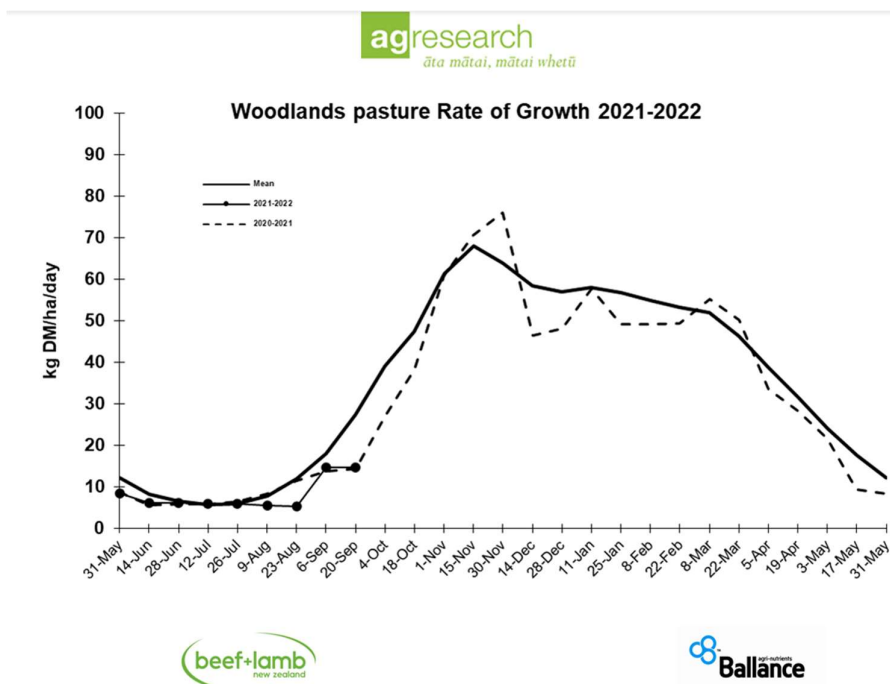


Figure 4: Woodlands 2021-2022 pasture rate of growth

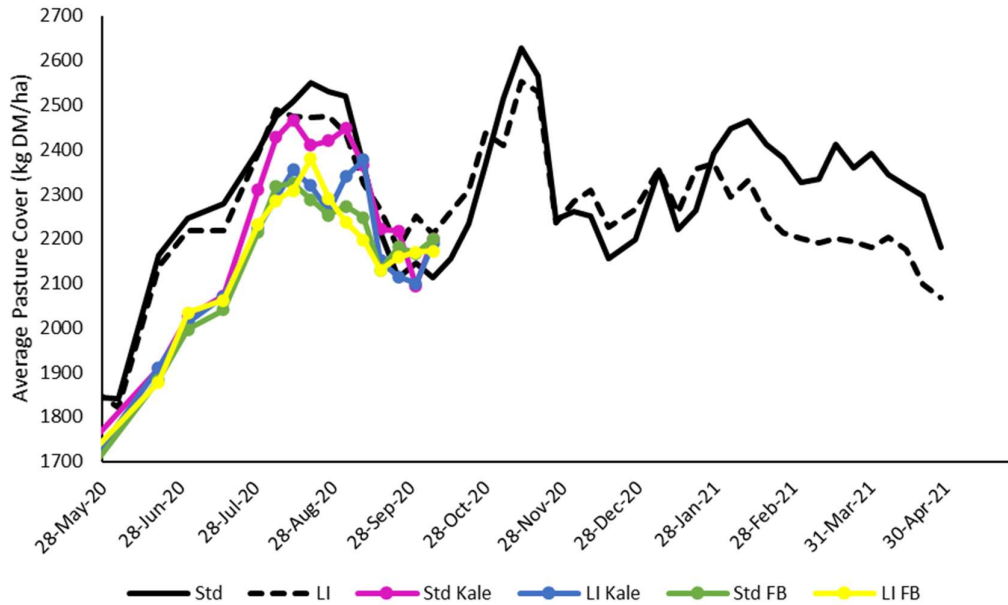


Figure 5: 2021-2022 Average pasture cover (kg DM/ha) compared with average Standard and LI growth rates from the previous two season

Unlike the Woodlands monthly growth that is behind last season our average pasture growth rates for this season have been similar season to date as the average of the last two years (Figures 3 & 4). Average pasture cover at calving was approximately 200 kg DM lower than the previous two years, primarily driven by lower APC at the end of the 2020-21 season.

Calving

For all herds the actual calving rate was faster than expected from estimated calving dates especially for the fodder beet herds in the first 3 weeks (Figures 6 & 7).

