FARMING THE FUTURE WITH CONFIDENCE

DairyNZ Farmers' forum 2020

SOUTHERN DAIRY HUB

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03 MARCH

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agresearch
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SOUTHERN DAIRY DEVELOPMENT TRUST

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SOUTHERN DAIRY HUB

In 2016 when the lease on the Southern Demonstration Farm ended, Southern farmers and Businesses committed an additional 1.2 million dollars towards establishing a dedicated Southern Dairy Hub (SDH) to facilitate dairying research and extension in the region.

With investment from DairyNZ and AgResearch, the 349ha drystock property at Wallacetown was purchased and converted into what is probably the largest pastoral Agricultural Research facility on the planet. The Southern Dairy Hub is owned by the dairy industry and is here for the good of the dairy industry, particularly for Southern Farmers.

SDH Vision: to be an internationally recognised, innovative and leading centre of excellence for dairy farming, comparative research, and extension

SDH Mission: providing economic, social and environmentally sustainable solutions for the southern South Island dairy farmers and community

SDH Fundamental aims:

- To improve the performance and protect the viability of existing dairy farms in the southern South Island.
- To help develop and test new options for dairying in the southern South Island.
- To support the responsible and sustainable growth of dairying in the southern South Island.
- To promote the Dairy Industry Strategy.

SDH, owns the farm and buildings and other infrastructure. For simplicity, a second entity (SDRF): The Southern Demonstration & Research Farm leases these assets and carries out the activities of running a commercial size and scale farm, with all commercial expectations whilst delivering farm systems research information for the Research funders.

SDRF is operating a research farm at the hub, and within that there are strict controls on what can and can't be done within each of the four farmlets we are implementing. Demonstration is by way of comparison between research farmlets. In 2017 farmers told us that having systems with reduced nutrient loss was important for the region. SDRF is currently exploring what happens when you change just the Nitrogen Strategy from 200kg/ha to 50kg/ha of Nitrogen per annum to a paddock, alongside comparing the interaction with either Kale or Fodderbeet as a winter crop.

Research farms are a place where industry can take some risk on behalf of farmers and sometimes, as is currently happening at the Hub, we push the boundaries too far. Being a research farm, we can't always address these negative impacts without compromising the research. So, we follow the process through and record all the farm systems impacts including profit, animal performance and environment.

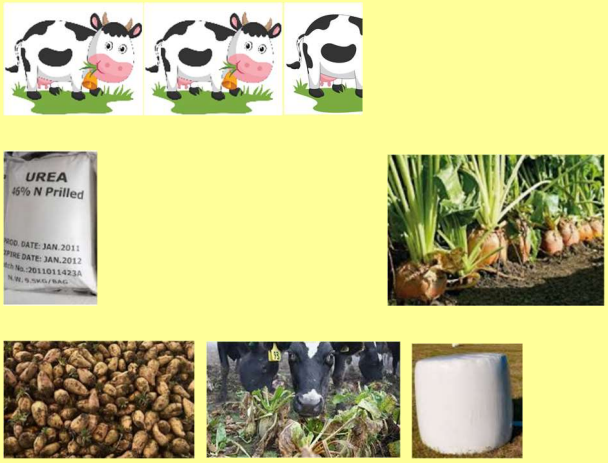
We're pushing the boundaries, so farmers don't have to. This means farmers can use our research as a springboard and can focus on the refinements required to re-stabilise a system.

Current Farm Systems Research Comparison

Objective:

1. To test the opportunity for crop choice and nitrogen management to reduce the N footprint 30% and improve profit compared to existing practices.
2. To engage farmers in experimenting on their own farms and building confidence to adapt their management

Table 1: Pictorial representation of the current farm systems comparison at SDH.

Standard Kale	Standard Fodder beet
	
Lower Impact Kale	**Lower Impact Fodder beet**
	

In addition to the farm systems research additional measurements are being taken to investigate the impact of winter diet on growth and performance of replacement stock, the processing characteristics of the milk and changes in pasture quality and composition.

Physical farm performance (2018-19 and 2019-20 season to date)

It is early days in the farm systems comparison solely funded by DairyNZ Inc with only 1 full lactation completed. We expect it to take a couple of seasons for the systems to settle and the full impact of the changes to be determine, however there were differences in pasture composition (proportion of clover) and annual yield after only 1 season (Table 2).

Table 2: Estimated pasture grown (kg DM/ha), N fertiliser application and proportion of clover in the pastures for the 2018-19 season and season to date for 2019-20.

	2018-19 Pasture grown	Annual kg N/ha applied to pasture	Clover % summer 2019	2019-20 pasture grown (season to date)	kg N/ha applied to pasture (season to date)
Std Kale	12.5	188	10.3	10.5	141
LI Kale	11.9	76	15.8	9.8	35
Std Fodder beet	12.3	170	7.8	10.3	142
LI Fodder beet	11.2	81	17.0	9.2	36

Implementation of more robust systems and processes for the 2019-20 season is allowing us more performance parameters than the 2018-19 season.

During the 2019-20 season differences in physical parameters were evident from the start of the season with the kale farmlet herds not achieving pre-calving BCS targets (Figure 1).

