SOUTHERN DAIRY HUB

Leading Innovation for
Southern farmers' propserity

SOUTHERN DAIRY HUB

October Field Day 2023

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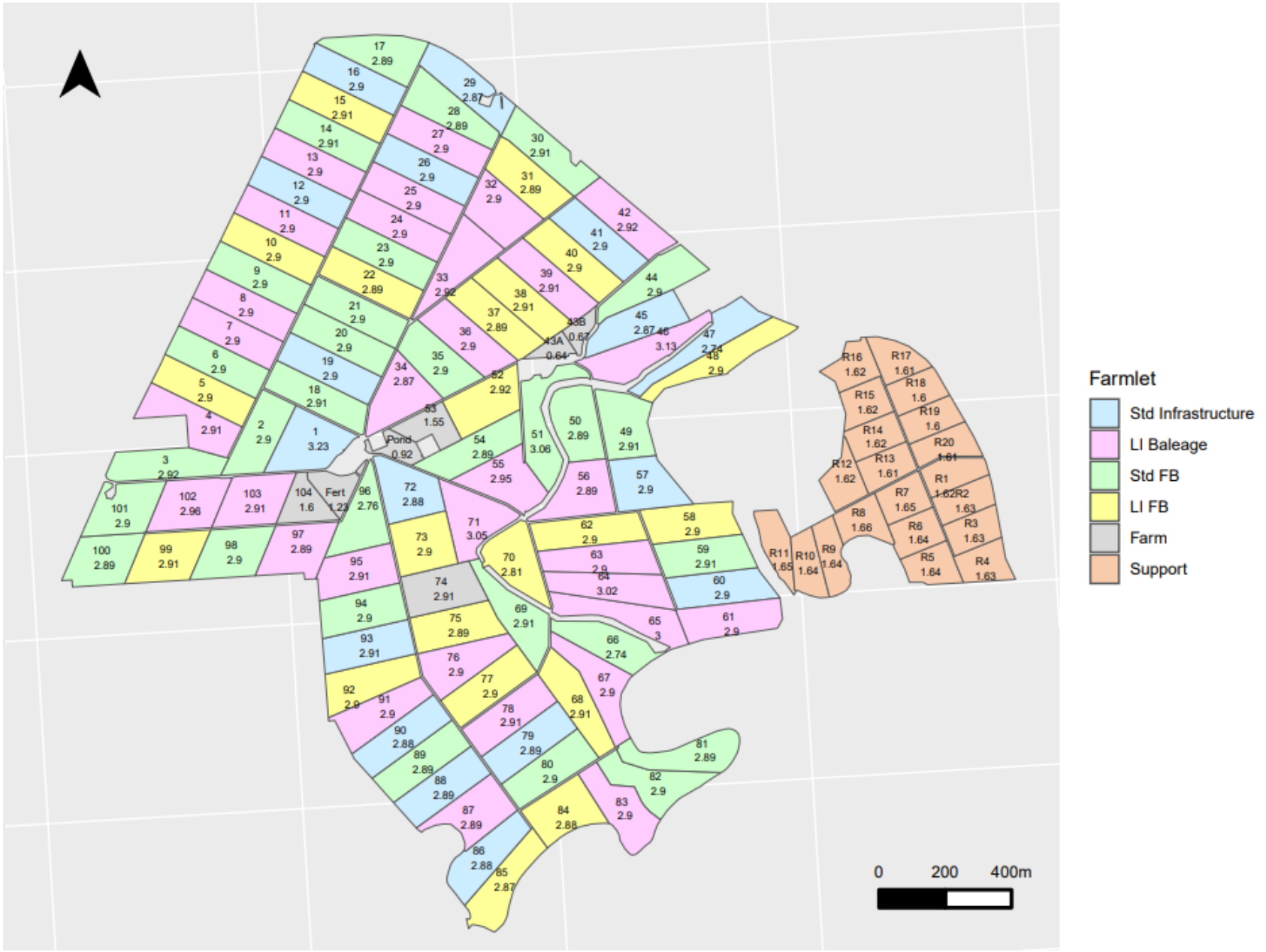
Contents

Farm Map


Farmlet
Std Infrastructure
LI Baleage
Std FB
LI FB
Farm
Support
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200
400m
Pond
0.92
Fert
1.23

Visitor Health and Safety Requirements

Entry onto property by permission and appointment only.

Contact either:

General Manager Andrea Dixon 027 564 5595 or

Farm Manager Billy Singh 021 115 5658

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

- 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 

- 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

Biosecurity Requirements for Southern Dairy Hub (SDH)

All visitors must comply with Biosecurity Requirements when visiting SDH

- All footwear must be disinfected with materials supplied, upon arrival at and departure from the SDH farm site.
- 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, from anyone within five days of their arrival in New Zealand from overseas.
- SDH retains the right at any time to refuse access to any person or persons deemed not to be complying with these requirements.

2023-24 Season to date update

Pasture supply

Strong pasture growth through autumn resulted in higher average pasture covers than the feed budget targets on farm at dry off. One mob of 100 cows were kept on farm for 2 weeks to take the tops out of the high mass paddocks before heading to the support block for wintering on baleage. While this helped, strong growth through June, July, and August (Figure 1) resulted in pre-calving covers greater than 2500 kg DM/ha (Figure 2). Season to date the farm has grown on average 350-400 kg DM/ha more than the same time last season (Table 1). Supplement fed in the first round was predominantly the inshed mineral blend with a small amount of baleage in individual paddocks.

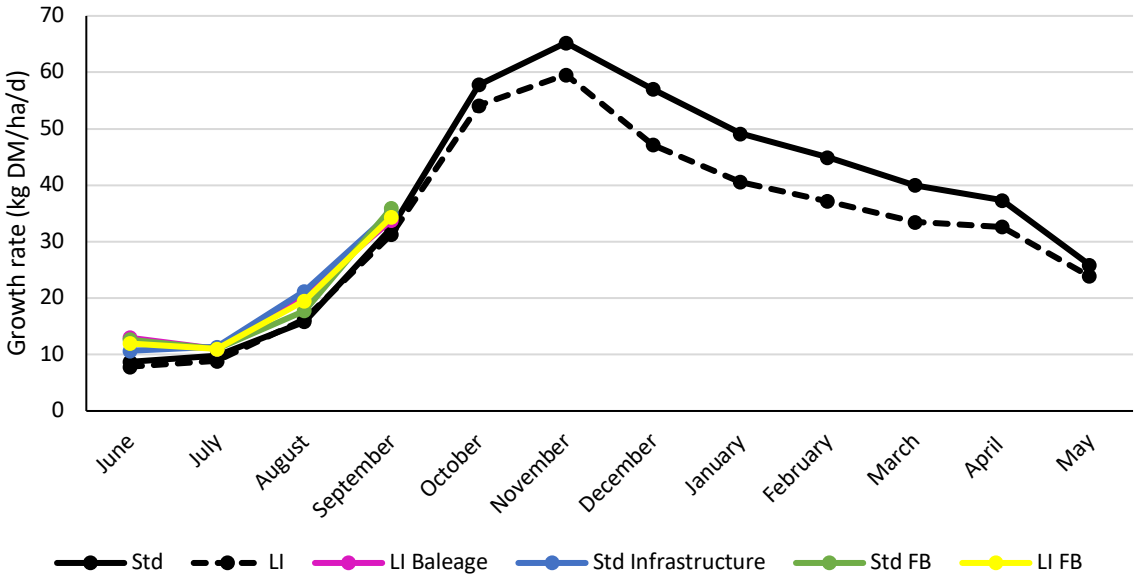


Figure 1: *Average monthly pasture growth rate for 2023-24 season compared with the 5-year average*

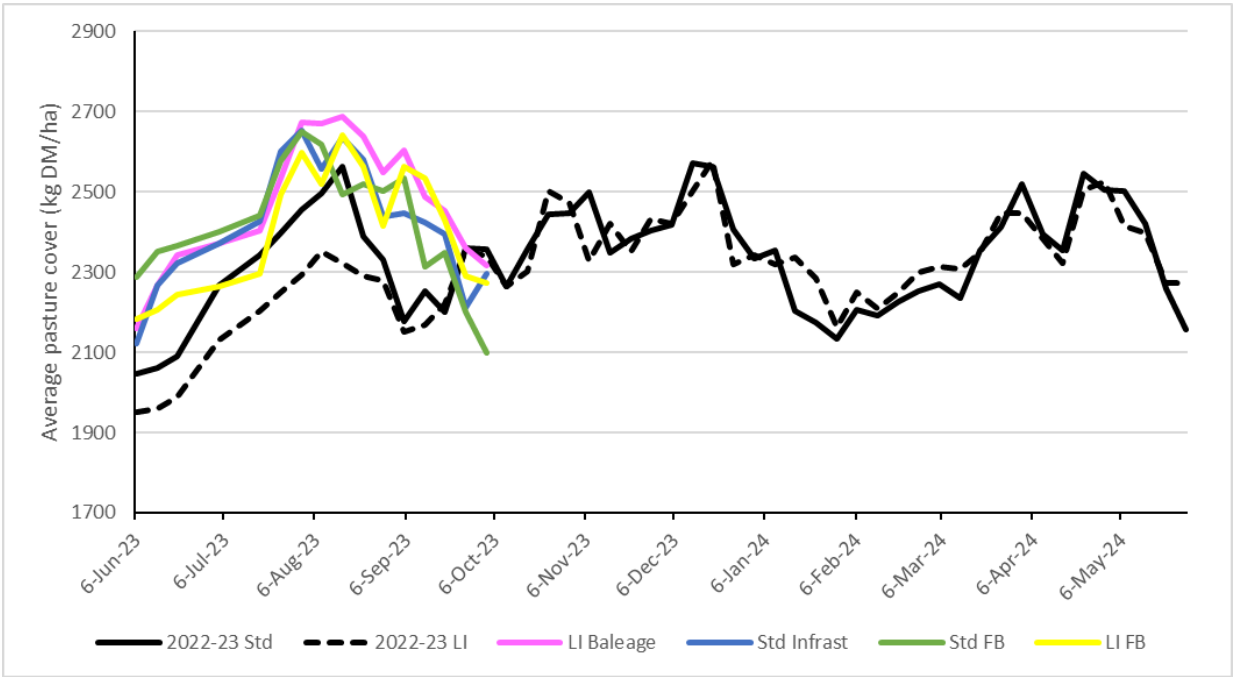


Figure 2: *Average weekly pasture cover (kg DM/ha) compared with the 2022-23 season*

Table 1: Average monthly growth rates compared with the previous 4 seasons.

SDH monthly growth rate summary												
	180-190 kg N						50 kg N					
	Mean	2019-20	2020-21	2021-22	2022-23	2023-24	Mean	2019-20	2020-21	2021-22	2022-23	2023-24
June	9	6	12	10	7	13	9	7	9	11	5	11
July	10	12	7	12	10	11	9	10	8	9	9	11
August	17	13	19	19	13	19	17	14	19	18	15	20
September	30	29	31	31	39	35	29	26	32	30	37	35
October	57	56	50	65	61		53	50	50	58	59	
November	65	69	67	59	66		59	62	61	53	63	
December	53	53	57	50	69		43	48	44	37	60	
January	55	50	73	43	31		44	44	52	37	30	
February	49	51	57	41	31		40	42	41	36	29	
March	39	42	51	23	43		32	32	42	22	39	
April	33	42	33	24	51		28	33	32	20	46	
May	24	23	24	25	31		22	20	21	24	30	
STD (kg DM/ha)	2019	1809	2087	2160	2068	2370	1944	1742	2034	2056	1986	2362
Total (kg DM/ha)	**13408**	**13479**	**14535**	**12264**	**13744**		**11655**	**11776**	**12419**	**10816**	**12793**	
Diff to Average						**351**						**418**

Pasture quality

Despite the high pasture mass, the first-round pastures were of high quality both in terms of energy and crude protein. With the introduction of plantain to our pastures last spring the monitoring programme includes pastures with and without plantain (Table 2). We are expecting more variability in second round pasture quality due to not achieving suitable residuals for all paddocks in the first round due to issues associated with the flooding and wet conditions in September.

Table 2: Average pasture quality for the first and second (till 3 October) pastures with and without plantain.

		DM (%)	ME (MJ/kg DM)	Crude protein (% DM)	NDF (% DM)	ADF (% DM)	Ash (%)	NSC (% DM)	Soluble Sugars (% DM)
With Plantain	1st round	17.8	12.3	19.3	38.1	19.5	9.8	29.4	12.4
	2nd round	15.3	11.8	22.0	41.6	21.5	11.5	21.4	12.4
No Plantain	1st round	17.3	12.1	21.1	39.8	20.7	10.3	25.2	10.6
	2nd round	16.6	12.3	23.6	42.9	20.7	10.1	19.3	10.1
Range		15.7-20.5	11.4-12.5	16.3-24.8	32.8-47.5	17.8-22.5	8.7-14.9	15.1-34.5	6.1-15.1

Wintering

This season two herds wintered on baleage and the other two on fodder beet followed by baleage in our optimised fodder beet system. In this system the cows started their transitioning up to 3 kg of fodder beet before dry off then up to their winter allocation of 9.5 kg DM fodder beet once dry. Cows were drafted off fodder beet onto a baleage & pasture diet 4 weeks before their expected calving date. Pasture comprised approx. 1.5 kg of their diet DM.

Fodder beet yields on farm this year were the best we have grown, averaging 21.7 T DM/ha for the direct drilled crop and 28.1 T DM/ha for conventionally established crops.

Proactive management of body condition score in autumn resulted in less variation in BCS heading into winter. As a result, we were able to achieve pre-calving BCS targets (5 for mixed age cows and 5.5 for heifers and R3's)

by planned start of calving (Figure 3). In general, the cows wintered on fodder beet wintered better than those wintered on baleage. The LI baleage farmlet were wintered at the support block and were affected by the July flood. Cows have maintained BCS well through spring with herd currently averaging BCS 4.9 although we are now starting to see more in the 4 to 4.5 BCS range.

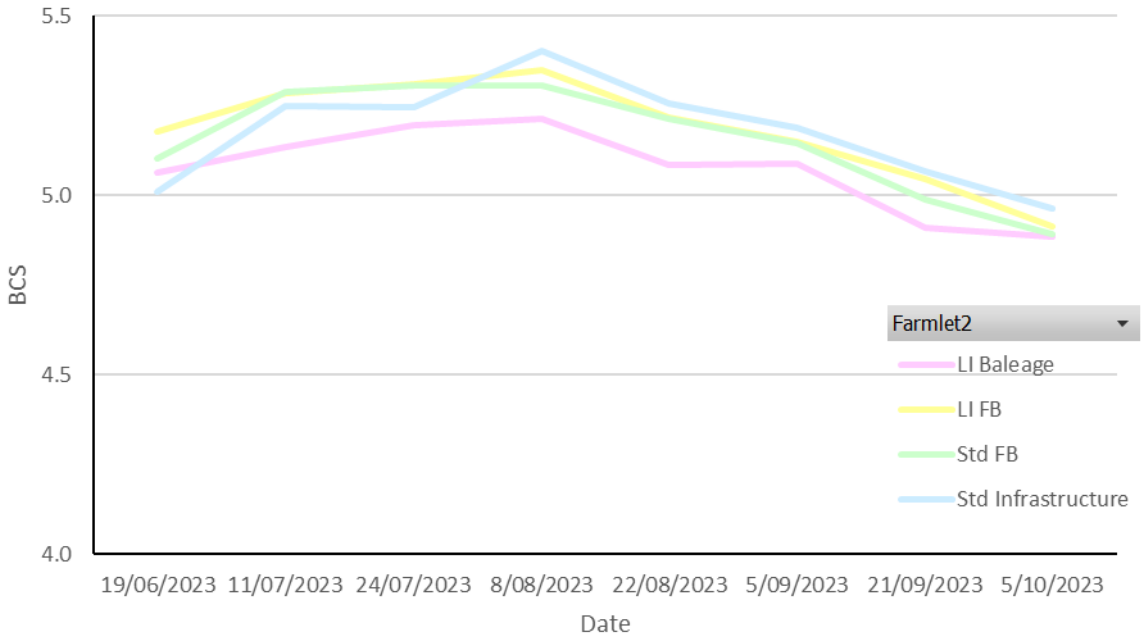


Figure 3: *Average herd BCS since the start of winter*

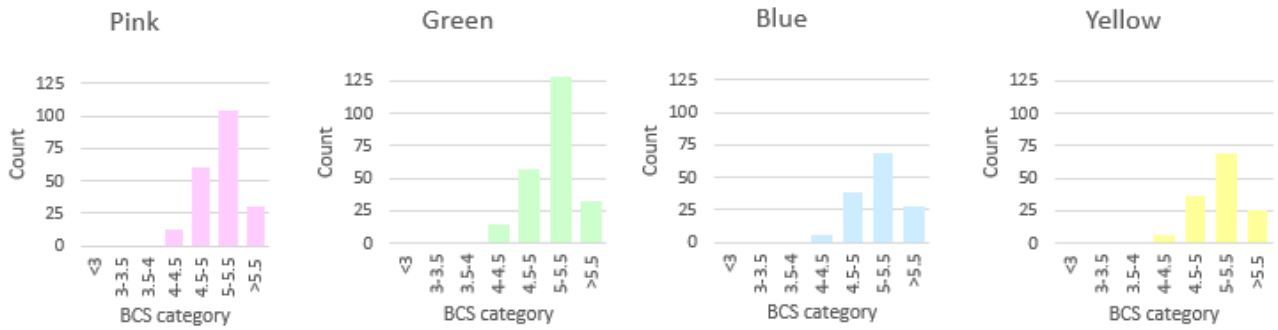


Figure 4: *Herd BCS range*

Springer Management

Cows were drafted off their winter diet at least 2 weeks before their predicted calving date onto a diet of 50:50 autumn saved pasture and baleage and supplemented with MgO and DCP (fodder beet wintered cows only). Pre-graze pasture mass was between 3500 and 4000 kg DM/ha.

Three springer mobs were run through the first 5 weeks of calving:

- Heifers and cows mated to non-replacement semen
- Baleage wintered cows
- Fodder beet wintered cows

Calving

Planned start of calving was intentionally delayed by 2 days for this season following 30% of cows calving before the planned start of calving in spring 2022. Surprisingly cows have calved much closer to their predicted calving dates this season with only 10-15% of the animals calved by the planned start of calving. There are currently 2 cows left to calve.

Following calving the colostrum cows were run as a single mob and offered 1 kg DM of inshed feed with our custom mineral mix plus 16 kg DM pasture. Because of the high average pasture cover on farm baleage was not required to achieve intake targets within the spring rotation plan area allocation (Figure 5).

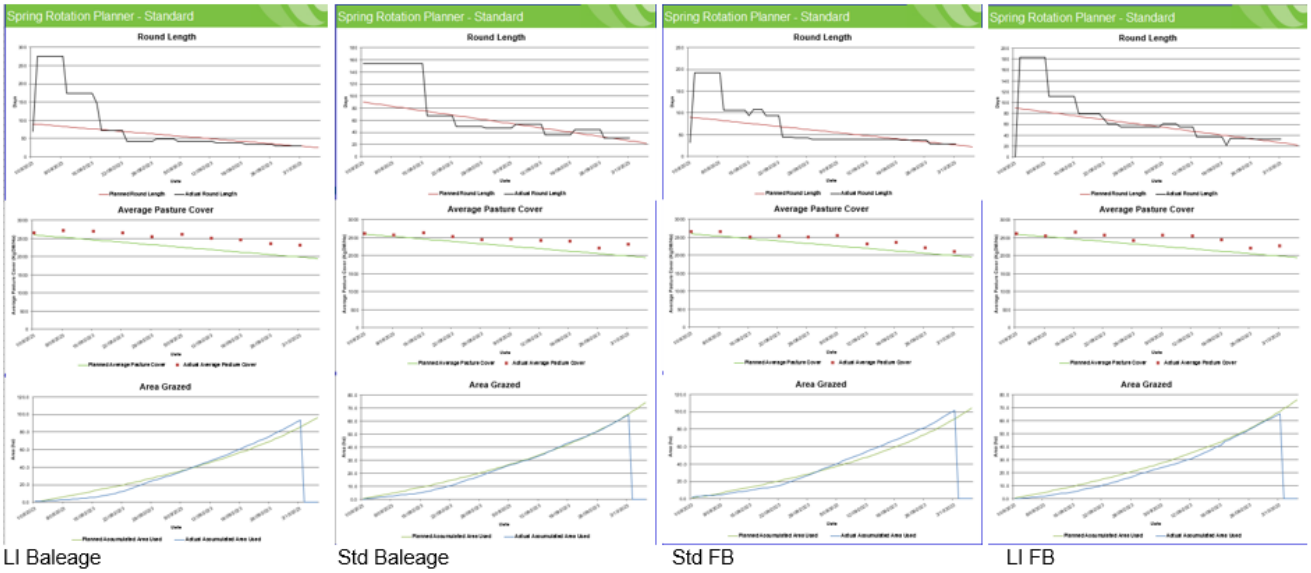


Figure 5: *Spring rotation plan tracking for each of the farmlets*

Milk production

With the slightly later planned start of calving milk, fewer cows calved before planned start of calving and more cow losses through winter & spring (dry off issues (4), slips (9) and calving related issues (6)) milk supply is lagging behind last season by approximately 5% (Figure 6). The gap started to close in mid-September however the significant flooding event on the farm is impacting peak milk production.

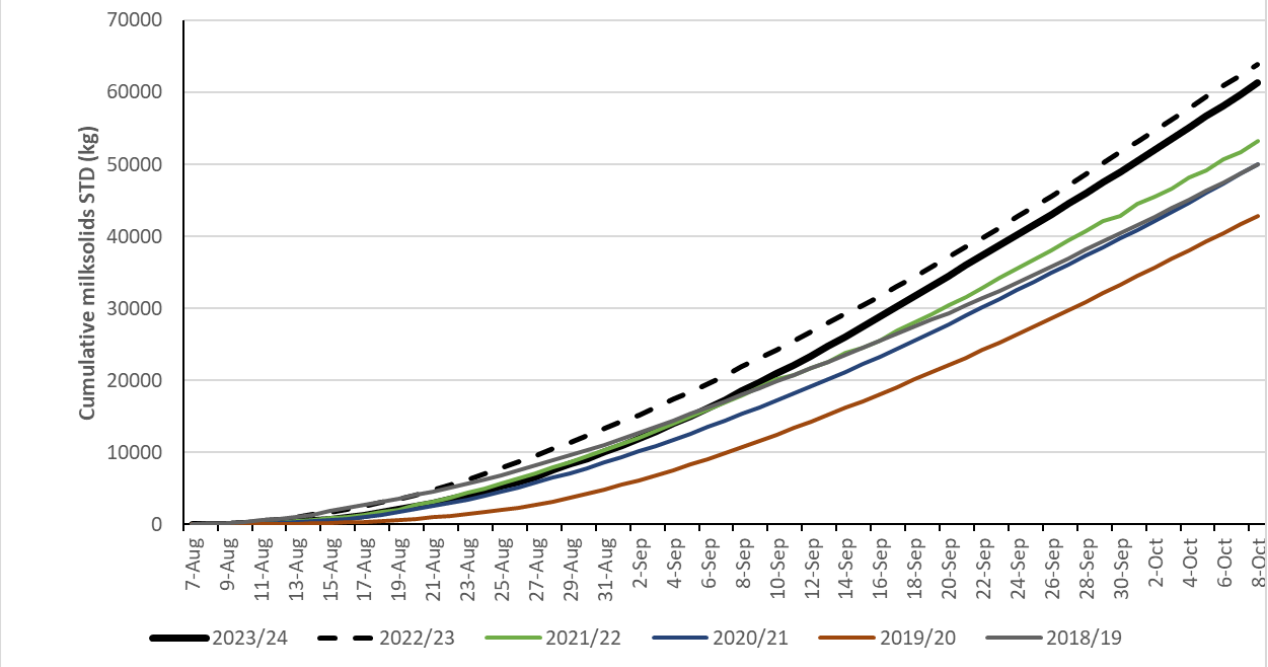
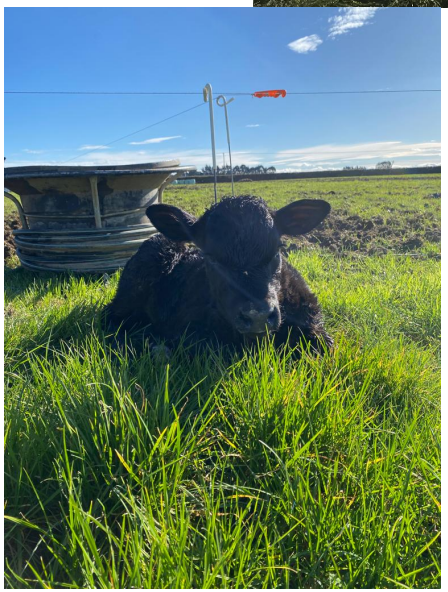


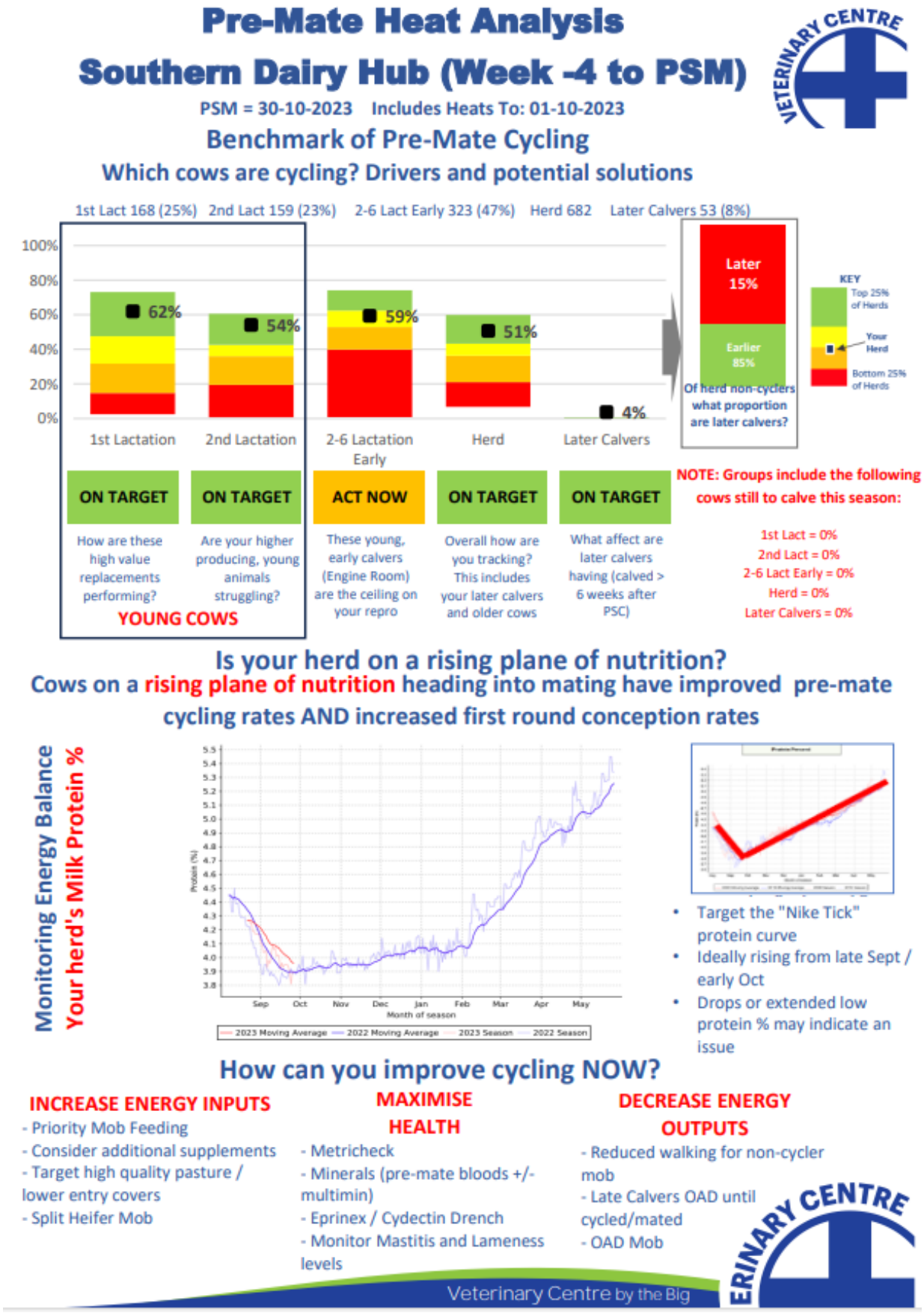
Figure 6: *Cumulative milk solids production season to date*

SDH winter in pictures

SDH spring in pictures



Utilising collar technology - Ryan Luckman Veterinary Centre



Collar Fertility Overview Report

2022/23 Season

Farm	Southern Dairy Hub			PSC	6/08/2022	PSM	30/10/2022
Herd Size	728	MA	542	1st Lactation	186	2nd Lactation	149

Key Outcomes Days in Milk

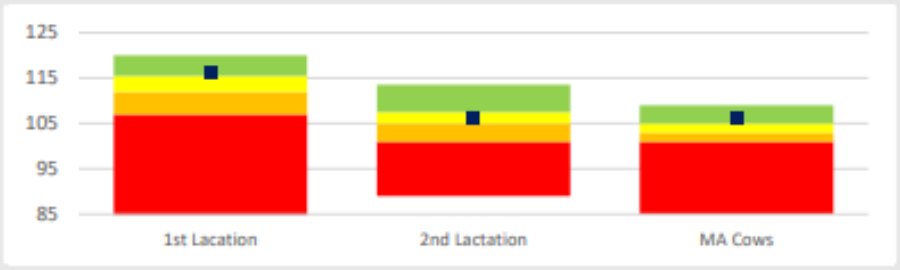
Calving pattern drives Days in Milk!

Earlier calving cows have increased days in milk (DIM) and this is a key driver of farm productivity.

** Note: Days in milk may not always highlight tail-end calvers. Please refer to separate Proportion of Later Calvers Graph at bottom of report.*

Average DIM/Cow for this season

Average DIM per cow from planned start of calving (PSC) until 120 days after PSC



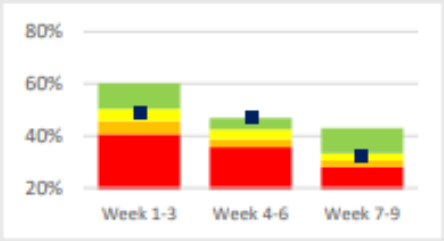
Key Outcomes Mating Period

Were there problem periods during mating?

Getting cows pregnant consistently across the whole mating period is key for a desirable future calving pattern, low Not-In-Calf rates and lifetime efficiency. It also provides scope for herd improvements.

In-Calf Rate

Percentage of non-pregnant animals conceiving in each 3 week mating round. This can highlight changes in nutrition over mating.



9 Week Not-In-Calf Rate

Percentage of animals Not-in-Calf by week 9 (therefore late calvers or MT). Indicates potential cow wastage.

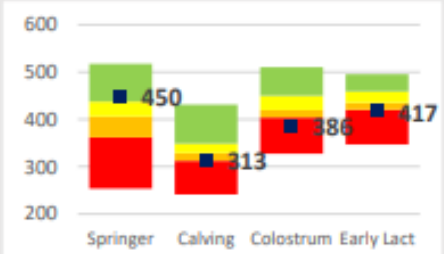
Pericalving Milestones

How did your cows transition?

Rumination activity gives an indication of how well the cows transitioned into lactation and Collar Health Events give an indication of underlying nutritional issues or peri-calving disease (eg metritis, metabolics & severe mastitis).

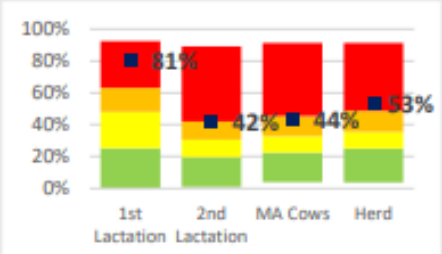
Rumination Activity

Mins/Day for Each Period



Collar Health Events

% of Group Affected



Premate Milestones

How did your cows cycle premate?

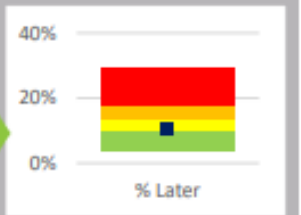
The proportion of cows cycling at Day -7 from PSM is influenced by transition success and early season nutrition. Later calving cows are less likely to cycle by the PSM

Cows Cycling by Day -7 from PSM

The following graphs highlight to what extent age and later calvers influenced cycling. Early calving young cows should cycle well by the PSM and issues in this group can highlight a more generalised nutritional or transition problem.

Proportion of Later Calvers

Calved >6 weeks after PSC



How many later calvers did you have?

Heat Stress in Southland – Kirsty Verhoek DairyNZ

Do cows in Southland get heat stressed?

Heat stress in cows is a significant seasonal challenge in some regions, and hotter weather is expected to become more common in New Zealand.

Like people, cows also feel the effects of hot weather, but cows begin to experience heat stress at much lower temperatures than humans, preferring temperatures below 20°C. This is partly because cows generate heat by digesting feed and producing milk. They absorb solar heat when out in the sun. Heat stress occurs when cows have more heat than they can shed, which creates discomfort and reduces milk production and fertility.

Identifying heat stress

The key changes to look for when identifying heat stress include:

- Cows breathing faster. See ***Figure 7*** which explains how to check a cow's breathing rate. Less than 7 breaths in 10 seconds means cows are comfortable, and ≥10 breaths in 10 seconds are an indication that cows need cooling opportunities.
- Cows standing more but grazing less.
- Cows crowding in shade.
- Increased water intake and cows hanging around troughs.
- Cows walking slower to and from the shed.
- Less milk in the vat.

Figure 7. *Checking breathing rate. Sourced from DairyNZ www.dairynz.co.nz*

Understanding heat load

Managing heat stress in cows is crucial for their well-being and to maintain milk production. To do this, it is important to know how hot your cows are feeling (i.e., their heat load). You can do this by watching for fast breathing, drool and sometimes with the mouth open (see an example in ***Figure 8***). It is even better if you can use a combination of weather forecasts and cow-specific factors for assessing heat stress risk.

Figure 8. *Cow at Southern Dairy Hub exhibiting signs of heat stress on a hot day with mouth open, panting and tongue sticking out.*

If you are in a place where it is not very humid, just looking at air temperature can help. But in more humid areas, you also need to think about the humidity because it makes it harder for cows to cool down by sweating and breathing faster.

The Temperature Humidity Index (THI) is a well-researched global indicator which combines air temperature and humidity to have a better understanding of how hot it really feels. For example, if the THI is 68, it is like having a temperature of 22°C and 50% humidity.

However, cows on pasture are also exposed to solar radiation and wind, which means that THI may not be accurate for New Zealand cows that are grazing outdoors.

In New Zealand, researchers have been developing a tool called the Grazing Heat Load Index (GHLI) to assess heat stress in cows while they are out grazing. This index helps to gauge the impact of heat on cows' well-being. This index considers not only the temperature and humidity, but also factors like how sunny and windy it is, and related it to cow respiration rate, which is a common indicator of heat stress. Work so far has reported a GHLI threshold of 70 when dairy cow welfare is compromised due to heat, although cows do increase their breathing rate more steeply before this threshold, at around a GHLI of 65 (***Figure* 9**). For example, if the GHLI is 65, this is like having a temperature 21.5°C, with light winds and sunny conditions (***Figure 9***).

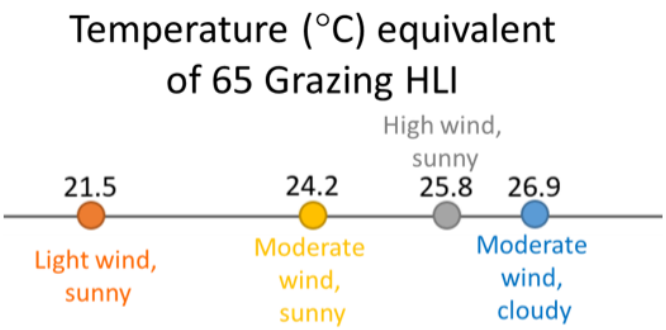


Figure 9. *Grazing Heat Load Index (HLI) assesses heat stress in cows while they are out grazing. This index considers not only temperature and humidity, but also how sunny and windy conditions are. Cow respiration rate starts to increase steeply from a GHLI of 65, which can be equivalent to a range of conditions such as that pictured here.*

Our current research

DairyNZ, in collaboration with AgResearch and Fonterra, are working together to better understand heat stress in New Zealand as part of the New Zealand Bioeconomy in the Digital Age (NZBIDA) research programme. We want to make sure that the GHLI we use in New Zealand is as accurate as possible.

To do this, we have gathered data from research and commercial farms all over the country. We are also exploring technology like rumen boluses and collars to monitor factors like rumen temperature and how much cows are panting. These are signs that can tell us if a cow is getting too hot. In the summer of 2023, we watched cows on eight farms in different regions, including Northland, Waikato, Canterbury, and Southland. We looked at how fast cows were breathing, whether they were panting, and used sensors to collect additional information such as rumen temperature. We also monitored milk production and recorded weather data at each site.

This was the first-time we have collected so much data from cows in the South Island. The North Island had a wetter summer and did not get as hot as the South Island, but it meant the weather was quite different from one place to another **(*Figure 10)***. Cows were observed to have respiration rates over 60-70 breaths per minute which is an indication that heat stress is starting to occur. In the South Island, cows were observed to have respiration rates up to 100 breaths per minute indicative of heat stress. While these results are preliminary, they are an example of how respiration rate relates with air temperature.

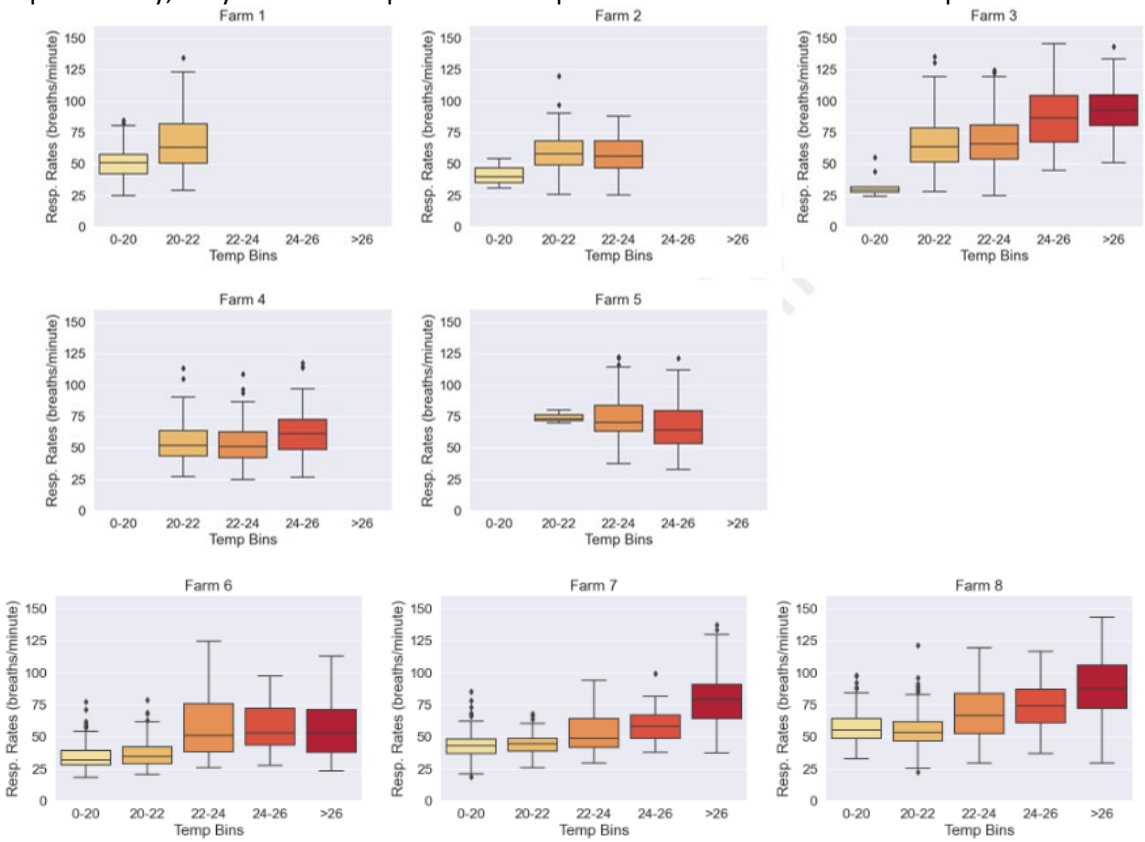


Figure 10. *Cow respiration rate (breaths per minute) observations plotted against air temperature bins (degrees Celsius) for farms located in the North Island (farms 1 to 5) and South Island (farms 6 to 8).*

How do we manage heat stress into the future?

Changes in our climate and how we farm increase heat stress risks for our dairy cows. It is not just an issue in warm places like Northland; even in Southland, there is a risk of cows getting too hot.

To tackle this, it is recommended that when the temperature goes above 20°C (depending on how humid it is and whether it is sunny or windy), farmers should look at their cows and consider providing cooling opportunities.

Farmers are already using various strategies to mitigate heat stress:

- Providing shade from trees or buildings (***Figure 11***)
- Making sure there is plenty of water troughs with clean, palatable water, and good water pressure to refill troughs.
- Adjusting milking routines to avoid walking in peak heat.
- Using sprinklers and fans in the dairy shed at milking.
- Carefully choosing where the cows graze to reduce their heat load (i.e., maximise shade, minimise walking distance etc).

Figure 11. Provision of shade to reduce heat load in cows. Photo credit: Karin Schutz

With the data we are collecting and learning about, we are getting better at predicting when cows might start to feel too hot. This means that we can use these strategies even more effectively in the future.
Looking ahead, we want to learn more about how factors like the cow's breed, coat colour, and the farm's set up affect heat stress. In New Zealand, where cows graze outdoors, we need to understand how this heat affects their milk production and what the other signs of heat stress might be so we can better predict it. We also want to understand if the "too hot" threshold might change as our climate changes, especially in different parts of the country.
To achieve this, technology will play a key role in data collection. This means we will not have to rely on manually counting how fast cows breathe, which is how we do it now. The goal is that by using technology, farmers will ultimately be able to make decisions that improve cow well-being and, consequently, milk production.

Call to action:
1. Identify when your cows might be heat stressed.
2. Have strategies to deal with it.

AgResearch Bale Grazing - Dr Ross Monaghan, Chris Smith and Dylan Ditchfield

Soil Armour

Bale grazing for preserving soil armour and soil function - another option for cow wintering

1 What is bale grazing? Bale grazing uses established pasture and a grid of pre-placed hay bales to winter cows.

A winter bale grazing system is being compared to a winter-grazed kale crop at a site in northern Southland to see if it provides benefits for soil and water quality, and cow welfare. The project has almost completed its third year of measurements and some preliminary messages have emerged.

Soil conditions are better than observed for kale-grazed plots, as evidenced by scores for soil roughness, pug depth, infiltration rate and Visual Soil Assessment.

2 How fast does pasture recover? Pasture recovery following winter grazing is reasonably rapid.

Immediately after grazing

17 June

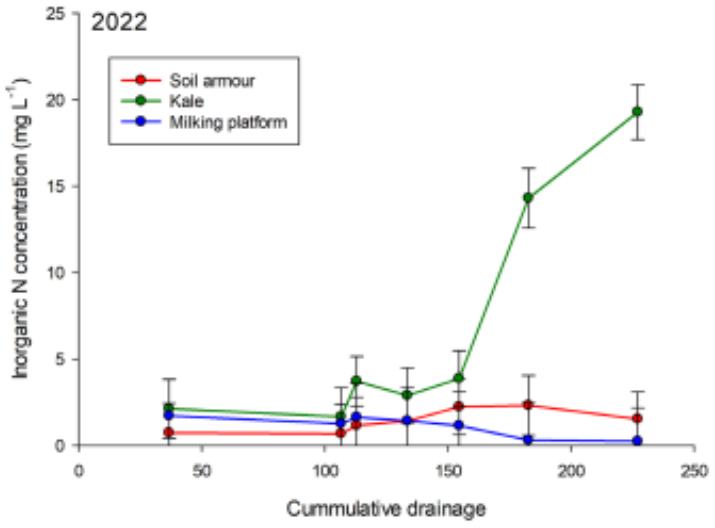
4 weeks after grazing

41% less bare soil

10 weeks after grazing

<10% bare ground

3 What about nitrate leaching? Nitrate leaching losses (2022) are lower, on both a per hectare and per cow wintered basis.



N leaching loss is approximately one quarter that estimated for kale treatment (per cow wintered).

4 Do the cows like it? Cow comfort is greater for bale grazing cows (2022 monitoring).

Bale grazed cows:

- Spent more time lying and in postures indicative of greater thermal comfort
- Spent more time ruminating
- Were warmer (skin temperature) and cleaner

Suggested Design Criteria

Grazing pressure of 16 m2/cow/day

For 100 cow mobs: feed 0.5 ha (3,000 – 4,000 kg DM/ha covers) in 3-day breaks with 15 large round hay bales

A well-drained soil helps

Bale Grazing information – Farmers Observation/Perspective

Freedom Acres Dairy Farm

- 163 ha effective / 158 ha milking platform Runoff (lease) 128 ha effective
- Stock 390 cows – Cross breed. 100 Heifers - Friesian /Cross breed
- Production 170,000 kgMS
- Team /staff 2 permanent
- Pastures 40% multi species, 60% perennial ryegrass and white clover
- Soil Mataura silt loam
- Time practicing RA 4 years regenerative farming practice
- N fertiliser use 10 units N/ha
- Wintered 80% bale grazing / 20% kale crop

"Bale Grazing" is a practice originating from the US as part of some regenerative farming systems. Apart from winter feeding livestock, the practice is used to improve the soil outcomes mainly form the bale litter left behind. The bale litter has seed that germinates, and the grasses established from the bale litter combined with the increasing temperatures, break down the litter to feed the biology in the soil which in turn transform the soil to become biologically active improving nutrient availability, infiltration, soil structure and pasture growth to name a few benefits.

Our journey – In our first season bale grazing we started off by trailing 3 paddocks, on which we calved our cows on. The next season we wintered half the herd, and this season we wintered ¾ of our herd plus all youngstock on bale grazing. We plan to be 100% bale grazing all livestock this coming year.

Findings - Pasture / Soil

Improved soil /pasture - Bale litter areas result in improved soil health achieving increased pasture growth and quality in the bale litter areas.
Bale seed - What seed is in the bale is what grows after in the bale litter areas.
Soil insulation - Bale litter insulates the soil under it, resulting in early germination of the bale seed to assist in the pasture establishment and bale litter breakdown.
Back in rotation - On the dairy platform, after calving our cows on the bale grazing paddocks the bale grazing paddocks are normally back into rotation by the middle of the second round (mid- October)
Pasture repair - We direct-drill with perennial pasture seed full sowing rate approx. 2-3% of the total area where pasture damage has occurred, and half rate on 8-10% of mild pasture damage.

Animal behaviour /welfare observations –

Cows don't walk around (compared to cows on crop) as they are fully feed and often ruminating on the hay, decreasing pasture damage.
Rumination creates body heat, and is observed in cold condition where cows seem more settled with full bellies on bale grazing than on winter conventional crops.
The bale litter insulates the soil, which influences cows to lie on bale litter rather than bare ground, requiring less energy to maintain body condition/temperature.
Majority of calving cows calve on bale litter, resulting in decrease calf mortality and better cow health.

Bale grazing setup guidelines –

- Shut-up paddocks early enough ideally to have 3500-4000 kgDM/ha pre-grazing cover before grazing. (March- early April depending on timing of grazing)
- Set out hay bales in a grid formation at approx. x30 bales / ha (approx. 18-20 metres apart)
- When budgeting, allow 15-20% extra to what is needed in theory allowing for wetter conditions to manage and minimise pasture damage. (70 days wintering for 100 cows = 13.6 ha + 408 bales)
- Recommend using the same paddock for the following year, placing bales in different position each year to eventually cover the whole paddock with bale litter over 3-4 winters/grazings

Grazing cow method –

- 100 cows offered ½ ha every 3 days (back fenced and offered water, use square breaks where possible)
- Normally leave bale on round edge, taking off netting before feeding break. (On steeper slopes roll onto side to prevent rolling off down the hill from playful cows)
- Feed **WITHOUT bale racks**. Cows eat approx. 80% of bale leaving 20% as bale litter.
- When wet weather events occur and pasture damage is starting to occur, move cows on to next break, coming back to the unfinished break once soil conditions allow (dry out)

Paddock Selection / Feed quality –

- Paddock selection is important. Harder to do on steep sidling's.
- Keep bales and water troughs out of hollows or potential ponding areas.
- The better the pasture and hay quality, the better weight gain results
- Hay bales - 4x4 or 5x4 round bales work best. Can use squares if placed not long before grazing.
- Can use baleage. Use dryer mature baleage with seed if possible. Hand sowing baleage patches with seed after grazing can be effective.
- Seed in the bale is important to achieve natural reseeding after the bale litter breakdown.
- We have bale grazed on freer draining and heavier soils generally with little difference in the damage to pasture, however heavier soils have pug easier when soil reaches saturation. How you manage this is key to minimising damage.

Pros

- Less N leaching
- Live plant in the ground all year round
- Minimal pasture damage
- Very little to no sediment runoff
- No cultivation / sprays / crop establishment costs
- Improved better functioning soil
- Easy wintering (shift every 3 days/ staff love it!)
- Better livestock welfare
- No massive feed transitioning for livestock
- Livestock require less feed (ME) to maintain body condition

Cons

- Require more area than conventional crop wintering (double to cropping)
- More challenging to make hay in Southland/ South Otago
- Feed (hay) ME is lower
- Mindset change – Hard to get your head around if you've told you can't winter cows on grass in Southland.

Trial Bale grazing - (without bale racks)

1. Start small - Start off with just one paddock, or a couple of hectares.
2. Place round hay bales (of reasonable quality) in a grid at a density of 30 bales/ha (18 metre spacings)
3. Use any sized mob of cows and feed off x3 day breaks proportionate to - ½ ha per 100 cows / 3 days.
4. A rough guide for different mob sizes- x6-7 cows/bale every 3 days. For youngstock approx. 12 yearling heifers/ bale every 3 days (We used ½ hay and ½ baleage for youngstock)

Considerations when deciding on a wintering practice / system –

- Consider the wintering practice and how it effects your farming system as a whole?
- When looking at the Ditchfield's cost comparisons, consider what the numbers don't include- like the advantages that improved soil biology/functioning would bring from the bale grazing system compared to the conventional cropping.
- Be careful not to let feed ME dominate your decision on what system you choose. Include issues like- animal welfare, people (labour required), soil integrity, environmental footprint, cost of energy (fuel), feed transitioning. These are just as important issues to consider when farming today and thinking of farming into the future.
- **What is possible that you are currently thinking is impossible.**

Comparison of wintering costs: hay bale grazing vs kale grazing vs off-farm grazing

The table below compares the relative wintering costs of three different modelled options for Southland dairy farmers; hay bale grazing, conventional kale crops and grazing off farm. It uses winter 2021 price estimates so there will be differences now with current price increases.

With approximately 75% of the hay/baleage made on-farm in both the kale and bale grazing options, conventional kale grazing is slightly more cost effective, until the opportunity cost of ex-kale paddocks awaiting resowing in spring is factored in.

400 Cows - Bale Grazing (hay + grass)		**400 Cows - Kale Grazing (kale + baleage)**		**400 Cows - Off Farm Grazing**	
54ha		**54ha**		**0ha**	

• 100 cow mobs
• Fed 0.5 ha (3000-4000 kgDM cover) + 15 bales every 3 days
• 1620 hay bales total
  • 1214 made on farm
  • 406 purchased
		• 28 ha of 10 TDM crop
		• 26 ha baleage cut at 8 TDM
		• 10 kgDM of kale fed per day
		• 5 kgDM of baleage fed per day
				• Off farm for 70 days	

		Crop seed and spray @ $275/ha	$7,700	400 cows @ $36/day for 10 weeks	$144,000
		Crop drilling @ $90/ha	$2,520	Trucking Costs – location dependent	Variable
		Crop fert @ $400/ha	$11,200		
1214 hay bales (~300kgDM) made on farm @ $15/bale	$18,210	770 bales (~270kgDM) made on farm @ $29/bale	$22,330		
406 hay bales (~300kgDM) purchased @ $69	$28,014	252 bales (~270kgDM) surplus @ $85/bale	-$21,420		
		Regrassing seed and spray @ $370/ha	$10,360		
		Regrassing cultivation and drilling time and diesel @ $253/ha	$7100		
		Regrassing Fert @ $250/ha	$6,500		
Land lease @ $593/ha	$32,022	Land lease @ $593/ha	$32,022		
Vehicles	$4,000	Vehicles	$4,000		
Fertiliser @ $270/ha	$14,580	Fertiliser @ $270/ha for 26 ha	$7,020		
Rates/R&M	$2,000	Rates/R&M	$2,000		
		Opportunity cost of grass not grown while new grass establishes (154 TDM @ 24c/kg)*	$36,000		
Total	**$96,826**	**Total**	**$91,332-127,332**	**Total**	**$144,000**

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Figure 12: Good soil armour pre grazing on bale grazing

Figure 13: Fully fed content cows on bale grazing

Figure 14: Plenty of scope for animal wellbeing while protecting the soil

Figure 15: Live roots and growing plants after grazing

Figure 16: Hay Insulation effect

Figure 17: Superior grass growth from the bale litter bringing soil biology to life

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