siddc
South Island Dairy Demonstration Centre

LUDF
LINCOLN UNIVERSITY DAIRY FARM

LUDF FOCUS DAY
28 SEPTEMBER 2022

LUDF Spring Update

- **Season to Date**
- **Milking 10 in 7 from day one this season.**
- **Managing spring with 10 in 7.**
- **2021/22 Season results with 10 in 7 from day one.**
- **2020/21 Season financial results & 2021/22 Season budget.**

Presentations from Guest Speakers:

- **Ryan Luckman – Vet Centre 111, Waimate.** Learning from Nutrition, Pasture Quality and Activity for Mating.
  What to monitor and tips for dealing with these challenges to improve Repro performance.
- **Paul Bird – Dairy NZ.** How Resilient are our Dairy Farm Businesses?
  Financial trends, profit targets and management strategies to cope with unpredictability!
- **Nicole Mesman – Lumen & Jeremy Savage – Macfarlane Rural Business.** Greenhouse Gas Emissions
  What are the potential implications for farmers, and what tools do we have now to prepare?
- **Trish Fraser – Plant & Food Research & Kate Fransen – Dairy NZ.** Research Updates on the Properties of Plantain. *An update on the environmental benefits of grazing Plantain.*

Lunch Sponsored by: LIC

Lincoln University Dairy Farm (LUDF)
@LUDairyFarm · Dairy Farm

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Visit the website: www.siddc.org.nz for weekly updates on Farm Walk Notes

SIDDC South Island Dairying Development Centre
Partners Networking To Advance South Island Dairying
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Speakers & Contents

SPEAKERS' PRESENTATIONS

LUDF Spring 2022 Update

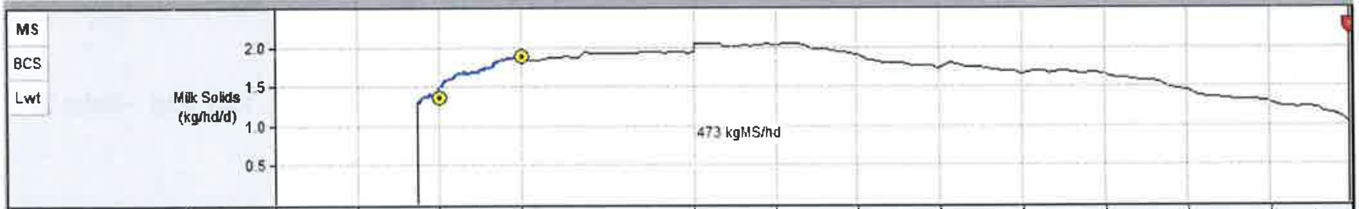
Pasture, Feeding & Milk Production

- 1st round finished approx. 14th September Had to feed 7 kgDM/cow silage at the end of the 1st round to push it out. The cover was a bit tight like most of Canterbury. Had to feed 3.7 kgDM/cow of silage in September (14-21st Sept).
- Tough spring – multiple calf pick-ups needed. Needed DNA as cow tags were hard to spot.
- Had a bit more grass on dairy support land – dryland grew well.
- Used less silage on springers.
- Progibb was used this spring to boost grass growth. Appeared to work very well.

Select a Feed	J	J	A	S			O	N	D	J	F	M	A	M
Pasture		15.5	17.4	14.2	14.6	14.9	17.9	18.6	18.2	19.8	19.9	15.9	13.8	12.8
F2 Pasture Silage bought			1.2	3.4	3.6	3.5						4.0	4.0	4.0
F2 Pasture Silage													1.0	1.6
Total (Utilised)		13.2	15.8	14.8	15.3	15.5	15.2	15.8	15.4	16.8	16.9	16.7	15.7	15.3

Production for Cows at home

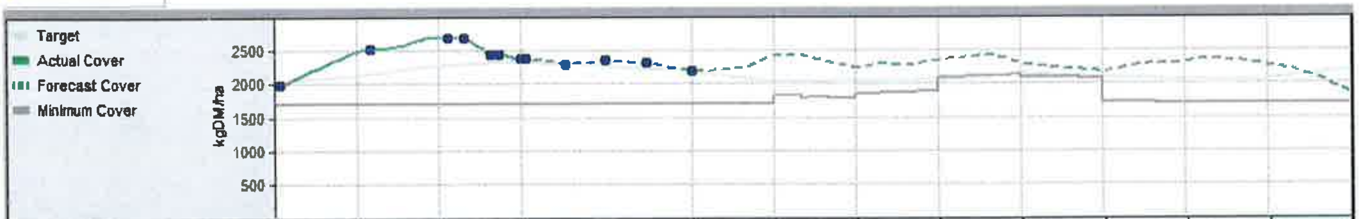
Milk Actuals... Calibrate Milk...



	Start	J	J	A	S			O	N	D	J	F	M	A	M
Model MS (kg/hd/d)			1.36	1.76	1.86	1.92	1.94	2.03	1.98	1.79	1.73	1.68	1.55	1.34	1.19
Actual MS (kg/hd/d)			1.36	1.76											
Actual/Forecast BCS	4.5		5.0	5.1	5.0	4.9	4.8	4.6	4.5	4.3	4.4	4.6	4.7	4.9	
Model Lwt (kg)			497	501	499	497	494	489	484	481	485	492	502	514	

Pasture Cover for LUDF DSM

Target Range...



(kgDM/ha)	Start	J	J	A	S			O	N	D	J	F	M	A	M
Forecast/Actual	1,987	2,489	2,689	2,370	2,308	2,324	2,190	2,416	2,236	2,355	2,301	2,175	2,310	2,272	1,866
Minimum	926	894	1,346	1,297	1,204	1,255	1,294	1,496	1,786	1,882	2,126	2,076	1,649	1,545	1,491
Potential Growth (kgDM/ha/d)		23.5	16.5	40.6	38.5	50.5	34.0	65.9	78.7	75.0	80.4	67.7	59.8	45.9	31.1

Stock Reconciliation

Wintered	566 cows (did cull for Johnes positive cows – 8).
Peak Milk	542
Winter losses	24 (4.2 %. Normally 2% LUDF)

Where losses came from:

Slips + Cull MT	5 cull +1 on farm.
Deaths – winter	4
Deaths – Spring	6
Pet Food	8 (5 with calving Issues)

Winter Losses

2%	=	great result. Low disease, good transition etc.
3%	=	average / acceptable
4%	=	Look for disease issues, cows identified as calved?
5%+	=	Getting too high. May have disease on the farm (Johnes / BVD). Need to survey as above done on LUDF to confirm what is causing problems.

Calving issues resulted in 8 cows leaving LUDF this season.

Calves:

AB Calves	151
Beef Calves to Sell	74
Late beef	5

October Feed Budget & Grazing Rules:

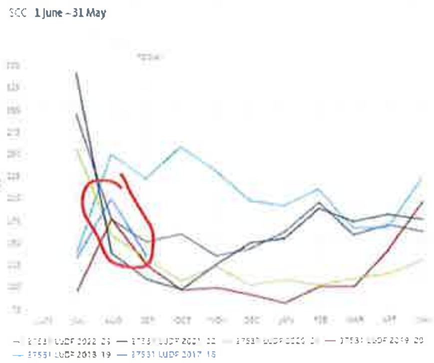
- 542 cows on 162 Ha = 3.35 cows/HA
- @ 2.1 kgMS/cow. Demand = 19.6 kgDM/cow (Feed quality high @ 12.6 MJME)
- Residual = 1,600 kgDM/HA for high performing cows.
- Demand = 65 kgDM/HA.
- Pasture required = demand X round length.
- Fastest Round = 23 days = 1,500 + 1,600 = 3,100 pre grazing (if less silage used to hold round)
- Longest Round = 26 days = 1,700 + 1,600 = 3,300 pre grazing (any more silage mown)

Feed Quality

Our Reference	Sample Reference	Date Sampled	Protein % dm	WSC % dm	NDF % dm	ADF % dm	Digestibility % (DMD)	MJ ME/kg DM	DM %	OM %
T2202202	Paddock S-8 18.1 clicks	7/09/2022	16.5	30.0	35.5	18.8	84.3	12.7	20.9	91.2
T2202203	Paddock S-2 18.9 clicks	7/09/2022	15.3	30.2	36.0	19.2	84.4	12.8	20.9	91.2
DS2200089	Paddock N-6 18.1 clicks	14/09/2022	14.1	24.6	37.4	20.8	83.4	12.1	16.9	87.9
DS2200090	Paddock N-11 20.6 clicks	14/09/2022	16.5	24.3	36.5	19.8	85.7	12.5	16.4	88.2

Fertiliser

- 1st Round 80 kg/Ha Ammo 31 = 24 kgN
- 95 Ha + will use until the farm recovered and silage is finished (1st October)
- Balance 25 kgN as Ammo.



Animal Health

- SCC high at the start of spring with wet conditions.
- Variable milking not impacting on SCC.
- 4th year with no Staph cows. SCC is significantly lower.

Staffing

- Winter and Spring 2022 completed with 2 full-time staff, Peter & 2IC.
- Staff 5+2
- Peter 6+1 roster.

Body Condition Score

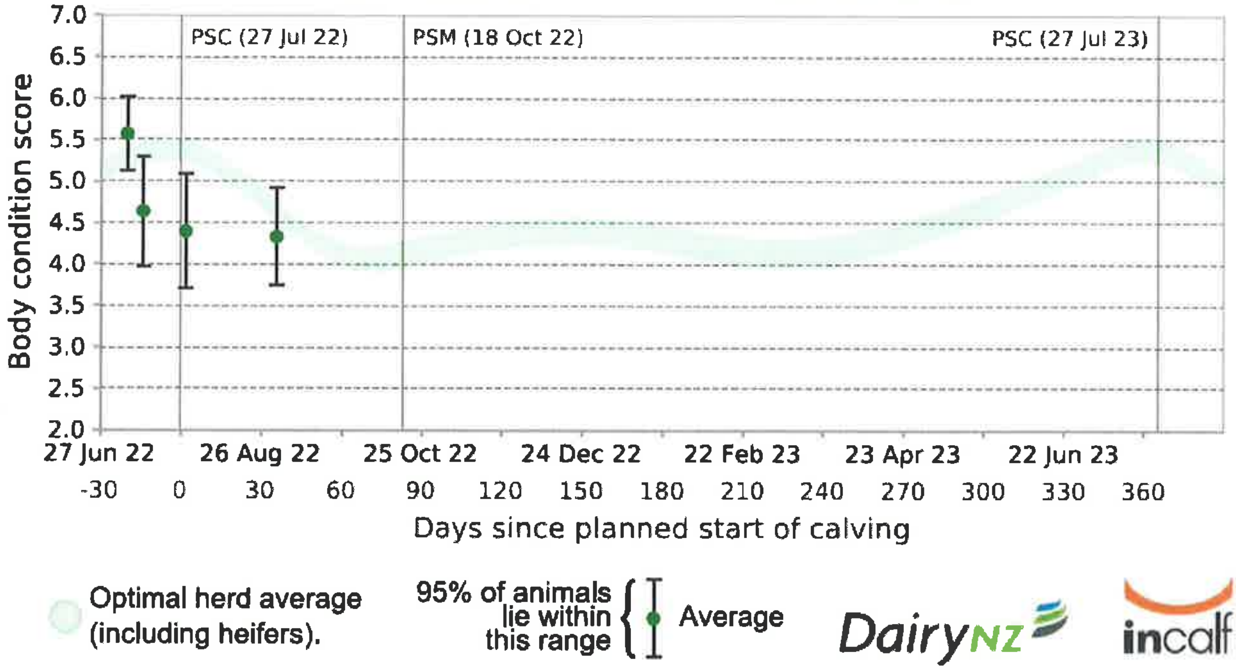
infovet | LINCOLN UNIVERSITY DAIRY FARM | Report Date: 1 Sep 22

Body Condition Score

Animal group: 1.9.22 BCS

Planned start of Calving: 27 Jul 22

Denominator is limited to the scored cows within the group.



Animal group: 1.9.22 BCS

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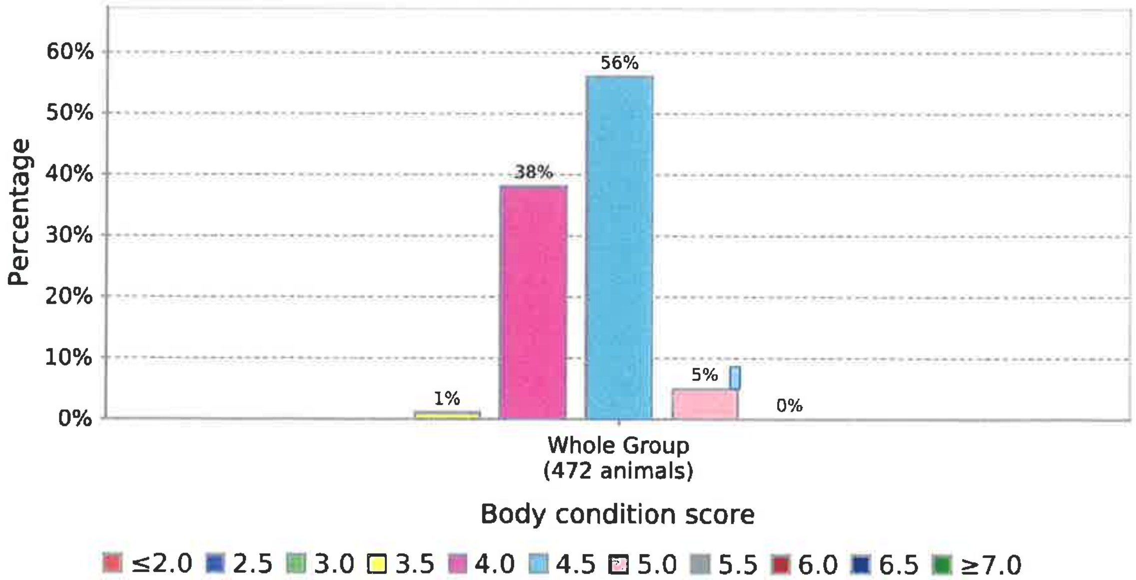
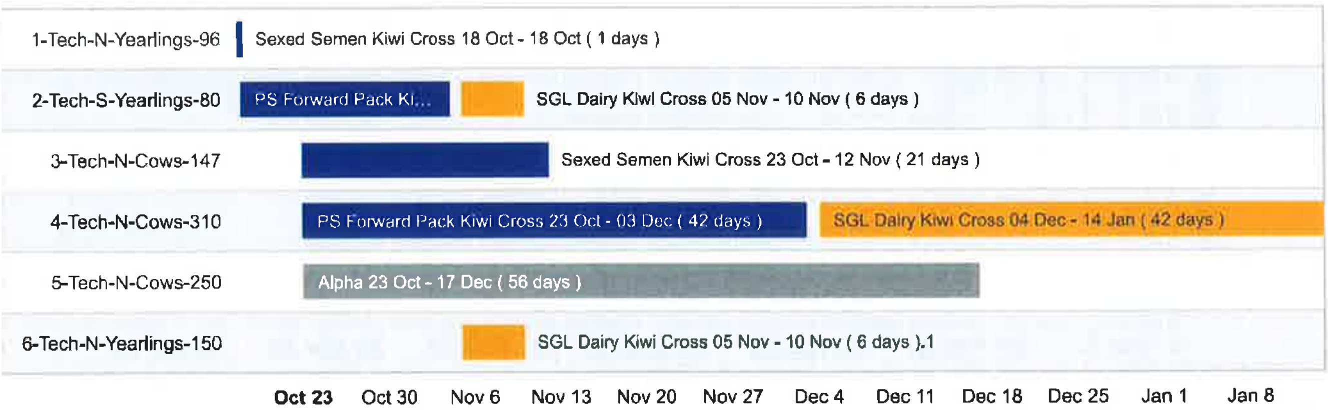


Mating Prep.

- Mating program in the herd is similar to last year.
- Intervention, premating heats, will PG anestrus cows after a scan and CL present.
- Collars on this season.
- PSM Mating Heifers, 18th October,
- Cows 23rd October.

PSM: 18th October 542 numbered animals

Mating Plan Details



Mating Heifers:

Will delay heifers until 18th. Mating heifers 6 days later. Having too many heifers calve earlier than planned on 15th July.

2021 Review of Mating heifers

BW Heifer Calves:

From Heifers (sexed Genomic)	304	(Dam Heifer BW 262)
From Superior cows mated	298	(Dam Superior Cow BW 226)

Where BW of the inferior cows was 144, they were all mated to Beef. Our breeding program allowed us to mate from BW 262 Heifers rather than BW 144 cows.

Cost of mating heifers, including staff time	$8,112 per year
Improved genetic gain for 2022 heifers born (average BW)	24 Per head
For 150 heifers, average 3.5 lactations per animal	$12,297 per annum.

The genetic gain in heifers (24 points) just outweighs the costs when you account for the animal's lifetime. One BW point = $1.

Other opportunities with our mating plan:

- Sell beef calf out of a MA cow compared to a Jersey calf out of heifer = bobby. Fewer bobbies.
- Sell surplus heifer replacements.
- Guarantee heifer numbers.
- Bring in the SGL to the main herd earlier with mating heifers.
- Driving towards a higher BW, more efficient herd.

LUDF Mating Benchmarking Program

For the 2021 mating season, LUDF had yet another very high empty rate of 20%, following 18% in 2020. We were anticipating a better result this year with a strong submission rate and potential benefits coming from 10 in 7 milking which was instigated 1st day of lactation. Cows milked 40 kgMS/cow less. However, after scanning and digesting yet another bad result, we are yet again left wanting for answers. Over the last 15 years, there have been many theories but no concrete answers or solutions.

To help us determine what the issues are, we are proposing to benchmark LUDF against a top quartile local performing farmer, Liam Kelly. We will test key attributes on both farms to identify what is likely to be contributing to LUDF's poor results. Key areas of focus will be:

1. Cow condition.
2. Energy balance through liver activity.

3. Feeding levels and supplementation.
4. Milk production levels and composition.
5. Progesterone testing.
6. Follow up multiple pregnancy tests.
7. Cow rumination and activity.

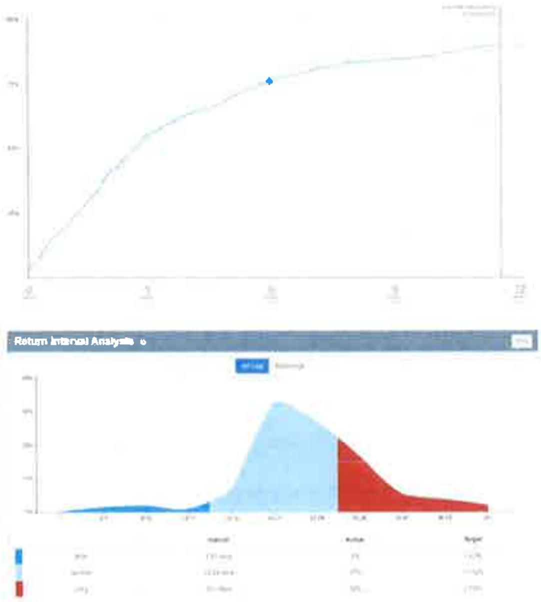
We have engaged with a working group of top practitioners from LIC, Dairy NZ, Lincoln University, Dunsandel vets and on-farm management. They have been instrumental in designing the benchmarking program and have agreed to see this project through to the conclusion to help us come up with some answers.

This issue is not unique to LUDF. The average empty rate is 16 % for Canterbury. A high empty rate is one of the greatest costs of wastage facing our national herd. The 2021 SIDDC strategy is based on lowering the LUDF greenhouse gas emissions by decreasing our replacement rate to 15 %. To do this, we need an empty rate of 8-10%. Finding a solution to our high empty rate is essential.

We have compared the LUDF mating to a top local farmer, Liam Kelly, who is achieving sound results, 10% MT:

LUDF 2020 & 2021 Mating

Liam Kelly 2021 Mating



We are finding that consistently LUDF repro performance drops off from 6 – 8th November.
To help us understand what is happening at LUDF, and potentially a number of farms in New Zealand, we are proposing to monitor LUDF and Liam Kelly intensively to establish the key drivers to Liam's success and what could be going wrong at LUDF. Liam's farm is on a similar scale to LUDF, using collars and feeding grain in limited amounts. Liam typically produces 510 – 520 kgMS/cow.

LUDF Finances	Final Season YTD 2020/21	Budget 2022/23
Effective Area	160	160
Stocking Rate	3.5	3.5
Peak Cows Milked	557	557
Milk Price	$ 9.30	$ 9.25
Milk Solids total	258,855	266,000
Milk Solids per farm ha	1,618	1,663
Milk Solids per cow	465	478

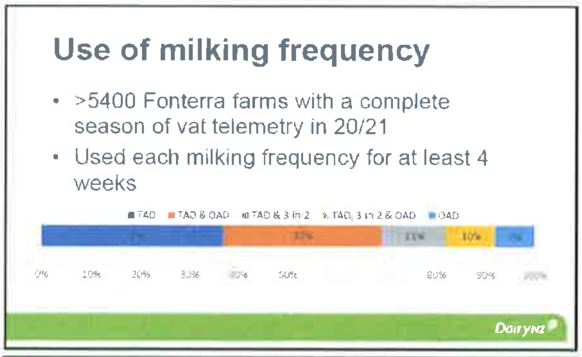
Account	Final Season YTD 2020/21 $	Budget 2022/23 $	Variation
REVENUE			
Dividend Income	47,530	27,000	-20,530
Sales - Other Livestock	52,442	107,999	55,557
Sales - Milk Solids Current Season	2,407,352	2,460,500	53,149
Income - Rent	0	0	0
Income - Other	169	169	0
TOTAL REVENUE	2,559,934	2,703,667	143,733
			0
EXPENSES			0
Salary Costs			0
Farm Salaries Perm & F/Term	198,900	240,000	41,100
Farm Casuals	25,393	30,000	4,607
Allowances	0	0	0
Superan,ACC,Incr Provison	6,525	14,000	7,475
Total Farm Salary Costs	230,818	284,000	53,182
			0
Operating Expenses			0
Internal Sales; Grazing, Feed	0	0	0
Internal Services; Fees, LU Rentals	0	7,381	7,381
Appointment Expenses	2,776	1,500	-1,276
H&S/Prot Clothing/BioSecurity	508	319	-188
Staff Development	0	0	0
Livestock Purchases	0	8,400	8,400
Animal Health	64,496	72,189	7,693
Breeding	72,710	71,952	-758
Feed & Grazing	450,378	343,234	-107,144
Crops/Pastures	1,092	19,800	18,708
Seed	4,970	167	-4,803
Fertilisers	125,433	173,023	47,590
Weed & Pest Control	0	0	0
Contractors	33,913	9,745	-24,168
Electricity	73,070	84,408	11,339
Freight	12,478	12,627	149
Vehicle Expenses	19,108	24,000	4,892
R&M (except Farm Houses)	96,345	109,200	12,855
R & M (Farm Houses)	0	0	0
Dairy Shed Operating Expenses	7,602	8,306	704
Farm Demonstration Costs	0	0	0
Administration	12,706	22,540	9,834
Fixed Charges	20,163	10,377	-9,786
Livestock Decreases (Increases)	0		
			0
Feed Decrease (Increase) Stock	0	0	0
Milk Levy Deducted	10,490	11,199	710
Other Expenses	0	0	0
Total Farm Operating Costs	1,239,055	1,274,368	35,313
			0
CONTRIBUTION MARGIN PROFIT (LOSS)	1,320,879	1,429,299	108,420
			0
Farm Working Expenditure	$ 4.86	$ 4.79	-0
EBIT / HA.	$ 8,255	$ 8,933	
Support Block Adjustments	21,000	21,000	
Operating Profit	1,299,879	1,408,299	
Operating Profit / HA	$ 8,124	$ 8,802	

Feed Pricing

	MRB - Feed Cost Comparison							
	Delivered c/kgDM	Feeding Costs	MJME	DM %	Wasted	c / kgDM Paddock	c / kgDM Eaten	c/MJME Eaten
Silage								
Grass - Silage	40	7	10.8	100%	30%	47	67	6.2
Grass - Bailage	40	7	10.8	100%	30%	47	67	6.2
Maize	40	7	10.8	100%	30%	47	67	6.2
Concentrates - Canterbury	$/T	$20/T freight						
Grain - now/Spot	630	4	12.6	86%	5%	78	82	6.5
Grain - Contract	560	4	12.6	86%	5%	70	74	5.9
Palm Kernal - Spot	430	4	11.8	90%	10%	52	58	4.9
Concentrates - Tasman	$/T	$90/T freight						
Grain - now/Spot	700	4	12.6	86%	5%	87	91	7.2
Palm Kernal - Spot	560	4	11.8	90%	10%	67	75	6.3
Fillers								
Straw	28	6	7	100%	25%	34	45	6.5
Nitrogen Response	$1,400	/T	=	$ 3.47	/kgN			
10:1	$ 0.35		12.4	100%	15%	35	41	3.3
12:1	$ 0.29		12.4	100%	15%	29	34	2.7
14:1	$ 0.25		12.4	100%	15%	25	29	2.3
Progibb	$58	/Ha						
200 kgDM/Ha	$ 0.29		12.2	100%	15%	29	34	2.8
300 kgDM/Ha	$ 0.19		12.2	100%	15%	19	23	1.9
400 kgDM/Ha	$ 0.15		12.2	100%	15%	15	17	1.4

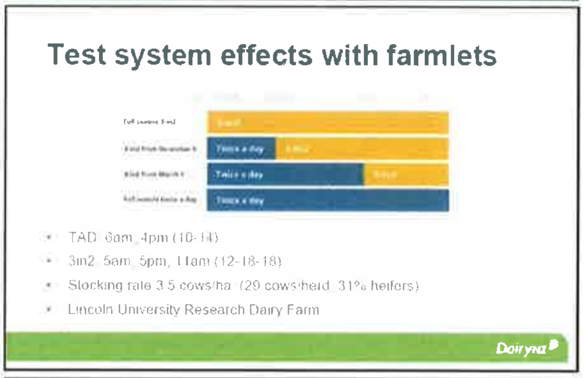
Variable Milking Research – Dairy NZ

Many NZ dairy farms have been practising variable milking for part of the season. The motivations of farmers have been to take the pressure off cows, people and the pasture demand. To confirm the impact of variable milking on milk production and cow welfare outcomes, Paul Edwards, Dairy NZ, completed research at the Lincoln University Dairy Research Unit.

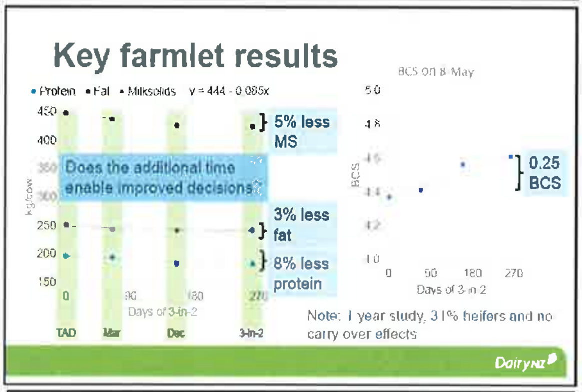


A variable research trial was completed based on three start dates for variable milking. Day 1 of lactation, 1st December and 1st March. A controlled comparison of twice-a-day milking (TAD) was included with cows milking the full season on TAD,

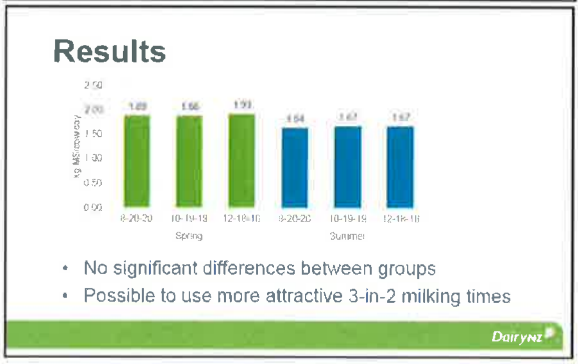
The research concluded that cows will drop 5% from the day that the farmer commences variable milking.



Most of this drop comes in the form of a drop in protein production. Cow condition at the close of the season was 0.25 CS better for full-season variable milking. The response in cow condition was linear from the time you started variable milking, e.g., mid-season = 0.125 CS better.



The research also completed a 6-week trial to confirm the impact of the time between milking on per cow production. The initial concept of variable milking was to milk the cows 8-20-20 hours apart, resulting in some antisocial milking times. The research concluded that the milk period had no significant difference in milk production, giving us greater flexibility on milking time and staff rosters.



LINCOLN UNIVERSITY DAIRY FARM (LUDF)

2021/22 VARIABLE MILKING RESULTS

Monday	4:30am		2.30pm	9.5 hours
Tuesday		9.30am		18 hours
Wednesday	4.30am		2.30pm	21.5 hours
Thursday		9.30am		18 hours
Friday	4.30am		2.30pm	9.5 hours
Saturday		11.00am		21 hours
Sunday		8:00 am		21.5 hours

Impact on Inputs, resources, and finances (Based on Dairy NZ research)

- Decreased petrol and motorbike R&M by 25%.
- Decreased power consumption by 13 % with less shed running time.
- Cost of cleaning shed and plant dropped by 25 %.

Changes in Human Resource

- Roster, 5+2 ran for most of the year.
- 3.5 FTE's on farm. 50 % of the workload in milking. 19 % less time in milking.

Expected Benefits – Not Realized

- Cow condition. Cow condition was light through the summer and autumn. Research suggested a 0.25 gain in condition score. Cows lost a lot of condition last summer and struggled to gain condition in the autumn. We did not get savings in winter feed as budgeted.
- Empty Rate. Cow condition looked very good until late October. Then the condition dropped dramatically. The empty rate for cows did not improve as anticipated.
- Making silage on farm.

Challenges Overcome

- Calf feeding & Colostrum. Short on calf milk, often had to wait to milk. Calf feeding irregular. Used heater for early starts.
- Picking up calves, more time this spring with very wet weather. Losses were low, but multiple pick-ups were needed.
- AB Plan. Mated TAD = 1st on the AB run. OAD were last on the run. Worked well.

Impact on profitability

At $9.00 / kgMS, the negative impact on the bottom line was $39,000 for going 10 in 7. At $7.00 / kgMS milk price, the impact would be $5,000.

10 in 7 Vs TAD for 2021/22 Season

2021/22 season was a poor growing season for LUDF. A very wet summer did not suit the heavy soils at all. Feed harvested was 14.4 TDM with no silage made. The silage use was high at 759 kgDM/cow on 10 in 7. Normally 400 – 500 kgDM/cow. IF LUDF was on TAD, the demand would have been 1,030 kgDM/cow.

The long-term average at LUDF for TAD milking is 505 kgMS/cow. We have modelled 490 kgMS/cow to reflect the tougher season.

LUDF - 10 in 7 Vs TAD		202122 TAD	202122 Season 10 In 7	Difference	
		Estimate	Actual		
Farm	Effective Area	160	160		ha
	Stocking Rate	3.5	3.5		cows/ha
	Potential Pasture Growth	17.9	17.9		t DM/ha
	Nitrogen Use per farm ha	161	161		kg N/ha
	Feed Conversion Efficiency (eaten)	11.2	11.3	0.2	kg DM eaten/
Herd	Peak Cows Milked	557	557		cows
Production					
	Milk Solids total	272,965	258,855	-13,122	kg
	Milk Solids per farm ha	1,706	1,618	-82	kg/ha
	Milk Solids per cow	490	465	-24	kg/cow
		+ 5 % Milk production			
	Pasture Eaten per cow *	3.9	3.8	0	t DM/cow
Feeding	Supplements Eaten per cow *	0.8	0.6	-0.2	t DM/cow
	Pasture Eaten per farm ha	14.5	14.4	-0.1	t DM/ha
	Supplements Eaten per farm ha	3.3	2.8	-0.5	t DM/ha

LUDF - 10 in 7 Vs TAD		202122 TAD	202122 Season 10 In 7	Difference
Revenue	Net Milk Sales - this season	2,432,184	2,278,102	-154,083
	Net Livestock Sales	82,206	80,991	-1,215
	Total	2,514,391	2,359,093	-155,298
Expenses				
Expenses	Wages	195,000	150,000	-45,000
	Management Wage	100,000	100,000	
	Animal Health	68,000	65,000	-3,000
	Breeding	75,200	75,200	
	Farm Dairy	8,450	6,500	-1,950
	Electricity	31,640	28,000	-3,640
	Feed Crop	8,640	8,640	
	Bought Feed	229,412	169,039	-60,372
	Calf Feed	7,028	7,028	
	Grazing	306,654	306,654	
	Fertiliser (Excl. N)	35,680	35,680	
	Nitrogen	56,534	56,534	
	Irrigation	47,000	47,000	
	Regrassing	38,883	38,883	
	Vehicle Expenses	11,000	10,000	-1,000
	Fuel	10,000	9,180	-820
	R&M Land/Buildings	96,345	96,345	
	Freight & Cartage	12,478	12,478	
	Administration Expenses	12,706	12,706	
	Insurance	18,000	18,000	
	ACC Levies	4,800	4,800	
	Rates	20,168	20,168	
Total Farm Working Expenses		1,393,617	1,277,835	-115,782
	Depreciation			
	Total Farm Expenses	1,393,617	1,277,835	-115,782
	Economic Farm Surplus (EFS)	1,120,773	1,081,258	-39,515
	Farm Profit per ha before Tax ($/Ha)	7,005	6,758	-247

Plantain

- Aiming for 30% of the daily diet.
- 1st 3 years.
- Will plant 10% of the farm as pure sward per year (aimed for 15% in 2022/23).
- If it lasts 3 years, 30-45 % of farm will be in plantain/clover, which should guarantee the 30%.
- End of 3 years. Will review and ease back on planting area based on the composition of plantain/clover mix and persistence of sward.
- Overseer modelling suggests this will drop nitrogen leaching from 35 to 26 kg/ha of nitrogen.

Planned cost:

Glyphosate (high rate with docks) 5 l/Ha + spray + adj	$ 70.00
Cost of seed $20.99 / kg. 10 kg/Ha + 2 kg/Ha White Clover @ 15/kg.	$ 240.00
Dicamba 400 mls/Ha = $40/Ha + spray	$ 65.00
Drill	$ 110.00
TOTAL Plan	$ 485.00

Actual Cost

Glyphosate (high rate with docks) 5 l/Ha + spray + adj	$ 67.00
Glyphosate (high rate with docks) 5 l/Ha + spray + adj	$ 67.00
Cost of seed 10 kg/Ha + 2 kg/Ha White Clover @ 15/kg.	$ 402.00
Dicamba 400 mls/Ha = $40/Ha + spray	$ 60.70
Drill	$ 130.00
Slug Bait	$ 121.00
TOTAL Actual	$ 847.70

Pasture Regrass Cost

Glyphosate (high rate with docks) 5 l/Ha + spray + adj	$ 67.00
Cost of seed Ryegrass 20 kg/Ha + 4 kg/Ha White Clover + 2 plantain.	$ 440.00
Preside + spray	$ 68.00
Drill	$ 130.00
TOTAL Actual	$ 705.00

Plantain taking another 20 days to establish.
Impact on feeding, 2 paddocks, 16 Ha, 30 days @ 68 kgDM/Ha/day
= 22 TDM of feed
= 40 kgDM/cow of silage to fill the gap.

Welcome to Lincoln University Dairy Farm (LUDF).

The farm is a fully operational, commercial dairy farm with a number of potential hazards for both visitors and staff. Many of the potential hazards cannot be eliminated while also providing access to visitors, therefore, all staff and visitors MUST watch for potential hazards and act with caution.

Hazard Summary: Look, think, act.

The following chart provides a reminder of the types of hazards at LUDF. Watch for these and any other hazards that may be on the farm today.

People: • Uninformed/ill-prepared visitors may be the greatest risk	**Animals:** • **You are in their space**	**Milking shed:** • Moving rotary platform • Confined animals • Chemicals
Eyes / Ears: • Water / oil / milk / chemical splashes • Welding flashes • Loud machinery		**Touch:** • Hot/cold surfaces, hot water, chemical burns • Electric fences – treat them as high voltage power sources
On-farm machinery and tools • Chainsaws, hand tools etc. generate noise, fragments	**Potential slips/trips:** • Uneven surfaces occur across the farm • Fences • Drains • Underpass • Effluent pond	**Vehicles:** • Contractors and farm equipment – **act as though they can't see you** – keep out of their way • Centre Pivot takes precedence over your plan

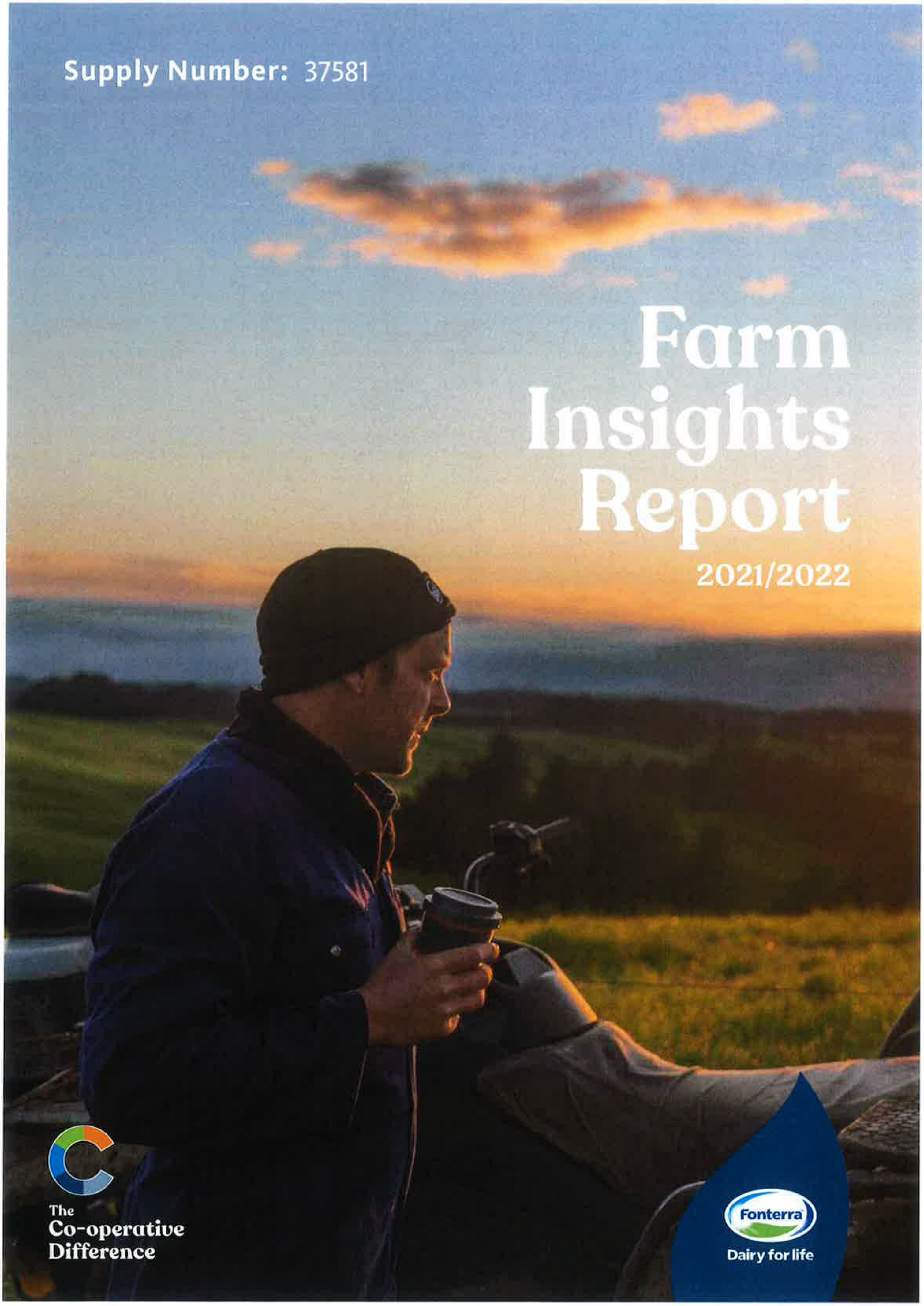
ARE YOU TRAINED FOR WHAT YOU ARE ABOUT TO DO? If not, STOP.
If you are uncertain how you should act or proceed, stop and contact the farm manager, other farm staff or your host.

By entering this farm, you are acknowledging your receipt of this hazard summary and your agreement to take personal responsibility to watch out for potential hazards and act in such a manner as to protect yourself and any others also on-farm.

Supply Number: 37581

Farm Insights Report

2021/2022



The Co-operative Difference

Fonterra

Dairy for life

Contents

A message from Rich

I hope the season has started well. We know it's important for you to have access to great information to support your farming business, so we've made some improvements to the report this year to help you understand how your farm is performing relative to your peers so you can identify opportunities to improve on-farm efficiency.

Some of the key changes:

- New section on farm system optimisation focusing on nitrogen fertiliser conversion efficiency.
- Expanded greenhouse gas emissions section to include non-biological emission sources.
- Further refined insights in the heat stress and milking efficiency sections.

As you'll see, the report contains a lot of information including some potential opportunities for improvements. There's a lot to take in, so I'd encourage you to get in touch with the Farm Source team, or your rural professional, to support you if required.

Hope the rest of the season goes well, catch up soon.

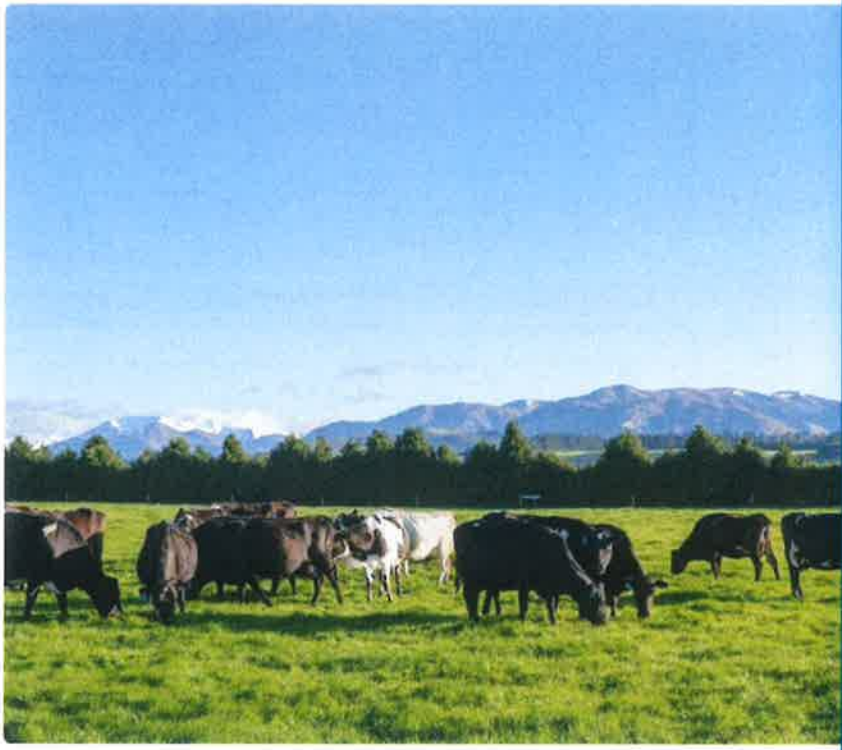
Noho ora mai,

Richard Allen
Group Director, Farm Source

Introduction

This report uses the information that you provide in your Farm Dairy Records, together with milk quality and production data that the Co-op holds, to provide useful insights into what is happening on your dairy farm. The metrics included in this report highlight risks and opportunities that may exist in your farming system, helping you to improve your efficiency and reduce your impact.

Improving your farm's efficiency can not only have benefits for your individual farm business, but collectively supports our strategy to maintain a sustainable milk supply.