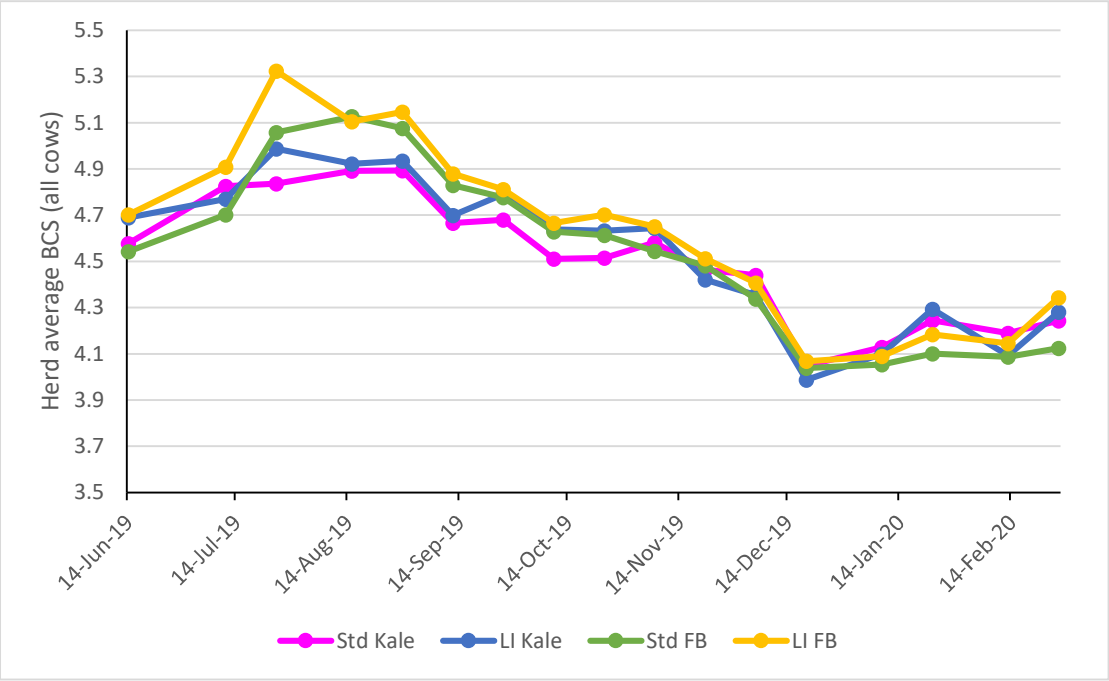


Figure 1: Average herd body condition score (all cows) for the 2019-20 season.

A mild winter resulted in good winter growth and pre-calve APC mass above our feed budget target. As a result, no supplement was required in the first round. Dry cows followed the milkers on the kale farmlets

when the winter crop ran out, in contrast to the fodder beet herds where dries remained on fodder beet until late September. As the result the kale farmlets had better quality pasture going into the second rotation. APC remained higher throughout the spring than initially intended (Figure 2).

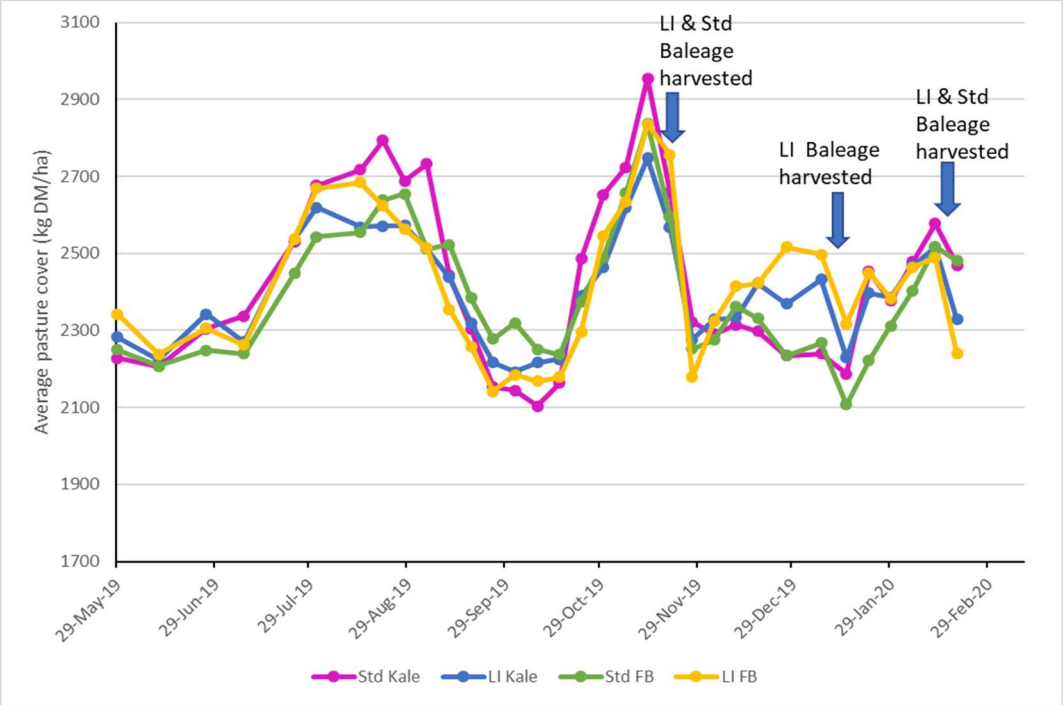


Figure 2: Average weekly pasture cover (kg DM/ha) season to date for the 2019-20 season.

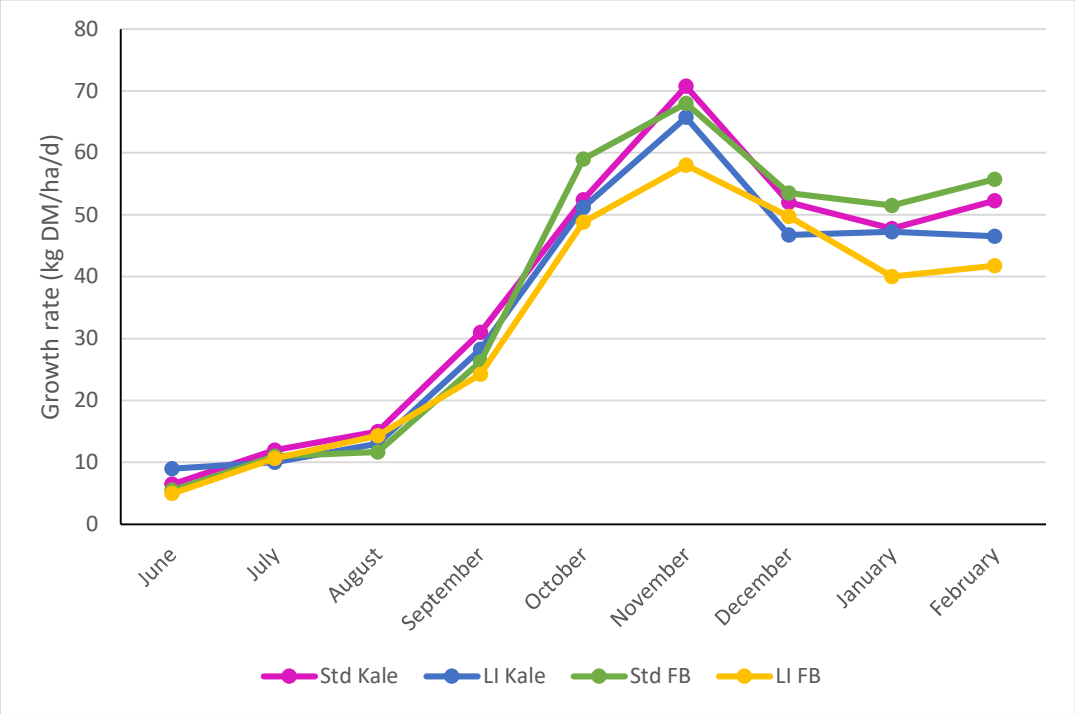


Figure 3: Average monthly pasture growth (kg DM/ha/day) season to date for the 2019-20 season.

