Meeting a Sustainable Future

Selwyn and Hinds | Inspiring High Performance, Low footprint farms

Project Launch

Canlac Holdings Field Day

Tony Coltman, 454 Old South Road, Dunsandel SN 37427

5 December 2018

DairyNZ

Meeting a Sustainable Future – Selwyn and Hinds

Inspiring High Performance, Low footprint farms

Through this new DairyNZ 5-year project, Canterbury dairy farmers will lead the way in showcasing how nitrogen (N) losses can continue to be reduced in order to protect local waterways.

The project will focus on how farmers in Hinds and Selwyn can meet N loss limits and maintain profitable businesses under the Canterbury Land & Water Regional Plan (LWRP).

This project builds on sustainable farming initiatives many farmers have already begun and on previous N loss research. It aims to give farmers confidence the limits are achievable. Many farmers have been making changes to reduce N loss for some time and this will continue to build on that.

A key aspect of this project is working alongside partner farms to identify the most appropriate solutions for them, considering their chosen production systems, goals, and aspirations. The information generated from these partner farms will be shared with other farmers and will provide a range of options and workable examples.

What does success look like?

- Farmers will have confidence in the options available to reduce N leaching and an understanding of the implications of these options on the overall performance of their production systems.
- The options will be demonstrated to other farmers as they are implemented.
- Farmers will have clarity on the most profitable options to reduce their environmental footprint in different conditions and for different farm systems.

How can you get involved?

If you are a farmer, you could become one of the supported farmers or you can engage with the range of extension activities.

If you are a rural professional, you can work with the project team to provide research questions and find the most appropriate solutions for your client farmers.

For more information about the project please contact Virginia Serra, project leader
Phone 021 932 515; /Email virginia.serra@dairynz.co.nz

CANLAC HOLDINGS – TONY COLTMAN and DANA CARVER

General Overview

- Canlac Holdings is located 5 km west of Dunsandel in the Selwyn Catchment.
- Tony and Dana have been running Canlac Holdings since 2013 after Tony spent several years in roles off farm and running farms in the US.
- Over the last five seasons they continued to enhance the farm's high level of performance.

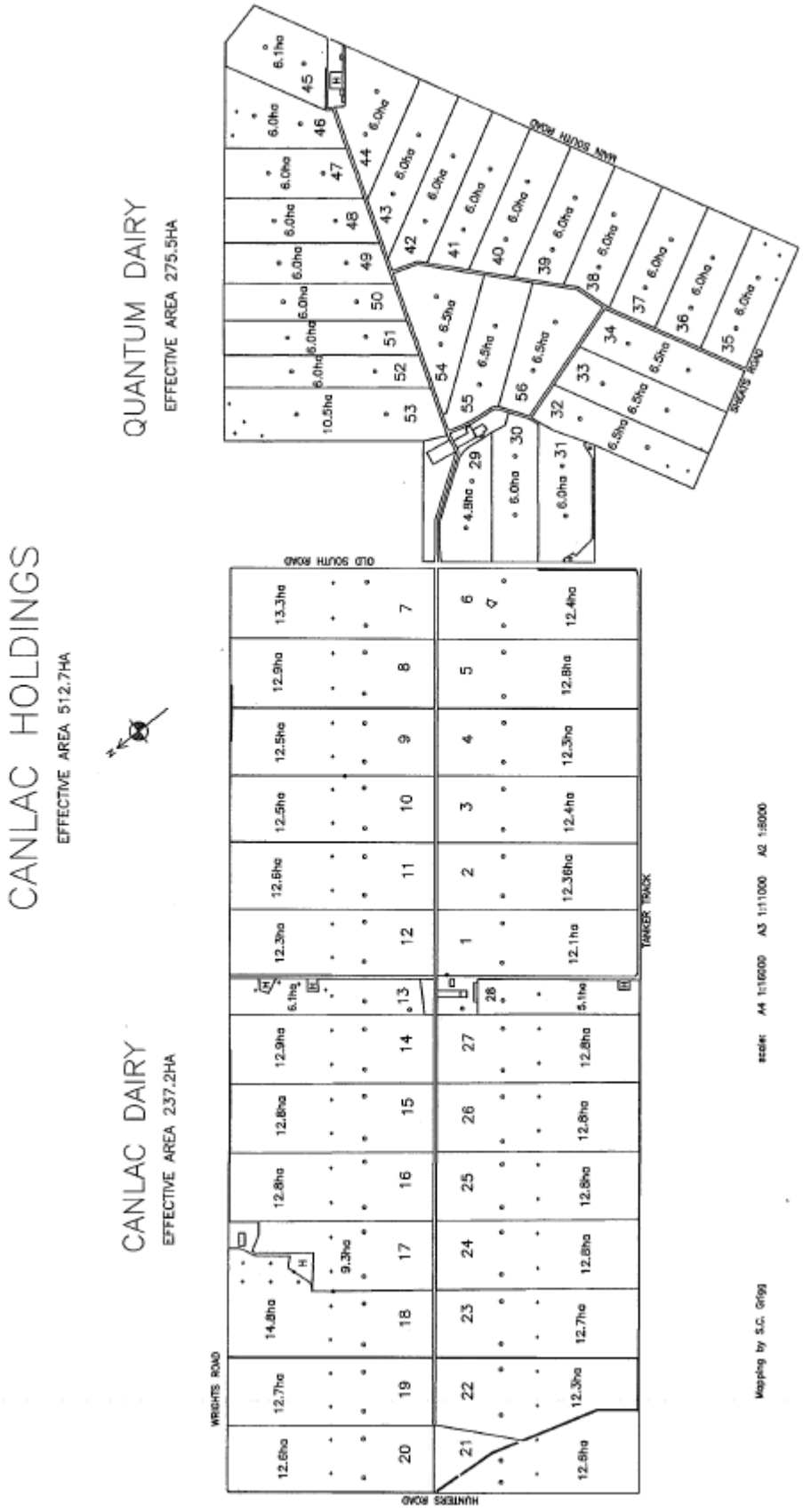
The farm's vision is: "To be a leader in the dairy industry in all areas by excelling with top 5% production, top 5% financial returns, an aesthetically well-presented farm, all environmental standards exceeded and happy and healthy staff"