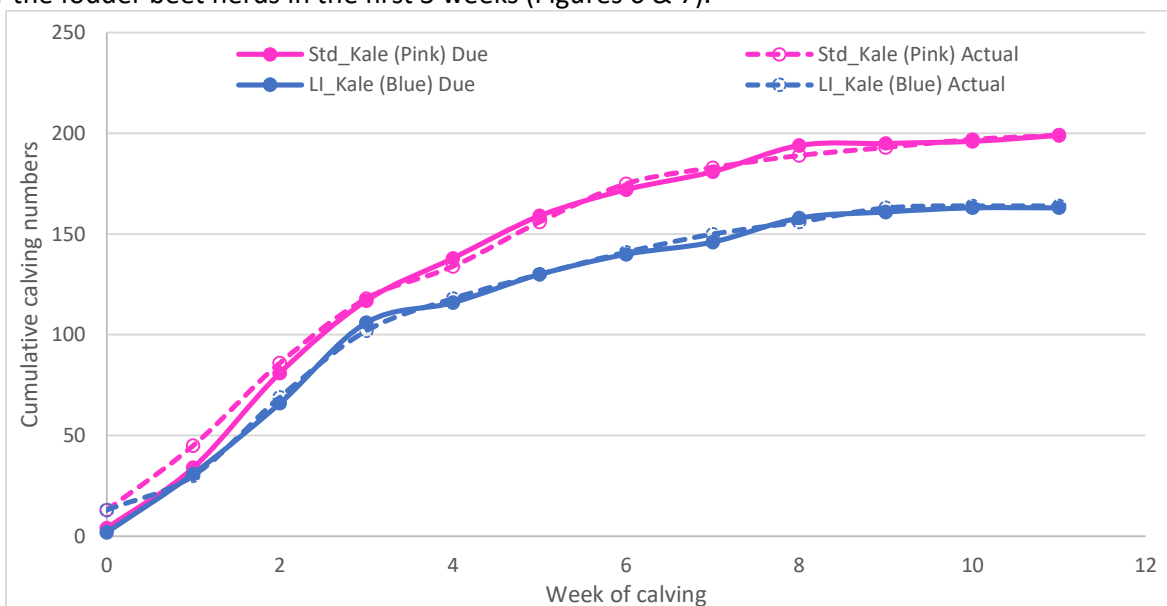


Figure 6: Cumulative calving for the Std and LI kale herds – expected numbers vs actual numbers

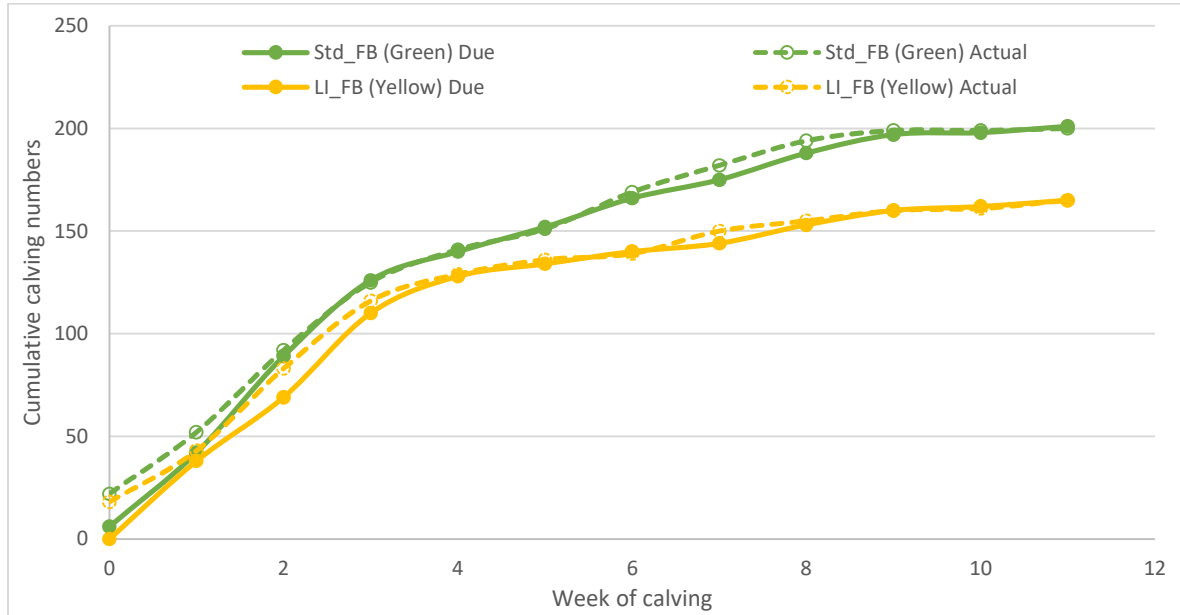


Figure 7: Cumulative calving for the Std and LI FB herds – expected numbers vs actual numbers

Milk production

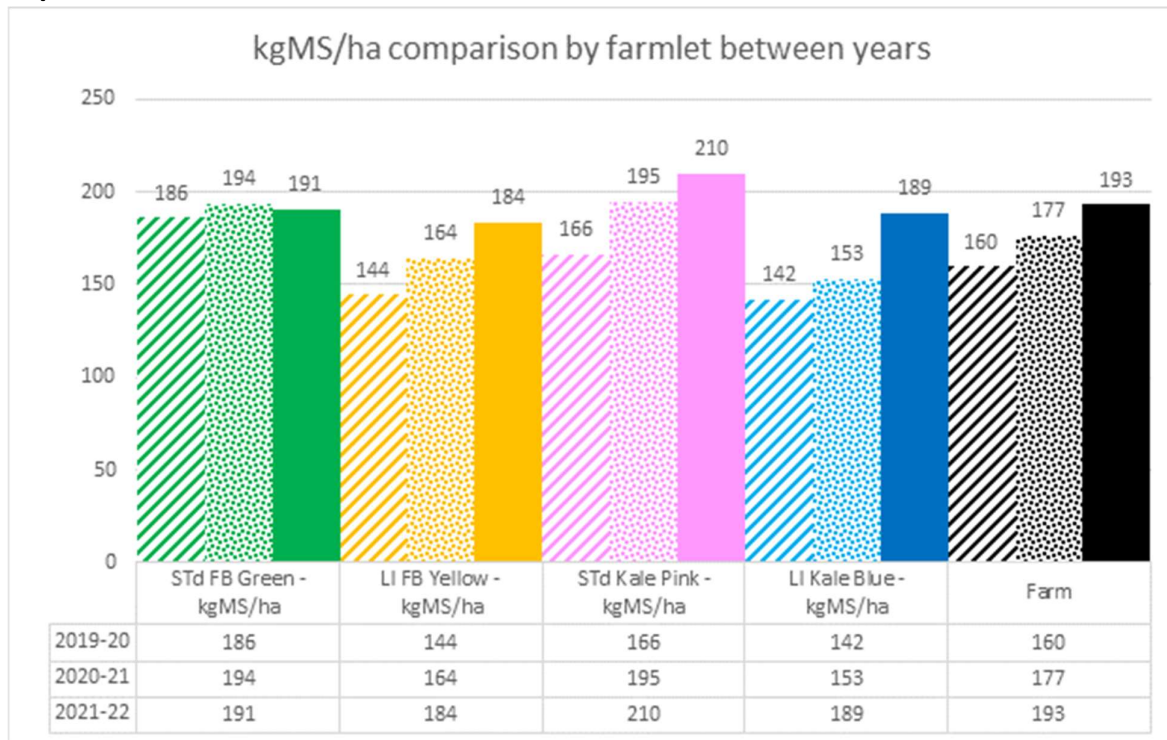


Figure 8: Season to date production comparison for all the herds

Up until last week all herds have been tracking ahead of the previous 2 seasons in milksolids production (Figure 8). The Std FB herd is struggling this season with higher incidences of animal health challenges and lower peak production.