Milksolids production per cow and per hectare from the fodder beet farmlets started stronger than their paired kale comparison primarily due to more cows calving earlier and higher milk solids production per cow in the first 3 weeks of lactation (Figures 4 & 5). However, the kale herds peaked higher and had a

slower decline from peak than their comparative fodder beet herds. There are several factors which may have contributed to this difference: better quality second round pasture for the kale cows resulting from dry cows following the milkers in the first round; a higher crude protein supplement (PKE vs lifted fodder beet bulb) available for feeding during pasture deficits and more total supplement fed season to date. Supplement consumption (kg DM/cow) for the herds season to date is as follows: Std kale 262 kg DM; Std FB 152 kg DM; LI kale 194 kg DM and LI FB 158 kg DM. Pasture growth on the LI FB farmlet has struggled since October relative to all other farmlets (Figure 3).

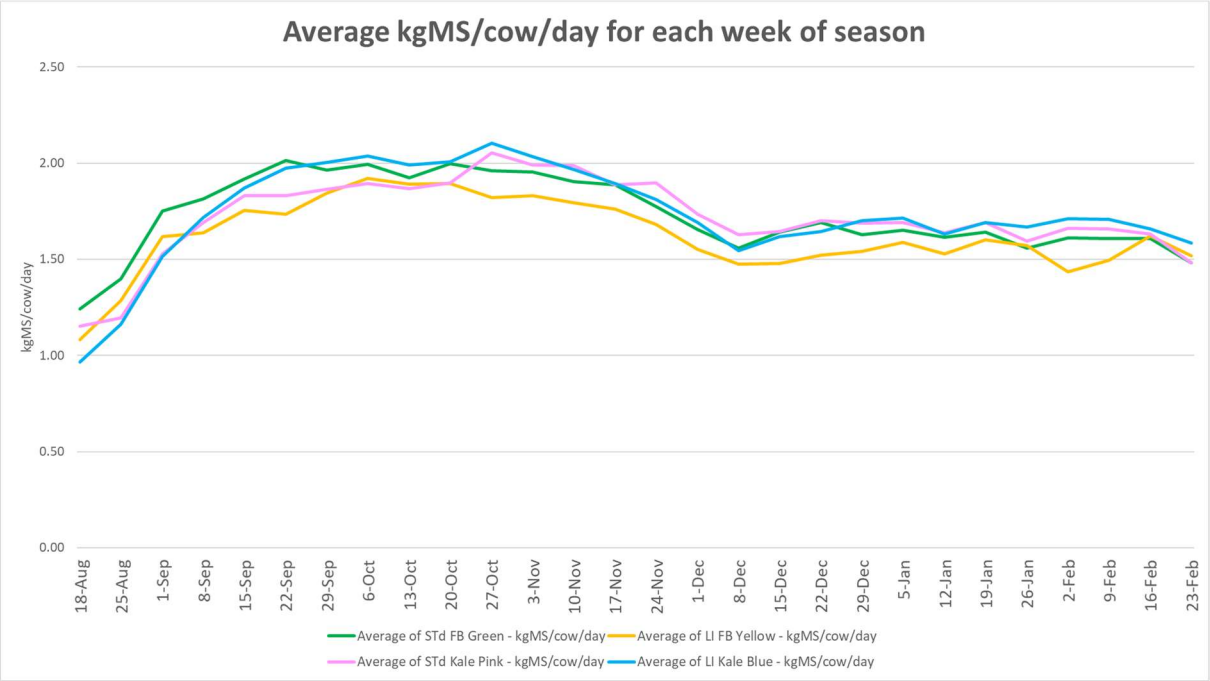


Figure 4: Average weekly kgMS/cow per day for the 2019-20 season

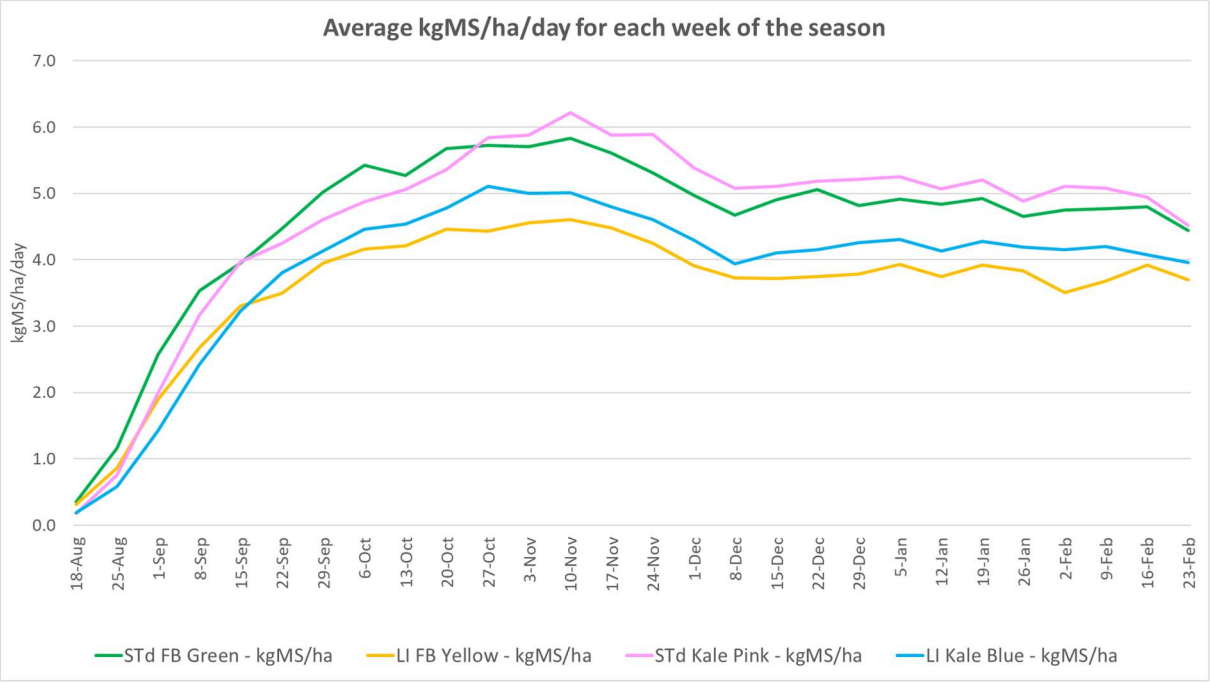


Figure 5: Average weekly kgMS/ha per day for the 2019-20 season

As a consequence, there has been a divergence between the kale and fodder beet farmlets in the kg MS/ha season to date, with the kale farmlets producing at a higher level (Figure 6).