- The farm next door (Quantum Dairy) was converted through the 17/18 season, milking from 15 March to 15 May 2018. Milk production and income from this farm have been excluded from the financial information presented in the following sections.
- Canlac Holdings and Quantum Dairy have been run as one unit during calving this season and some changes in area and cows allocated to each farm will also be adjusted to make the most of the infrastructure on both farms.
- There is a 155-hectare leased support block run as a separate business, charging commercial rates for feed and grazing.
- Heifers are grazed off-farm from weaning to 21 months on an owned heifer grazing property (Manapouri)

Farm Information: Canlac Holdings

- Canlac farm was converted to dairy 19 years ago.
- The total area of the farm is 348.5 ha with 335 ha effective.
- The farm is irrigated by two large pivots (82% of the farm area), two rotorainers (9%), and sprinklers (9%).
- The soil types on the farm are Lismore/Mayfield with a PAW_{60} of 86/88mm (Profile Available Water for the top 60 cm soil)
- The farm is irrigated with Central Plains Water irrigation scheme (CPW) water (2,400 m3) and from bores when necessary
- Canlac Holdings is run by a team of 8 people with Tony overseeing all operations
- Effluent is applied on 41% of the milking platform. There is a two- pond system with 90-day storage
- A feed pad was built in autumn 2016 and used in the 2016/17 season
- There is no in-shed feeding system

Farm Maps - Canlac Holdings and Quantum Dairy



Physical and Financial Performance

Farm Description	2014/15	2015/16	2016/17	2017/18
Milking Platform (eff. Ha)	335	335	335	318*
Support Block (leased ha)	155	155	155	155
Cows (peak Numbers)	1,371	1,391	1,437	1,367
Stocking Rate (cows/ ha)	4.1	4.2	4.3	4.3
Kg Live weight per ha	1,964	1,993	2,106	2,175
FTE total	7.3	7.5	7.5	8
Cows/FTE	188	185	192	171
Kg MS/FTE	93,822	93,016	95,893	84,748
Milk Production Efficiency				
Kg MS Total	684,740	697,625	719,198	677,984
Kg MS/cow	500	502	500	496
Kg MS/ha	2,044	2,082	2,147	2,128
Kg MS/kg LW	104%	104%	102%	98%
Feed use and Efficiency				
Pasture Harvested (TDM/ha)	17.8	18.5	18.6	18.3
Imp. Supp. Lactation (TDM/ha)	3.3	3	3.9	3.8
Imp. Supp. Lactation (TDM/cow)	0.805	0.714	0.907	0.884
Winter Grazing (T DM/ha)	2.9	3.2	3	3.2
Total Feed Eaten (T DM/ha)	23.8	24.4	25.3	24.9
Nitrogen applied (kg N/ha)	271	292	243	224
Gross Farm Income ($/ha) **	12,661	10,696	15,652	16,295
Operating Expenses ($/ha)	7.774	8,023	8,728	8,809
Operating Profit ($/ha)	4,887	2,673	6,924	7,486
Gross Farm Income ($/kg MS)	6.20	5.14	7.29	7.66
Operating Expenses ($/kg MS)	3.81	3.85	4.07	4.13
Operating Profit ($/kg MS)	2.39	1.28	3.23	3.53
Farm Working Expenses ($/Kg MS)	3.53	3.58	3.55	3.74
Depreciation	0.33	0.33	0.43	0.59
Net Stock Income /kg MS	0.33	0.61	0.73	0.79
Net stock Income /ha	674	1,270	1,567	1,681
Nitrogen Leaching (Kg N/ha)	75	75	62	54
N Surplus of imported N	238	231	186	165
Fert Efficiency (kg MS/Kg N)	7.5	7.1	8.8	9.5
N Conversion Efficiency	36%	38%	42%	45%
% Reduction from Baseline	-10%	-10%	-26%	-35%