Impact of low N fertiliser applications on low impact farmlets

Background to current system comparison

Pre-experimental modelling indicated that to achieve a 30% reduction in nitrate leaching we would require a significant decrease in purchased N surplus. The resulting farm systems comparison with 200 (Std) and 50 kg N/ha (lower impact LI) as the target fertiliser N applications were implemented to test this alongside our comparison of fodder beet and kale for wintering. Stocking rates were adjusted to match feed supply with demand resulting in 3.1 and 2.6 cows/ha

The first round of N fertiliser uses projects with sulphur to top up levels lost during the winter. Subsequent applications are either urea or N Protect. Nitrogen can only be applied if the following conditions are met:

- Not more than 40 kg N/ha onto pasture in a single application
- Spring applications – soil temperature >5°C and trending upwards
- Autumn application – soil temperature >7°C, nothing after the 10th April
- Sufficient soil moisture

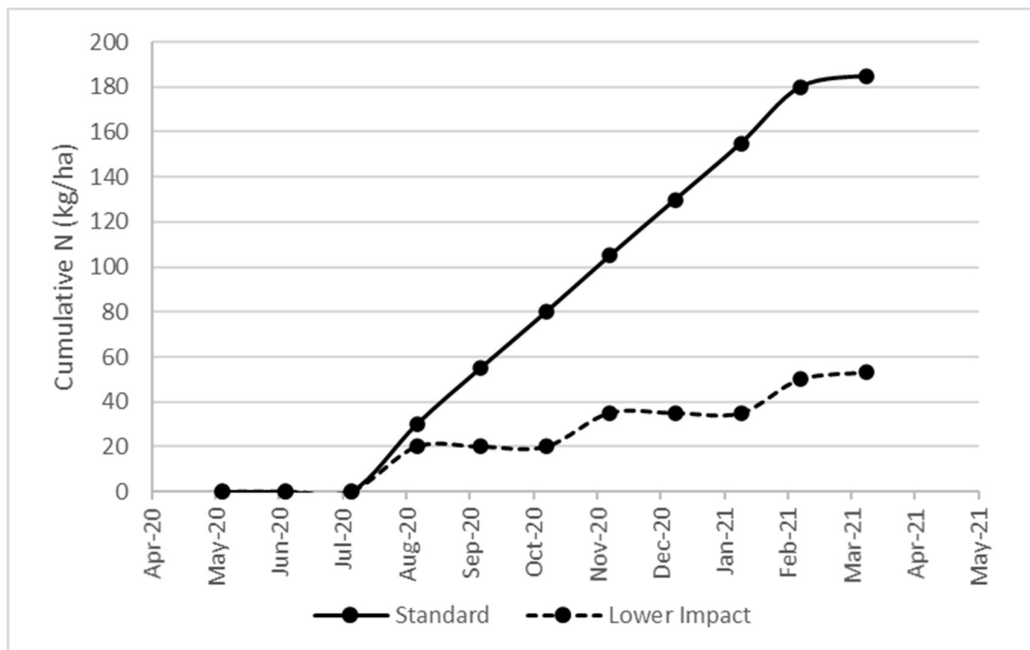


Figure 9: Cumulative N fertiliser application for Standard and Lower Impact farmlets

Average monthly growth rates during June, July, August and September do not differ between the Std and LI farmlets but from November onwards and especially through the summer months the average growth rate lines start to deviate (Figure 10). Differences in growth reduce again in the autumn.

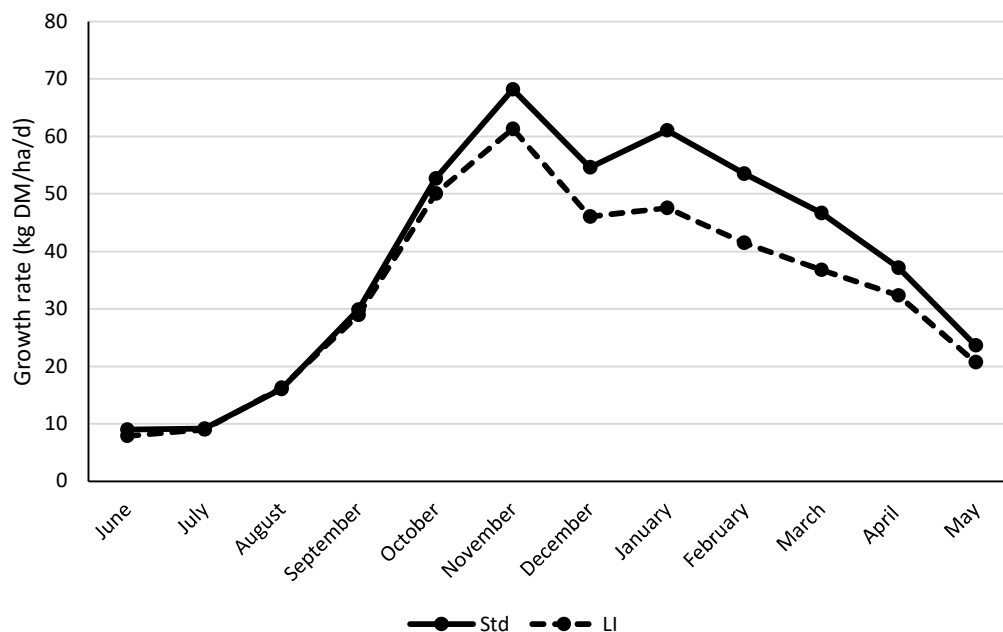


Figure 10: Average monthly pasture growth rates for the Standard and LI farmlets for the last two seasons

Monthly growth rate differences have resulted in less pasture grown in each of the last 3 seasons (Table 1). The clover proportion of the pastures in summer is higher in the LI than the standard farmlets (Table 1) but there is a lot of variation between paddocks within and between farmlets with proportions ranging from 0 to 58%.