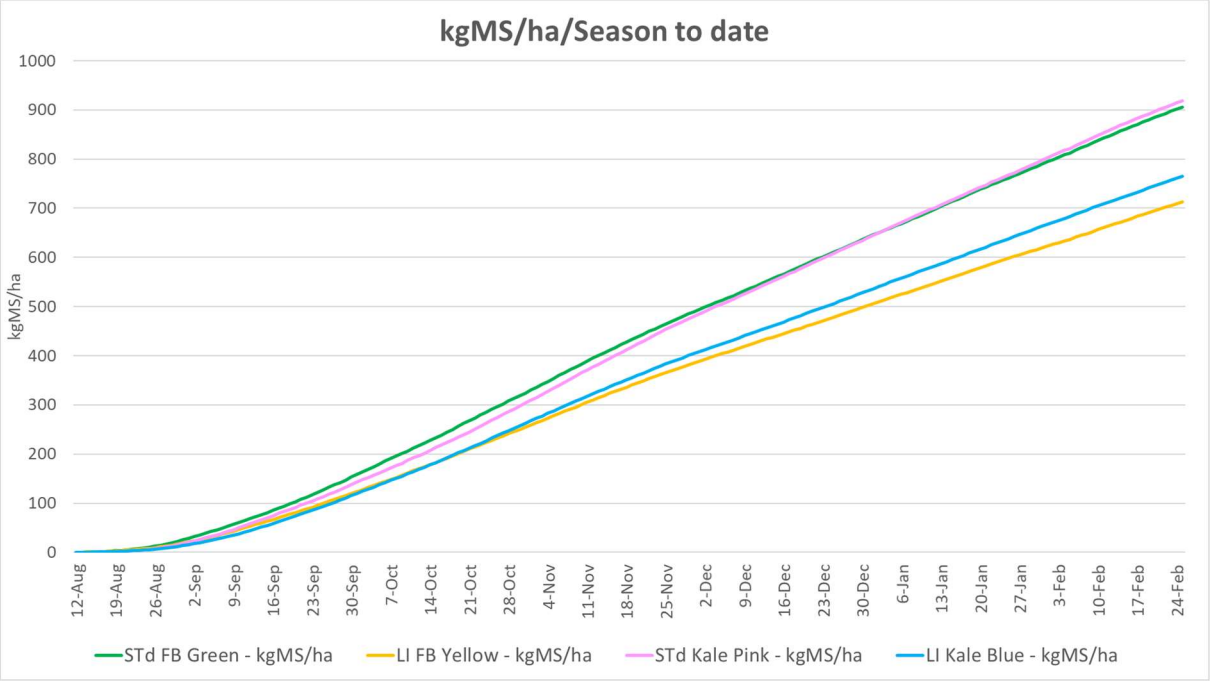


Figure 6: Cumulative milk solids production (kgMS/ha) for the 2019-20 season

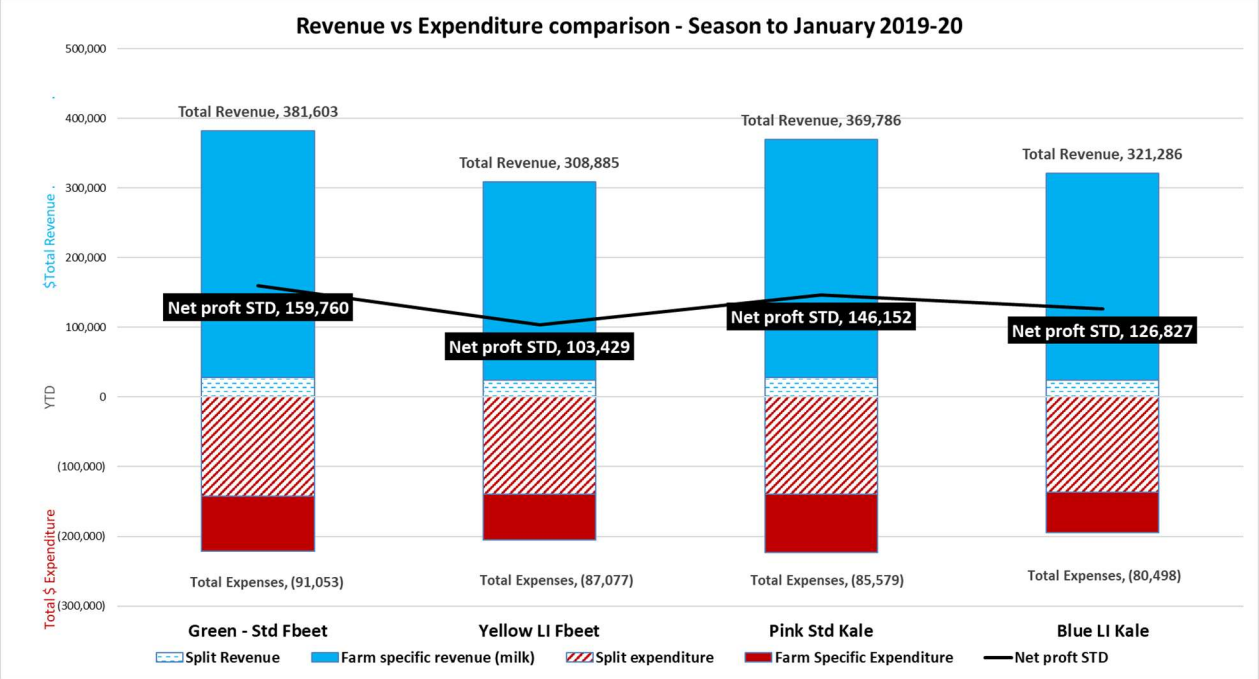


Figure 7: Preliminary revenue vs expenditure comparison season to date

While milk production in the Std kale has improved the Std FB are currently running at the highest estimated profit with far less money spent on supplement to date than the Std Kale. The Std FB milk advantage over Std Kale in early lactation also collected more revenue from capacity adjustment payments than the STD Kale. The LI FB having the poorest profitability impacted predominantly by low milk revenue especially compared to the LI Kale. (Figure 7).