Your Farm's Key Information	Units	2019/2020	2020/2021	2021/2022
Dairy farm effective area	ha	160.0	160.0	160.0
Peak cows (maximum cow numbers)	cows	555	558	558
Stocking rate (milking cows)	cows/ha	3.5	3.5	3.5
Production (milk solids produced)	kgMS	280,122	280,381	258,851
Production per cow	kgMS/cow	505	502	464
Production per hectare	kgMS/ha	1,751	1,752	1,618
Average somatic cell count	cells/ml	110,834	117,358	142,485
Nitrogen fertiliser applied per hectare	kgN/ha	169	133	144
Imported supplementary feed fed	tDM	244	262	418
Imported supplementary feed fed per cow	tDM/cow	0.4	0.5	0.7
Purchased Nitrogen Surplus	kgN/ha	69	36	73
Biological Greenhouse Gas Emissions per hectare	$kgCO_2e/ha$	14,469	14,390	13,938

Previous seasons data will be shown where data is available and farm ownership hasn't changed.

Environment

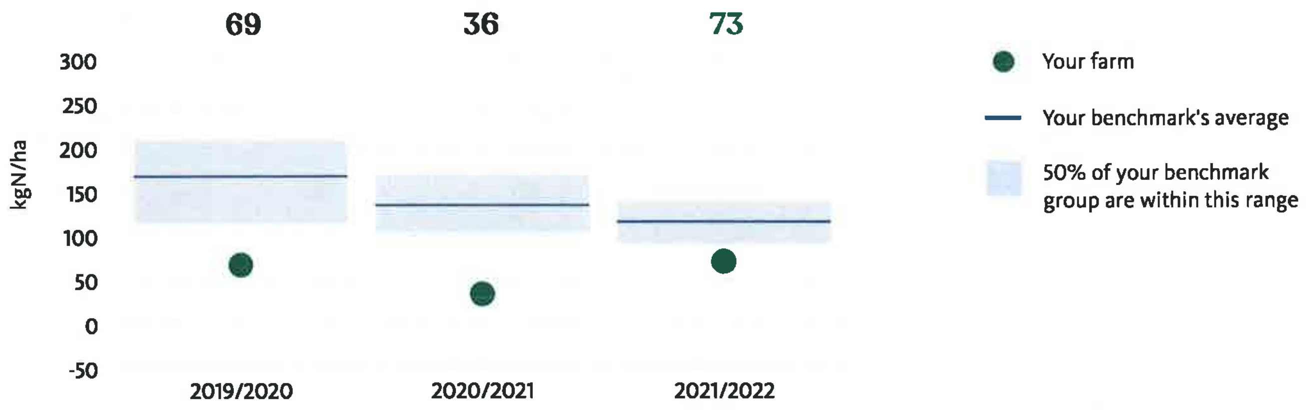
Your farm's environmental insights are broken down into Purchased Nitrogen Surplus, Nitrogen Risk Scorecard, Nitrogen Fertiliser Conversion Efficiency and Greenhouse Gas Emissions.

Purchased Nitrogen Surplus

Purchased Nitrogen Surplus is the difference between the nitrogen inputs (fertiliser and imported feeds) and the nitrogen outputs (milk, meat, crop, supplementary feed or exported effluent) on your dairy farm effective area. A high number means more nitrogen is at risk of being lost from your farm to the receiving environment.

Your Farm's Purchased Nitrogen Surplus Per Hectare

Nitrogen Fertiliser		Imported Feed		Exported Product		Purchased Nitrogen Surplus
144 kgN/ha	+	42 kgN/ha	–	113 kgN/ha	=	73 kgN/ha



Your farm is benchmarked against other farms in the Canterbury region with production **between 1401-1700 kgMS/ha.**

Your Farm's Nitrogen Risk Scorecard

Stock Management	VERY HIGH	Cropping and Cultivation	VERY LOW
Nitrogen Fertiliser	VERY LOW	Effluent Management	VERY LOW
Imported Feed	VERY LOW	Irrigation	LOW

Environment

Your Farm's Nitrogen Risks

STOCK MANAGEMENT

VERY HIGH

Stocking Rate

The higher the stocking rate[1] (peak), the greater the nitrogen loss.

Total	27.9 su/ha
Milking herd (3.5 cows/ha)	27.9 su/ha
Replacement/other animals	0.0 su/ha

Dry Matter Eaten

The more dry matter eaten[2] per hectare, the more nitrogen ingested by the animal and returned to pasture as dung and urine.

Total	19.3 tDM/ha
Grown on this farm	
Pasture and crops	15.7 tDM/ha
Imported to this farm	
Pasture and crops[3]	3.6 tDM/ha
All other feeds	0.0 tDM/ha

Wintering Off/Culling

Reducing the number of animals on farm (from peak numbers) by culling and/or wintering off (May-Aug) will reduce the nitrogen loss risk on your dairy farm effective area.

51% off platform

Winter Practices

Reducing the amount of time cows spend on pasture and/or crops over winter will reduce the nitrogen loss risk.

Off pasture facility	0%
On pasture	100%
Break fed fodder crop	0%

NITROGEN FERTILISER

VERY LOW

Nitrogen Fertiliser Applications

The more nitrogen fertiliser applied, the higher the nitrogen loss risk.

144 kgN/ha

Milk Solids per kg Nitrogen Used

Using less Nitrogen fertiliser (all other inputs being equal) whilst maintaining production, will lower purchased nitrogen surplus.

11 kgMS/kgN

Timing of Application

Fertiliser applied during the winter months can increase the chance of nitrogen being lost.

Sept - Apr

Jul - Aug

May - Jun

Highest Application Rate

Lower application rates reduce the nitrogen loss risk.

Below 25 kgN/ha

Above 25 kgN/ha

Feed Budget

Using a feed budget or wedge to help plan strategic fertiliser applications is a good farming practice.

No feed budget used

Feed budget used

IMPORTED FEED

VERY LOW

Nitrogen Imported From Feed

The greater the amount of imported feed, the more nitrogen that enters the system.

42 kgN/ha imported

Nitrogen Content

The greater the average nitrogen content, the higher the amount of nitrogen that enters the system.

Average N content of 1.60%

Nitrogen Use Efficiency of Imported Supplements

The greater the conversion efficiency, the lower the nitrogen surplus available to be lost.

39 kgMS/kgN

[1] Stock Units (su) are a means of calculating stock numbers between species, breeds, and age groups based on relative feed demand. As an example 23.9su is equivalent to approximately 3 cows/ha (Friesian/Jersey cross) or 1500kg liveweight per hectare.

[2] Energy model calculations based upon the DairyBase model developed by DairyNZ.

[3] Includes feed fed to stock grazed off the dairy farm effective area.

Key driver of Nitrogen loss risk.

Your Farm's Nitrogen Risks Continued...

CROPPING AND CULTIVATION

VERY LOW

Conventional

This is the greatest risk method for sowing a crop and the risk increases as the cultivated area increases.

Not Applicable

Minimum Tillage

This is a lower risk activity than conventional cultivation, however the risk increases with the total area cultivated.

Not Applicable

Direct Drill

This is a lower risk activity than both full cultivation and minimum tillage for establishing a crop.

Not Applicable

Season of Harvest/Grazing

Crops harvested/grazed during winter pose a higher risk to nitrogen leaching.

Not Applicable

Timing of Fertiliser Application

There is greater risk if fertiliser is applied to crops during high risk months of May, June, July and August.

Not Applicable

EFFLUENT MANAGEMENT

VERY LOW

Effluent Discharge Method

Discharging treated effluent to land is the lowest risk.

Irrigate to pasture

Irrigate to pasture (low storage)

Discharge to water

Discharge to water and pasture

Effluent Irrigation Area

An undersized effluent area can result in the average amount of nitrogen per hectare applied exceeding local rules and regulations.

5ha/100 cows

Application Depth

Low rates will ensure greater flexibility of management with more irrigation days available and increase the chance of the plant utilising the nutrients within the effluent rather than it being lost.

‹ 12mm application depth

IRRIGATION

LOW

Irrigation Method

Irrigation generally Increases the nitrogen loss risk due to the potential for over irrigating to induce drainage events. Some systems are inherently riskier than others irrespective of management.

Pivot or linear	88%
Rotary boom, gun or k-line	12%
Border dyke	0%

Irrigation Scheduling

Deciding when to start or stop irrigation is important as poor management of an irrigation event can lead to induced drainage.

Soil moisture monitoring/ water budget	100%
Visual assessment/when water is available	0%

Irrigation Application Method

Having control over the amount and how often water is applied can greatly influence nitrogen loss risk with poor management of irrigation events leading to induced drainage.

Variable rate irrigation	0%
Deficit irrigation	100%
Fixed depth and return	0%

Key driver of Nitrogen loss risk.

Farm System Optimisation

Optimising your current farm system means making the most of the factors within your control. The benchmarking below provides an indication of how others in your local area* are performing. Understanding how you utilise nitrogen fertiliser to supplement pasture growth is our first step in helping you to improve the efficiency of your farming system.

Your Farm's Nitrogen Fertiliser Conversion Efficiency

This data compares your farm's nitrogen fertiliser conversion efficiency against farms in your local area. If an opportunity **to grow the same amount of pasture from less nitrogen fertiliser** looks possible, then the benefits will be estimated.

How does your farm compare?

Your farm is using

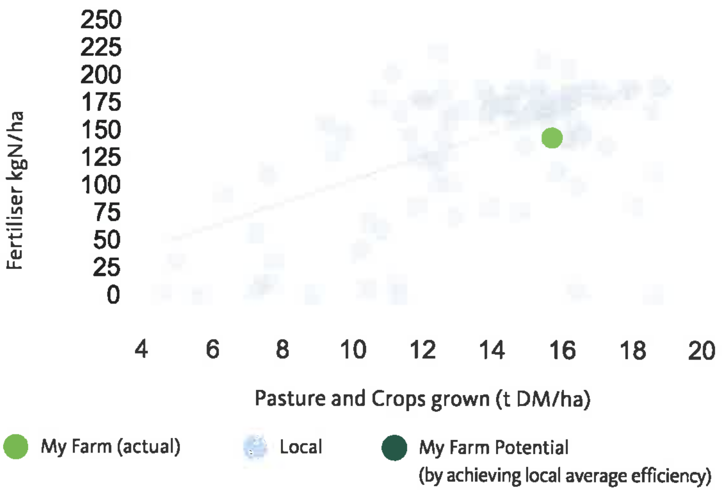
9 kgN

for every 1 tDM grown

Your local average farm is using

11 kgN

for every 1 tDM grown



**Local as defined as the 100 closest farms to your location (radius 30kms).*

You are achieving above average efficiency

Further improving efficiency by using less nitrogen fertiliser for the same yield could reduce:

- Purchased Nitrogen Surplus
- GHG Emissions
- Annual spend on nitrogen fertiliser

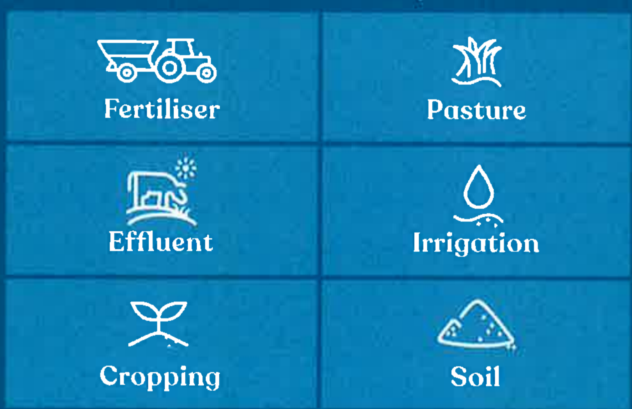
Further advice should be sought if you would like to explore factors influencing efficiency of your farm system.

Support and Next Steps

There are many factors that influence nitrogen fertiliser conversion efficiency and before you make any decisions, it is recommended that you seek further advice from your **Sustainable Dairying Advisor** or a suitably qualified person to complete:

- An assessment on-farm of potential contributing factors
- Prioritise focus areas for improvement
- Further modelling to assess impacts

Examples of factors influencing nitrogen fertiliser conversion efficiency



Greenhouse Gas Emissions

Your farm's greenhouse gas (GHG) footprint consists of both Biological and **Non-Biological** sources of emissions. The Greenhouse Gas Emissions in this report accounts for practices on your dairy farm effective area. Your biological emissions are what we have reported in previous years and are covered on the next page.

Your Farm's GHG Emissions per kgMS

9.5 $kgCO_2e/kgMS$

Biological — 8.6

Emissions derived from biological sources on farm.

Non-Biological — 0.9

Emissions derived from non-biological sources.

Methane (CH_4) — 7.2

Nitrous Oxide (N_2O) — 1.4

Carbon Dioxide (CO_2) — 0.9

Enteric Methane — 6.6

Emissions created in the digestive processes of the rumen.

Dung Methane — 0.3

Emissions from dung that is deposited in the pasture.

Effluent Methane — 0.3

Emissions from dung that is captured and spread via your farms effluent management system.

Urine and Dung — 1.1

Emissions from when dung and urine is deposited on to pasture.

Effluent Storage — <0.1

Emissions from the farms effluent management system.

Nitrogen Fertiliser — 0.3

Emissions from the application of nitrogen based fertilisers.

Nitrogen Fertiliser — 0.3

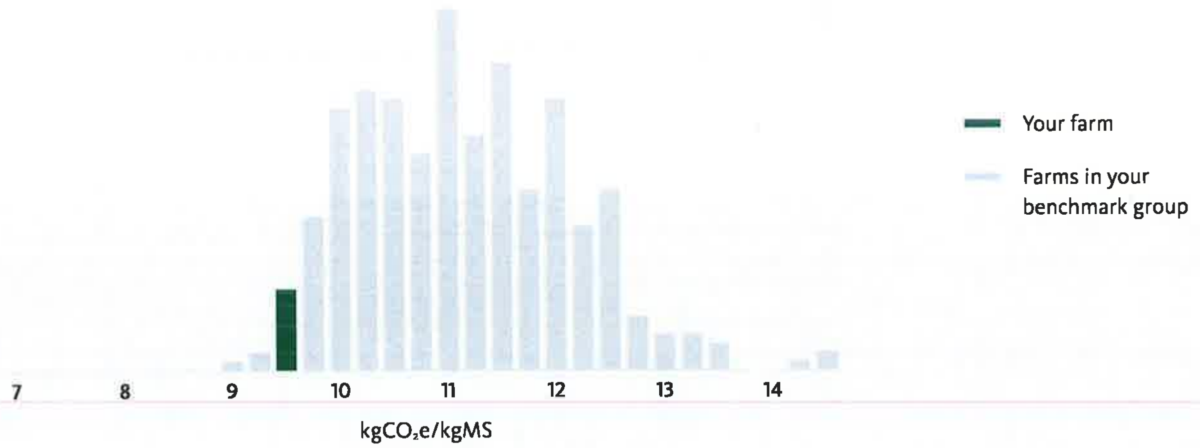
Emissions from manufacturing and transportation of nitrogen based fertiliser products.

Imported Supplements — 0.3

Emissions from the production and transportation of imported supplements.

Other Sources — 0.3

Emissions from sourcing non-nitrogen based fertilisers and lime, in addition to electricity and fuel use on farm.



Your farm is benchmarked against other farms in the Canterbury with production **between 1401-1700 kgMS/ha**

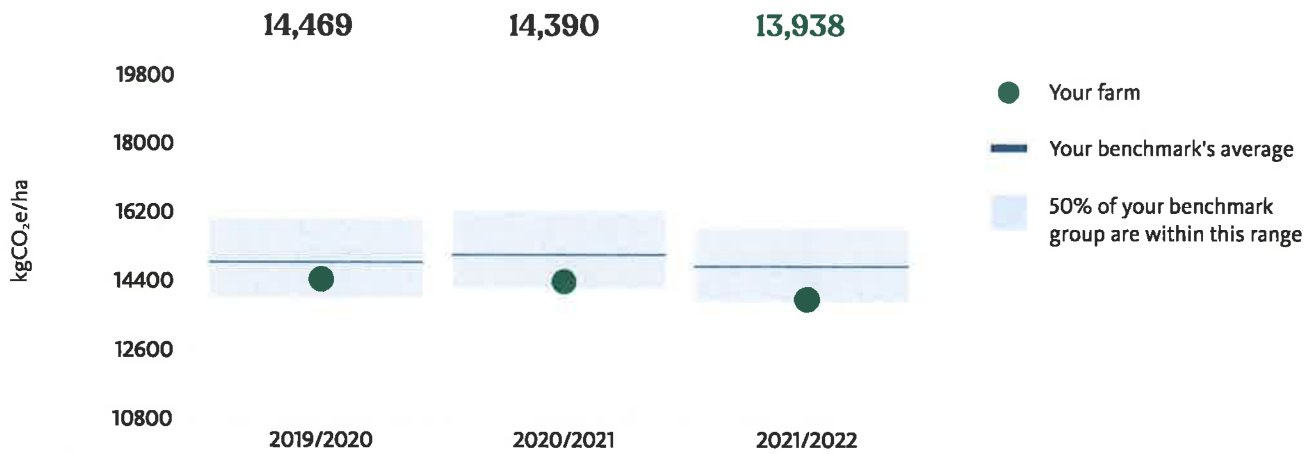
Your Biological Emissions were calculated using the Agriculture Inventory Model (AIM), which was developed by Ministry for Primary Industries. All Non-Biological emissions in this report have been calculated using regional averages and the emissions factors in accordance with NZ GHG Inventory and the AgResearch LCA model.

Your Farm's Biological GHG Emissions per Hectare

This section shows estimates of your farm's biological GHG emissions for your dairy farm effective area. Your biological emissions consist of methane and nitrous oxide gases. A GHG Emissions assessment for your total farm area is available on the Farm Source Business website under Digital Farm Insights (if your Farm Dairy Records Submission included additional information relating to animals and practices on your support land). For the link to this website, please go to the reference guide at the back of this report.

Methane		Nitrous Oxide		Biological Emissions
11,611	+	**2,327**	=	**13,938**
$kgCO_2e/ha$		$kgCO_2e/ha$		$kgCO_2e/ha$

(Equivalent to 430 kg/ha of methane)



Your farm is benchmarked against other farms in Canterbury with production **between 1401-1700 kgMS/ha**.

Trees on Farm

In the future farmers may be recognised for their ability to sequester carbon from some types of on-farm vegetation. As a guideline the information below is approximately how much carbon will be removed from the atmosphere from 1 ha of on-farm vegetation that meets the criteria.

Indigenous Vegetation	Riparian Vegetation	Scattered Forest
2,000-6,000 $kgCO_2/ha/year$	**1,000-3,000** $kgCO_2/ha/year$	**1,000-2,000** $kgCO_2/ha/year$

All carbon sequestration values have been averaged across the country for soil type and growth potential.

For more information

Information relating to agriculture, climate change, and carbon sequestration is available on the He Waka Eke Noa and AgMatters websites. **For links to these websites, please go to the reference guide at the back of this report.**

Milk

This section of the report provides key insights into potential savings and opportunities for your farm. These insights have been provided using tools and calculators that have been tested and developed through industry research.

Somatic Cell Count

Mastitis is usually caused by bacteria, which enter through the teat canal and infect the udder. Effective mastitis prevention will ensure more milk in the vat, higher quality milk, less use of antibiotics and more time saved on farm. If your bulk somatic cell count (SCC) is greater than 100,000 cells/ml this indicates some cases of sub-clinical infection are present with the potential to impact milk production.

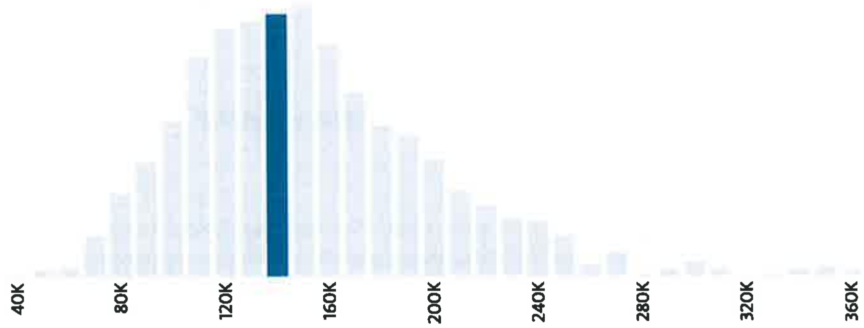
Research has shown there is a 2.1% loss in production for every doubling of somatic cell count over 100,000 cells/ml.

Potential Benefit

$25,800

By reducing your cell count to 100,000 cells/ml there is the potential to increase production on your farm that could be worth up to $25,800. This does not include the cost of treatment or culling and is based off a milk price of $9.30.

Your Farm's Annual Average Somatic Cell Count 2021/2022



142,485

cells/ml

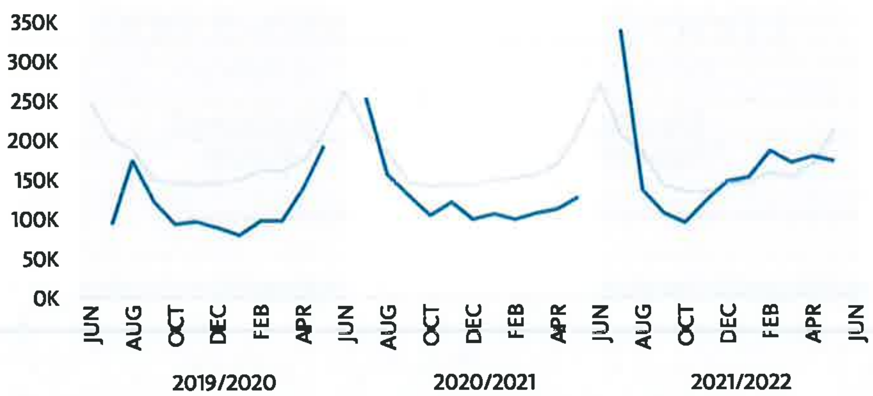
Your farm

Farms in your benchmark group

Your farm is benchmarked against other farms in your region. This placed you in the **top 50%** of suppliers in the Canterbury Region for the 2021/2022 season.

SmartSAMM
Powered by DairyNZ

Your Farm's Historical Monthly Average Somatic Cell Count



Your farm is benchmarked against other farms in your region.

Your farm

Farms in your benchmark group

Previous season's trends will be shown for up to three seasons where data is available and farm ownership hasn't changed.

Milking Efficiency

More efficient milking leads to better outcomes for people, cows and farm profitability. Simple changes that save seconds per cow can quickly add up to minutes saved per milking, and hours saved per day.

This section of the report uses milk vat monitoring data for your month of peak production to benchmark your milking efficiency. It uses DairyNZ research to provide an estimate of the amount of time that could be saved by changing the way your dairy is operated.

Your Farm's Peak Milk Production Data

Shed Type	50 bail rotary
Herd Size	557 cows
Peak Month	October
Peak Volume	12,169 L/day
Milking Frequency	3 in 2 (10-18-20 h interval between milkings)

Milking*	Times	Volume
1	05:00 to 08:00	18
2	15:00 to 17:15	9
3	05:00 to 08:00	16
Total	**4 hours/day**	**22 L/cow**

*Milking is defined as the start of milk flow to the end of milk flow into the vat

We Estimate You Could Save

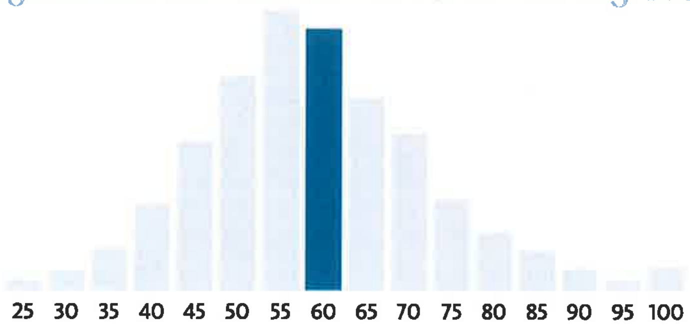
6 to 11 hours

per week

This estimate is based on your farm reaching 80-100% of its potential milking efficiency using the maximum milking time (MaxT) strategy.

The insights in this section will not be accurate if you have a split calving herd or if part of the herd is being milked OAD. For more detailed information please use the Dairy NZ Milksmart App or visit the website found in the reference guide at the back of this report.

Average Litres Per Cluster Per Hour During Your Peak Month



59

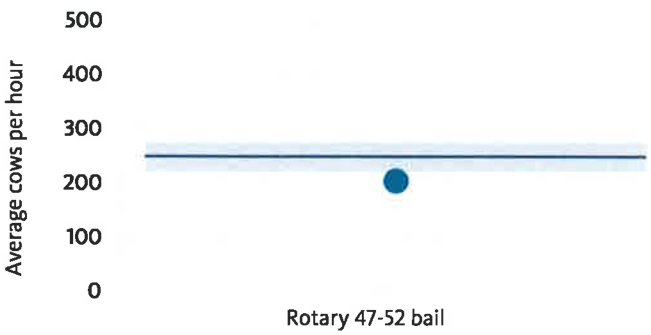
L/cluster/hour

Your farm

All Fonterra Farms

This benchmark allows a fair comparison of all dairy types, sizes and production levels.
For context, if your cows average milk flow rate is 2 L/min, then the maximum potential would be 120 L per cluster per hour (2 L/min × 60 min).

Average Cows Milked Per Hour During Your Peak Month



203

Cows/hour

Your farm

Your benchmark's average

50% of your benchmark group are within this range

This benchmark is influenced by the number of clusters in the dairy and the herd's level of production. Therefore, you are benchmarked against similar sized dairies nationally.

Support and Next Steps

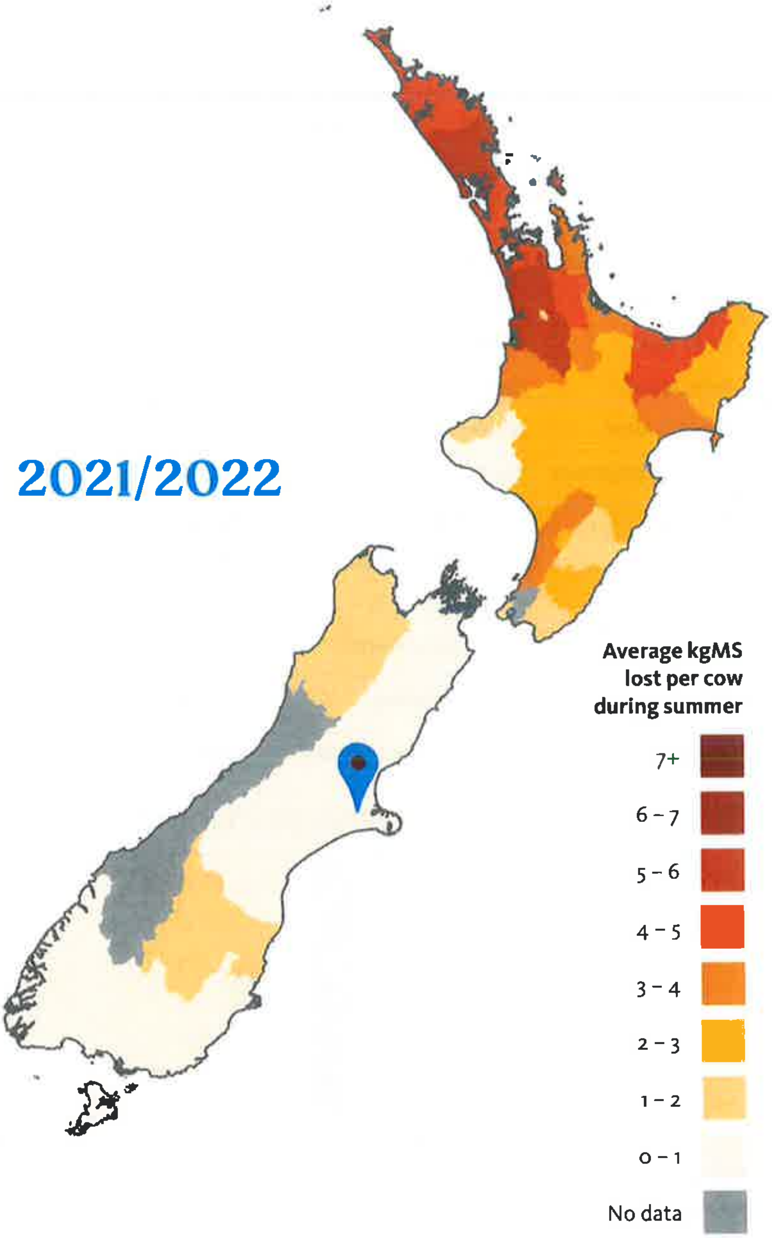
Contact your field team representative or the Service Centre on 0800 65 65 68 for a Milk Quality Improvement visit or Milking Efficiency visit with your Regional Food Safety and Assurance Manager.

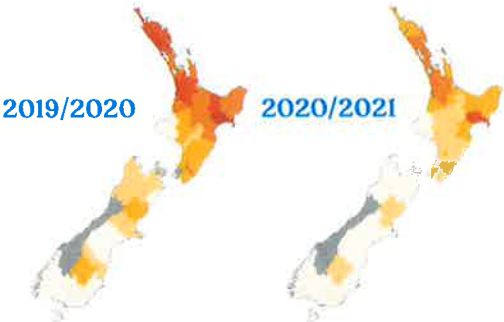
Animals

Heat Stress

The heat generated by rumen fermentation means that cattle are more tolerant to cold conditions than humans, but it also makes them more likely to get too hot. Cows that are too hot will seek shade, drink more, and their appetite and rumination times will reduce, depressing production. Severe heat stress can also have impacts on reproductive performance.

New Zealand research (AgResearch and DairyNZ) has shown that milk production decreases relative to increasing temperature and humidity. Combining this research with actual and modeled weather data supplied by NIWA for your farm location, along with your herd size and breed, we have calculated the impact of unmitigated heat stress for your farm.





Farm Details

Herd size	558
Predominant breed	Friesian x Jersey
Nearest virtual climate station	2.6 kms

	Above Threshold	Predicted Loss
2019/2020	29 Days	522 KgMS
2020/2021	28 Days	423 KgMS
2021/2022	21 Days	190 KgMS

Estimated Impact of Heat Stress For Your Farm

$1,800

per year

Lost revenue indicated above (predicted production loss @$9.30/kgMS) is based on the 2021/2022 weather data from your nearest virtual weather climate station. The table also shows predicted loss (kgMS) for the three most recent seasons.

To find out more in depth information about the impact heat stress can have on your herd visit the DairyNZ website. For the link to this website, please go to the reference guide at the back of this report.

Estimates based on a collaborative NZ Bioeconomy in the Digital Age project between AgResearch, DairyNZ, NIWA and Fonterra funded by NZ taxpayers and milk solids levy payers through the Strategic Science Investment Fund and DairyNZ Incl. In preparing NIWA VCSN data for this insight, all reasonable skill and care was exercised and the best available data and methods were used. NIWA accepts no liability for any loss or damage (whether direct or indirect) incurred by any person through the use of or reliance on this information.

Mastitis

Mastitis is painful for the affected animal, takes time and money to treat, and can have long term impacts on production, reproduction, and cell count. Most antibiotics used in dairy farming are for the control of mastitis, and reducing cases will reduce the risk of development of antibiotic resistant bacteria.

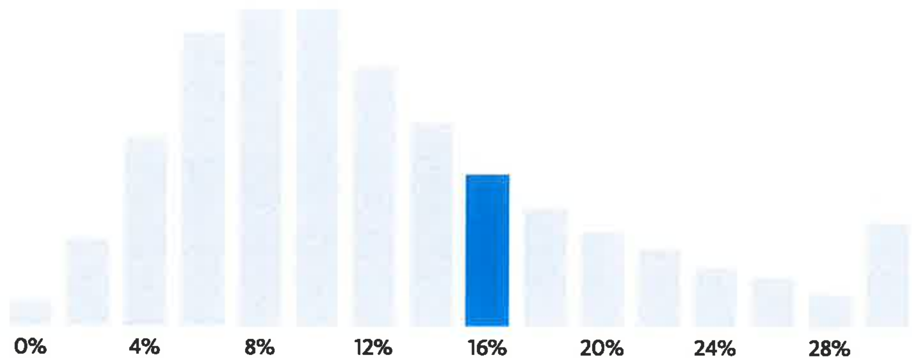
Estimated Impact of Mastitis For Your Farm

$13,200

per year

This is based on the 88 cases of clinical mastitis reported in your Farm Diary Records, multiplied by $150. This represents the average cost of treatment and withheld milk, but doesn't cover the longer term costs such as reduced production or increased culling risk. A more detailed calculator is available from DairyNZ. The link for this calculator can be found in the reference guide at the back of this report.

2021/2022 Mastitis Cases as % of Peak Cows



16%

Annual mastitis rate

Your farm

All Fonterra Farms

Lameness

As well as being painful for animals, lameness can add considerable cost to a farming operation with impacts on milk production, reproduction and staff time.

Management decisions have a huge influence on lameness rates, and DairyNZ have created a great guide called Preventing and Managing Lameness, that has some simple actions farmers can take to assess and improve the situation on their farm.

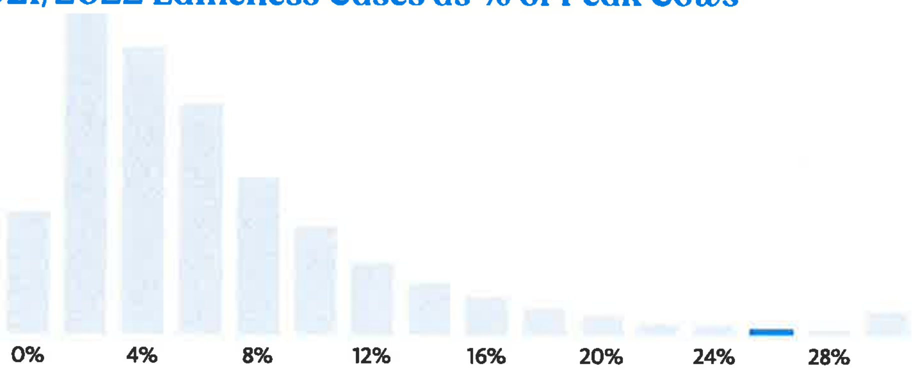
Estimated Cost of Lameness For Your Farm

$36,750

per year

The base cost to treat and withhold a lame cow is thought to be around $250 per case. The figure above is calculated for the 147 lame cows you diagnosed or treated last season. DairyNZ have developed a calculator that takes into account the additional costs due to lost reproductive performance and increased culling risk. The link for this calculator can be found in the reference guide at the back of this report.

2021/2022 Lameness Cases as % of Peak Cows



26%

Annual lameness rate

Your farm

All Fonterra Farms

Reference Guide

Environment

He Waka Eke Noa
www.hewakaekenoa.nz — 9

AgMatters
www.agmatters.nz — 9

Farm Source Website - Farm Insights
fonterra.nzfarmsource.co.nz/fs/s/farm-insights — 9

Milk

Milking Efficiency
www.dairynz.co.nz/milking/milking-efficiently/milksmart-app — 11

Milk Quality Improvement
nzfarmsource.co.nz/business/advice-support/mq-service/ — 11

Animals

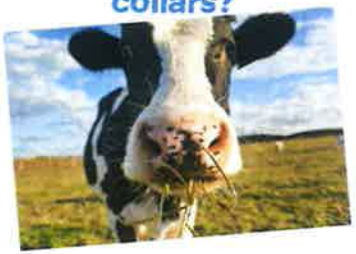
Heat Stress
www.dairynz.co.nz/animal/cow-health/heat-stress — 12

Mastitis
www.dairynz.co.nz/animal/cow-health/mastitis/ — 13

Lameness
www.dairynz.co.nz/animal/cow-health/lameness/ — 13

LUDF

Mating – What have we learnt from collars?



Veterinary Centre by the Big Blue Cross

1

Overview

What does a collar do?

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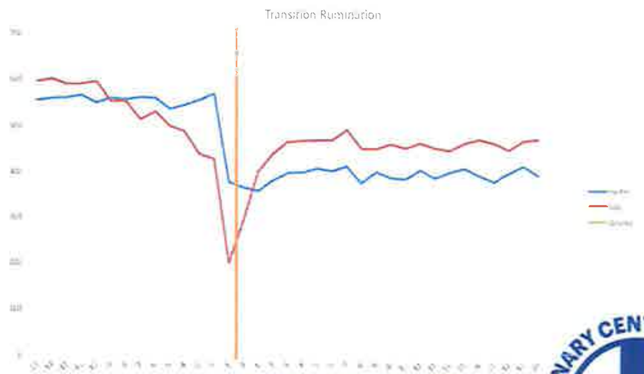
2

Transition is Key



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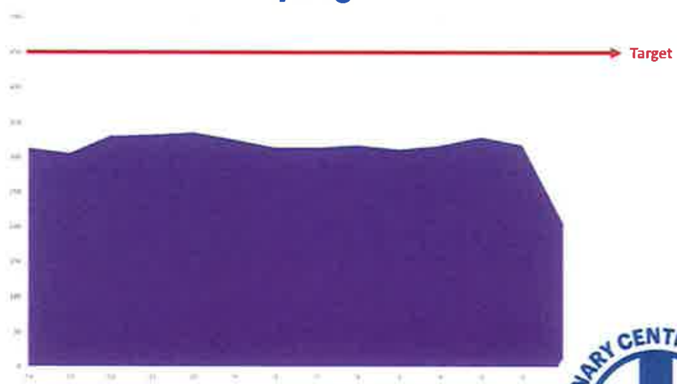
3

Springers



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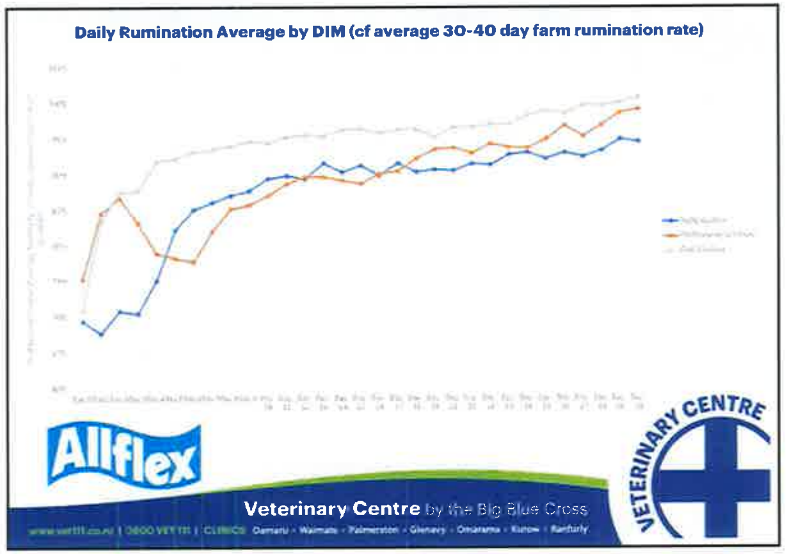
Daily Rumination Average by DIM (cf average 30-40 day farm rumination rate)
Allflex
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Pre-Mate Heats – What can we do now?
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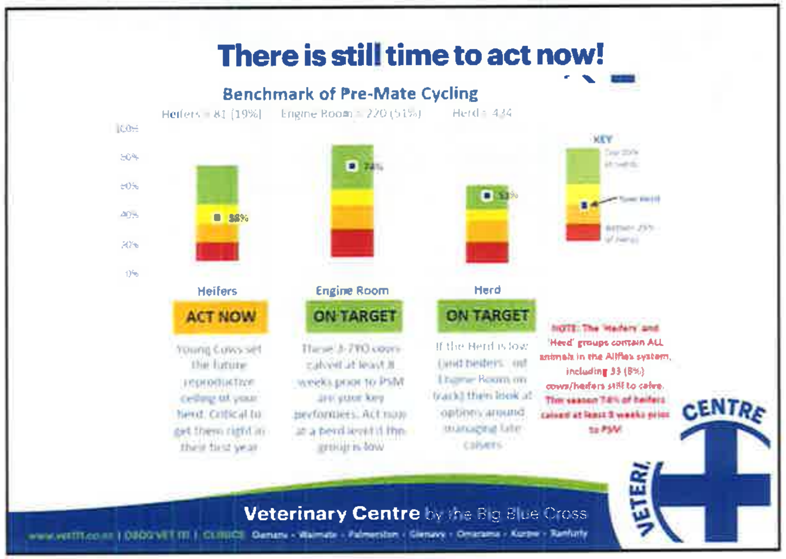
There is still time to act now!
Benchmark of Pre-Mate Cycling
Heifers
ACT NOW
Engine Room
ON TARGET
Herd
ON TARGET
KEY
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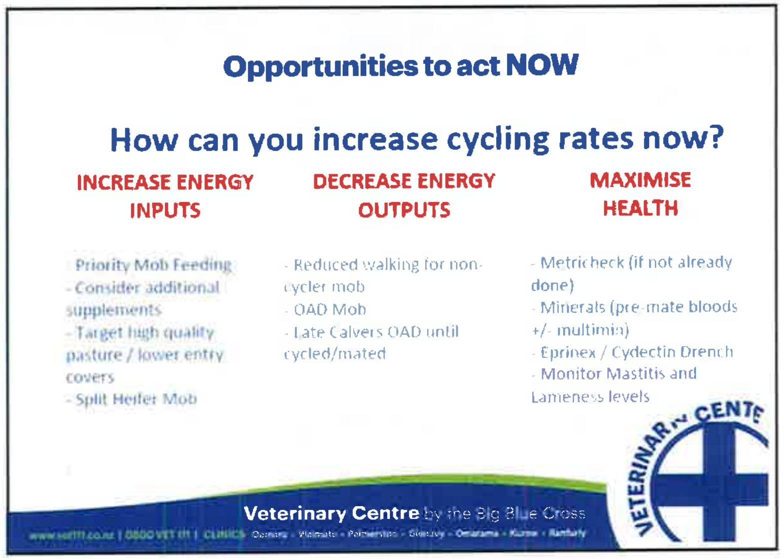
Opportunities to act NOW
How can you increase cycling rates now?
INCREASE ENERGY INPUTS
DECREASE ENERGY OUTPUTS
MAXIMISE HEALTH
Priority Mob Feeding
- Consider additional supplements
- Target high quality pasture / lower entry covers
- Split Heifer Mob
- Reduced walking for non-cycler mob
- OAD Mob
- Late Calvers OAD until cycled/mated
- Metricheck (if not already done)
- Minerals (pre-mate bloods +/- multimin)
- Eprinex / Cydectin Drench
- Monitor Mastitis and Lameness levels
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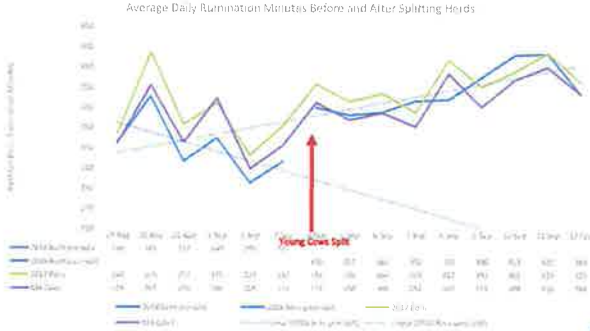
Focus areas today:

- Splitting Heifers
- Late calvers on OAD
- Monitoring milk protein levels
  - Timely supplements if needed
- Managing grass quality / APC

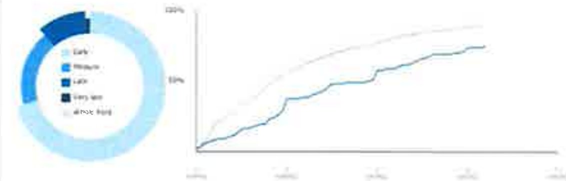
9

Splitting Heifers



10

Late Calvers 20/21 (TAD)



Calving Pattern			Count		3 weeks	6 weeks	9 weeks	9+ weeks	Not in-calf rate
					In-calf rate				
Early calvers	< 3 weeks	23 Aug	707	71%	60%	82%	92%	93%	7%
Medium calvers	3-6 weeks	13 Sep	181	18%	45%	67%	81%	83%	17%
Late calvers	6-9 weeks	4 Oct	104	10%	29%	51%	71%	75%	25%
Very late calvers	9+ weeks	25 Oct	10	1%	50%	60%	90%	90%	10%

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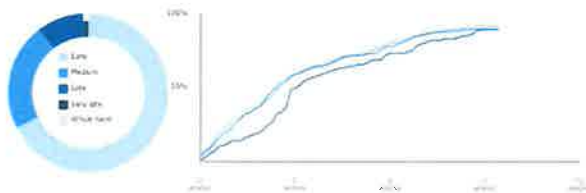
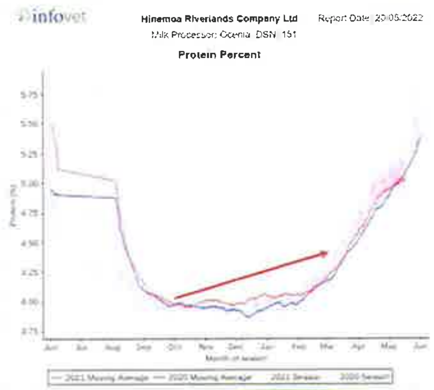
Late Calvers 21/22 (OAD)



Calving Pattern			Count		3 weeks	6 weeks	9 weeks	9+ weeks	Not in-calf rate
					In-calf rate				
Early calvers	< 3 weeks	23 Aug	672	68%	58%	80%	92%	92%	8%
Medium calvers	3-6 weeks	13 Sep	217	22%	57%	77%	89%	89%	11%
Late calvers	6-9 weeks	4 Oct	94	9%	48%	72%	89%	89%	11%
Very late calvers	9+ weeks	25 Oct	11	1%	18%	64%	82%	82%	18%

12

Negative Energy Balance? – Monitoring Milk Protein



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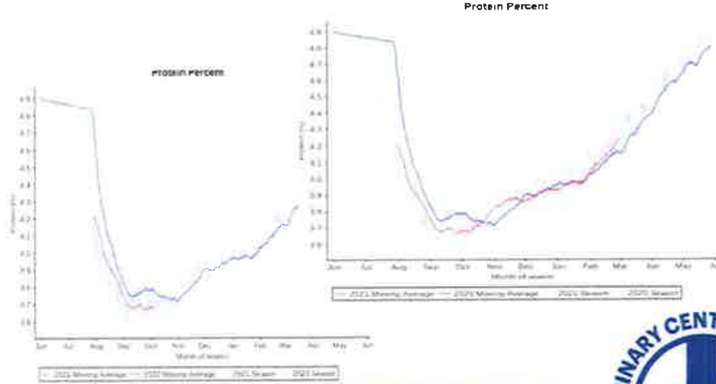
Monitoring Protein Levels



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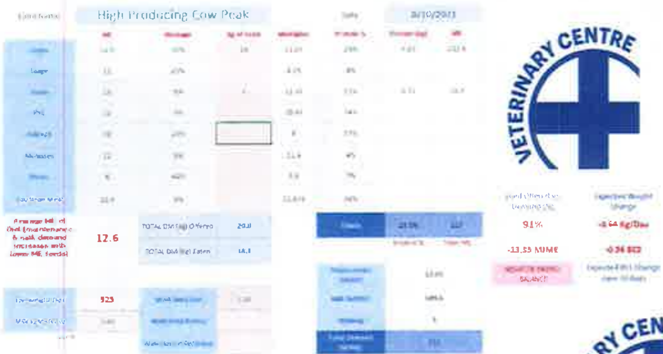
Lactational Energy Calculator



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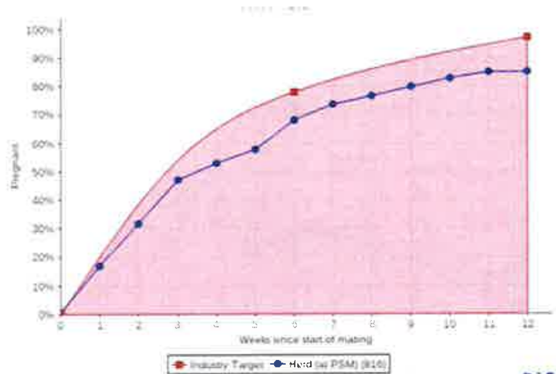
Typical Week 3-6 Week Dip



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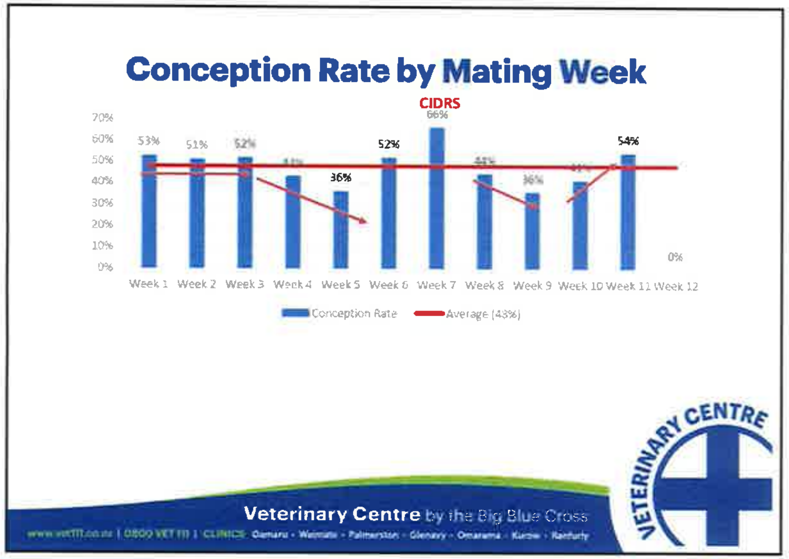
Conception Rate by Mating Week
CIDRS
66%
70%
60%
50%
40%
30%
20%
10%
0%
53%
51%
52%
36%
52%
54%
0%
Week 1 Week 2 Week 3 Week 4 Week 5 Week 6 Week 7 Week 8 Week 9 Week 10 Week 11 Week 12
Conception Rate
Average (43%)
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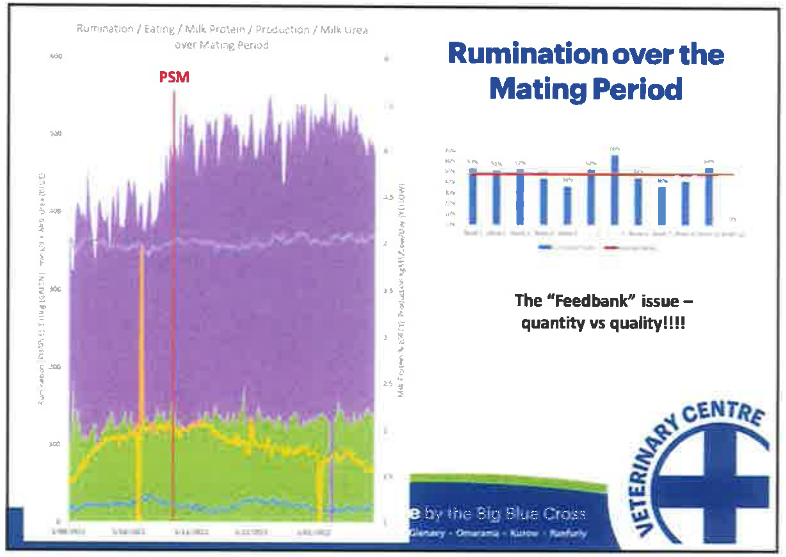
Rumination / Eating / Milk Protein / Production / Milk Urea over Mating Period
PSM
Rumination over the Mating Period
The "Feedbank" issue – quantity vs quality!!!!
by the Big Blue Cross
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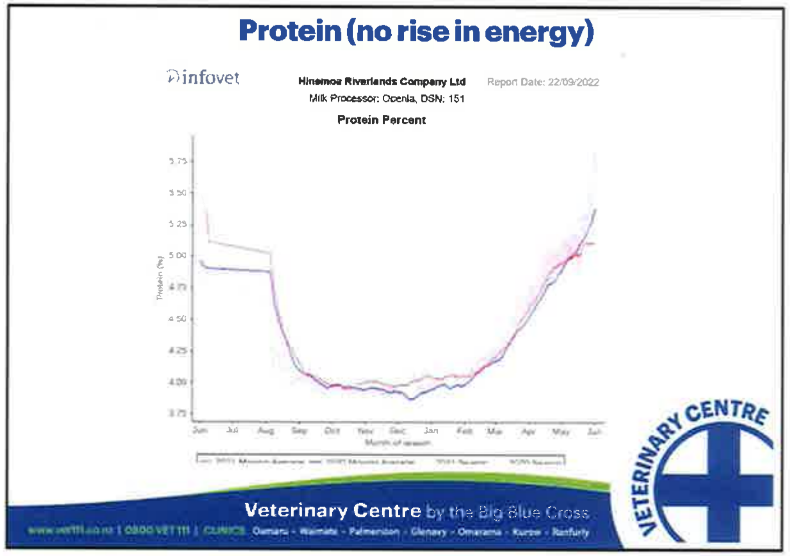
Protein (no rise in energy)
infovet
Hinemoa Riverlands Company Ltd
Milk Processor: Ocenla, DSN: 151
Report Date: 22/09/2022
Protein Percent
Protein (%)
5.75
5.50
5.25
5.00
4.75
4.50
4.25
4.00
3.75
Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun
Month of season
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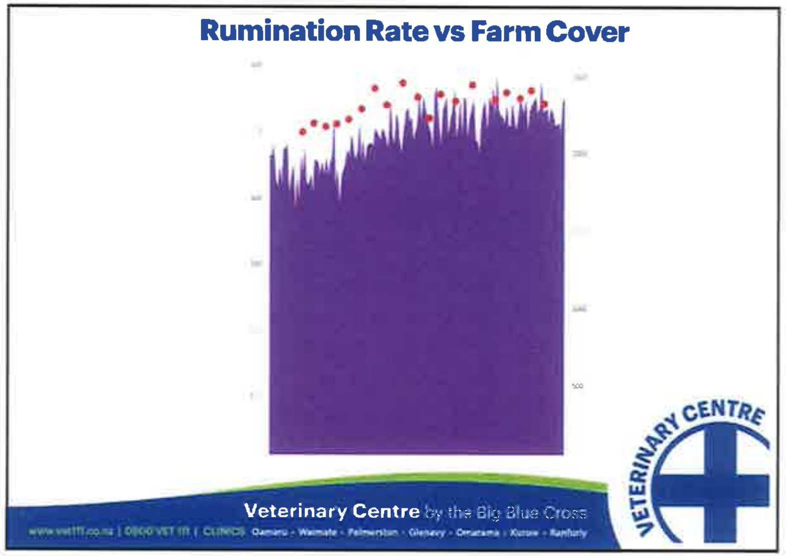
Rumination Rate vs Farm Cover
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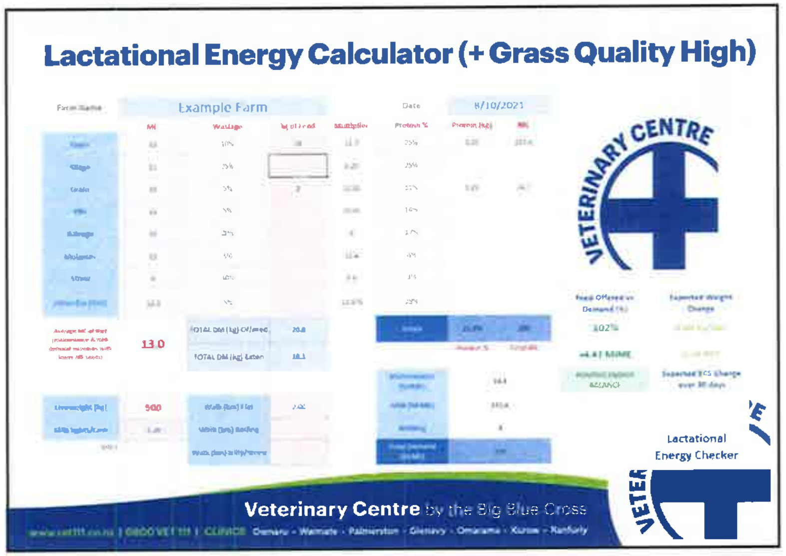
Lactational Energy Calculator (+ Grass Quality High)
Example Farm
13.0
500
102%
Lactational Energy Checker
Veterinary Centre by the Big Blue Cross
www.vet111.co.nz | 0800 VET 111 | CLINICS Oamaru • Waimate • Palmerston • Glenavy • Omarama • Kurow • Ranfurly

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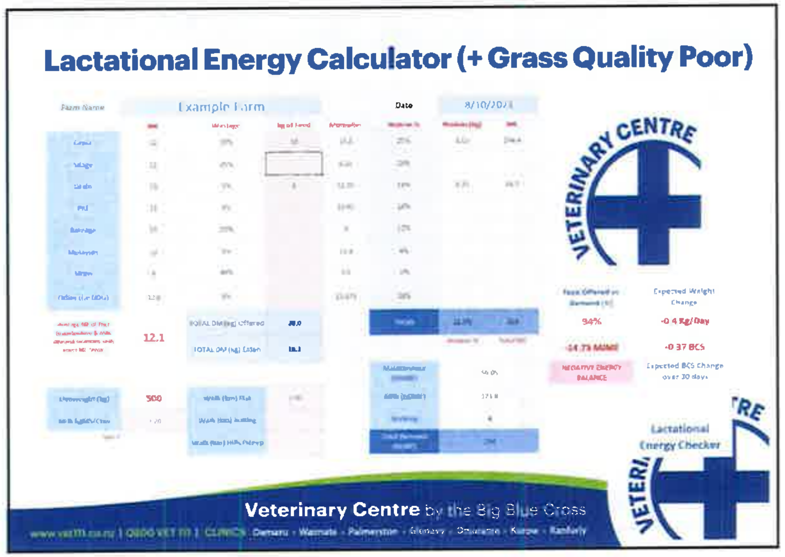
Lactational Energy Calculator (+ Grass Quality Poor)
Example Farm
Date
12.1
500
94%
-0.4 Kg/Day
-0.37 BCS
Lactational Energy Checker
Veterinary Centre by the Big Blue Cross
www.vet111.co.nz | 0800 VET 111 | CLINICS Oamaru • Waimate • Palmerston • Glenavy • Omarama • Kurow • Ranfurly

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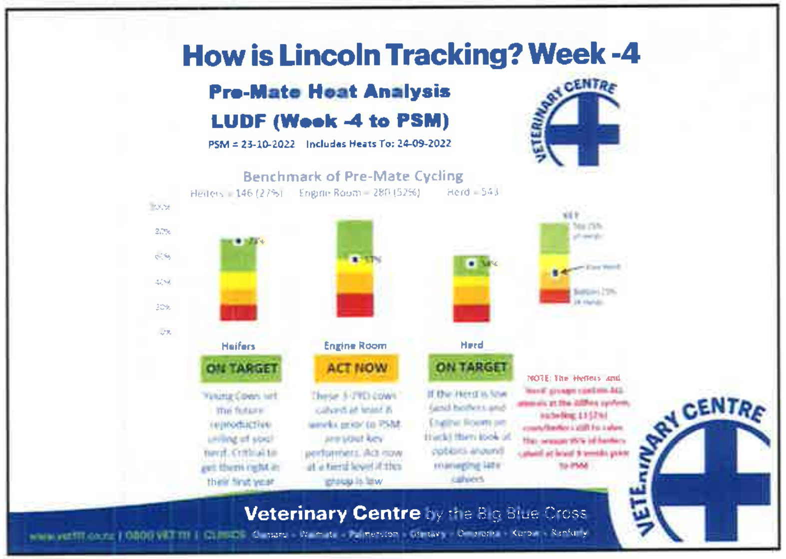
How is Lincoln Tracking? Week -4
Pre-Mate Heat Analysis
LUDF (Week -4 to PSM)
PSM = 23-10-2022 Includes Heats To: 24-09-2022
Benchmark of Pre-Mate Cycling
Heifers
ON TARGET
Engine Room
ACT NOW
Herd
ON TARGET
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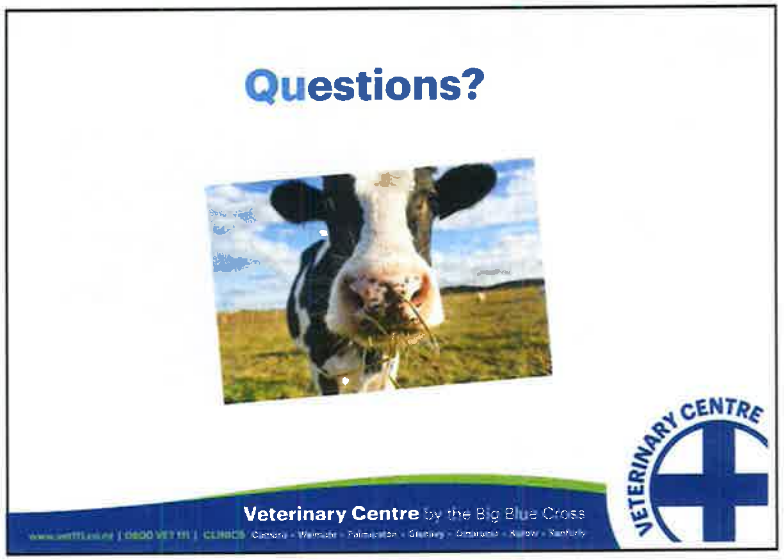
23


Questions?
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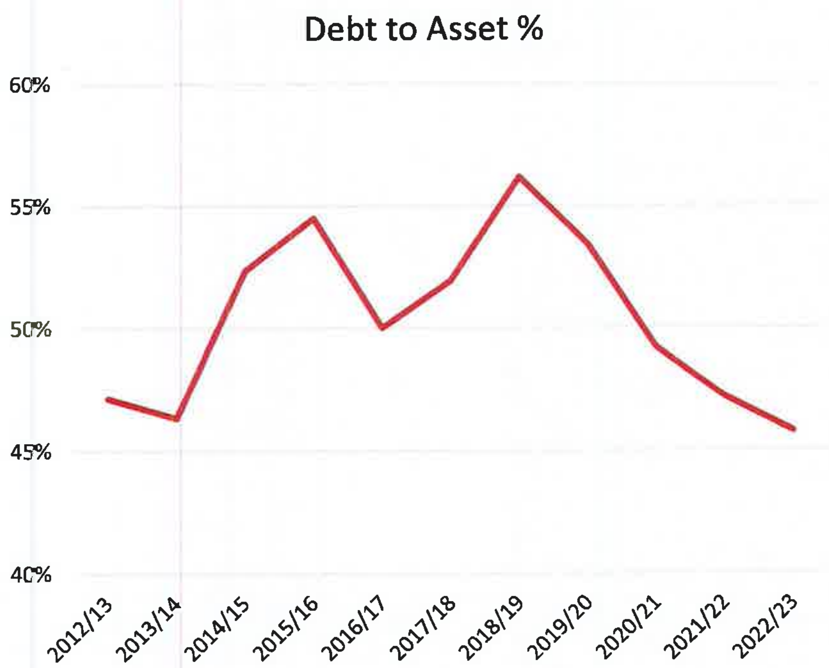
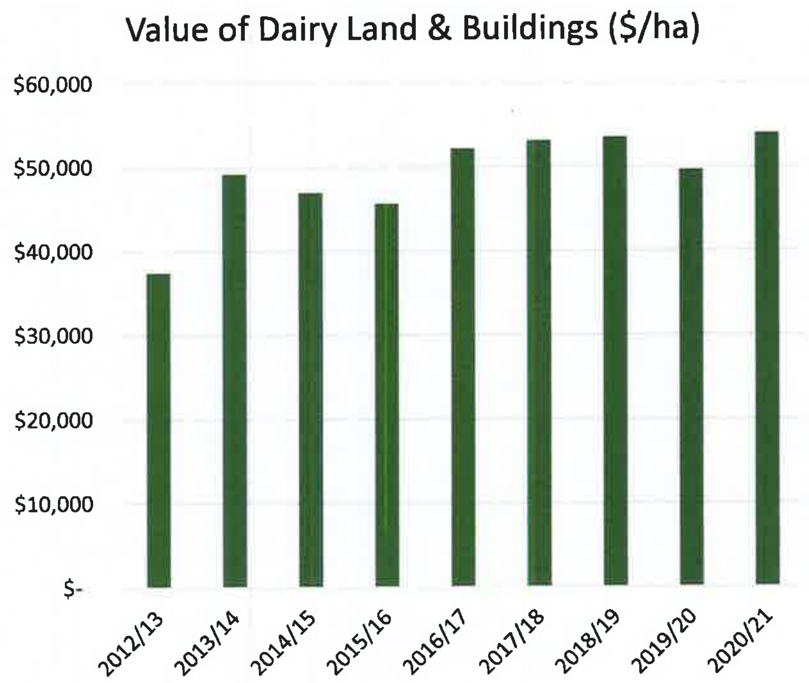
How resilient is your farm business?

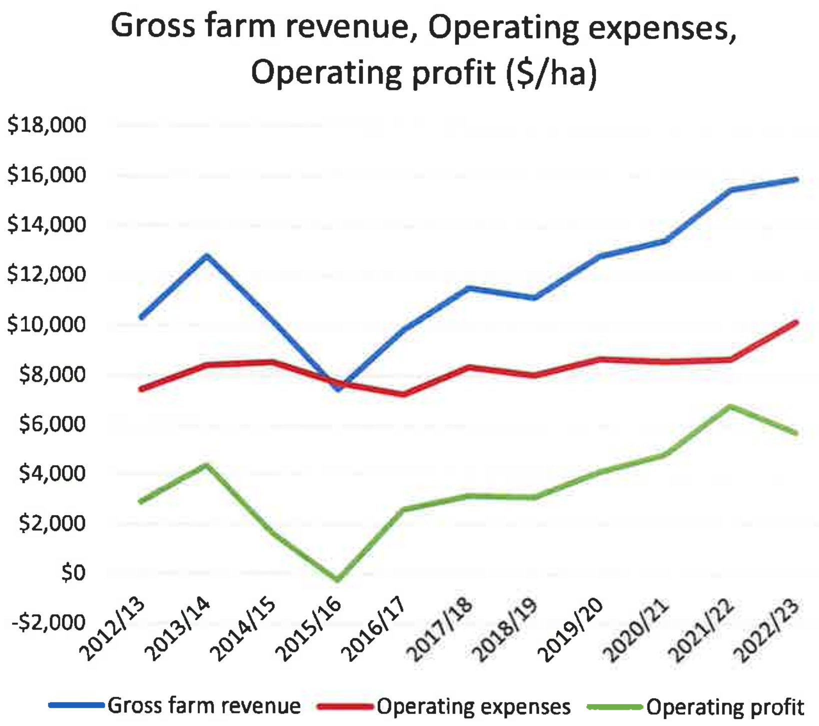
Analysis of Canterbury Dairy Farms in DairyBase 2013-2023

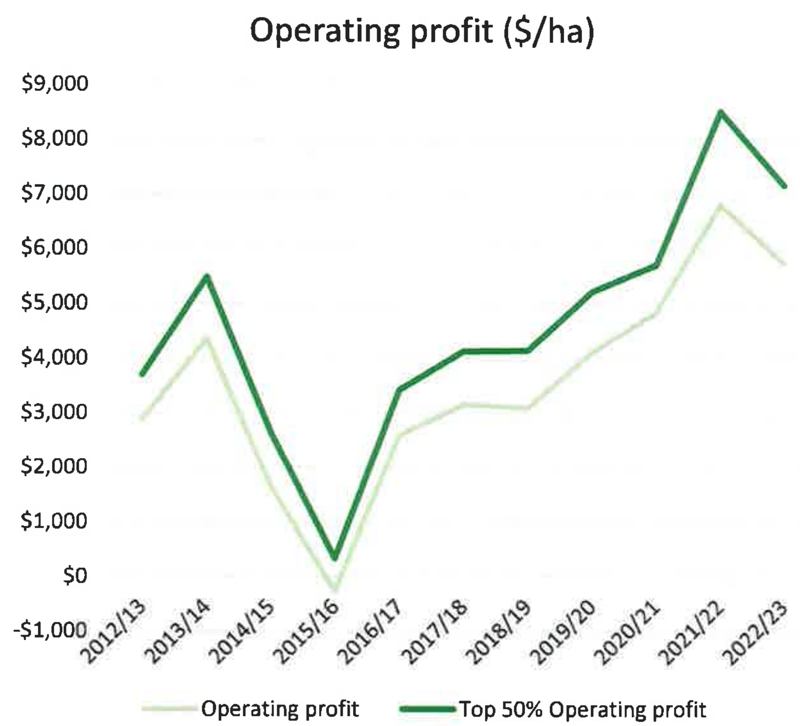
Paul Bird
DairyNZ





- Significant debt has been repaid since 2019.
- Debt reduction is a good option for most farm businesses leading to increased financial resilience.
- Dairy land has only increased marginally since 2014, based on 90 farms in DairyBase.
- Land value generally increases over long periods of time however, it is risky to budget on capital gain in the short term. Therefore, it is essential to focus on optimising profit and achieving a high return on assets (RoA), above the cost of borrowing.





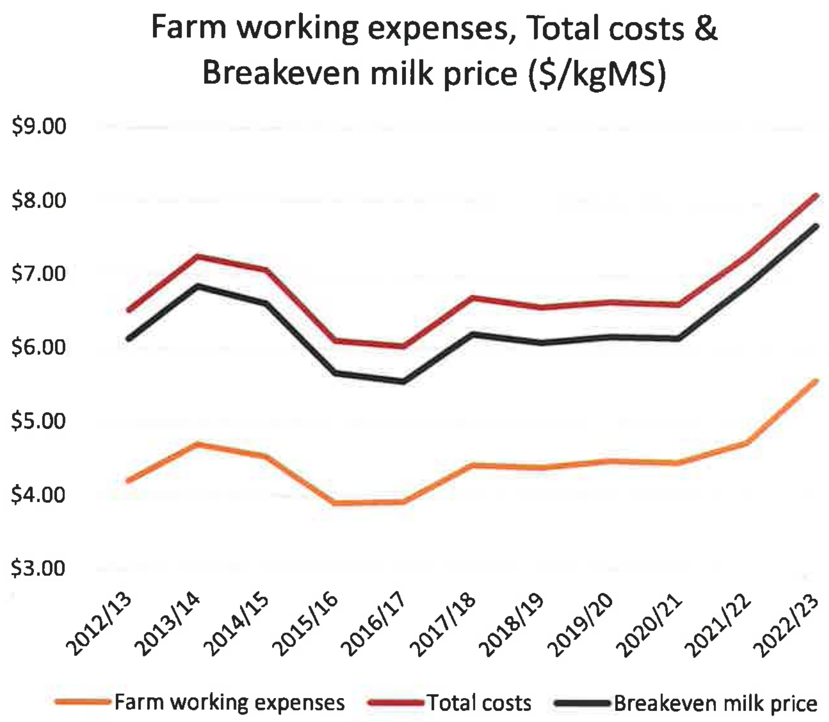
- Gross farm revenue has risen strongly since 2016, well ahead of operating expenses, resulting in higher operating profit.
- This trend is forecast to reverse in the 2022/23 season due to increasing operating expenses.
- The top 50% operating profit group will likely follow this trend, but they will have increased capacity to manage volatility.

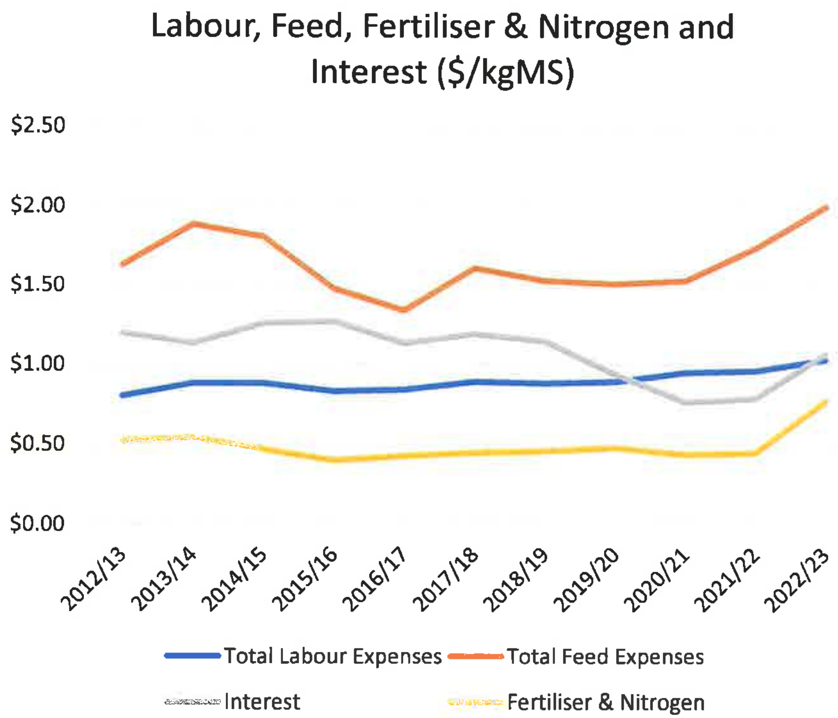
Trends in costs and breakeven milk price

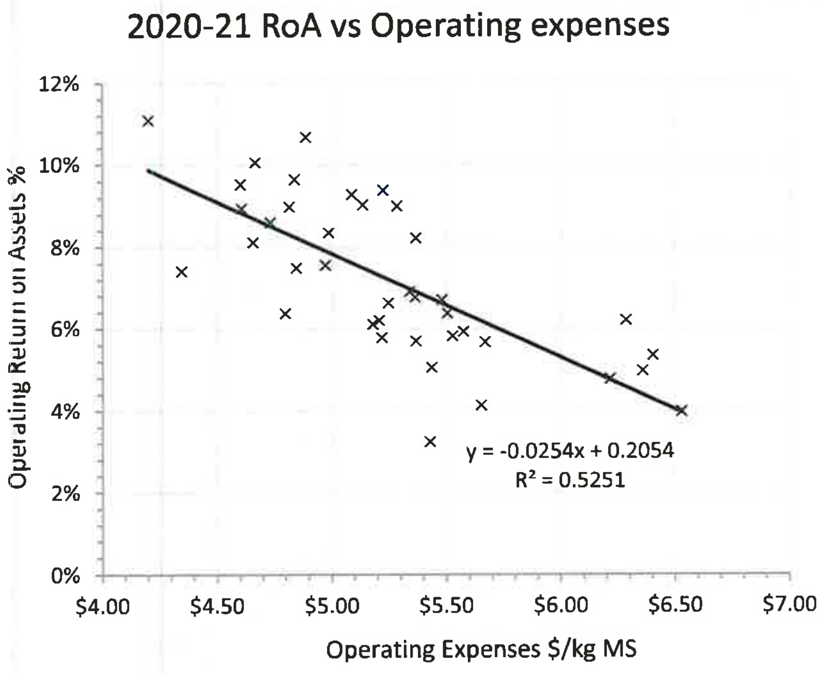
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22*	2022/23*
Farm working expenses	$ 4.20	$ 4.69	$ 4.53	$ 3.90	$ 3.92	$ 4.42	$ 4.39	$ 4.48	$ 4.46	$ 4.73	$ 5.57
Depreciation	$ 0.48	$ 0.48	$ 0.51	$ 0.53	$ 0.51	$ 0.51	$ 0.48	$ 0.48	$ 0.44	$ 0.46	$ 0.46
Interest & rent	$ 1.27	$ 1.17	$ 1.32	$ 1.34	$ 1.19	$ 1.24	$ 1.20	$ 0.99	$ 0.82	$ 0.85	$ 1.13
Tax	$ 0.22	$ 0.40	$ 0.09	$ 0.01	$ 0.10	$ 0.19	$ 0.19	$ 0.35	$ 0.55	$ 0.88	$ 0.61
Drawings	$ 0.34	$ 0.51	$ 0.61	$ 0.32	$ 0.30	$ 0.33	$ 0.30	$ 0.33	$ 0.33	$ 0.36	$ 0.35
Total costs	**$ 6.51**	**$ 7.25**	**$ 7.06**	**$ 6.10**	**$ 6.03**	**$ 6.69**	**$ 6.56**	**$ 6.64**	**$ 6.61**	**$ 7.28**	**$ 8.11**
Less stock income	$ 0.39	$ 0.41	$ 0.46	$ 0.44	$ 0.48	$ 0.50	$ 0.48	$ 0.47	$ 0.46	$ 0.41	$ 0.42
Breakeven milk price	**$ 6.12**	**$ 6.84**	**$ 6.60**	**$ 5.66**	**$ 5.55**	**$ 6.19**	**$ 6.08**	**$ 6.17**	**$ 6.15**	**$ 6.87**	**$ 7.69**
Net Milk Sales	$ 6.33	$ 7.72	$ 5.73	$ 3.95	$ 5.75	$ 6.54	$ 6.43	$ 7.01	$ 7.40	$ 9.14	$ 9.27

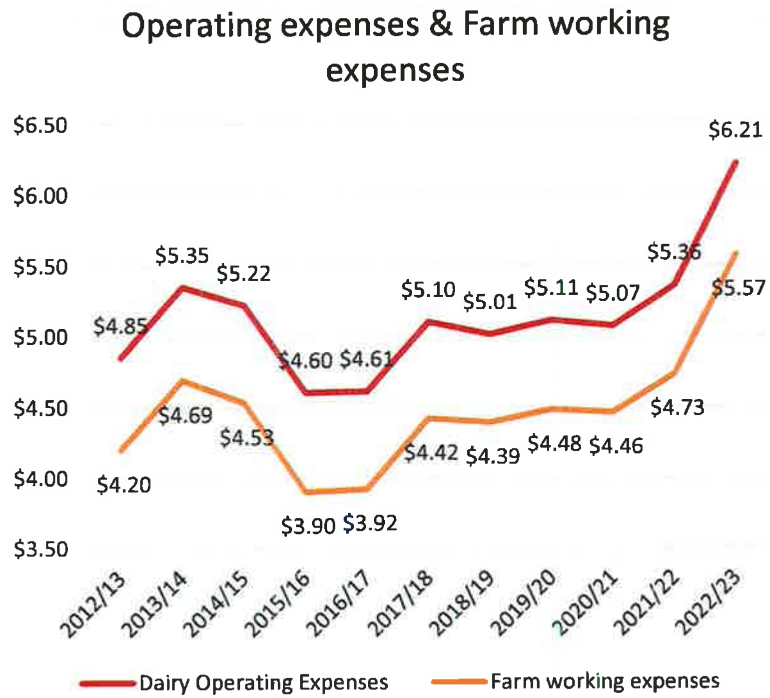
**estimates*

- Farm working expenses are estimated to increase by $1.11/kgMS from 2020/21 to 2022/23.
- Interest costs are increasing significantly due to rising interest rates, even allowing for ongoing debt reduction.
- Depreciation has averaged $0.46/kgMS and is used as a proxy for 'maintenance capital expenditure'. It has been relatively consistent over time. However, as infrastructure ages (e.g. irrigation systems) this may not be enough of an allowance to cover actual capital expenditure requirements over the next 5 to 10 years.
- The average breakeven milk price was $6.15 for the 9 years 2013 to 2021. The estimate for the 2023/23 is 25% higher at $7.69/kgMS.

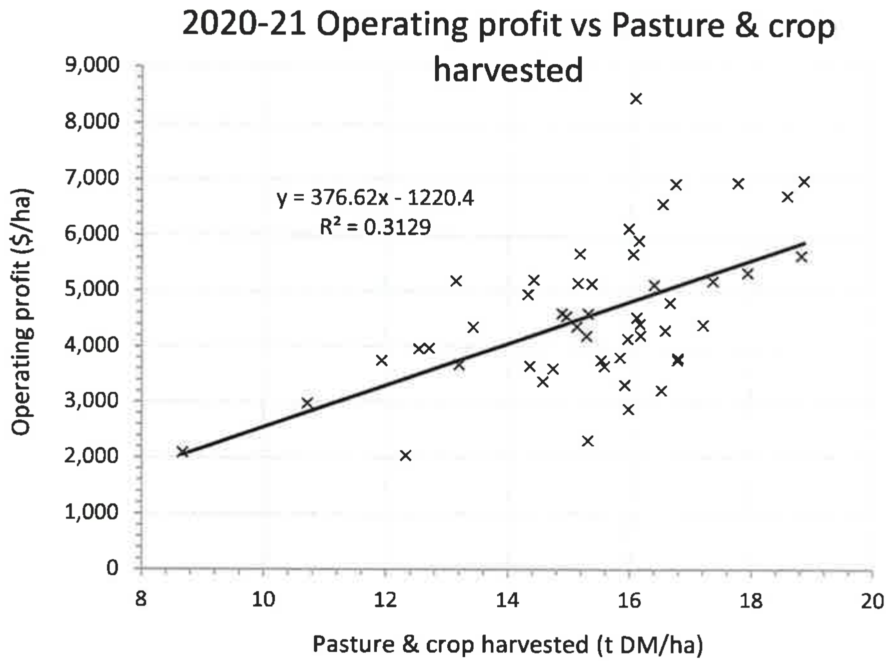

Farm working expenses, Total costs & Breakeven milk price ($/kgMS)
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
2012/13
2013/14
2014/15
2015/16
2016/17
2017/18
2018/19
2019/20
2020/21
2021/22
2022/23
Farm working expenses
Total costs
Breakeven milk price

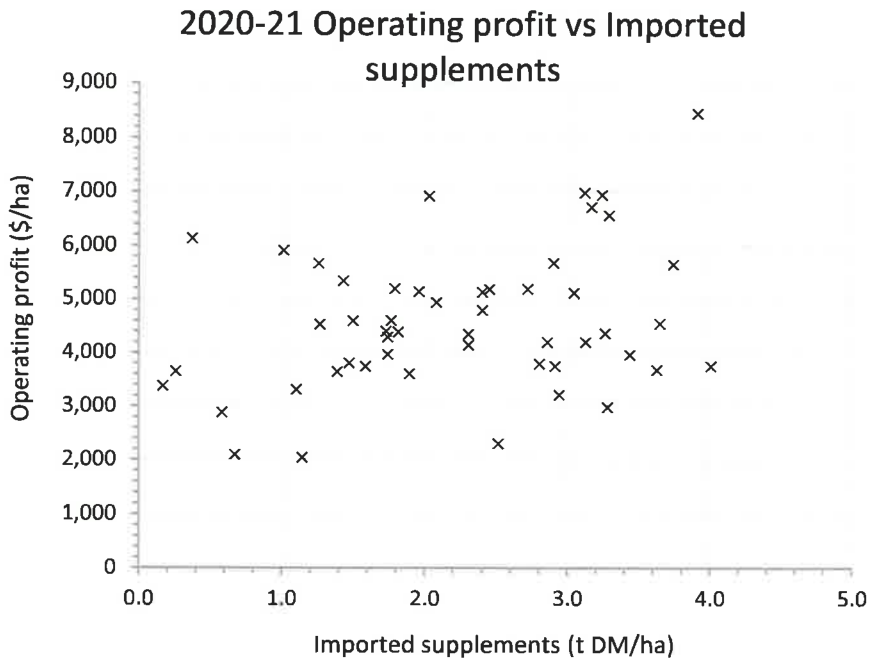

Labour, Feed, Fertiliser & Nitrogen and Interest ($/kgMS)
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
2012/13
2013/14
2014/15
2015/16
2016/17
2017/18
2018/19
2019/20
2020/21
2021/22
2022/23
Total Labour Expenses
Total Feed Expenses
Interest
Fertiliser & Nitrogen





- Farm businesses that generate RoA above interest rate make money off every dollar borrowed.
- If Operating expenses reduce by $0.50/kg MS, RoA increases by 1.3%
- Businesses based on commodities must focus on low unit cost of production i.e. Operating expenses/kgMS and Farm working expenses/kgMS.
- Operating expenses are best used when benchmarking.
- Farm working expenses are best used for cash budgeting.





- Pasture & crop harvested is still an important driver of operating profit. 1 ton of extra pasture harvest = an extra $380 of profit/ha.
- Top pasture managers have a relentless focus on pre-grazing cover, post grazing residuals, average pasture cover & rotation length.
- There is no significant relationship between Operating profit/ha and Imported supplements/ha.
- Generating the same profit with less inputs will mean inflation has less of an effect on increasing costs.
- DairyNZ supplement calculator shows: autumn use of supplements can be profitable with the following assumptions: at $9.00/kg MS and target residuals met (saved pasture used to increase rotation length); when supplement prices are at or below $450/t PKE/blends; grain $650/t and pasture silage $400/t. Baleage marginal at $500/t.

Summary

- Focus on generating RoA above the interest rate.
- The 2022/23 forecast profit is still looking solid despite very high inflation. However, forecasts cannot be relied upon – be prepared for a lower milk price.
- Keep paying off debt.
- Maintain a relentless focus on cashflow monitoring and pasture management.
- Review the 5-year capital expenditure requirements to maintain farm infrastructure.
- Review your autumn supplement decisions. They can be profitable if you don't overpay or leave high grazing residuals.
- Benchmark your business using DairyBase or your Consultant/Accountants benchmarking system, so you know your potential
  - Return on assets
  - Operating profit
  - Operating expenses
  - Farm working expenses
  - Pasture & crop harvested

He Waka Eke Noa and farm greenhouse gas review

LUDF focus day

Nicole Mesman

28/09/2022

LUMEN

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He Waka Eke Noa – Process to date

Background

- In response to international and national pressure agriculture was to become part of the ETS
- The industry proposed an alternative called He Waka Eke Noa

Where we have landed

- Proposal of a split gas pricing for emissions to recognise that methane stays in the atmosphere for a lot less time than CO_2 and N_2O.
- The proposal for more sequestration options that are not currently in the ETS.
- And to recognise other mitigations which reduce GHG emissions as the science is developed to support them.

HWEN proposal to Government May 2022 → **Feedback from the Climate Change Comission July 2022** → **Government has until end of 2022 to release its final decision**

LUMEN

Farm level split gas pricing scheme

Farm-Level Split-Gas Recommendations

A		B		I		C		$
The cost of short-lived gas emissions (CH_4)	+	The cost for long-lived gas emissions (N_2O and CO_2)	–	The incentive payment for approved actions	–	The value of on-farm sequestration	=	The total 'net' emissions cost

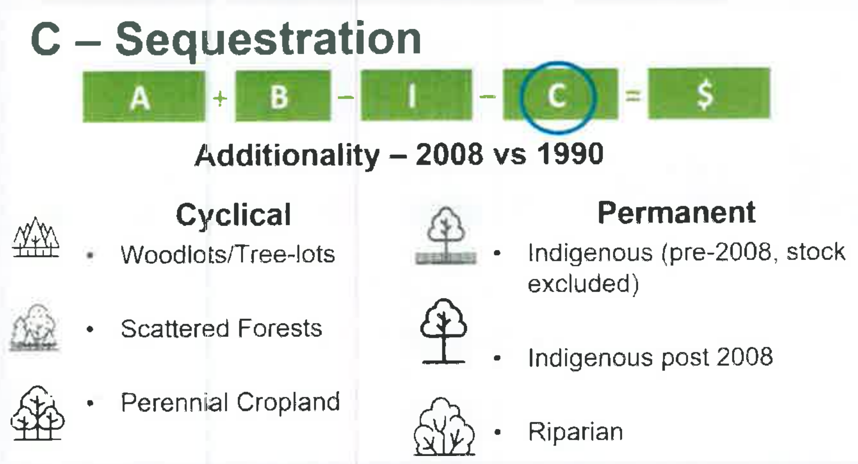
Tax – A + B

- The proposed price for CH_4 (A) starts at $0.11/kg (important to note it is in kg not tonnes)
- For CO_2 and N_2O (B) the proposed starting price is $4.25/tonne.

Credit – C

- The proposed value for on-farm sequestration is 75-90% of the NZ ETS price for a tonne of carbon
- Estimated to be $85 in 2025 (likely to be higher than this)
- 75% of this would be $64/tonne.

On farm sequestration proposal



Sequestration categories

- <u>Permanent</u>
  - Before 1st Jan 2008 <u>stock must be excluded</u> and regenerating* and/or planted > 0.25 ha
  - After 1st Jan 2008 > 0.25 ha planted and/or regenerating*
  - Riparian after 1st Jan 2008 (min 1 m wide, non woody vegetation ie flax and toetoe included but not predominant species).
  - Woody species include manuka, kanuka, matagouri, mixed broadleaf, five finger, cabbage trees

*** Regenerating means must be a native seed source within 100 m of area.**

- <u>Cyclical</u>
  - Minimum 0.25 ha and 15 stems/ha
  - Orchard/ vineyards > 0.25 ha
  - Shelterbelts min linear canopy cover of 90%
  - Forests > 0.25 ha but < 1 ha

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Detail on proposal

- The levy placed on all gases, discount on the price of sequestration and value of incentive discounts to be updated every three years
- Price for sequestration be updated annually to align with ETS price
- System Oversight Board directs investment of revenue, recommends pricing to ministers for final decision
- The pricing proposal is for farms which exceed:
  - 550 stock units (incl sheep, cattle, deer, goats)
  - 50 dairy cattle
  - 700 swine
  - 50,000 poultry
  - Or applying over 40 tonnes of synthetic N fert.

HWEN proposal to government

- Submitted May 2022, inclusion of on farm sequestration and split gas approach key to proposal
- Climate Change Commission response:
  - Agreed with the move from simple to detailed emission calculator,
  - Suggested that synthetic N fertilisers be priced at the importer/manufacturer level
  - Does not support the inclusion of on farm sequestration.
- Feedback on this by HWEN and others stating the importance of on farm sequestration being included
- Now waiting for government response in December 2022

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Calculation of emissions

Move from simple farm emission calculator in 2025 to detailed in 2027.

Simple Calculator - 2025

Four farm inputs:

- Farm area,
- Annualised stock reconciliation,
- Production,
- Synthetic N-fertiliser type and amount,
- Partial recognition for mitigations such as low emission sheep, nitrification inhibitors and reduced bought in feed and N use.

Detailed calculator - 2027

Recognises increased farm detail such as:

- Monthly animal numbers,
- Quarterly body weight,
- Imported feed,
- Effluent application,
- Wider range of mitigations such as forage type, farm specific management and timing of operations.

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Timeframes – what is next

- 2022 (end) all farms (over 80 ha or with a supply # or a feedlot) to know their GHG number
- 2023 (end) pilot project testing on farm accounting and emission reporting
- 2025 (start) all farms have a plan to manage GHG emissions and mandatory emission reporting starts
  - Recommended price of $0.11/kg holding till 2028
- 2026 pricing of emissions based on 2025/26 season using simple calculator
- 2026/27 season detailed calculator released for pricing of emissions
- 2030 modelled increase in prices to be around $0.17-$0.35/kg of CH_4 and around $13.8/ tonne of CO_2 and N_2O.
  - This is based on an expected NZ ETS price for carbon in 2030 of $138/ tonne. Discount on ETS price starts at 95% in 2025 and reduces by 1% per annum reaching 90% by 2030. This is the same outcome as if agriculture was in the ETS.

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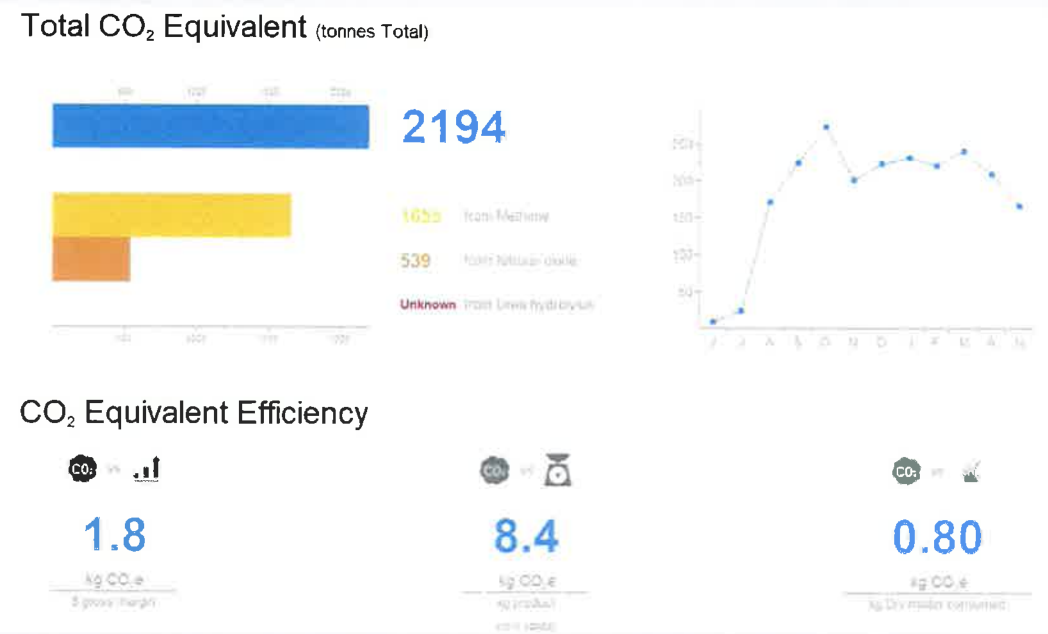
LUDF example

- **Total emissions 2194 tonnes CO_{2e}**
- **Under proposed HWEN pricing for 2025**
  - Methane – 1655 tonnes CO_{2e} = 1,655,000 kg CO_{2e}
  - Convert to kg methane divide by 25 = 66,200 kg CH_4
  - Proposed price of CH_4 \$0.11/kg = \$7,282
  - N_2O – 539 tonnes CO_{2e}
  - Proposed price of N_2O \$4.25/tonne = \$2,291
  - Total proposed price under HWEN for LUDF in 2026/26 season (based on 2021/22 season results) = \$9,573
  - Farmax does not yet include CO_2 emissions from hydrolysis of urea
  - Worked example by HWEN suggests could see 65% of this reduced by action based incentives and 6.5% reduced by on farm sequestration for a Canterbury dairy farm

If using Overseer need to be careful that not all emissions are priced on farm, indirect N_2O excluded and only CO_2 emissions from fertiliser dissolution (such as urea hydrolysis) included.



Under ETS pricing

- Based on predicted NZ ETS price for CO_2 of \$84/tonne in 2025 and initial discount of 95% of ETS price
- Total emissions 2194 tonnes CO_{2e} x \$84 = \$184,296
- Given 95% discount in 2025 = \$9,215

LUMEN

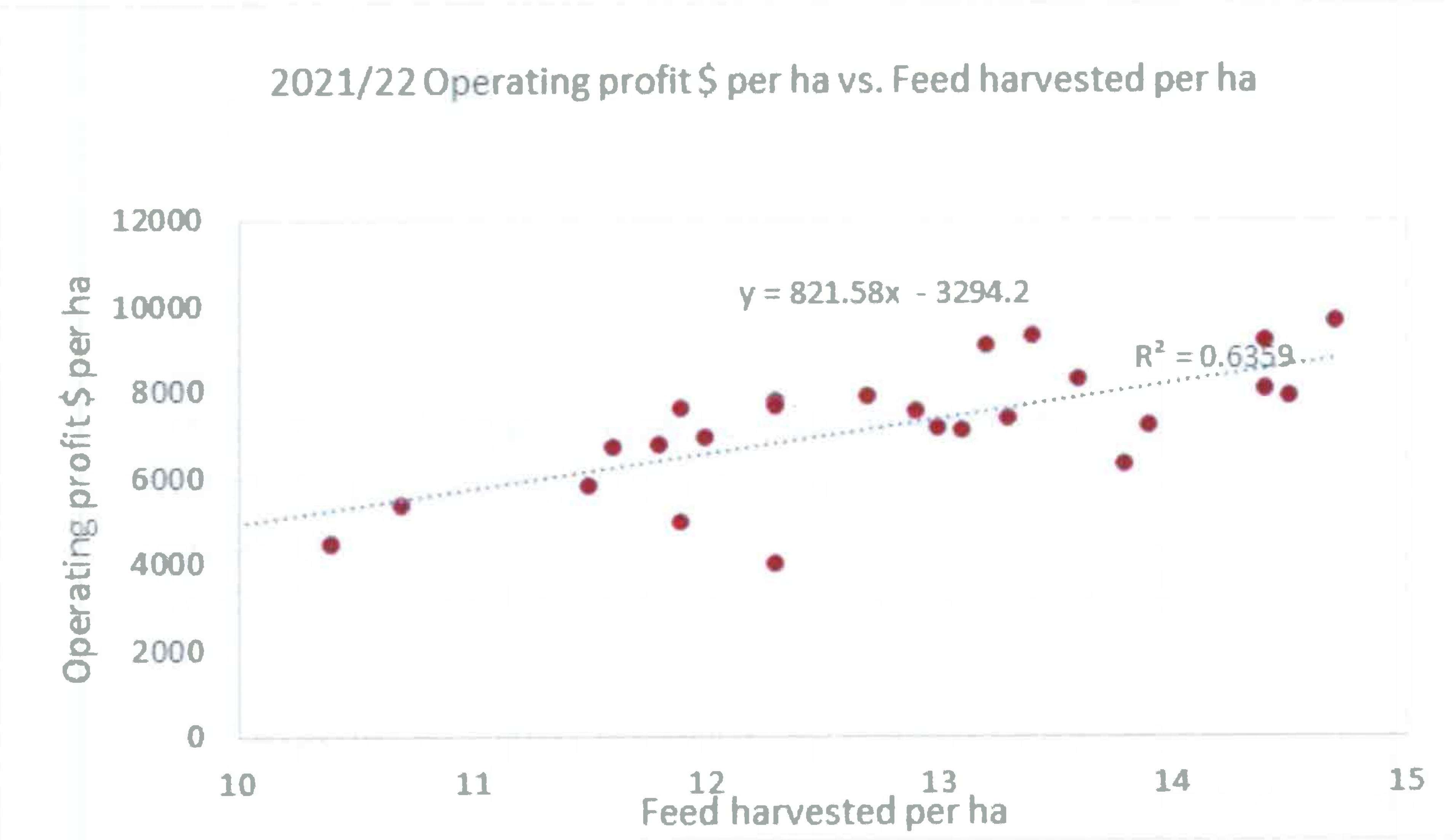
Summary

- HWEN proposed pricing is very similar to ETS pricing to start with
- We want HWEN as it recognises on farm mitigations and sequestration
- Still a lot of uncertainty around the extent to which HWEN proposal will be accepted by government
- But we will have an emission pricing system in place in 2025
- Split gas pricing allows adjustment in future as methane reduction targets are met
- Farms to start thinking now about how they are going to manage emissions using tools around on farm efficiency

Impact of Farm System – Pasture Harvested

- 202122 MRB clients lift in Profit from harvest grass $820 / T (Long term $600)
- Cost of CH_4 0.2 c / kgDM ($20 / TDM)
- Drops the lift in profit per TDM pasture harvest to $800 (still not shabby).

Impact of Farm System – Pasture Harvested



The Methane Cost

- Approximately 22 gms of methane are produced per kgDM.
- It takes Approximately 10 kgDM (platform only) to make 1 kgMS.
- You will produce 0.220 kg of CH4 per 1 kgMS
- The proposed start price of methane CH4 is $0.11 / kg CH4 Based on 5%.
- The starting price is $0.024 / kgMS
- Or 0.2 c / kgDM

Impact of Feed Sources Pasture & Supplement on GHG (Methane) Costs

Impact of Farm System – Supplement Use

Shoulder Season Feeding (Aug to Mid Oct) + (Mid March to May)

- Supplement costs range \$0.47 - \$0.70 / kgDM. (Mid point 0.59 / kgDM)
- Response rate 10 kgDM per 1 kgMS.
  - Feed Costs \$5.90 / kgMS
  - CH4 costs \$0.024 / kgMS
  - Total Costs \$5.924 / kgMS

Running Costs of a Cow					
Capital Value			1800		
Expenditure		Full labour		1/2 labour	
Cow Wintering ($0.35 / kgDM)		$	298	$	298
Grazing Cost of replacement @ 25%		$	377	$	377
Calf Cost @ $610 / T @ 25% replacment		$	153	$	153
Animal Health + Breeding		$	210	$	210
Wages (90 cents/kgMS)		$	423	$	210
Shed + Power		$	54	$	54
Interest @ 5%		$	90	$	90
Death Rate @ 3%		$	54	$	54
Income					
Cull Income @ $700, 21 %		$	147	$	147
Bobby Calf		$	25	$	25
Dog Tucker 1%		$	1	$	1
Net Marginal Costs		$	1,485	$	1,272
Cow production	Response rate Feed kgDM/kgMS		Costs per kgMS		
@ 500 kgMS/cow	9.6	$	2.97	$	2.54
@ 465 kgMS/cow	9.8	$	3.19	$	2.74
@ 430 kgMS/cow	10	$	3.45	$	2.96

Impact of Farm System – Supplement Use

High Stocking Rate Feeding (When feeding supplements to support a higher stocking rate – eg, feeding all year round)

- Supplement costs - Mid point 0.59 / kgDM
- Cow Running Costs
- Response rate 10 kgDM per 1 kgMS.
  - Feed Costs $5.90 / kgMS
  - CH4 costs $0.024 / kgMS
  - Cow Running costs $3.00 / kgMS
  - Total Costs $8.924 / kgMS

Summary

- The costs of CH4 will increase to $0.35 / kg Methane. ($60 / T pasture) over next 15 years.
- If making milk on pasture, CH4 costs are wearable.
- Supplement use, the margins are getting squeezed.
- If feeding all season, you need to be a well above average farmer to make money.

Plantain
Potency and Practice
Update on Results and Implementation

LUDF September 2022

Funding partners

Ministry for Primary Industries
Manatū Ahu Matua

DairyNZ

Fonterra
Dairy for life

PGG Wrightson Seeds

Delivery partners

AgResearch

AGRICOM

Massey University

Manaaki Whenua Landcare Research

Lincoln Agritech

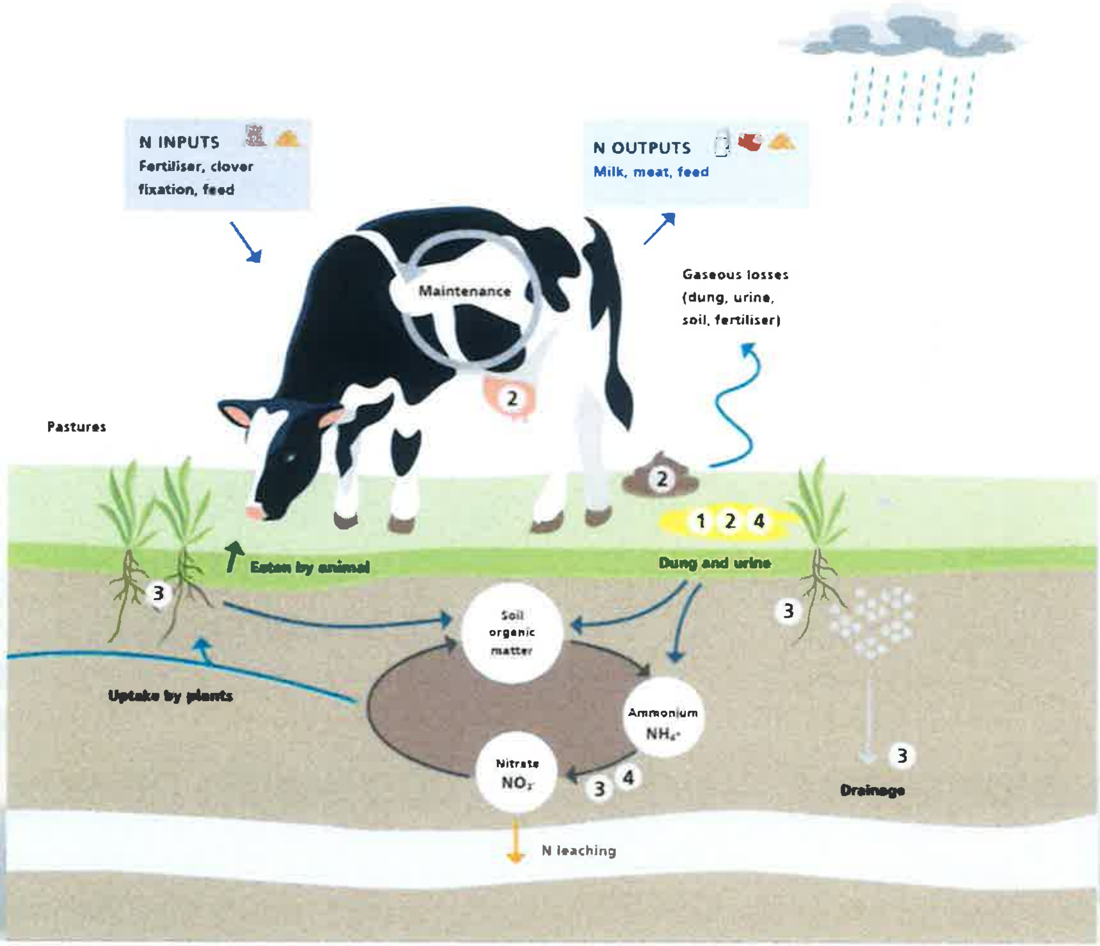
Lincoln University

Plant & Food Research

What are we aiming to achieve?

- ✓ Quantify the effect of plantain on nitrate leaching
  - At paddock/farm scale
  - In different soils/climates
- ✓ Understand more about how plantain works to reduce nitrate leaching
- ✓ Identify any risks to human health or our markets, and any benefits
- ✓ Management strategies to keep plantain in pastures and ensure systems fit
- ✓ Evaluation System to assess effectiveness of plantain cultivars for reducing N leaching
- ✓ Recognition of plantain by regional councils as a mitigation option, tools in place for implementation
- ✓ Widespread adoption and impact for reducing nitrate leaching and maintaining profit

How Ecotain plantain works



1. **Dilution effect**: Higher urination frequency & volume (lower DM%)

2. **Partitioning effect:** More N partitioned to dung vs. urine

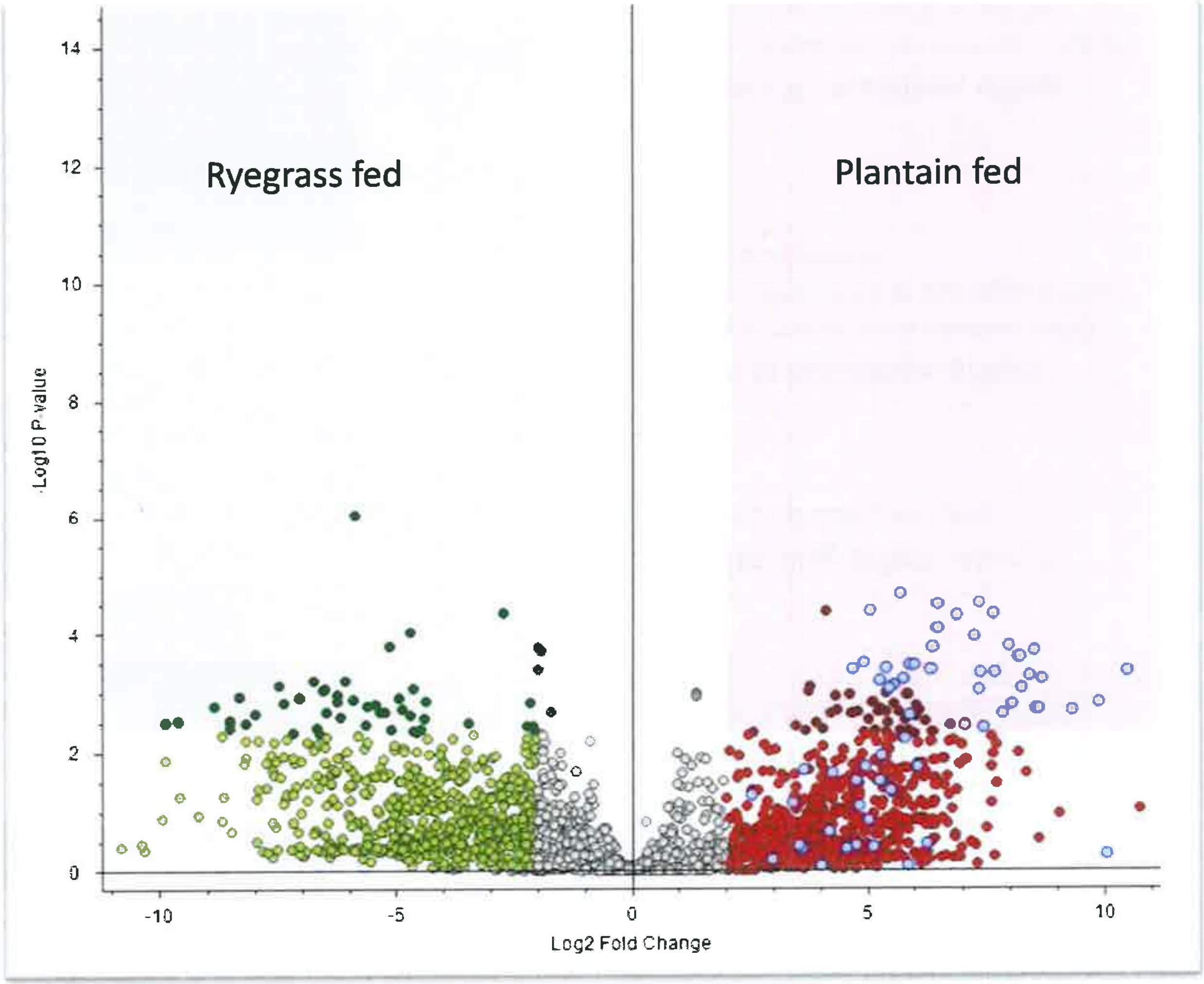
3. **Direct N retention effect:** Secondary compounds in plantain roots slow down conversion of soil organic N to inorganic (available) N

4. **Indirect N retention effect:** Secondary compounds in urine slow down conversion of urine-urea N to nitrate

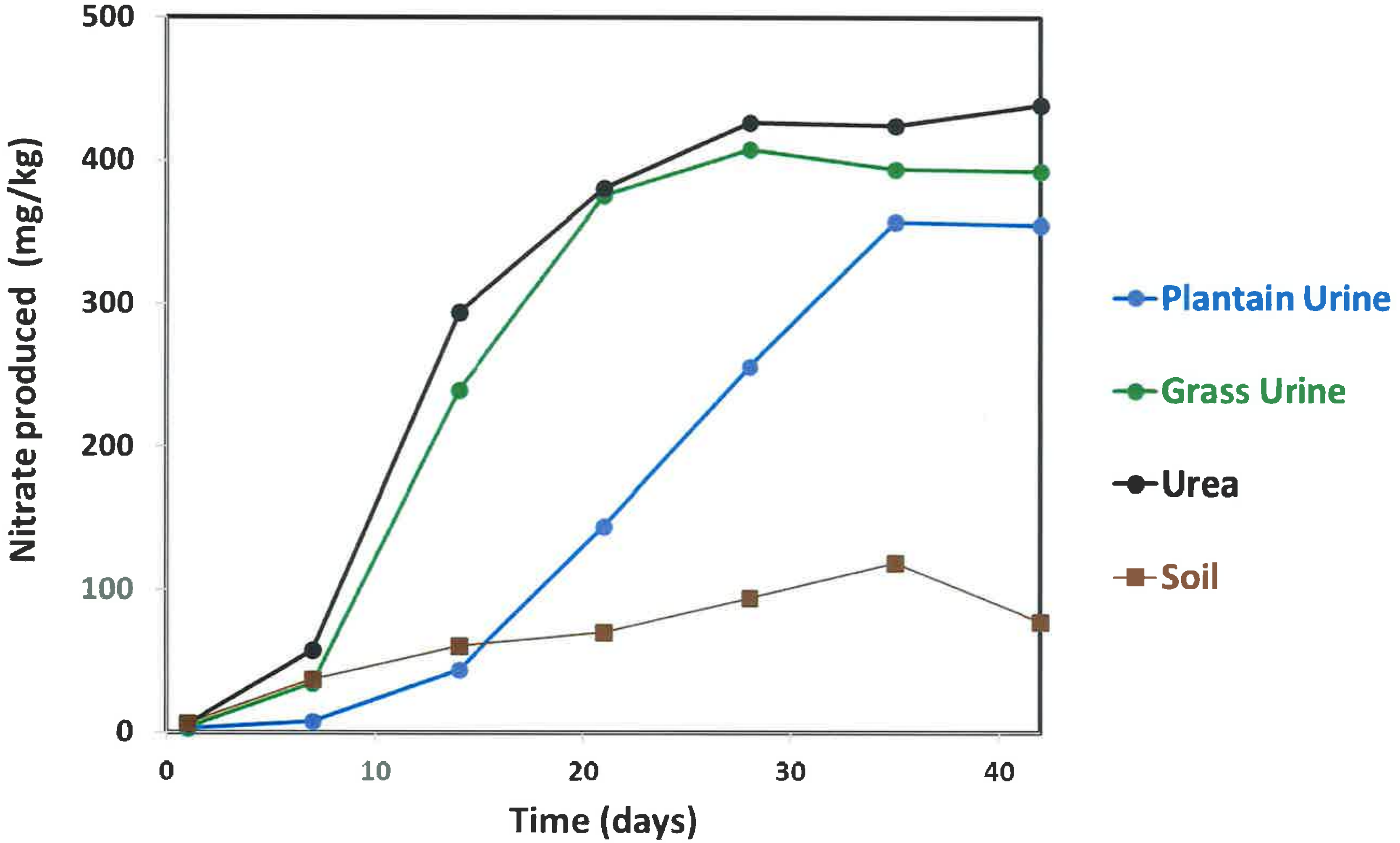
Sheep urine composition – 'metabolomic profile'

> 2000 compounds identified… !

… 75 compounds that are unique to, or are present in much higher concentrations, in the plantain than in the ryegrass sheep urine



Nitrate-N production over time (lab experiment)



Unique biological compounds are found in plantain

Plantain contains unique secondary compounds:

- aucubin
- catalpol

→ *Iridoid glycosides*

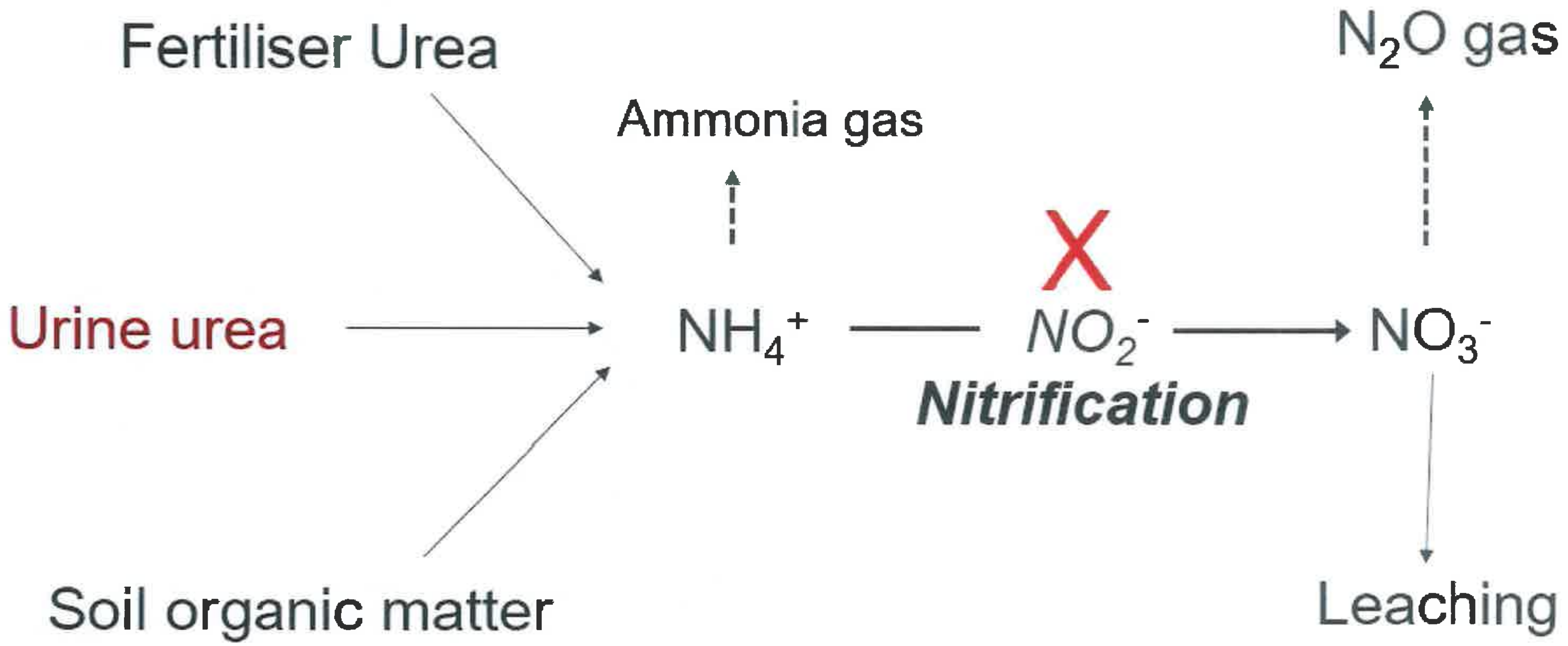
- verbascoside (*aka* acteoside)

Phenylpropanoid glycoside

Known to have:
antimicrobial; antifungal; anti-inflammatory and anti-oxidative properties.

...evidence suggests may act as natural Biological Nitrification Inhibitors in soil

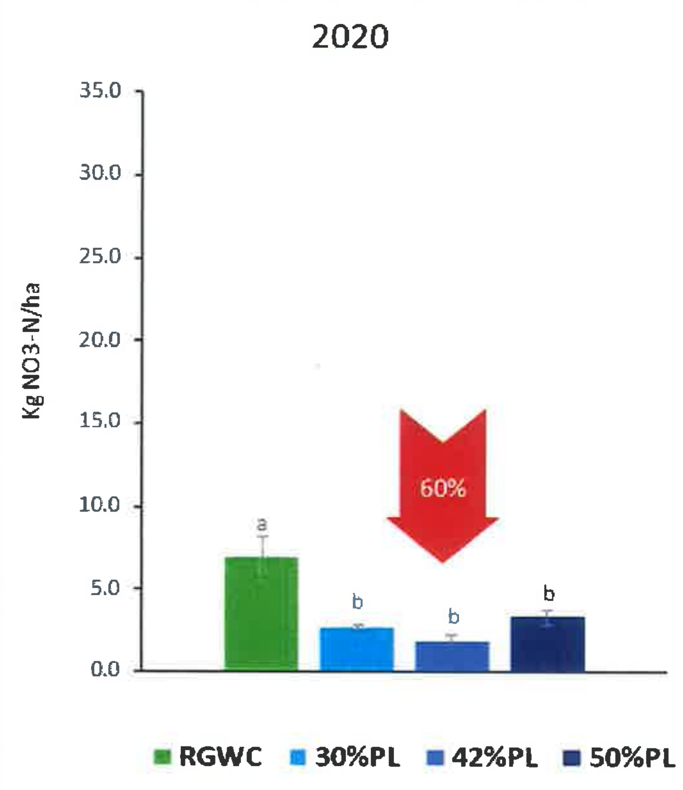
Biological Nitrification Inhibition (BNI)

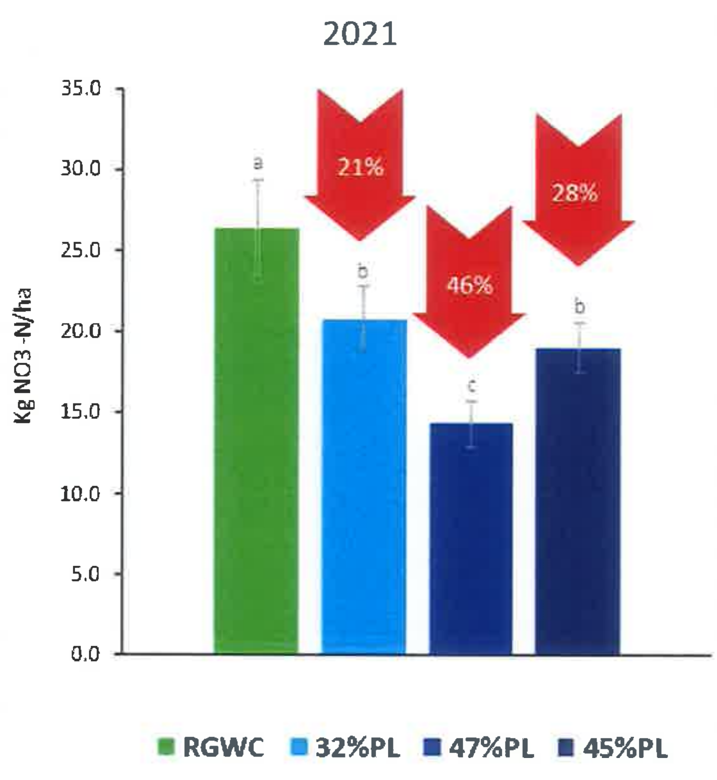


Results to date

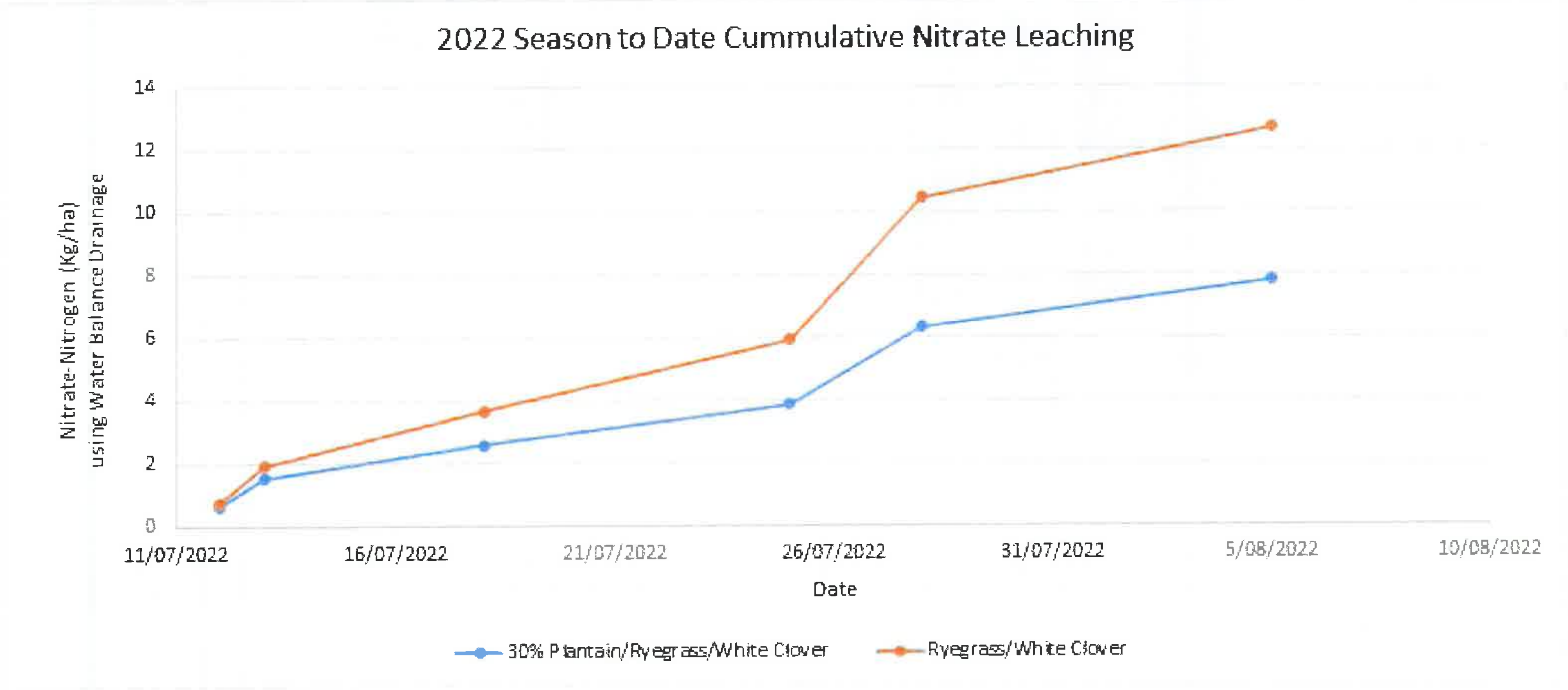
- Leaf aucubin and verbascoside poor indicators of BNI activity
- Verbascoside and aucubin in the roots correlated positively with BNI activity
- BNI activity associated with chemicals in the exudates

Plantain (cv. Agritonic) at Massey Research Site

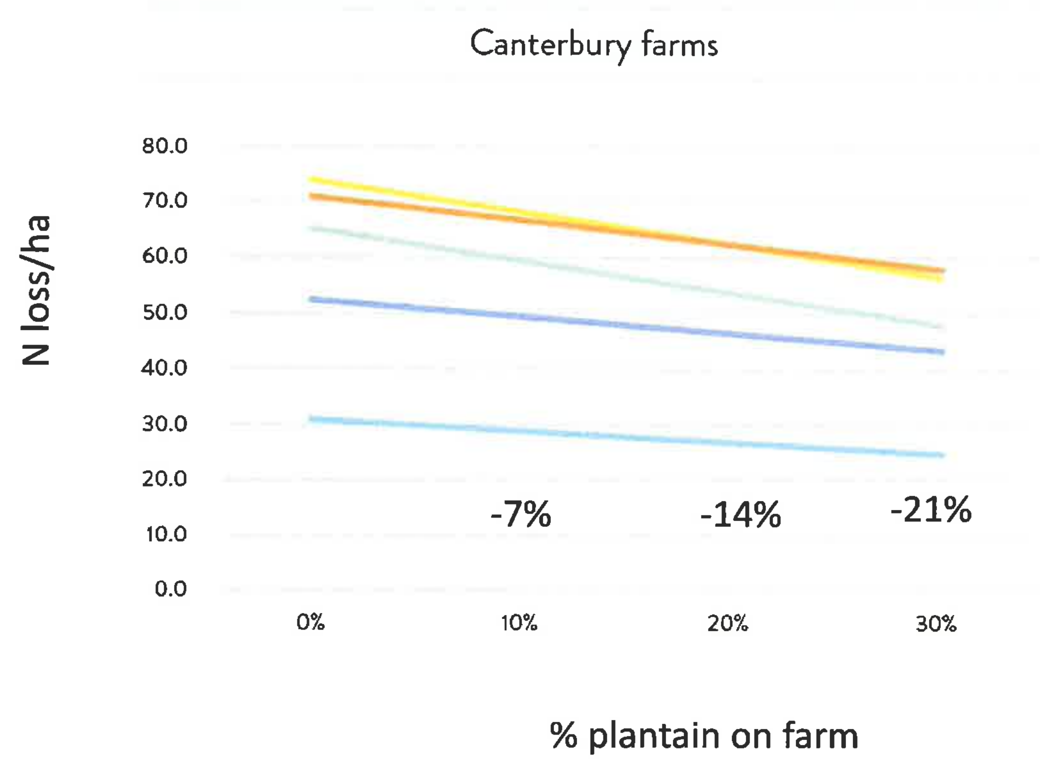




Plantain (cv. Agritonic) at LURDF

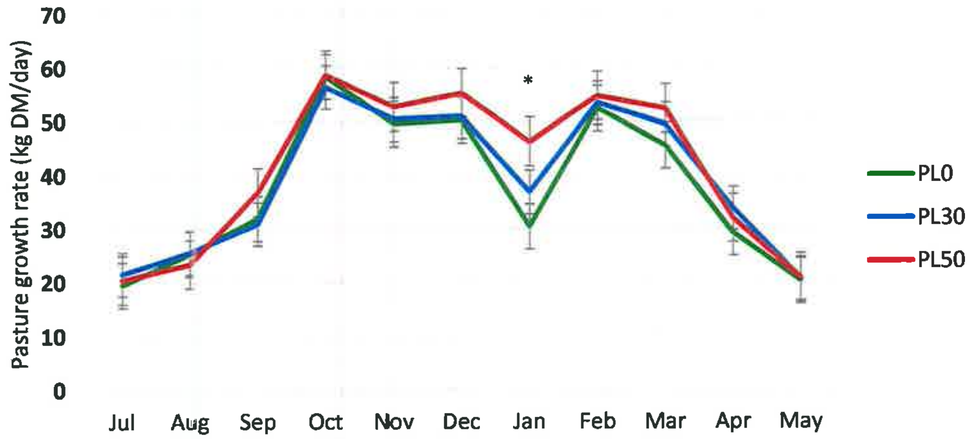


Plantain in Overseer (Urinary N effect only, soil effects in 2027)

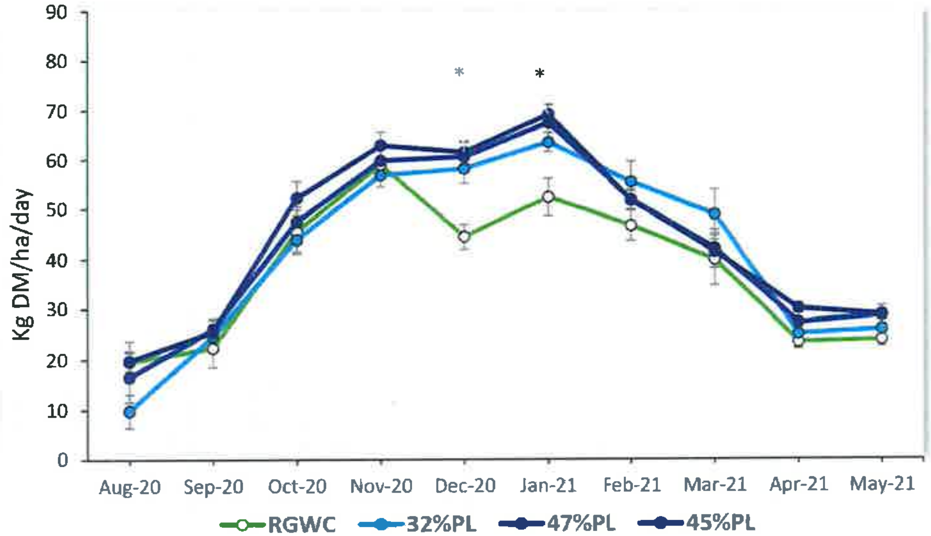


Pasture production

Lincoln 2021-22



Massey 2021-22



Plantain and milk

- 2-year Fonterra/DairyNZ farmlet and Calengate experiments show that milk from plantain-fed cows:
  - Poses no risk to human health
  - Has no significant impact on milk composition
- Research is ongoing to determine:
  - Any impact on processability
  - Potential for milk to be used to determine % plantain in the diet.

Plantain recognised by ECan 2022 onwards

- Autumn visual assessment of plantain content (responsibility of farmer, checked by auditors)
- Urine effects only at this stage (Overseer used to determine amount of leaching reduction credited)
- Approved cultivar required (2 years grace for stands sown before announcement)
- Management strategies to increase or maintain plantain discussed with auditor to assess timeframe of re-assessment of pastures (1, 2 or 3 years).

Plantain Cultivar Evaluation System

- There is some evidence of variation in effectiveness of plantain cultivars for the drivers of N leaching reduction
- DairyNZ endorses Agritonic and Tonic as effective for reducing urinary nitrogen, given data available from animal experiments
- Seed companies can test their cultivars using animal experiments, using protocol provide by Evaluation System
- New work underway to develop plant-based test for urinary nitrogen traits (2025) and soil traits (2027)
- Effective cultivars listed on DairyNZ website

Using the plantain visual assessment guide

- Conduct assessment in Autumn
- Pastures need to be pre-graze height
- Provide estimates at block level
- Basic spreadsheet available for recording
- Assessing plantain on farm - DairyNZ

Resources

www.dairynz.co.nz/feed/crops/plantain/

Environmental benefits of plantain

Plantain is becoming an attractive option for farmers to reduce their environmental footprint.

Assessing plantain on farm

A guide to assessing the proportion of plantain in a pasture sward.

Plantain cultivar evaluation system

Providing farmers and regulators with confidence in the effectiveness of plantain cultivars promoted for their environmental effectiveness.

Plantain research and partner farms

See what and where plantain research and demonstration is happening across New Zealand.

Plantain: Dairy grazing management

This booklet covers recommended grazing management and seasonal management decisions for plantain.