Table 1: Average system pasture growth, fertiliser N applications and summer clover percentage for the three completed years of the study

	Pasture Grown (T DM/ha)			Annual fertiliser N application (kg N/ha)			Summer clover (%)		
	2018-19	2019-20	2020-21	2018-19	2019-20	2020-21	2018-19	2019-20	2020-21
Std Kale	12.5	13.8	13.4	188	180	184	10.3	10.3	10.4
LI Kale	11.9	12.3	11.7	76	56	53	15.8	18.3	16.0
Std Fodder beet	12.3	13.5	14.2	170	175	182	7.8	8.5	10.8
LI Fodder beet	11.2	11.6	11.9	81	57	53	17.0	17.4	17.3

There are no major trend differences in pasture quality between the Std and LI systems (from samples collected monthly for 3 seasons; Figure 11). There are bigger differences between individual paddocks within farmlets than between farm systems due to different cultivars, soil types and cropping history across the farm.

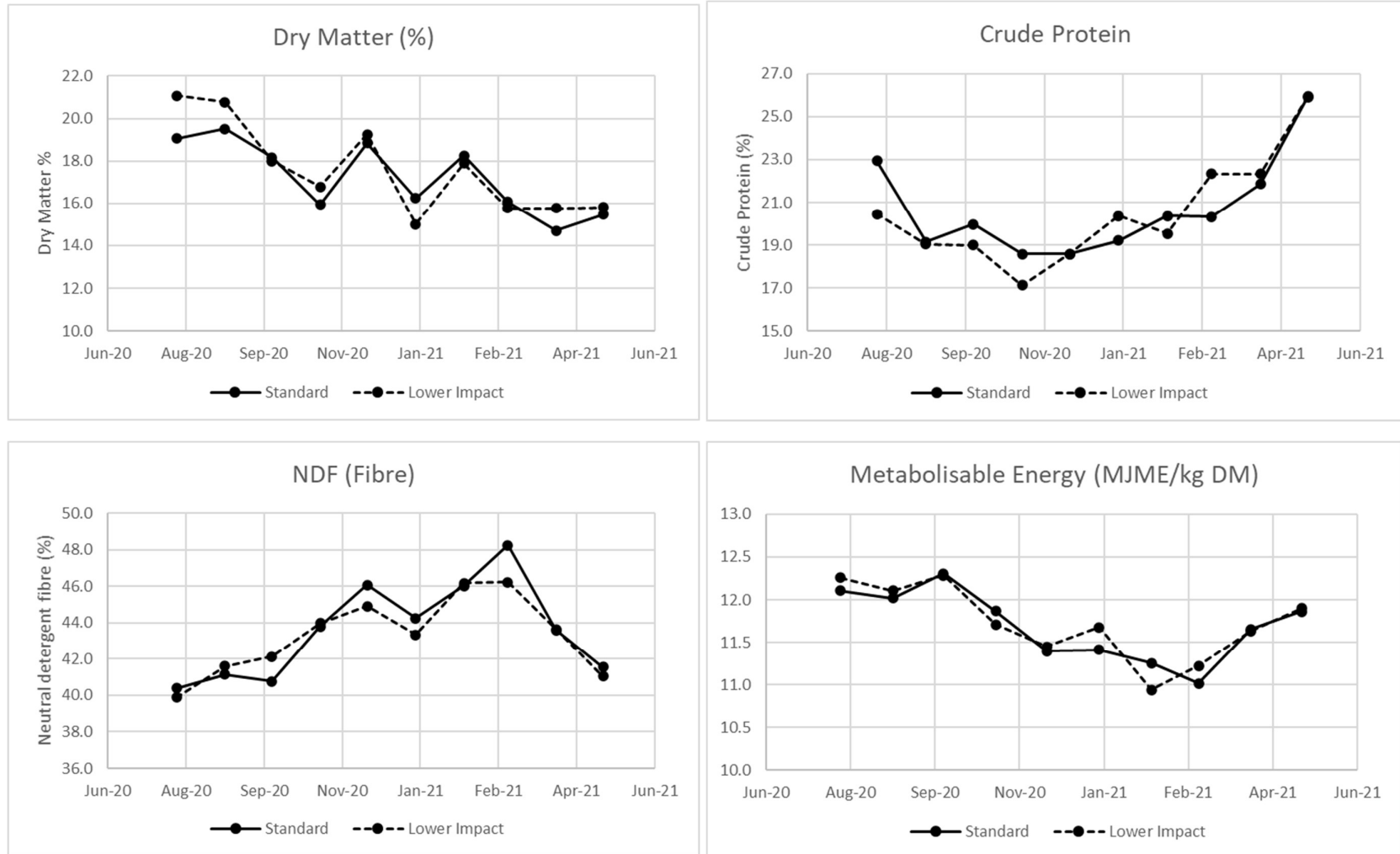


Figure 11: Average monthly pasture quality from spring 2018 till Spring 2021 for the Standard and Lower impact farmlets

Using the nitrate losses calculated by Overseer for the pasture areas of the milking platform combined with the measured N losses from the winter crop areas, it is possible to estimate the total N losses from each of the 4 farmlets. These results, presented in Figure 12, indicate that the change in fertiliser N inputs resulted in about 22% less N leached. Similarly changing from kale to fodder beet as the winter crop lowered N leaching losses by about 16%. The low impact (N) FB treatment leached 34% less than the standard kale farmlet.