Environmental Research

Research has mainly focussed on quantifying N leaching losses from crop paddocks at SDH. Some key messages from this activity are:

- Autumn grazing of fodder beet (FB) resulted in significantly greater leaching losses of N than measured for winter-grazed fodder beet (Figure 1).
- Leaching losses from winter-grazed kale appear to be considerably greater than measured for winter-grazed FB.
- Lifting of FB in autumn did not appear to greatly reduce N leaching losses.
- Assessments at a farmlet scale (Table 1) indicate that choosing FB as a winter crop could reduce N leaching by about 20 - 30%. This benefit is the result of 2 effects:
    - Lowered per hectare N leaching losses
    - Reduced crop area required (thanks to greater per hectare DM yields)
- These are preliminary insights that will be confirmed once findings from the full 3-year measurement and modelling exercise is completed.

Figure 6. Measurements of N leaching from fodder beet (FB), kale and pasture locations at SDH.

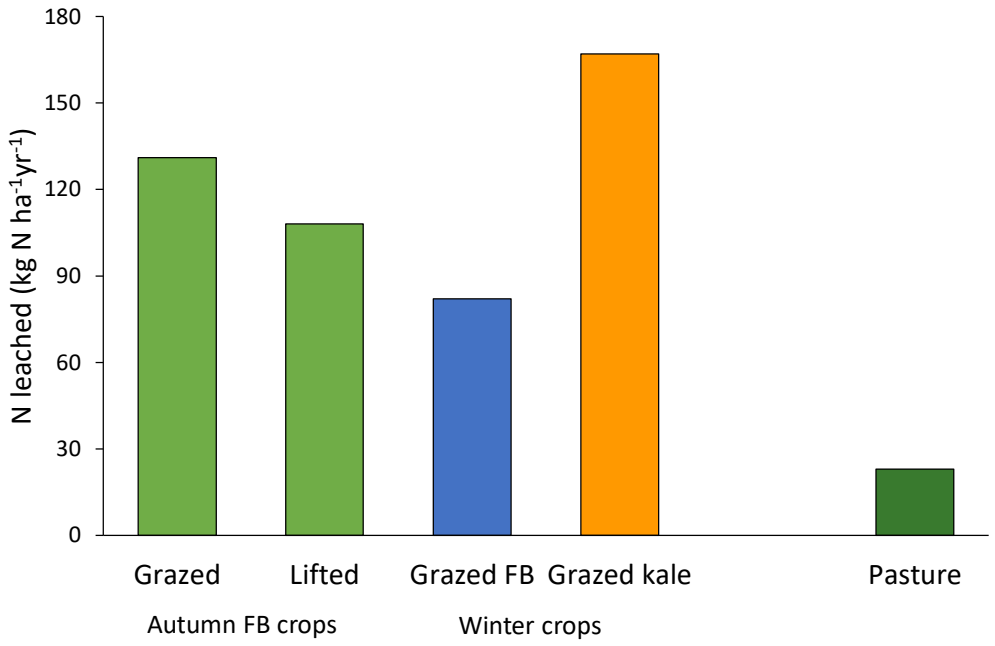


Table 3. Whole-farmlet scale assessments of N leaching losses. Areas for replacement stock have been excluded from calculations; italicised numbers are based on preliminary estimates.

	N leached	
Farmlet	kg N $ha^{-1}yr^{-1}$	*kg N per T MS*
Std Kale	54	*57*
LI Kale	45	*50*
Std FB	44	*46*
LI FB	30	*38*

Cumulative effects of winter crop feeding on dairy replacements

This research was initiated following feedback from farmers and rural professionals that they were observing differences in the resilience of calves born to fodder beet dams especially following feed restrictions, progeny had an increased incidence of humeral fractures as rising 2-year olds and disappointing early lactation milk production.

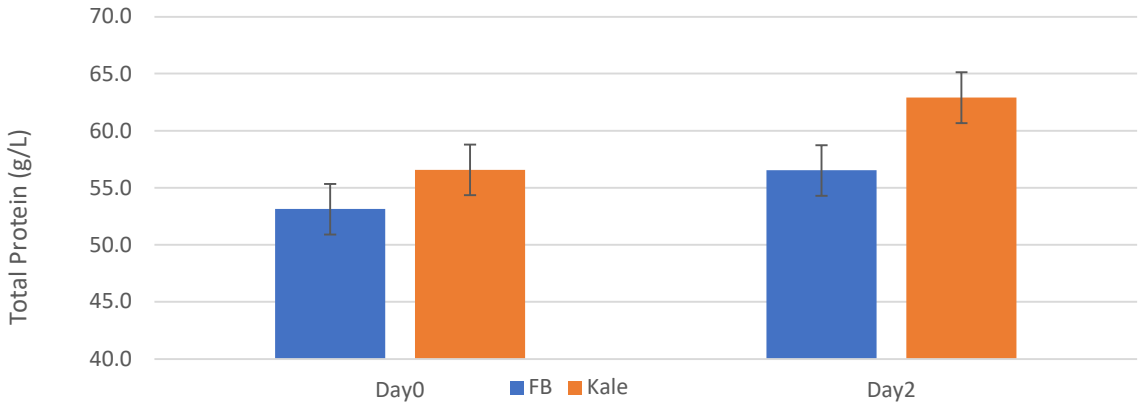
No data were available on the effect of a mineral and potential protein imbalance plus a high soluble sugar intake in mid to late pregnancy on the unborn calf development and their subsequent growth. Replacement calves from spring 2018 and 2019 have undergone a comprehensive measurement regime as we attempt to better understand any cumulative effects of winter diet. In spring 2019 bone density and histology were measured in bull bobbies.

Replacement heifers born from fodder beet dams were on average 9% lighter with a smaller stature (Table 4). Calves born to fodder beet dams had similar serum total protein concentration on arrival to the calf shed but lower concentrations on Day 2 (Figure 6).

Table 4: Weight (kg) and stature (cm) of calves born to fodder beet or kale dams at SDH

	Dam winter diet	Weight (kg)	Height (cm)	Length (cm)	Girth (cm)
2018 heifers	Fodder beet	29.2	69.2	57.7	72.5
	Kale	32.1	70.9	58.1	74.9
	% difference	9	2	1	3
2019 heifers	Fodder beet	29.5	68.1	55.7	73.2
	Kale	32.4	70.3	57.3	76.1
	% difference	9	3	3	4
2019 bulls	Fodder beet	30.8	68.0	55.7	75.0
	Kale	32.5	70.6	57.7	76.7
	% difference	5	4	3	2

Figure 6. Serum total protein concentration (g/L) of replacement heifer calves on Day 0 and Day 2.



Liveweight and stature measurements are on-going, and the first cohort of calves will enter the herds in spring 2020. Whether these observed differences have a long-term impact is yet to be determined.

Southern wintering systems on off-paddock infrastructure

South Island is known for its heavy soils that can pug easily in the wet. This becomes a real problem in the winter for southern farmers where the winter feed paddocks are converted to mud and become an animal welfare risk and increase nutrient and sediment load in our waterways. Our current wintering options are attracting unwanted attention and farmers are looking for cost effective solutions.

There is a real desire across Dairy to show leadership with a new innovative hybrid farming system that could work for wintering in a pasture-based system on heavy soils that provides a sustainable solution for all:

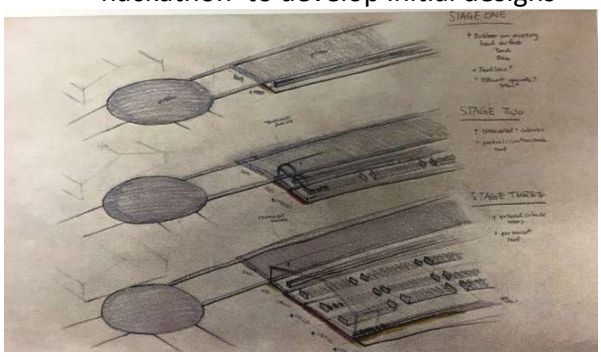
- Cow comfort, health and performance
- Reduced environmental impact
- Economic hybrid farming system that leverages the best of pasture and winter crops

Objectives

- Design and testing of 'fit for purpose' infrastructure for wintering on wet heavy soils
- Investigate the fit of the infrastructure within the farm system
- Test a new system against best of our cropping options on SDH

How are we doing it and how far have we got

- Started by studying infrastructure and systems in Southland and around the world – US, Ireland, Netherlands
- Collected information from NZ research
- Identified opportunities to make improvements, particularly in animal care and cost (both capital and operating)
- Experts (scientists, engineers, industry rural professionals) and farmers participated in a 'hackathon' to develop initial designs



- Initial concepts are currently being developed into designs with plans and costings

Next steps

- bring back 'developed' designs to farmers for tweaking and decision (which design to trial on SDH)
- Build design on SDH
- Trial new system with best of cropping

Wintering taskforce recommendations

The full report from the wintering taskforce is available online: https://www.agriculture.govt.nz/dmsdocument/38210-winter-grazing-taskforce-final-report-with-appendices-included-pdf

Key Messages from the Wintering Taskforce

1. Both immediate and longer-term actions are required. There is an urgent need for MPI to establish a pan-sector action group to implement these recommendations.
2. Poor animal welfare in intensive winter grazing systems is not solely a 'farmer' problem: it will take a concerted effort along the supply chain to improve animal welfare in winter grazing systems.
3. Farming leaders need to support coordinated actions for farmers to improve animal welfare. Some changes can be made immediately.
4. Government and the primary sector need to invest in animal welfare research to better understand the extent of the intensive winter grazing problem and inform the potential solutions.

Key expectations from the Wintering Taskforce for winter 2020 and beyond

The following should never happen, and action must be taken immediately to prevent them:

- Animals giving birth on mud
- Avoidable deaths in adverse weather events
- Mass mortality events on winter grazing systems

The following are things that should always happen, and action must be taken immediately to ensure they do happen:

- Provision for animals to lie comfortably (on a soft dry substrate) for as long as they want to
- Ability to readily move animals to shelter/dry land in adverse weather before harm occurs
- Continuous convenient access to fresh, clean water
- Access to an adequately balanced diet, including appropriate supplementary feeding for animals on fodder beet and other crops, that keeps animals warm and doesn't cause acute or chronic malnutrition and metabolic problems.

Following on from the recommendations of the Wintering Taskforce a Wintering Action Group has been established to work through the implications and implementation of the Wintering Taskforce recommendations. The first meeting of the Wintering Action Group occurred on the 24th February.

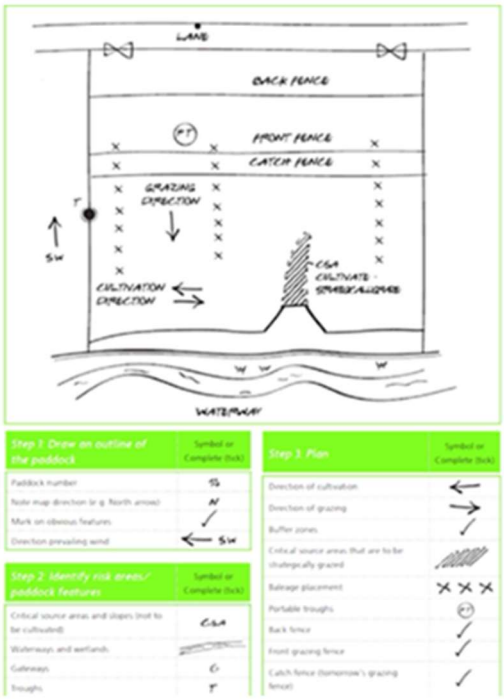
In supporting dairy farmers around the winter planning and implementation, DairyNZ are updating their wintering resources and have a series of joint wintering days across the region with Beef & Lamb NZ scheduled for late March/Early April (dates and venues just being confirmed) so keep an eye out for details at https://www.dairynz.co.nz/events/

What does Good Management Practice wintering look like?

DairyNZ has developed a wintering guide and video to help farm teams plan their winter cropping https://www.dairynz.co.nz/feed/crops/wintering-cows-on-crops/

Creating a wintering plan video

Watch this video and find out how to create a wintering plan using the DairyNZ Wintering on crop and pasture guide.



Wintering cows on crop in the South Island is an activity that requires attention to detail in multiple areas to be done well, these include:

- Environmental management,
- Animal care,
- Feed allocation and planning,
- People management and
- Finance

Scientific research has provided:

- Options to reduce the environmental impact of crop grazing
- Key indicators of cow comfort and wellbeing
- Feed quality, utilisation and performance targets and
- A whole of system understanding of a range of wintering systems

This knowledge has resulted in good management practices for:

- Crop paddock selection and setup
- Crop establishment
- Grazing management
- Post-grazing management

For more information go to https://www.dairynz.co.nz/feed/crops/wintering-cows-on-crops/

As we head into winter it is important that a grazing management plan for all crop paddocks is established. Key factors to consider are:

Transitioning

- Ensure that cows are transitioned onto crop effectively to minimise digestive upsets.
- Transitioning requires a gradual introduction of the crop so that the rumen can adapt to the new feed type; 7-10 days for brassicas, 14-21 days for fodder beet
- Ensure that enough supplement/pasture is offered during this transition period to meet cow energy requirements as the crop allocation is increased.

Feed allocation and utilisation

- Ensure that stock are offered sufficient feed to achieve body condition score targets over the winter period
- Be realistic with utilisation levels of crop and supplement when working out allocations

Cow condition

- Planning for achieving BCS targets should start in autumn to utilise milking frequency and dry off date, therefore minimising the amount of body condition gain required during winter
- Cows in good body condition are better able to withstand cold as the fat layer beneath the skin acts as an insulating layer therefore plan to gain condition early.
- Establish initial wintering mobs based on BCS and priority feed those with the biggest BCS gain requirement
- Monitor cow condition regularly through winter and adjust feed allowances and mob makeup if targets are not being achieved

Cow lying time

- Ensure cows have access to drier areas so they achieve eight hours lying time per day.
- Have a 'Plan B' for prolonged periods of extreme wet

Cold Stress

- In cold and wet weather allow for decreased utilisation of crop and increased cow demand for energy.
    - Offer more supplement or Increase the crop allocation or increase the frequency of moving the break
- Watch the weather predictions and be proactive in implementing your 'Plan B' to reduce cold stress

Utilisation and back fencing

- Reduce crop wastage by moving the fence once or twice a day rather than offering a few days feed at a time
- Offer long feeding faces rather than blocks. All cows should be able to access fresh feed at the same time
- Back fencing is a good way of reducing excessive movement of animals and ongoing damage to soils

Managing Critical Source Areas (CSA's)

- Fence off CSAs and leave ungrazed or graze quickly in dry conditions at the end of the paddock grazing.

Water access and portable troughs

- Ensure animals always have access to water troughs. Portable troughs are a good way to minimise unnecessary movements and should be kept close to the feeding face to limit cows walking.

Calving cows on crop

- Cows should not calve on the crop paddock. Ensure that cows are inspected regularly and drafted out to ensure they return to pasture and receive appropriate mineral supplementation at least two weeks prior to their expected calving date.

Smart Wintering Events

Are you prepared for winter 2020?

DairyNZ and Beef+ Lamb, with support from Environment Southland and Otago Regional Council, invite all farm owners and managers, farm staff and rural professionals to join us for a workshop on wintering good management practice and creating a wintering plan for your farm.

The workshop will cover

- Why wintering is so important for Southland/South Otago
- What wintering good management practice research tells us
- Creating a wintering plan which includes:
  - Critical Source Areas and waterway management
  - Strategic grazing
  - Stock management
  - Planning for adverse weather events during & developing a Plan B

Come along with your team and set yourself up for a successful winter period this year

When	Region	Venue
Wednesday 25th March, 10:30-1:00	Taieri/South Otago	Henley Hall, Centre Road, Henley
Wednesday 25th March, 6:00-8.30	Clydevale/West Otago	Tapanui Community Centre, 1 Suffolk Street, Tapanui
Thursday 26th March, 10:30-1:00	Hedgehope/Browns	Hedgehope Community Hall, 1421 Rakahouka-Hedgehope Road, Hedgehope
Thursday 26th March, 6:00-8.30	Wyndham/Mataura	Wyndham Rugby Club, Memorial Drive Wyndham
Tuesday 7th April 10:30-1:00	Mossburn/Te Anau	Mossburn Community Centre, Devon Street, Mossburn (access via the memorial gates opp Mossburn Diner)
Tuesday 7th April 6:00-8:30	Drummond/Central	Drummond Golf Club, Boundry Road Drummond
Wednesday 8th April 10:30-1:00	Gore	Heartland Hotel Croydon, Gore
Wednesday 8th April 6:00-8:30	Riverton	Riverton Rugby Club, 45 Leader Street, Riverton
Thursday 9th April, 10:30-1:00	Tuatapere/Western	Waiau Town and Country Club, 41 King Street, Tuatapere

For more information contact Ronda Ridsdale ronda.ridsdale@dairynz.co.nz or call 03 2182274

Tree-warding

As part of The Vision is Clear campaign, we are encouraging Kiwis to think about how they can protect our waterways and providing opportunities to make it easy to get involved.

Find out more here at https://www.dairynz.co.nz/environment/the-vision-is-clear/do-something-tree-warding/

Do Something Tree-warding is an easy way for anyone to make a difference simply by donating a native tree.

100% of the donations made are passed on to conservation charity Trees That Count and will result in a real native tree in the ground; planted in a community project to benefit New Zealand's precious waterways.

Why? Because native trees really are Tree-warding: They help reduce sediment and filter out nutrients before they reach waterways, prevent soil erosion, reduce greenhouse gases, and provide shade and habitats for birds, fish and insects – all adding up to healthier waterways.

How it works

1. Donate a tree

Head to GrabOne and donate a native tree (or more!) to Trees that Count to help our waterways – just $10 each.

2. Your tree gets allocated to a planting project

100% of your donation is passed on to Trees That Count and matched with a community planting project to benefit a waterway. Your tree will hit the ground in the 2020 planting season.

3. We'll keep you up to date

Trees That Count will let you know where your tree (or trees) will be planted.

You can see the number of trees donated and planting projects supported here https://grow.treesthatcount.co.nz/funders/thevisionisclear#plantings
Like The Vision is Clear on Facebook https://www.facebook.com/thevisionisclearnz/ or follow us on Instagram https://www.instagram.com/thevisionisclearnz/ for more updates.

Help spread the word using the hashtag **#thevisionisclear**.

Every tree planted makes a difference, so do something Tree-warding today!

Research program detail Farm Systems Trial-2021

Background

The Research Advisory Committee (RAC) held a series of meetings and workshops to discuss farm systems options for implementation from 1 June 2018 for 3 lactation seasons. A brainstorming session was used to identify issues facing dairy farmers in Southland and Otago. These issues were collated into 13 themes from which the top 3 were identified.

The top 3 issues were:

1. **Fodder beet**
2. **Nutrient loss reduction**
3. **Wintering**

There is a desire to understand crop vs **off-paddock wintering** and the **impact of infrastructure on whole system performance**, profitability and achieving environmental regulation. Realistically, however, it will be a 2-3-year timeline before this could be considered on the SDH farm due to the current lack of infrastructure and the tight budget situation.

The proposed systems have been designed to better understand crop-based wintering in relation to consequences for environmental impact and profit with the view that the best crop system would be used as the base farm in the next phase of farm systems comparisons (2021 onwards), that might include off paddock infrastructure.

The Process

The Standard kale system was set up as the base model in Farmax Dairy. The results of this were used to generate the key input parameters for the Standard fodder beet system.

Further management changes were considered (reduced N fertiliser, less supplementary feed, reduced stocking rate, dry off date) for each to generate the parameters of the two reduced impact systems.

During the modelling process we identified several physical aspects of the farm and a constraint of OVERSEER that could impede model results being achieved. These are:

1. The pasture growth of the farm (we may have been optimistic on the time to reach potential yield given the early stage of farm conversion).
2. Choice of in-shed supplement and amount that can be consumed during milking
3. The uncertainties associated with N leaching estimates for autumn-grazed fodder beet crops.

System Performance and Input Parameters

Table 2: System performance and input & output parameters

		Crop Type	
All Systems		5-10 Aug Planned start of calving ≥ 250 days in milk 23% replacement rate No N applied after 10th April or if soil temperature <5 °C in spring Youngstock off	5-10 Aug planned start of calving ≥ 250 days in milk 23 % replacement rate No N applied after 10th April or if soil temperature <5 °C in spring Youngstock off
		Kale	**Fodder beet**
N Input	**Standard Environmental Impact System**	≥1300 kg MS/ha (milking platform) Up to 250 kg N/ha for 2018-19; 200 kg N/ha thereafter; after each grazing Up to 700 kg/cow lactation supplement (home grown first, use driven off pasture deficit) Lactation supplement PKE/grain and pasture silage Winter crop – kale 3.1 cows/ha	≥1300 kg MS/ha (milking platform) Up to 250 kg N/ha for 2018-19 200 kg N/ha thereafter; after each grazing Up to 700 kg/cow lactation supplement (home grown first, use driven off pasture deficit) Lactation supplement fodder beet and pasture silage Winter crop - fodder beet 3.1 cows/ha
	Reduced Environmental Impact System	30% lower N leaching Lactation supplement PKE/grain and pasture silage Up to 75 kg N/ha for 2018-19; 50 kg N/ha thereafter N applications – Sep, Dec, Feb/Mar Winter crop - kale 2.6 cows/ha	30% lower N leaching Lactation supplement fodder beet and pasture silage Up to 75 kg N/ha for 2018-19; 50 kg N/ha thereafter N applications – Sep, Dec, Feb/Mar Winter crop – fodder beet 2.6 cows/ha

Yellow – highlights that this system is the control system

Several mitigations to reduce the environmental impact were also considered in the pre- experimental modelling and farmlet design.

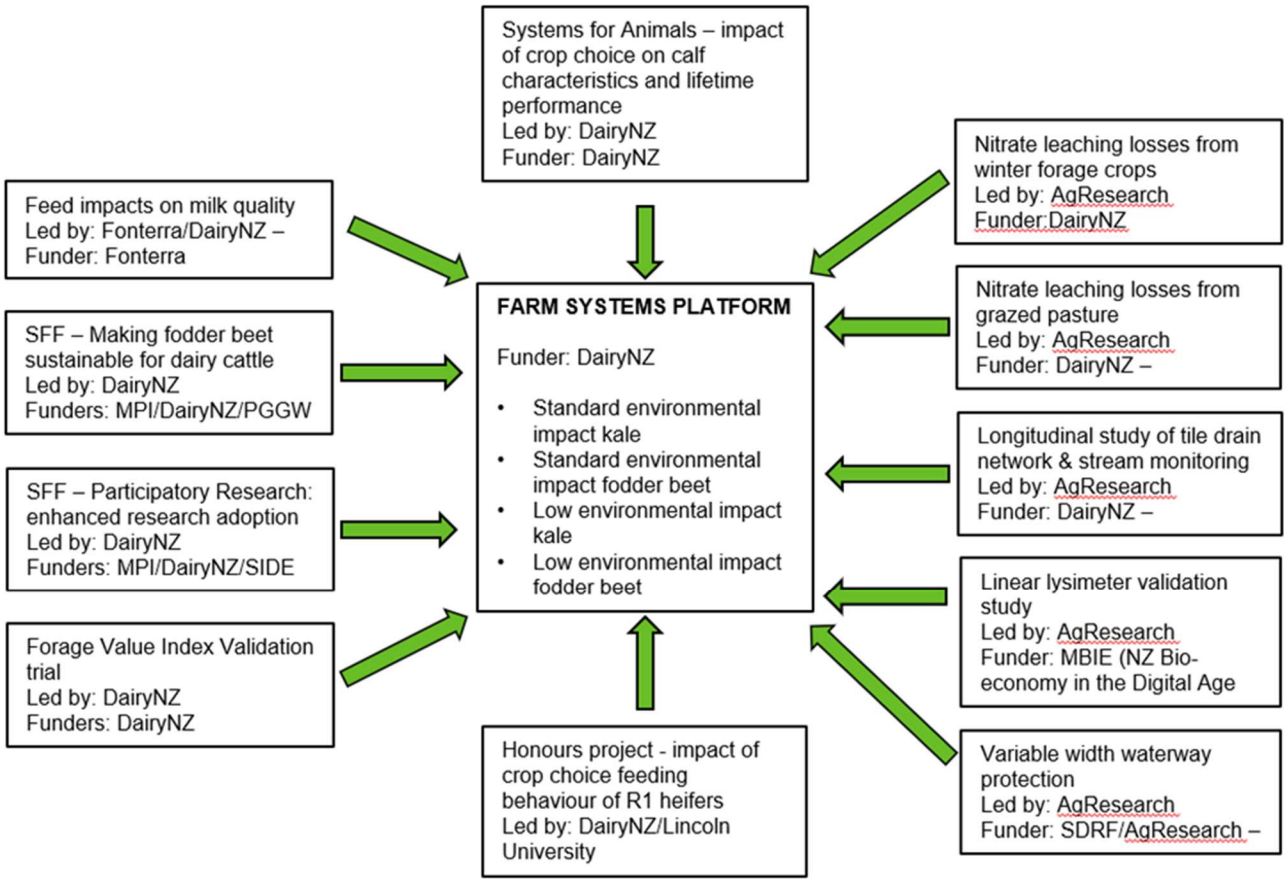
But the RAC opted to only consider system changes where there is high confidence in reducing the environmental impact, with current modelling available.

Current Research Activities at SDH

The farm systems comparison funded by DairyNZ forms the base research platform at the Southern Dairy Hub.

Other research projects led and funded by a number of organisations are using this platform to address key research questions relating to the systems that are being implemented or the issues currently facing dairy farmers in Southern regions.

The current suite of research projects is summarised in the diagram below.



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

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