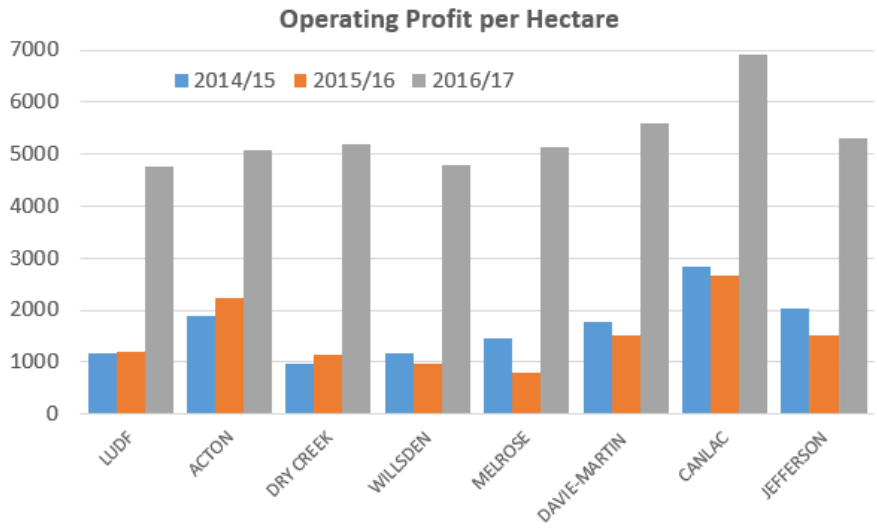
* The area was reduced to reflect the area used to achieve the production from Canlac.

** For the last 3 seasons milk Income was calculated by multiplying the kg MS produced during the season by a standard milk price including dividends and net of the DairyNZ levy.

Benchmarking

Canlac Holdings has been part of the Lincoln University Dairy Farm Benchmarking group for the last 3 years and it has been in the top group for Operating Profit per ha.

Operating Profit $/ha. (Benchmarking data presented at the LUDF Focus day in July 2017)



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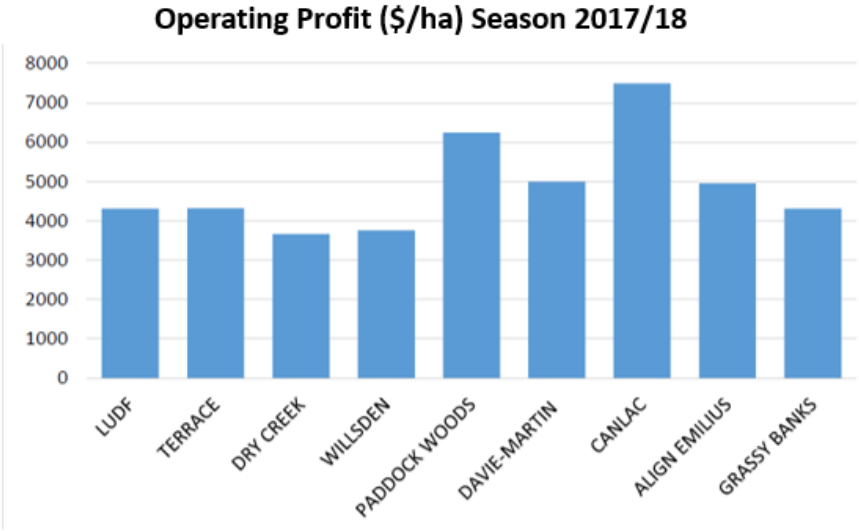


Net Stock Income Canlac ($/ha)

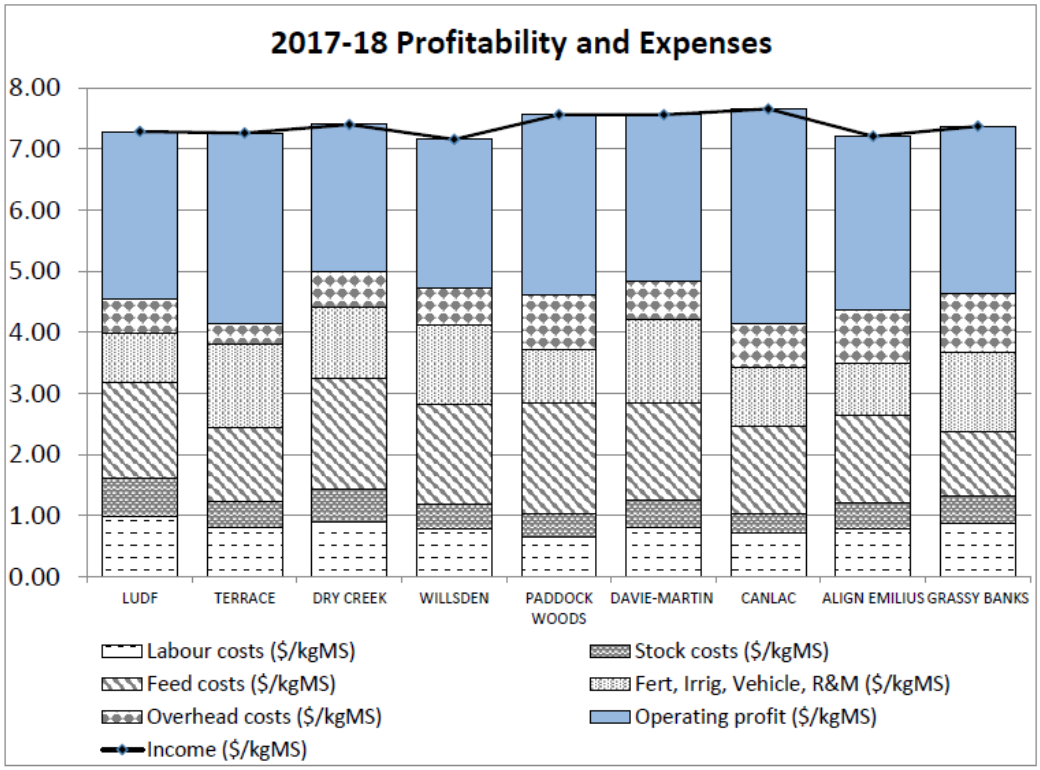
$/ha	2015/16	2016/17	2017/18
Stock Sales	$939	$1,144	$1,171
Less Stock Purchased	0	$188	0
Plus Stock Adjustments	+330	+$607	+518
Net Stock Income	**$1269**	**$1,563**	**$1,689**

Net Stock Income ($/ha) Season 2016/2017 Canlac compared to LUDF and ACTON Farm (Presented at LUDF Benchmarking Focus Day July 2017)

$/ha	LUDF	CANLAC	ACTON
Stock Sales	$796	$1,144	$782
Less Stock Purchased	$212	$188	$612
Plus Stock Adjustments	-22	+$607	$243
Net Stock Income	**$562**	**$1,563**	**$413**

Higher stocking rate supports higher stock income, plus 6% retained stock contribute to Canlac's net stock Income

Operating Profit and Operating Expenses (Benchmarking data presented at the LUDF Focus day in July 2018)



Key Performance Drivers

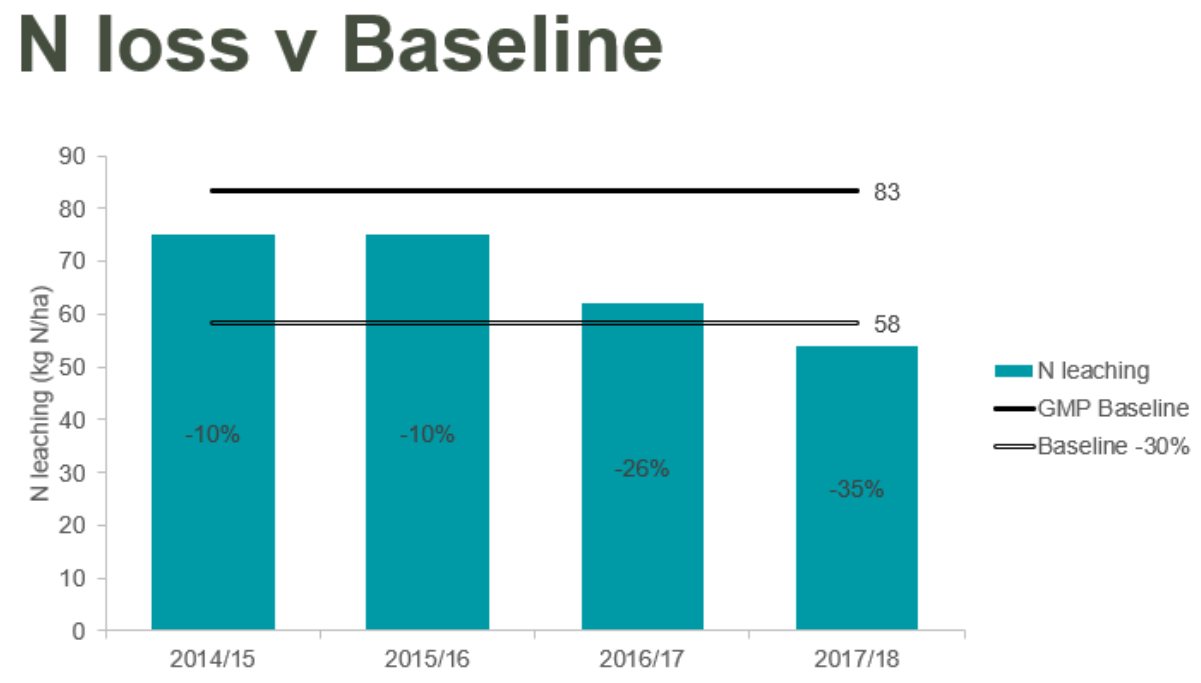
Canlac is a high output, high profit farm that has achieved a consistent high performance over the last few years. The key strategy behind Canlac performance is to maximize performance from the resources invested on the farm

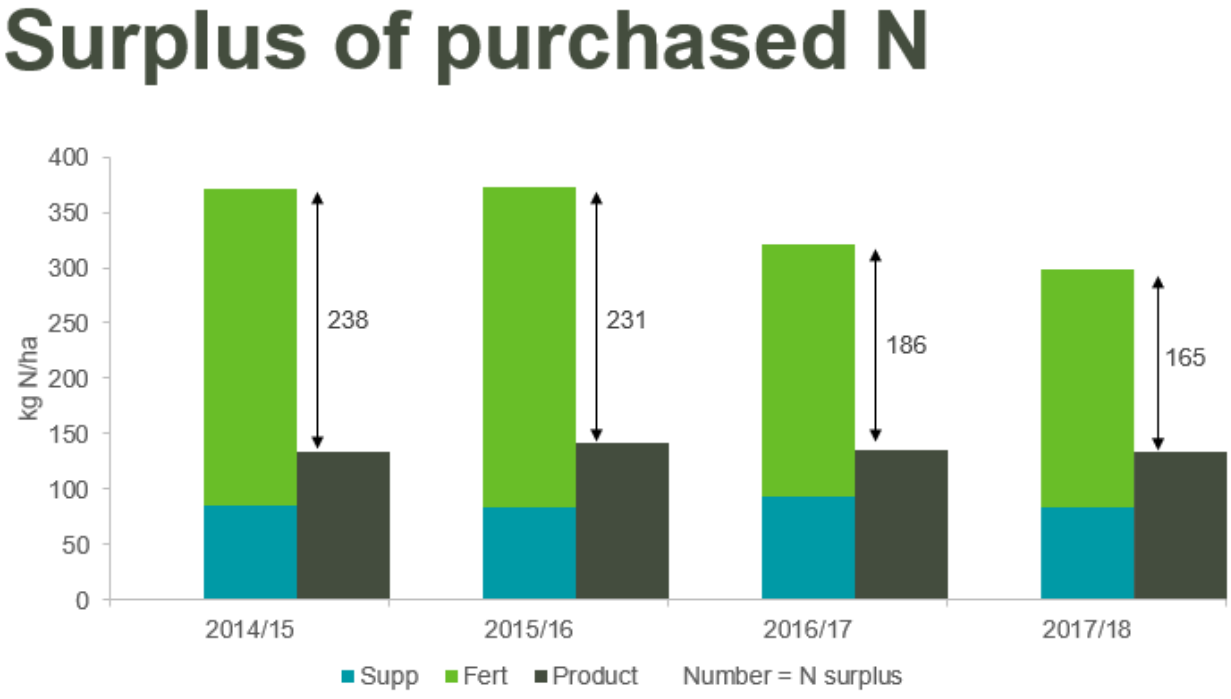
Some of the key divers behind the performance are:

- Pasture and crop eaten has been between 3-3.5 TDM higher than the average for Canterbury. (The involvement with the FRNL project as a monitor farm created a discipline of more intensive monitoring than what was happening before contributing to a further increase in Pasture harvested)
- Investment in irrigation and the increase on the effluent area also contributed to further increase in pasture growth with better efficiency in the use of water and nutrients from effluent
- Focus on cost of production by expecting a return on every dollar invested on the farm
- High stock income (approximately 0.30 $/kg MS than the average for Canterbury)
- High utilization of all feeds used on the farm
- Low wastage of animals
- High use of Nutrients (efficient use of Nitrogen and effluent)
- High specialization on producing milk from grass. Contractors do all machinery work.

Like many other farms in Canterbury reproductive performance has been a key challenge for Canlac.

Achieving the Required N Leaching Reductions





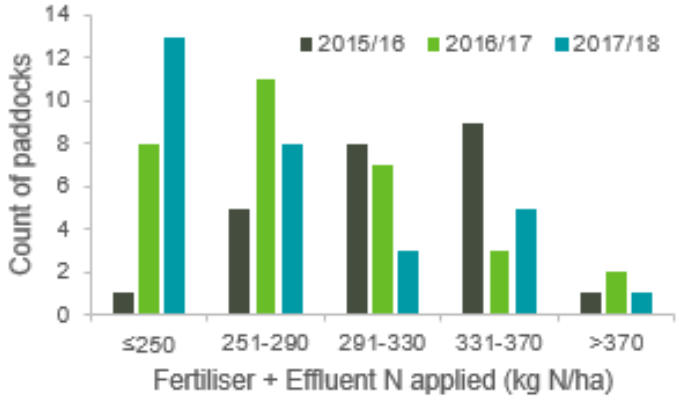
G

Rt

Changes to N applied

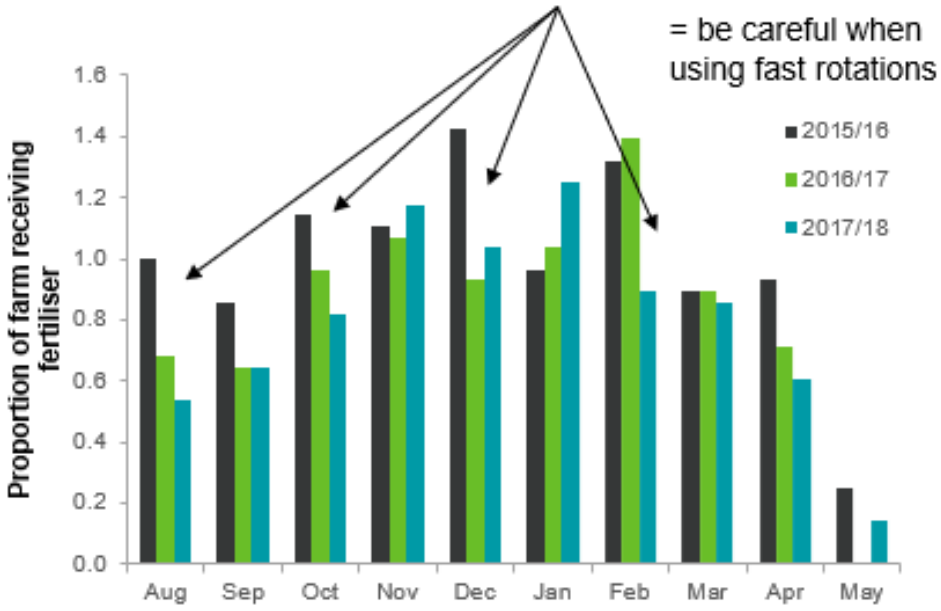
Season	2015/16	2016/17	2017/18
Avg fertiliser application rate (kg N/ha)	29	27	28
Number of applications to farm	9.9	8.3	8.0
N fertiliser applied (kg N/ha)	293	243	224
N Effluent applied (kg N/ha)	22	33	36
Total N (kg N/ha)	315	276	260

Similar rate, so reduction driven by fewer applications



Moved from most paddocks getting 291-370 to <250 kg N/ha

= be careful when using fast rotations



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Canlac Holdings Ltd

Notes

- Milking platform only
- Supplement and pasture is reported as 11 MJME/kg DM equivalent
- Overseer nitrogen numbers (red and green diamonds) include non-effective land, other metrics use effective area

Nitrogen summary	Calculation	14/15	15/16	16/17	17/18
Simple N surplus	+ Fert N + Supplement N – Product N – Stored supplement N	238 kg N/ha	231 kg N/ha	186 kg N/ha	165 kg N/ha
N leaching	Overseer v6.3.0	75 kg N/ha	75 kg N/ha	62 kg N/ha	54 kg N/ha
Nitrogen use efficiency	Product N Stored supplement N Fert N Supplement N	36%	38%	42%	45%

28% reduction from 14/15 to 17/18

Farm characteristics

Soils

Soil family	Lismore Mayfield
PAW60	86 mm 88 mm

Climate

	14/15	15/16	16/17	17/18
Rainfall	436 mm	702 mm	584 mm	744 mm
Evapo-transpiration	919 mm	919 mm	919 mm	919 mm

Fertiliser

	14/15	15/16	16/17	17/18
Nitrogen applied (effective)	271 kg N/ha	292 kg N/ha	243 kg N/ha	224 kg N/ha
	285	288	228	215

Irrigation

	14/15	15/16	16/17	17/18
Irrigation applied	657 mm	486 mm	467 mm	364 mm

Note change in area from 335ha to 318.6ha

Stock

	14/15	15/16	16/17	17/18
Peak cows	1371	1391	1437	1367
Stocking rate	4.1 cows/ha	4.2 cows/ha	4.3 cows/ha	4.3 cows/ha
Live weight	480 kg/cow	480 kg/cow	491 kg/cow	507 kg/cow

Pasture

	14/15	15/16	16/17	17/18
Pasture eaten	17.8 t DM/ha	18.5 t DM/ha	18.6 t DM/ha	18.3 t DM/ha
Fertiliser efficiency	66 kg DM/kg N	63 kg DM/kg N	77 kg DM/kg N	82 kg DM/kg N
Water efficiency	16 kg DM/mm	16 kg DM/mm	18 kg DM/mm	17 kg DM/mm

Imported supplement

	14/15	15/16	16/17	17/18
Imported supplement	1106 t DM	1005 t DM	1307 t DM	1211 t DM
	3.3 t DM/ha	3.0 t DM/ha	3.9 t DM/ha	3.8 t DM/ha
	802 kg DM/cow	729 kg DM/cow	905 kg DM/cow	878 kg DM/cow
	86	84	93	83

Farm management

Farm production

Products

	14/15	15/16	16/17	17/18
Productivity	2044 kg MS/ha	2082 kg MS/ha	2147 kg MS/ha	2128 kg MS/ha
	500 kg MS/cow	502 kg MS/cow	500 kg MS/cow	496 kg MS/cow
Milk from pasture	84%	86%	83%	82%
Fertiliser efficiency	7.5 kg MS/kg N	7.1 kg MS/kg N	8.8 kg MS/kg N	9.5 kg MS/kg N
MS as % of liveweight	104%	104%	102%	98%
	128	134	132	127

Stored supplement

	14/15	15/16	16/17	17/18
Harvest crop area	0 ha	0 ha	0 ha	0 ha
% of farm cut for silage	22%	19%	11%	23%
Stored or exported feed	87 t DM	134 t DM	67 t DM	96 t DM
	5	7	3	6

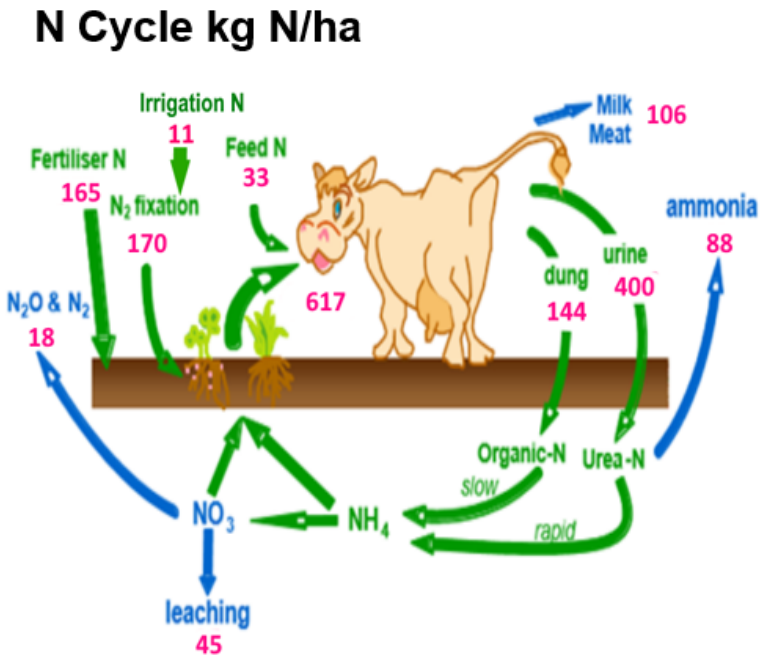
Strategies to reduce nitrate leaching

- The installation of the second pivot on the western side of the farm previously irrigated by rotorainers and the extension of the effluent area from 21% to 41% of the milking platform, contributed to a significant reduction in N loss in 2013. Since this point the farm has operated below its GMP baseline figure of 83 kg N/ha.
- Under the current system there has been further management changes that allowed the farm to reduce N surplus of purchased N; this led to a reduction in N leaching from 75 kg N/ha in 2014/15 to 54 kg N/ha last season. These management changes were:
  - A reduction in the use of nitrogen fertiliser from 292 to 224 kg N/ha per annum. This was achieved by slowing the round length down (less applications) and by maintaining a relatively low rate each time (27-29 kg N/ha). The total amount of nitrogen fertiliser used was reduced but the same amount of pasture has been harvested.
  - Buying a higher proportion of feed with lower N content, e.g. maize silage and fodder beet
  - Introducing plantain in pasture

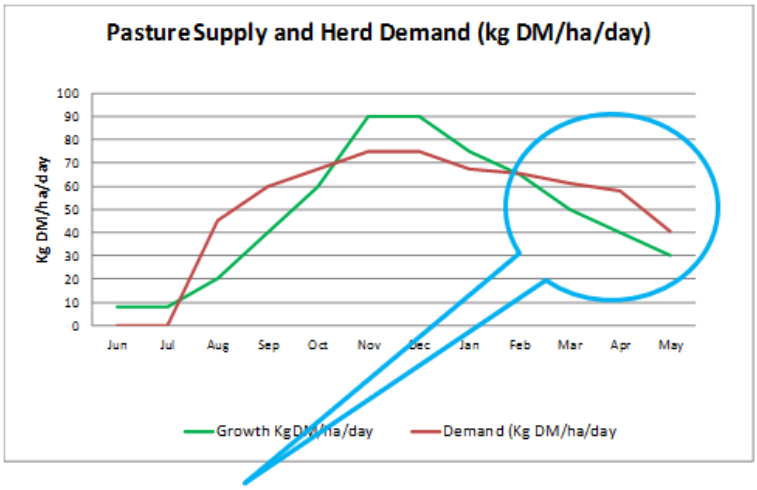
Further changes in 18/19

- Reduction in SustaiN application rate from 60 to 50 kg/ha
- Treating front and back of paddocks differently for fertiliser application
- Growing a catch-crop after autumn fodder beet
- Seeking further opportunities to reduce N surplus

Key Drivers of N Leaching



- **Cow does not create N**
- **Cow concentrates N in urine patches**
- **N eaten per ha plus drainage → N leaching** not cows/ha
- **As ↑ kg N eaten/ ha in autumn ↑ N leached**
- **Dilution of urine N reduces N leached**



January – May HIGH RISK

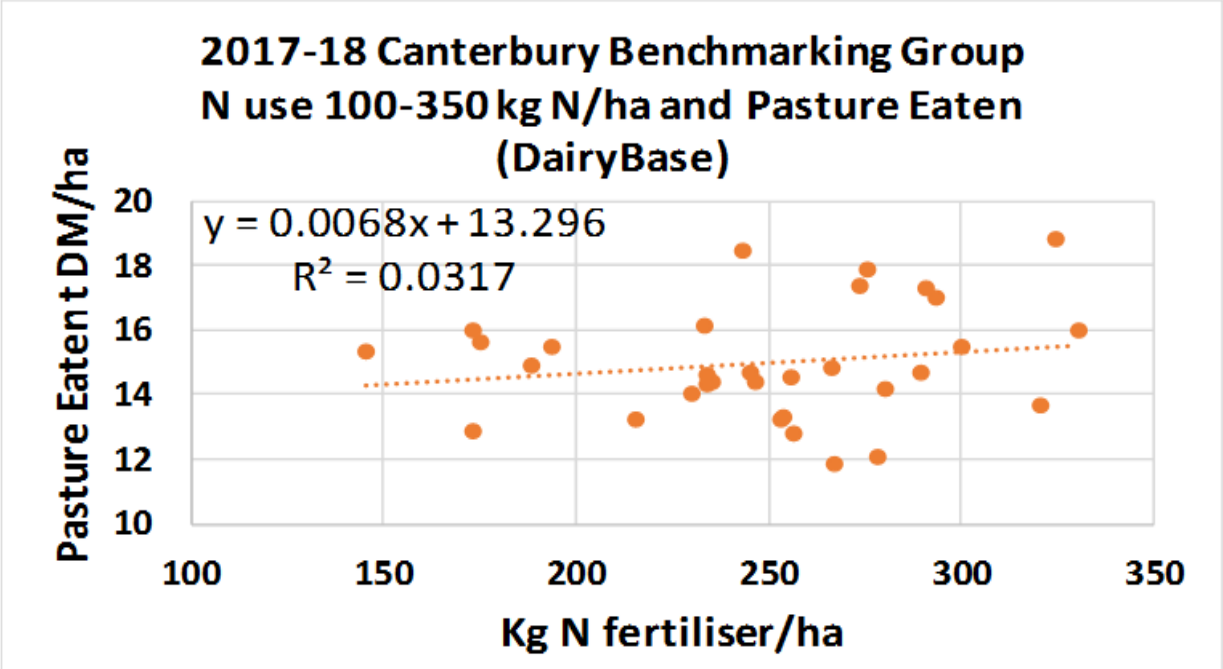
- Declining plant growth
- Accumulation urine patches
- Drainage May-July = N Leaching

ACTION: AUTUMN

- Reduce feed demand
  - Cull early
- Feed low N feeds so total N eaten/ha/month is reduced
  - E.g. Fodder beet, maize silage
- Feed plantain
- Capture N, spread late spring

N Fertiliser and Pasture Eaten

No relationship Canterbury Dairybase



MITIGATIONS	N Leached	GHG	Profit/System/People
Reduce N Fertiliser	✓	✓	✓ If can maintain Pasture Eaten
Less N Eaten/ha			
1. **Less N boosted pasture**	✓	✓	Maintain profit if can reduce costs
2. **Less Imported Feed**	✓	✓	
3. **Reduce autumn kgN/ha demand: Early culling**	✓	✓	Cull cow premium & cost control
4. **Same milk less cows**	✓	✓	Challenge executing high pasture management skill
4. **Feed low N% feeds**	Need total N eaten/ha to be reduced		
• Fodder Beet (FRNL)	✓	?	Need to achieve yield, transition, farmer stress, animal health, low N fertiliser requirements ~ 125 kgN/ha
• Low: Molasses, maize silage, fodder beet, maize grain, tapicoa • Average: Barley, wheat grains, pasture silage, PKE, kale, swedes, turnips • High: DDG, Lucerne, soya bean meal			

MITIGATIONS	N Leached	GHG	Profit/System/People
Salt	✓	✓	✗ Cost of salt & feeding out; animal health side effects, water supply
Plantain (FRNL)	✓	?	✗ Need to >30% in diet, cost to maintain, adds complexity to management as need some plantain crop and under/oversowing
Capture N	✓	✗	✗ Cost of capital and maintenance (hard to offset), adds management complexity
Low N Cows	✓	?	Year 1 of 7 year science project underway
Effluent: Storage, area spread spreading rate	✓		Need sufficient area <200 kg effluent N/ha; ✓ as reduce fert spend
Irrigation Efficiency	✓	?	All farmers need to be doing good management practices

Appendix I - Selwyn Te Waihora Rules

If the nitrogen loss is over 15 kg N/ha/year the farm requires a Farming Land Use consent now unless the farm is part of the CPWL environmental management programme. Farms require the first audit within 12 months of getting a consent or as part of CPWL.

- From 2017 be operating at Baseline gmp
- From 2022 further 30% reduction beyond Baseline gmp

* Baseline gmp in Selwyn and Hinds is modelled in Overseer by following an input process, please talk to your nutrient adviser about this.

Timeline

Baseline Period

Operate at or below Baseline gmp

Operate at 30% below Baseline gmp


DairyNZ