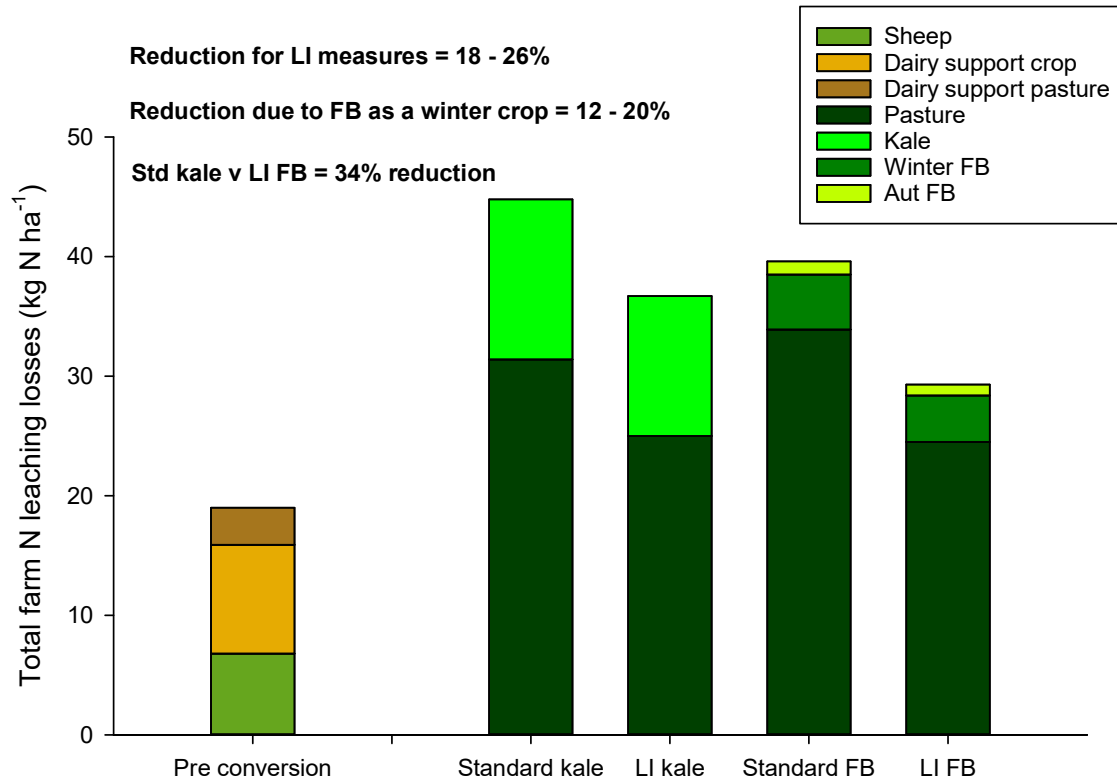


Figure 12: Comparison of the calculated and measured N losses pre conversion and from the four farmlets. Note that the low impact (LI) treatments indicate lower N inputs.

SDH Participatory Research Project Update

Project Objectives:

The project is taking an integrated approach focusing on water quality while increasing farmer awareness of system change impacts on greenhouse gas emissions, and farm profitability. By partnering with farmers across Southland and Otago we have recognised the range of landscape-specific vulnerabilities and farming systems that require different solutions for improved environmental outcomes. Community engagement in the project has also created an opportunity to further extend the research outcomes from the Southern Dairy Hub.

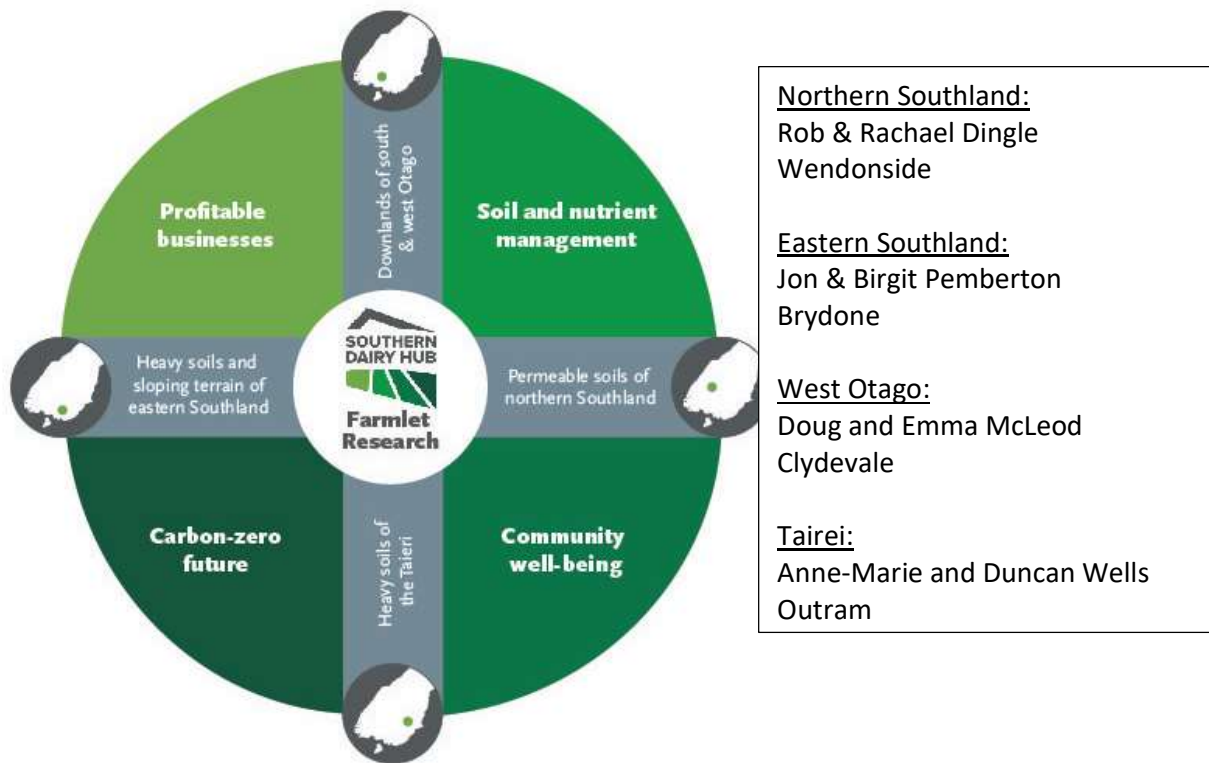


Figure 13: Schematic of the Satellite farms and their relationship to SDH

Results to Date:

The project has identified a range of opportunities for farmers to manage their environmental footprint and highlighted there is no 'one size fits all'. An easy win across all farms is reducing the N surplus through efficient use of N fertiliser and reducing the reliance on imported supplements. Including plantain in pastures and catch crops following winter cropping are also cost-effective mitigation options. Investment in infrastructure to keep cows off paddocks in autumn and winter reduced nutrient loss to water. However, the impact on greenhouse gases and profitability depends on the type and cost of the infrastructure and how it is integrated into the system.

What's next for the project?

1. AgResearch are in the process of calculating the greenhouse gas (GHG) footprints of the SDH farm systems using pasture and supplement feed quality information collected over the last 2 seasons. This information will be shared as soon as it is available.
2. Greenhouse gas footprints will then be calculated for the four satellite farms using the same methodology developed with the SDH farmlet and using information collected from each farm last season
3. The GHG footprints for SDH and the satellite farms will be interpreted, and scenarios will be developed to identify options to reduce the GHG footprints.

Proposed extension events – summer 2022:

Two events:

- Otago
- Southland

About 3.25 hours, running concurrent sessions

A plenary session, attended by everyone, would set the scene and provide context around regulation, financial performance and opportunities of better environmental outcomes.

Workshop sessions would follow and focus on potential solutions and practicalities. Each session would be about 10 minutes of technical information from a topic expert, 10 minutes from a farmer sharing their stories and experiences with the topic, and 20 minutes of Q&A and discussion.

We are keen to hear from you what you consider the key topics to cover in these sessions.

Options that link to the scenario modelling from this project include:

- Life with less N fertiliser
- Plantain
- Catch crops
- Assessing sediment loss risk
- Reduced tillage crop establishment
- Infrastructure – system fit and options available
- Baleage wintering
- Alternative land uses
- OTHER

Complete the form at the field day or email dawn.dalley@dairynz.co.nz



SDH Future Farm Systems

Developed from farmer feedback at field days, SDH Farmer Reference group discussions, SDH Research Advisory Committee discussion and input from farm systems and environmental scientists from DairyNZ, AgResearch and Fonterra.

Farmer priorities

- System intensity (as related to greenhouse gas reduction targets)
- Wintering

Achievement of the current systems

- Current LI kale and LIFB systems have delivered the 2030 10% methane reduction target, but at the expense of profit
- Reducing intensity (lower impact system) did not deliver the expected improved per cow production seen in previous research in other regions - WHY?
 - Similar comparative stocking rate as pasture grown reduced with less N fertiliser and less supplements were fed i.e. we didn't feed the lower impact cows enough so either needed to decrease stocking rate more or increase supplementary feed

Table 2: SDH farm systems summary statistics for 2018-2019 and 2019-2020 seasons

		MS/ha	MS/cow	Pasture & crop	Imported Supp	Dry cow grazing	Total feed eaten	Assumed CSR	methane/ha	N surplus	Profit/ha	methane reduction rel to std kale	Profit reduction rel to std kale	MS/cow rel to std kale
Std Kale	2019-20	1245	402	11.4	1.1	3.03	15.5	80	8370	197				
	2020-21	1326	428	11.4	1.7	3.11	16.2	77	8748		\$3,838.00			
LI Kale	2019-20	1042	401	10.9	0.8	2.58	14.2	73	7668	95		-8%	-15%	-2%
	2020-21	1080	415	11	0.9	2.36	14.3	73	7722		\$3,271.00	-12%		
Std FB	2019-20	1220	394	12.2	0.5	2.8	15.5	80	8370	175				
	2020-21	1270	410	12.2	0.8	2.8	15.9	78	8586		\$3,370.00			
LI FB	2019-20	960	369	9.6	0.6	2.4	12.6	83	6804	77		-19%	-22%	-7%
	2020-21	1048	403	10.3	0.5	2.4	13.1	79	7074		\$3,009.00	-18%		

Given the current systems have achieved the targeted environmental reductions i.e. reduced nutrient loss to water (30%) and GHG emissions (>10%) the key challenge is how to regain the lost profitability while maintaining the environmental gains i.e. optimizing the current lower intensity systems.

Four design options were considered all with slightly different research questions. These have been discussed and debated with the Farmer Reference Group, Research advisory committee and farm systems and environmental scientists.

The four potential system options and designs were:

1. Winter x Intensity – 2 intensities x 2 wintering options (crop & infrastructure)
2. Winter x Intensity – uneven factorial to allow more wintering options to be tested
3. Wintering – all at lower intensity (2.5 cows/ha), 4 different wintering systems
4. Intensity – 4 intensities, all the same wintering system

Options 1 and 2 above were modelled using Farmax and Overseer.

Wintering by intensity: proposed future farm systems

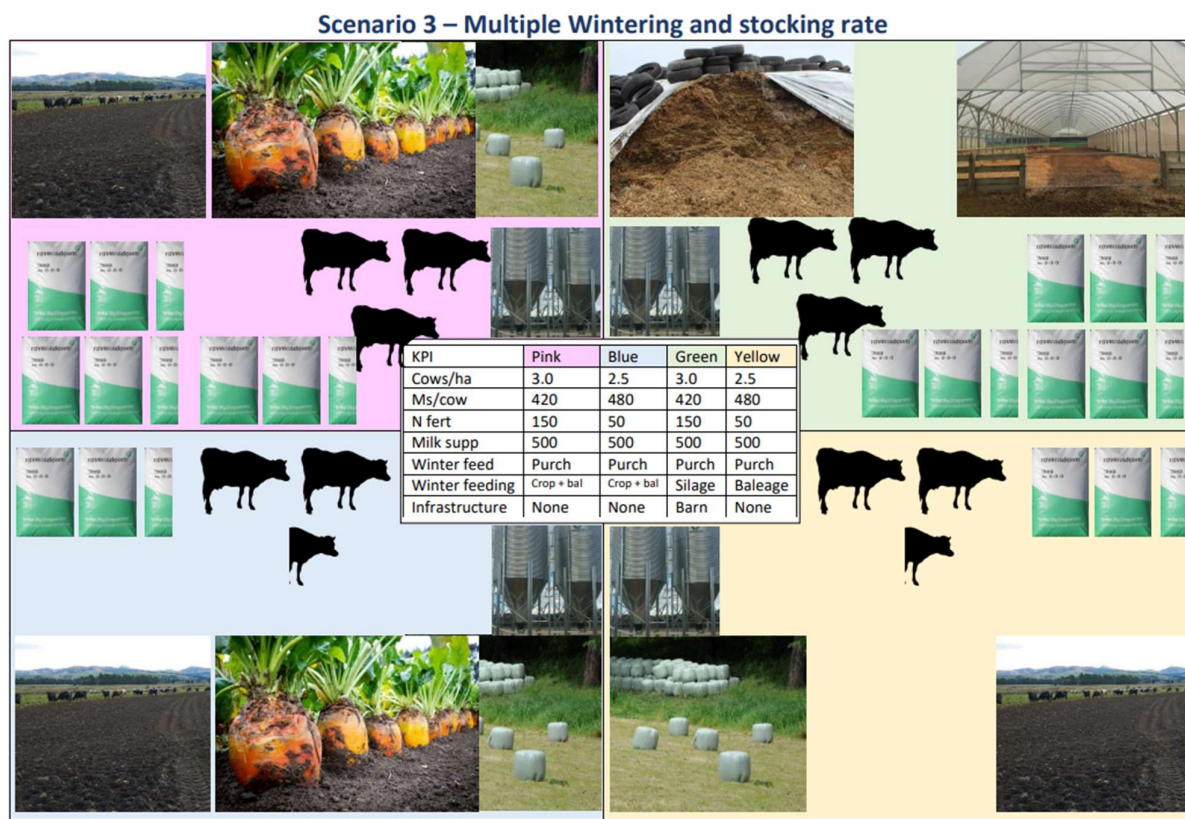


Figure 14: Schematic of proposed future farm systems commencing August 2022

General

- Addresses the top 2 issues identified by farmers and rural professionals
- Need to finalise where to pitch the 2 intensities
- Can compare crop wintering with conserved pasture wintering (silage or baleage) either on or off paddock

Pros

- Allows a range of wintering systems to be assessed
- More diversity of systems being implemented during lactation

Cons

- uneven design – can compare between wintering options at the same intensity but can't look at intensity by wintering interactions
- Difficult to look at carry over effects from winter because of intensity differences

Ho: that low intensity optimized crop has a lower environmental footprint than high intensity optimized crop and can be as profitable

Ho: that wintering cows off paddock will provide better animal welfare and water quality outcomes than wintering on crop.

Ho: That wintering cows on silage/baleage off paddock will have a lower environmental footprint than on paddock baleage wintering

Ho: That on paddock baleage wintering has a lower environmental footprint than optimized crop wintering and is more profitable (at low intensity)

Table 3: Proposed Future Farm systems

	Winter 1	Winter 2
	<u>Optimised crop & baleage/kale</u>	<u>Fully off paddock</u>
Intensity 1	62 ha milking platform	72 ha milking platform
150 kg N/ha	186 cows peak milked	216 cows peak milked
3 cows/ha	Fodder beet for 6 weeks	Silage wintering - 12 kg DM/cow
500 kg lactation supp	followed by baleage (12 kg DM) or kale	Winter silage imported
420 kg MS/cow	Winter baleage imported	
20% replacements		
	<u>Optimised crop & baleage/kale</u>	<u>Baleage wintering</u>
Intensity 2	62 ha milking platform	62 ha milking platform
50 kg N/ha	155 cows peak milked	155 cows peak milked
2.5 cows/ha	Fodder beet for 6 weeks	Cows wintered on 12 kg DM baleage (some imported)
500 kg lactation supp	followed by baleage (12 kg DM) or kale	off paddock option for adverse weather
480 kg MS/cow	Winter baleage imported	
20% replacements		

Table 4: Farmax and Overseer initial modelling results for proposed future farm systems

Mitigation	Control Farmlet, Intensity 1, Optimised crop	Intensity 1, fully off- paddock .	Intensity 2, Optimised Crop.	Intensity 2, fully off- paddock	Intensity 2, Baleage wintering
Purchased N-surplus (kg N/ha, Overseer)	95	134	17	15	26
N leaching loss (kg N/ha, Overseer)	25	19	20	44	16
Total N loss (kg N, Overseer)	1,966	1,519	1,607	1,220	1,223
P loss (kg P/ha, Overseer)	0.9	0.8	0.8	0.7	0.8
Total P loss (kg P, Overseer)	71	61	66	57	60
Total feed eaten including grazing off/ha of MP (FARMAX)	14.7	17.4	13.3	15.6	13.6
Methane (kg CO ₂ e/ha, Overseer)	7339	9098	6655	8069	6853
N ₂ O kg/ha (kg CO ₂ e/ha, Overseer)	2140	2427	1686	1863	1683
CO ₂ kg/ha (kg CO ₂ e/ha, Overseer)	1495	2139	1124	1729	1253
Total GHG (kg CO ₂ e/ha, Overseer)	10974	13664	9465	11661	9789
N loss % change	0%	-23%	-18%	-38%	-38%
P loss % change	0%	-14%	-7%	-20%	-15%
Total GHG % change	0%	25%	-14%	6%	-11%
Operating profit (FARMAX \$/75 ha)	2788	1689	2813	1806	2542
% Change operating profit relative to control		-39%	1%	-35%	-9%

Catch-crops for cleaner water



Catch Crops for Cleaner Freshwater



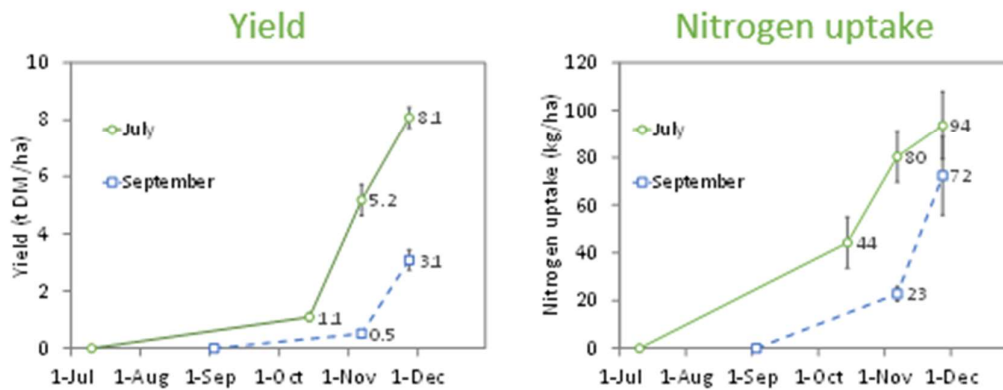
Brendon Malcolm, Shane Maley (Plant and Food Research), Anna Taylor (AgResearch)
Brendon.Malcolm@plantandfood.co.nz; 021 865 126; @malcolm_brendon (Twitter) (Project Leader)

Winter grazing of forage crops = high risk of nitrate leaching (40–180 kg N/ha) – can “catch crops” help?

What is a “catch crop”?

A fast-establishing short-rotation crop, grown in between two main crops, primarily to take a nitrogen and reduce nitrate leaching

On-farm trial data (ex-fodder beet), Lumsden, 2020 (Eureka - Acidic Orthic Gley soil)



Key agronomic message for maximum success

1. Sow as early as possible after grazing, when conditions allow	Maximises both N uptake and yield potential.
2. Select winter-active species	Cereal (e.g. oats) make good catch crops.
3. Target a high plant populations	300 plants/m ² ; 120 kg seed/ha
4. Target minimum/no tillage	Cultivation likely required if soils are compacted or particularly uneven – soil-to-seed contact is key
5. Sow at a consistent depth of 3–4 cm	Too deep and seed can rot; too shallow or close to surface and prone to birds or poor soil-to-seed contact
6. Control weeds	Weeds can compromise catch crop performance, particularly during establishment
7. No nitrogen at sowing	Some N fertiliser <u>might</u> be required during later stages of growth (from October onwards)
8. Harvest at the “booting” stage for green-chop silage (cereals)	Just as the reproductive head is starting to emerge – represents good balance between high yield and high quality

DairyNZ have produced some guidelines and a podcast. You can access these at this link:
<https://www.dairynz.co.nz/media/5791668/catch-crop-guidelines.pdf>



'Sustainable Land Management and Climate Change (SLMACC) – Freshwater Mitigation' project (4-years)

Objective 1: Identify best sowing practices for soil protection and N uptake during winter and spring

Objective 2: Measure the effect of catch crops on N, sediment and P runoff losses after winter forage

Objective 3: Assess the benefits of catch crops across a range of climatic, management and soil conditions – modelling

Objective 4: Have farmers identify barriers to successful implementation on farm, and the resources needed when considering catch crops <https://www.facebook.com/catchcrops> [OVERSEER engagement]

Southern Lysimeter Facility (Objective 2)



Aim: Test the effect of tillage depth (10 & 25 cm) and catch crop sowing timing (winter & spring) on nitrogen leaching losses from simulated winter grazing



Trt #	Cultivation depth (cm)	Urine rate (kg N/ha)	Urine timing	Catch crop	Sowing/cultivation timing	# of replicates
1.	Nil/Fallow	-	-	Fallow	-	4
2.	Nil/Fallow	200	July	Fallow	-	4
3.	25	200	July	-	July	4
4.	25	200	July	Oats	July	4
5.	25	200	July	-	September	4
6.	25	200	July	Oats	September	4
7.	10	200	July	-	July	4
8.	10	200	July	Oats	July	4
9.	10	200	July	-	September	4
10.	10	200	July	Oats	September	4

Funded/supported by:

Rainfall to date (mm)

	Jun	Jul	Aug	Sep
2021	99.2	64.4	120.2	148.6
Historical	116.4	72.2	74.9	69.2
Difference	-17.2	-7.8	45.3	79.4

The Farm

Farm Area

Milking platform: 299 ha

Support Block: 39 ha

Unproductive land: 2 ha

Milking infrastructure

60 bale rotary dairy with DeLaval plant and Delpro Herd Management software

Automatic cup removers and on-platform teat spray, Automatic drafting and weighing

Greenwash on the backing gate

Climate

Mean Annual Maximum Temperature - 17.7 °C

Mean Annual Minimum Temperature - 5.4 °C

Average Annual Soil Temperature – 11.0 °C

Average Annual Rainfall – 785.4 mm

Soil Types

Table 4: Soil types, locations and characteristics on farm

Soil type	Location	Characteristics
Edendale	Top terrace	Well drained, high WHC, seldom dries out
Pukemutu	Through centre of farm	Poorly drained due to sub surface pan between 600 and 900 mm deep. Vulnerable to waterlogging.
Makarewa	Bottom terrace	Poor aeration during wet periods due to poor sub surface drainage and slow permeability. Severely vulnerable to waterlogging in wet periods.

Staffing and management

Roster System – Year-round 8 on 2 off, 8 on 3 off

Milking Times – cups on at 5 am / 2.30 pm

Effluent System

Two receiving ponds with weeping walls, leading into a storage pond. Effluent applied by travelling irrigator. Solids cleared out November 2018. Some effluent applied by umbilical system in March 2019. Greenwash on the backing gate

Herd Details

Table 5: BW and PW as of 28 February 2021

		BW	PW
Pink – Std Kale	Cows (195)	116	144
Blue – LI Kale	Cows (156)	118	148
Green - Std FB	Cows (193)	113	129
Yellow – LI Kale	Cows (156)	127	158
Grouped	Youngstock	156	175



We would also like to recognise and thank the businesses who continue to support us, specifically:

