FOCUS DAY

ALDERBROOK FARM – North Rakaia

2086 North Rakaia Road, Southbridge 7783 - SN 37450

Wednesday 26 April 2023

10.15am to 1.00pm

LUDF UPDATE

Presented by **Kirsty Thomas (SIDDC Demonstration Lead)**

- Production results for the season to date and forecast
- Autumn management – feed budget, culling dates, etc.
- Winter feeding plan. Cow condition
- Cost structure update. Budget vs Actuals

PASTURE MANAGEMENT

Come and listen to experts in the field. At this interactive talk in the paddock, you can choose to listen to either:

- **Graham Kerr (Barenbrug)** on Pasture 101 and the importance of grazing management
- **Alistair Black (Lincoln University)** on achieving optimum production with the addition of legumes in pasture when farming under a 190 kg N/ha/yr nitrogen cap

LUDF MATING RESULTS

As part of the Mating Benchmarking Project, we will be discussing the latest results and comparing them with local farmer Liam Kelly, whose farm the Focus Day is being held:

- **Jeremy Savage (Macfarlane Rural Business) and Liam Kelly (Farmer - Alderbrooke Farm)**

Time:	**10.15am to 1.00pm followed by light lunch**
Location:	**Alderbrook Farm, 2086 North Rakaia Road, Southbridge 7783 - SN 37450** *Parking on the left next to tanker track* IF WET will be held at Rakaia Community Centre, Rakaia
Visit the websites:	SIDDC LUDF
Enquiries:	T: 03 423 0022 E: office@siddc.org.nz

Please note registration is required on arrival

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.

Contents

LUDF Farm System Overview

SIDDC

Lincoln University Dairy Farm (LUDF) is a demonstration farm developed by the South Island Dairy Demonstration Centre (SIDDC). This industry-funded partnership of six leading dairy sector organisations collaborate to promote the sustainable development of South Island dairying via demonstration activities, research, education and training of farmers. The current partners of SIDDC are:

Strategic Objective at LUDF

To maximise sustainable profit embracing the whole farm system through:

- Increasing productivity
- Without increasing the farm's total environmental footprint
- While operating within definable and acceptable animal welfare targets; and
- Remaining relevant to Canterbury (and South Island) dairy farmers by demonstrating practices achievable by leading and progressive farmers.

Focus for 2022/23 Season:

Nil-Infrastructure, low input, low N-loss, optimise profit.

Current farm system:

- 3.5 cows/ha (peak milked).
- Target up to 190kgN/ha synthetic fertiliser.
- 450kgDM/cow imported supplement.
- Winter cows off farm.
- FWE of less than $1.235 million ($5.00/kg MS).
- Target production 475 kgMS/cow (>100% liveweight in milk production less 5% with 10 in 7 milking).

Current research projects on the farm

Variable Milking Project

- 10 milkings in 7 days.
- Commenced from start of season, this is second season of the project.
- Predict 5% drop in MS production.
- Profitability should remain the same because of lower costs (drop a labour unit, less animal health and shed costs, better cow condition and higher mating results).
- Last year made a loss because of high pay out.

Plantain Grazing Project

- Aim to get 30% of farm in pure plantain stand over net 3 years.
- Cows fed a break of plantain every day in between milkings.
- Results in a decrease in N loss in OverseerFM from 35 kg N/ha/yr to 26 kg N/ha/yr.

Mating Benchmarking Project

- Previous seasons poor mating results (20% empty 2021/22 season) has resulted in setting up a benchmarking project top quartile local performing farmer, Liam Kelly to help determine what the issues are.

LUDF 2022/2023 Season Update

Stock Rec 14th Apr-23

Currently milking MA Cows 531

MTs+culls 81 (only 4 Johnes cows).

	IC Aged cows	450
+	IC Heifers	134
=	IC MA Cows	584 wintered

With 3 % winter losses (normally 4%), peak milk 566 cows.

Budget for next season 565 cows.

- All culls are gone by the end of April. This is a strategy to reduce N loss in Overseer.
- This year the farm can cull more cows on lameness, SSC, Johnes (test results came back with 4 cows) and low MS production (15 + cows: first time in around 10 years) due to lower empty rates compared to previous season.

Drying Off Dates

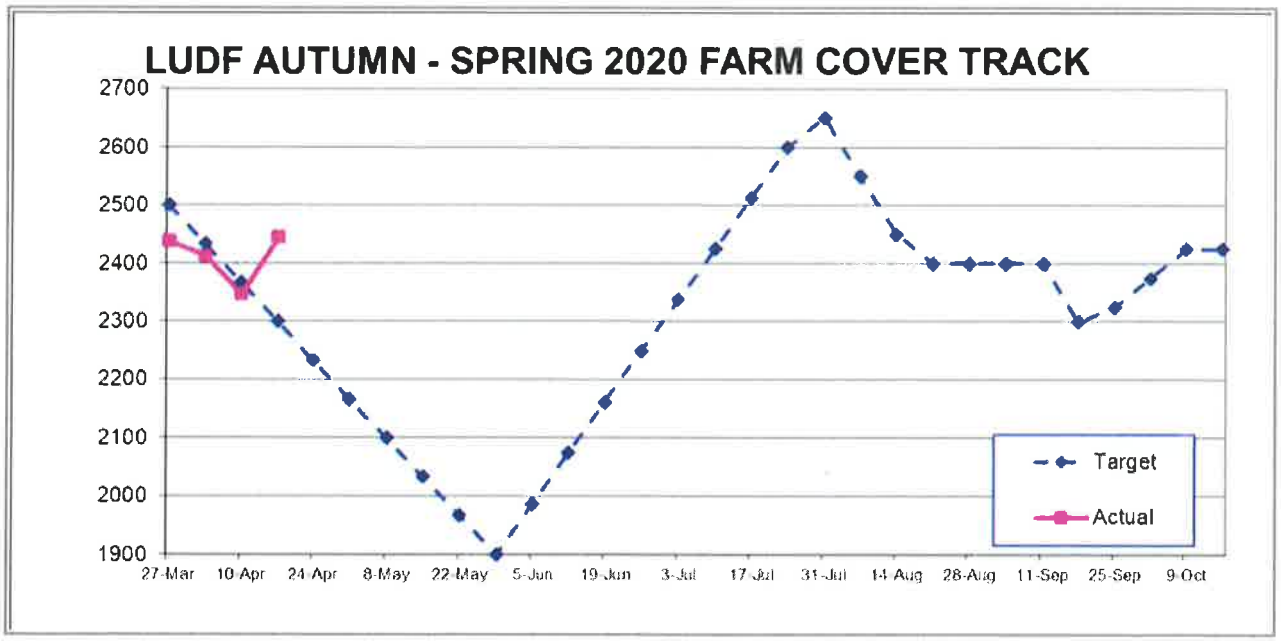
- Selwyn Rakaia Vet Services sent through some details to help with drying off early calving lower BCS cows to help set them up for next season (based on the DairyNZ recommended number of days to gain the body condition score needed):

Batch	Date	Cows per batch	Accumulated
Batch one	Mon 20 Feb 2023	0	0
Batch two	Fri 07 Apr 2023	12	12
Batch three	Thu 04 May 2023	107	119
Batch four	Wed 31 May 2023	342	461

- However, the farm will dry off 12 cows, 1st week of May but remainder will be milked all the way to the end of May.
- The reason for this is:
  - Cows are currently tracking 0.2 CS better than last season – probably due to variable milking.
  - Historically the light cows have gained 1.0 CS over the winter by feeding 16 kgDM/cow/day.
  - Last year had issues with very wet soil conditions and poor utilisation but this season on better class of land and have learnt some key lessons.

Pasture and feeding - Autumn

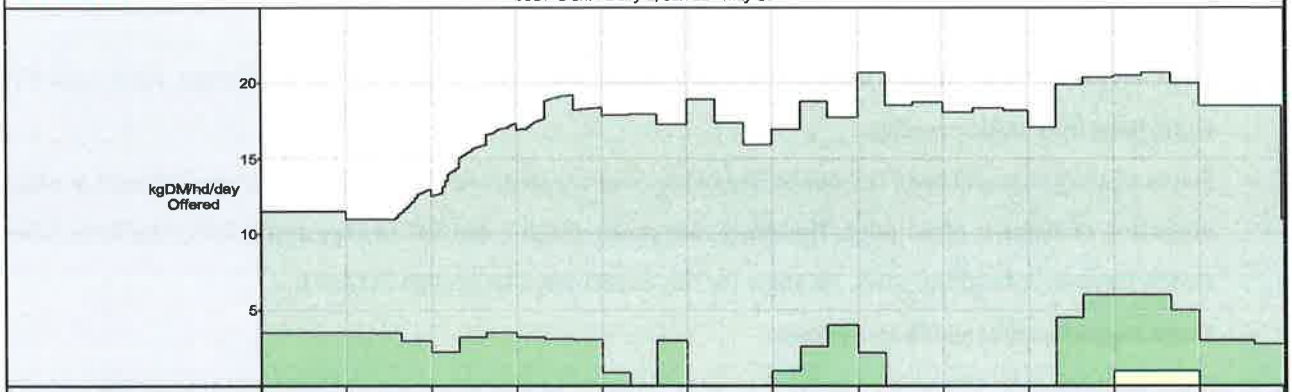
- Has been a wet March – no irrigation applied since mid February.
- Farm has grown lots of feed in autumn – March growth rates were 58 kg DM/ha/day average. April growth rates were 48 kg DM/ha/day average.
- Plenty of silage has still been fed out to keep high covers over March: Paddocks are notoriously wet in May and utilization of silage is often poor. Therefore, not much silage is fed out in May and instead the farm relies on mostly pasture to feed the cows. To allow for this covers need to be high in March.
- Silage is good quality and liked by cows.
- From April onwards, the pasture on farm is eaten down to an average cover of 1900 kg DM/ha by the end of May to utlilise as much grass grown as possible (see cover tracker below).
- The cows are grazed off farm over winter which gives the pasture a chance to recover from the heavy grazing it has had over the end of the autumn period.
- Covers need to get down to 1900 by end of May to ensure there is not too much grass at the start of next season.
- Too much grass in early spring will result in low protein levels in the pasture, and a feed deficit in the second round because pasture can't recover in time.



FARMAX

Feed Offered for Cows at home

LUDF DSM : Dairy 2, Jun 22 - May 23



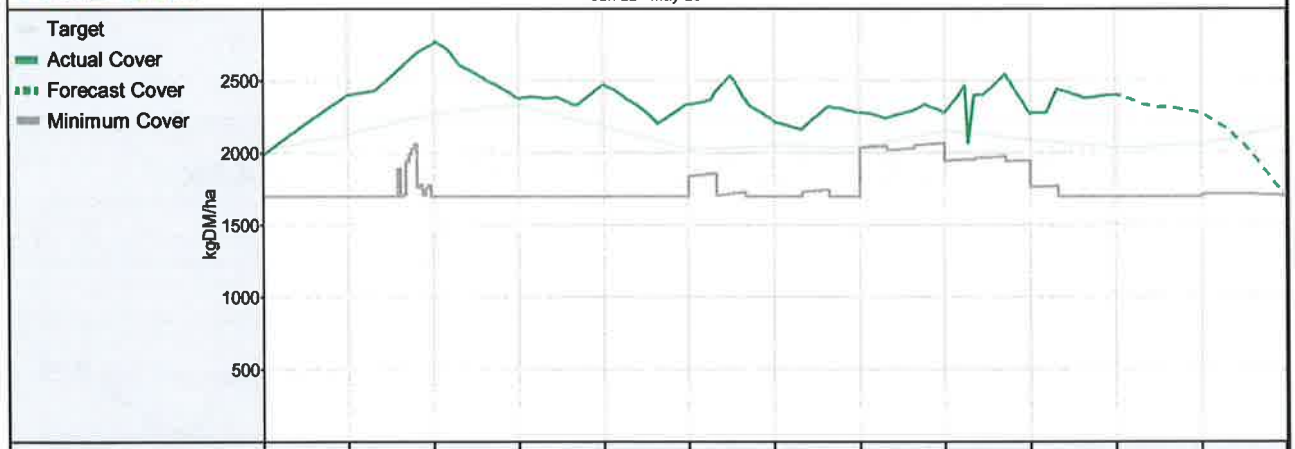
Select a Feed	J	J	A	S	O	N	D	J	F	M	A	M
Pasture	8.0	8.0	12.4	15.1	16.3	17.4	15.2	18.6	18.2	15.6	14.7	15.4
F2 Pasture Silage bought	3.5	3.3	2.8	3.1	1.3		2.6	0.7		3.6	4.7	2.9
F2 Pasture Silage											1.0	
Total (Utilised)	9.6	9.6	12.9	15.3	15.0	14.8	15.0	16.4	15.5	16.1	17.1	15.4

Farmax Dairy 8.2.0.36

FARMAX

Pasture Cover for LUDF DSM

Jun 22 - May 23



(kgDM/ha)	Start	J	J	A	S	O	N	D	J	F	M	A	M
Forecast/Actual	1,987	2,404	2,757	2,384	2,478	2,346	2,232	2,282	2,285	2,281	2,411	2,286	1,726
Minimum	1,113	1,054	1,406	1,220	1,403	1,363	1,609	1,527	2,068	1,948	1,609	1,697	1,487
Potential Growth (kgDM/ha/d)		18.5	21.7	27.0	52.6	52.3	69.4	53.5	65.5	79.6	57.6	41.9	31.1

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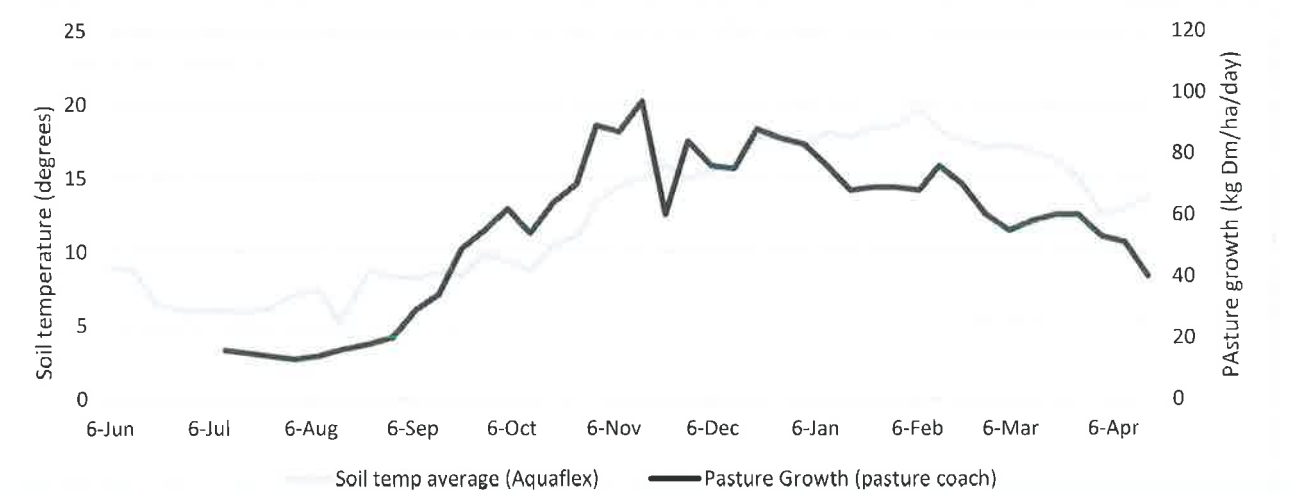

Supplements this season

- Supplements fed in the 2022/23 season were 641 kg/cow. This was 118 kg/cow less than last season.
- The plan is to feed a similar amount of supplements per cow next season.

FARMAX

Supplement Feeding for LUDF DSM

Jun 21 - May 22

DM Offered tonnes	F2 Pasture Silage bought	New Pasture	Total
Jun 21	1.15		1.15
Jul 21	0.90		0.90
Aug 21	18.8		18.8
Sep 21	58.0		58.0
Oct 21			
Nov 21			
Dec 21			
Jan 22	86.0		86.0
Feb 22	67.9		67.9
Mar 22	66.8		66.8
Apr 22	83.2		83.2
May 22	40.0		40.0
Total	**423**		**423**
kg/Milker	*759*		*759*

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FARMAX

Supplement Feeding for LUDF DSM

Jun 22 - May 23

DM Offered tonnes	F2 Pasture Silage bought	F2 Pasture Silage	Plantain	Total
Jun 22	1.26			1.26
Jul 22	1.08			1.08
Aug 22	31.9			31.9
Sep 22	48.5			48.5
Oct 22	22.4			22.4
Nov 22				
Dec 22	43.1			43.1
Jan 23	11.9			11.9
Feb 23				
Mar 23	59.2			59.2
Apr 23	71.6	15.3		86.8
May 23	40.4			40.4
Total	**331**	**15.3**		**347**
kg/Milker	*613*	*28.3*		*641*

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FARMAX

Supplement Feeding for LUDF DSM

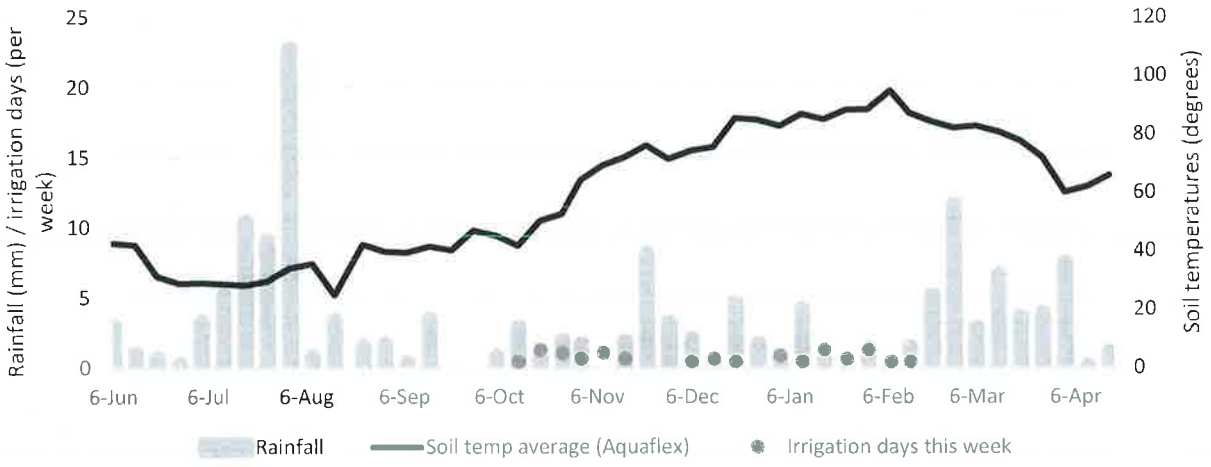
Jun 23 - May 24

DM Offered tonnes	F2 Pasture Silage bought	F2 Pasture Silage	Plantain	New Pasture	Total
Jun 23	1.68				1.68
Jul 23	1.46				1.46
Aug 23	34.5				34.5
Sep 23	25.3				25.3
Oct 23	0.54				0.54
Nov 23					
Dec 23					
Jan 24	70.1				70.1
Feb 24					
Mar 24	69.5				69.5
Apr 24	80.3	16.1			96.4
May 24	57.8	14.5			72.3
Total	**341**	**30.5**			**372**
kg/Milker	*604*	*54.0*			*658*

Farmax Dairy 8.2.0.37

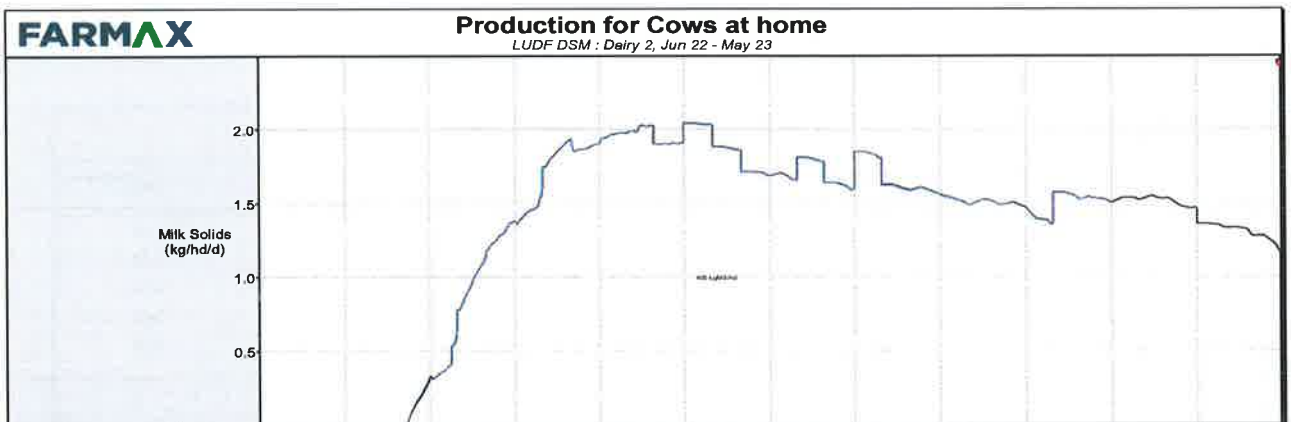
Irrigation season

- It has been a very wet irrigation season this year.
- The farm has only irrigated 56 days. This a 38% less than the average season (farm would normally irrigate 80-90 days).
- There was no irrigation in March.
- Average soil temperatures over the autumn period (March and April) were 12.5 degrees.
- Total rainfall season to date is 672.8 mm.



Milk solid Production

- Budget 266,000 kgMS. 560 cows @ 475 kgMS/cow (If on twice a day, would be equivalent to 485 kg MS/cow/day based on Dairy NZ Research that the farm will drop 5.7 % MS production going to 10 in 7).
- Revised production, 251,583 kgMS. 541 cows @ 465 kgMS/cow.
- 10 in 7, combined with variable tanker pickups makes monitoring per cow production a real challenge.



	Start	J	J	A	S	O	N	D	J	F	M	A	M
Model MS (kg/hd/d)			0.05	0.89	1.73	1.96	1.87	1.69	1.67	1.50	1.49	1.51	1.25
Actual MS (kg/hd/d)			0.05	0.90	1.73	1.96	1.87	1.69	1.67	1.51	1.48		
Actual/Forecast BCS	4.5	4.9	5.1	5.0	4.8	4.6	4.3	4.1	4.1	4.2	4.4	4.6	4.8
Model Lwt (kg)	510	536	544	516	495	487	478	474	477	482	492	507	524

Farmax Dairy 8.2.0.36

Next seasons budget

- Target – TAD cows 500 kgMS less 5.7% (10 in 7) = 471 kgMS/cow
- Production 22/23 **Revised**

Peak Cows	541 cows
Total	251,463
Per cow	465 kgMS
Per Ha	1,552 kgMS

- Production 23/24 **Budget**

Peak Cows	565
Total	265,550
Per cow	470 kgMS
Per Ha	1,552 kgMS

FARMAX **Compare Physical Summary**
Jun 21 - May 22

		202324 Plan	2022/23 Revised	202122A	
Farm	Effective Area	160	160	160	ha
	Stocking Rate	3.5	3.4	3.5	cows/ha
	Potential Pasture Growth	18.1	17.3	17.9	t DM/ha
	Nitrogen Use per farm ha	180	172	161	kg N/ha
	Feed Conversion Efficiency (eaten)	11.0	11.0	11.0	kg DM eaten/kg MS
Herd	Cow Numbers (1st July)	565	561	560	cows
	Peak Cows Milked	565	541	557	cows
	Days in Milk	280	273	285	days
	Avg. BCS at calving	5.0	5.0	5.1	BCS
	Liveweight per farm ha	1,699	1,618	1,663	kg/ha
Production (to Factory)	Milk Solids total	266,157	251,583	258,855	kg
	Milk Solids per farm ha	1,663	1,572	1,618	kg/ha
	Milk Solids per cow	471	465	465	kg/cow
	Peak Milk Solids production	2.05	2.04	2.10	kg/cow/day
	Milk Solids as % of live weight	97.9	97.2	97.3	%
Feeding	Pasture Eaten per cow *	4.0	4.0	3.8	t DM/cow
	Supplements Eaten per cow *	0.5	0.5	0.6	t DM/cow
	Off-farm Grazing Eaten per cow *	0.6	0.6	0.7	t DM/cow
	Total Feed Eaten per cow *	5.2	5.1	5.1	t DM/cow
	Pasture Eaten per farm ha	14.2	13.4	14.3	t DM/ha
	Supplements Eaten per farm ha	2.0	1.8	2.8	t DM/ha
	Off-farm Grazing Eaten per farm ha	4.8	4.8	4.5	t DM/ha
	Total Feed Eaten per farm ha	21.0	20.0	21.6	t DM/ha
	Supplements and Grazing / Feed Eaten *	22.2	22.6	25.7	%
	Bought Feed / Feed Eaten *	13.1	13.5	15.6	%

(*) feed eaten by females > 20 months old / peak cows milked

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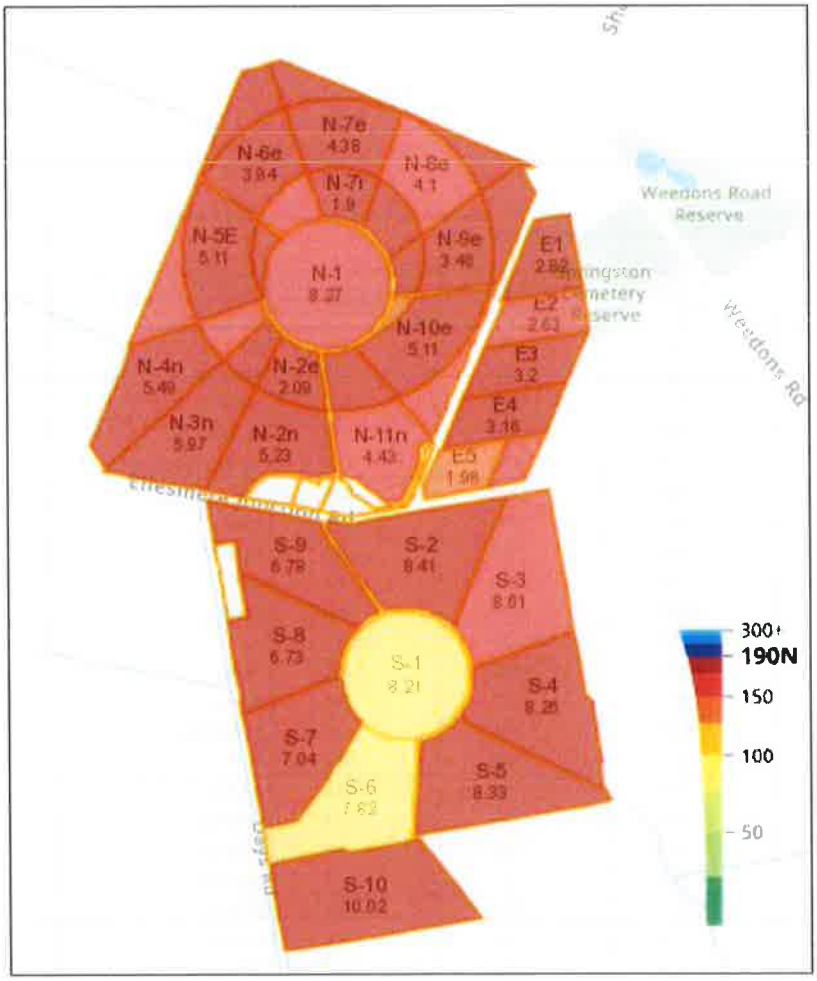
Re grassing program

- Plan to re grass an additional 15.6 ha into plantain on milking platform. 7.6 ha in early November, 8 ha in January.
- Also re grass 12 ha on support block into Italian ryegrass (Jackies block).

Fertiliser

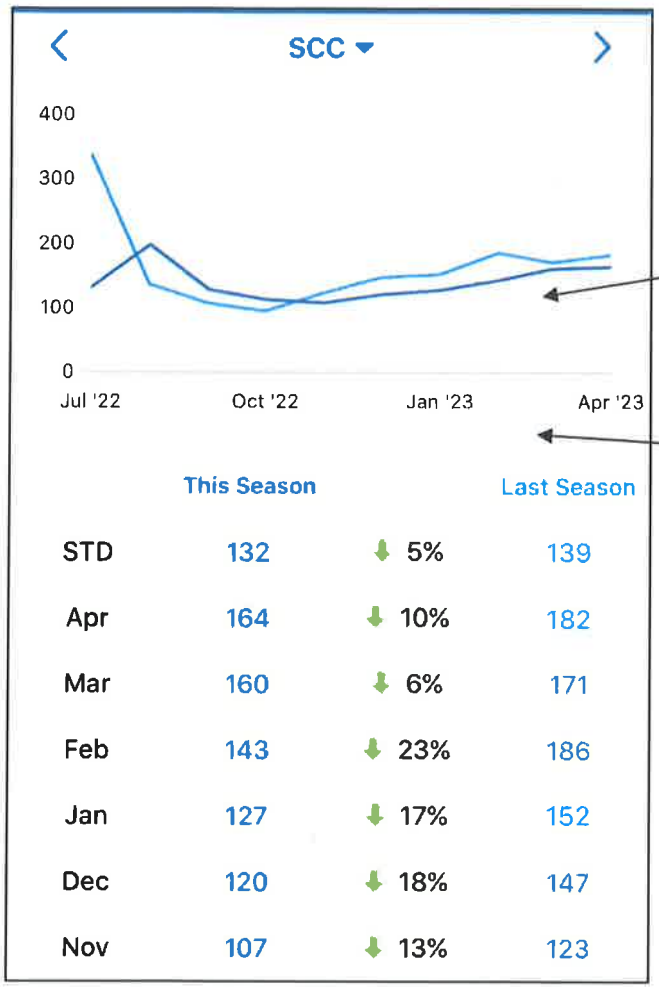
- The majority of paddocks have received just under 190 kg N/ha/yr (max application rate of synthetic nitrogen) – see Hawkeye Head Map below.
- Paddocks that haven't received so much nitrogen are regrassing paddocks and calf paddocks.
- Effluent and non effluent area treated the same.
- Effluent is spread over a bigger area this year to make the most of nitrogen from effluent (90 ha vs last season 28 ha).
- Super applied in spring. Rates depended on Olsen P results.

N190 Heat Map:



Animal health

- Quite a few lame cows over autumn (currently 6 on OAD) – mostly feet issues due to wet March. These cows should have been culled last season, but poor mating resulted in less cows culled.
- Cell count low. Average since start of season is 132 thousand (target is below 150).
- SSC starting to creep up in March and April due to wet March but still and average 5% lower than last season.
- Variable milking not impacting on SCC.

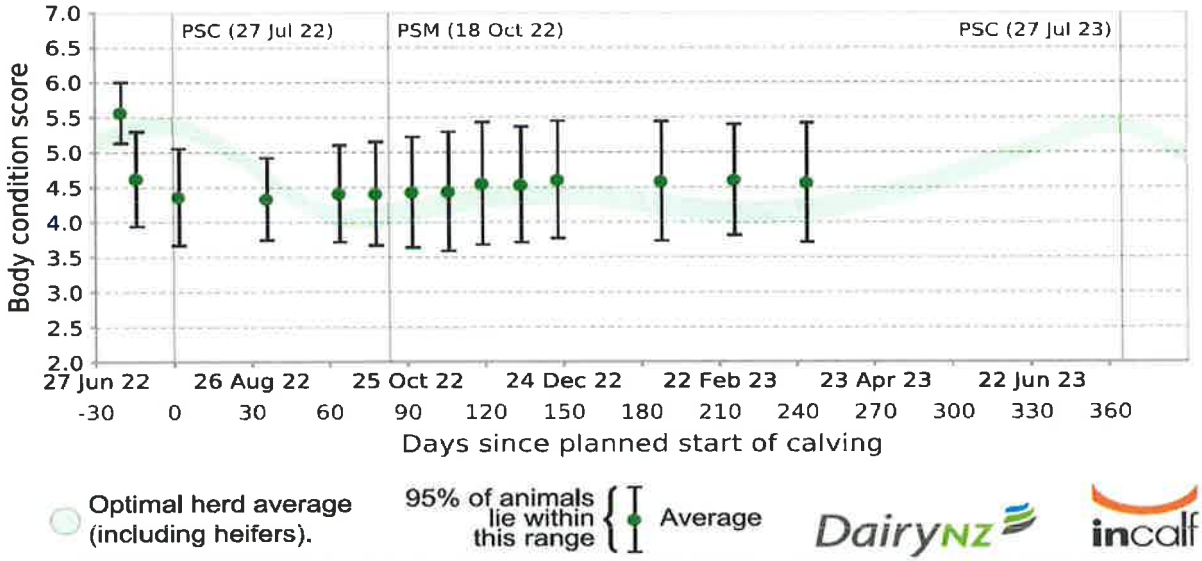


Body Condition Score

- Average condition was 4.6 BCS on 28th March (see below graphs).
- This is above the optimum herd average which is a great result.
- An age analysis was also made on the cows which showed that the older cows (9+ years) were lower in condition score than the younger cows (3-8 year olds).
- Next condition scoring on 12th May. We will use this info to draft cows into groups for winter grazing. Lighter cows will get more feed, heaver cows will get less.

Planned start of Calving: 27 Jul 22

Denominator is limited to the scored cows within the group.



Optimal herd average (including heifers).

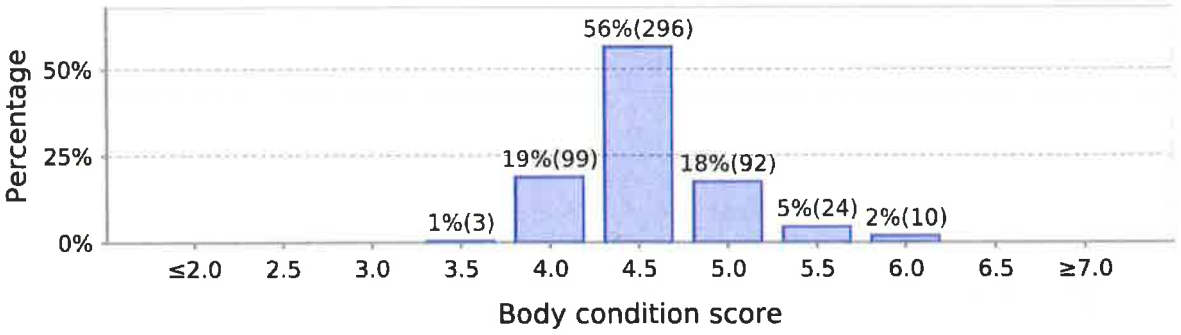
95% of animals lie within this range { Average

DairyNZ

incalf

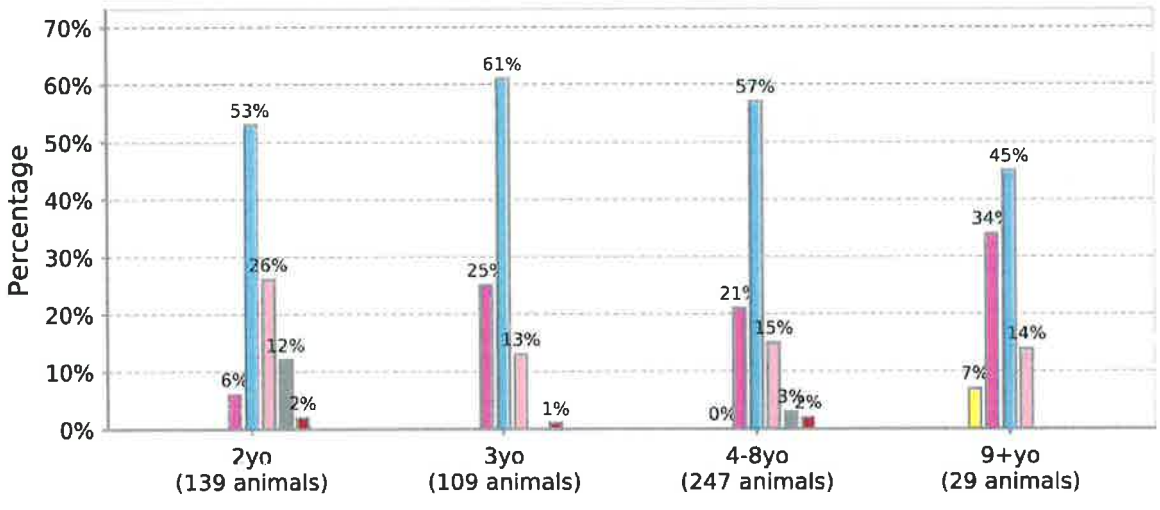
Body condition score

28 Mar 23 (524 animals - identified, average: 4.6)



Body condition score

≤2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 ≥7.0



Body condition score

≤2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 ≥7.0

Winter Feeding

- LUDF sends MA cows off farm on 28 May to an independent grazier block in Hororata. They all come back around 15th July.
- For 2022 winter cows did not gain the 0.5 condition score target. Issues with feed utilization with a wet winter.
- LUDF have met with the grazier to improve results.
- Plan for this year which has been discussed with grazier:
    - Try and place silage and open up paddocks so less walking back to silage and water.
    - Or portable troughs – can move the fences etc. Back fence, keep cows off pugged areas.
    - Have the conversation – about feeding being prepared to waste more. Consequences is feed will run out faster.
    - Throw out wheat straw as bedding 3 pm for cows lying time.
    - Once a day Vs twice a day feeding to improve utilisation? Dairy farm to provide support – a better option than throwing more feed
- Feeding regime:
    - Light condition early calver's (4.0 CS cows)

      Will be fed 16 kgDM cow on good quality feed @ 70 % utilisation.
    - Mid condition (4.5 CS) and late calving CS 4.0.

      Will be feed 13.5 kgDM/cow on good quality feed, @ 75% utilisation.
    - Fat Cows (5.0+ CS)

      Will be feed 10.5 kgDM/day on average feed @ 80 % utilisation.
    - IC Heifers (already 5.5 CS)

    Will be feed 10.5 kgDM/day on average feed @ 80 % utilisation.
- The average diet is typically 13.5 kgDM/cow for the winter.

Plantain Project

Background:

- Science has found plantain reduces N leaching losses on farms.
- LUDF has sown plantain as a pasture mix for the past 5 plus years. However, the ryegrass always outcompetes the plantain in the sward.
- Therefore, a different strategy has been proposed where 30% of the farm has been sown as a pure stand. The cows will be fed a break of the plantain every day after morning milking. They will stay on the paddock for around 6 hours. This equates to around 30% of their diet.

Pros so far

- Reduce N leaching on the farm from 35 kg N/ha/yr to 26 kg N/ha/yr if cows can achieve intakes of 30% or higher
- Same growth rates and protein levels as pasture and similar nitrogen response rates so it can easily fit into farm system
- The project aligns with SIDDCs approach to adopted a low foot print farm program approach

Cons so far

- Takes longer to establish which puts pressure on round length and meant silage had to be fed out. This is a cost to the farm profit.
- Appears to be more sensitive to compaction issues
- Subject to significant weed burden and limited sprays available
- Has been taken out by pests (grass grub)
- Expensive? - (currently doing a cost analysis on establishment and maintenance).
- Takes 3 years to establish 30% in pasture rotation.
- Palatability, cows don't like it (Peter hoping that once they graze it every day, they will enjoy it more – palatability improves).
- Lower in quality compared to pasture – lots more seed head over spring and summer period.
- Could pose animal health problems with cows walking more often to plantain paddocks every day.
- Takes longer to set up breaks in the plantain paddocks – this will have to be done every day.
-

Species	Date Sampled	DM (%)	ME (MJ/kg DM)	Protein (% DM)	NDF (% DM)	Digestibility (%)
Pasture	Oct	16.8	12.2	18.8	31.7	82.9
	Nov	16.4	12.0	17.3	32.0	82.0
	Dec	15.9	11.8	19.7	34.7	80.3
	Jan	17.1	12.2	22.0	35.1	81.4
Plantain	Nov	11.1	11.3	18.2	18.1	77.4
	Dec	11.9	11.5	17.1	20.2	78.2
	Jan	14.3	11.2	15.7	24.7	74.6
Baleage	Dec	47.1	11.7	15.4	41.0	78.7

Plan moving forward:

- SIDDC partners agree to continue forward with the plantain project even though there have been considerable obstacles. They recognise the value in plantain, and are not ready to give up on it yet – This is what a demonstration farm is for!
- However, it now understood that it will take longer than first thought to get it right. We want to find a solution on how to make plantain work in an irrigated Canterbury dairy system so that commercial farmers don't have to bare the cost of trialing it.
- N1 has been sprayed out as it has been decided that it is a paddock not suitable for direct drilling plantain – lesson learnt from this paddock: watch out for compacted soils – don't direct drill plantain into these!
- The aim is to get the most plants established as possible at sowing – therefore, we have found cultivating paddocks results in better establishment and retaining plant populations. However, this also results in great weed establishment! – To combat this we are now trialling annual grass as a crop in between perennial RG and plantain. This allows a double kill of weeds (once before annual RG sowing, and once before Plantain sowing).
- The plan moving forward for establishing plantain paddocks is as follows:

  Autumn: Rip paddock while in old pasture > spray with high rate of glyphosate > minimum tillage > sow in Italian RG

  Spring: Spray paddock with lower rate of glyphosate > direct drill plantain > spread slug bait.

Conclusions

- Continue to talk to farmers and industry to understand more about establishing and maintaining pure plantain in farm system.
- The strategy around use of plantain is to take our time and get it right. The process cannot be rushed through as farmers will rely on our recommendations.

Milking 10 in 7 from day one this season

Current milking regime:

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

- Summer completed with 2 full-time staff, Peter & 2IC.
- Staff 5+2

Results so far

- Low staff turn over - currently no staff have moved on since 10 in 7 milking started.
- Drop in profit in 2021/22 season was $39,000 @ $9.30 pay out.
- There would have been no drop in profit at $7.00 payout.
- The pay out drove the loss in profit with a drop in production.
- Decreased petrol and motorbike R&M.
- Decreased power consumption with less shed running time.
- Cost of cleaning shed and plant dropped.

Additional benefits that could be attributed to 10 in 7 roster - but haven't been proven yet

- Better cow condition – currently 4.6 BCS – higher than optimum herd average.
- 6 week in calf rate is better than previous seasons.
- Watch this space!

Assumed benefits that didn't occur this season

- Making silage on farm – haven't made any silage this season to date.

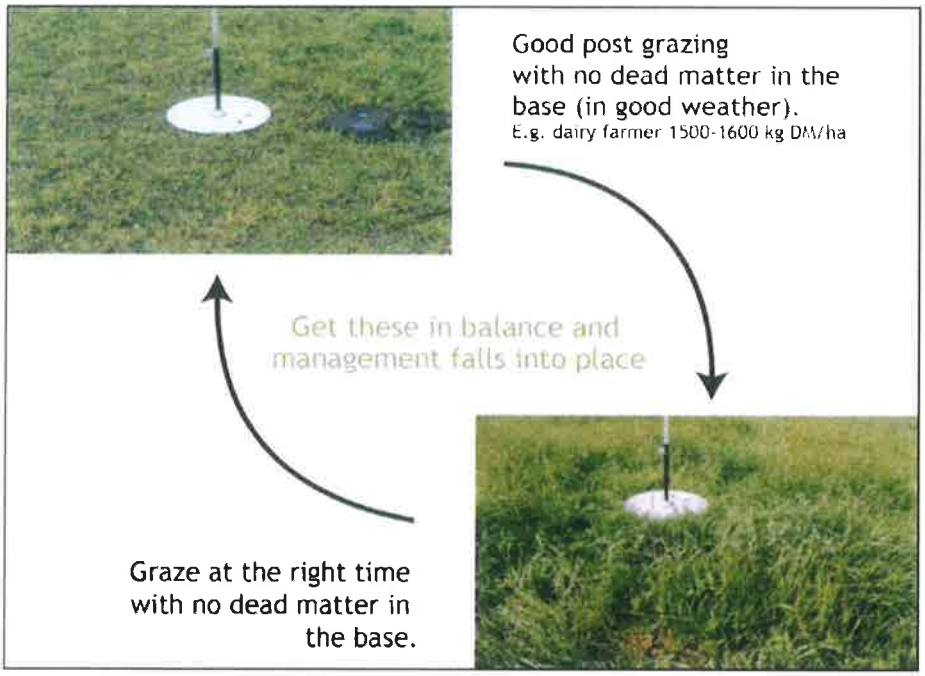
Pasture secrets – profits to make ($$ inputs aren't needed!)

by Graham Kerr, Barenbrug

We constantly focus on pasture for a reason: *pasture eaten* is the #1 profit driver in our systems.

Pasture management is simple (in theory). There are only 3 rules:

1. Graze to the right residual
2. Graze at the right time
3. Repeat rules 1 and 2.



1. Consistent residuals day-in day-out (except when wet)

Achieving consistent post-grazing residuals is valuable. A small increase in feed eaten (+3%) may mean **$162,000/year extra income is on a 200ha farm.** Remember residuals drive pasture quality, so you also get a small increase in pasture metabolisable energy or ME (+0.3 MJ ME).

Estimated value of small improvement grazing residuals on a 200ha dairy farm.

Benefit	Amount	Pasture grown	Extra	Extra MS*	Value
Increase eaten	Extra 3% eaten	3,000,000 kgDM (=200ha x 15,000kgDM/ha)	90,000 kgDM (3,000,000 kgDM x 3%)	9000 kgMS	$72,000 @$8/kgMS
Increase in ME	Extra 0.3MJ ME/kgDM	3,000,000 kgDM	900,000 MJME (3,000,000 kgDM x 0.3 MJ ME)	11,250 kgMS	$90,000 @$8/kgMS
				Total income for extra eaten & higher ME =	**$162,000**

* additional pasture converted to MS at 10kgDM/kgMS; ME converted to milk solids at 80 MJME/kg MS.

The key to post-grazing residuals is ***consistency***. Some farmers aim to graze to 1500 kgDM/ha, some 1700. These options maybe fine, based on the farm system. The correct thing to do is to be consistent, so cows are eating the high quality plant leaf *above* the same residual each grazing.

Tips for smarter residual management:

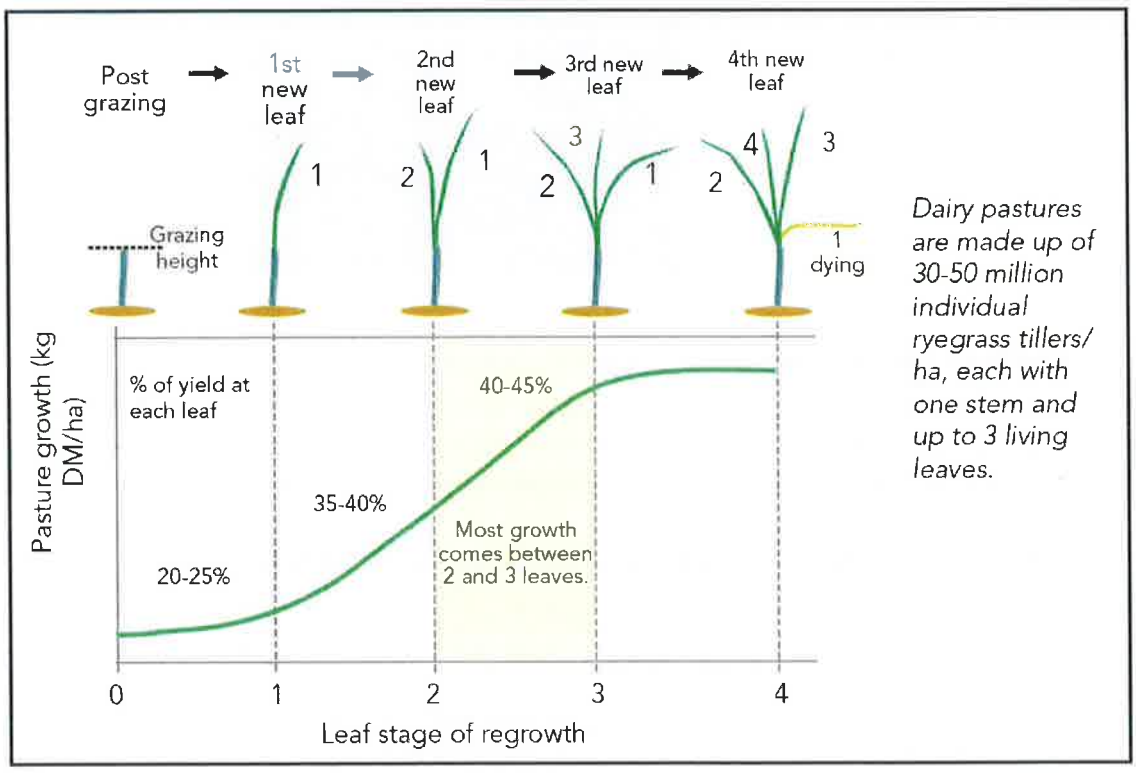
1. Define target residual – so whoever is moving the cows know this.
2. Have a photo of right residual on everyone's phones to check against.
3. Use a plate meter –avoid the "I think it's 1500. No, I think it's 1700" discussions. Measure it.
4. Use 24 hour grazings – Only half as many residuals to get right as 12 hour grazings.
5. Have residual as a KPI for those shifting cows –in a job description or contract.
6. When residuals aren't achieved – and this happens - act quickly to reset them. E.g. putting cows back into the paddock, post-graze mowing, pre-graze mowing next round.

2. Graze at the right time

Like residuals the plan is ***consistency***. You want cows going into a paddock which you are confident will allow a good post-grazing residual.

The later you can graze, the more you grow, as regrowth accelerates over time as shown below. Basically more grass = more photosynthesis. But this is balanced by needing to get high utilisation. As a rough rule:

- Good diploid ryegrass: 3000-3200 kgDM/ha is a good target cover
- Good tetraploid/diploid ryegrass: 3300-3600 kgDM/ha is a good target cover (see next page)
- Older pasture (with cocksfoot etc): may need to be grazed <2800 kgDM/ha



There is nothing surer than that pasture growth rates will vary, meaning continual adjustment.

Tips for keeping cover in the sweet spot:

1. Set targets for cover through the year – have a plan, so you know when things change.
2. Monitor regularly — the difference between a good and bad pasture manager is 2 weeks - to identify and react to changes. Weekly monitoring is recommended, as this makes it a habit.

The *4front* system – taking things further!

(For the full 'The 4front system' booklet, download it at www.barenbrug.co.nz)

Mostly we sow diploid ryegrass-based pastures, and we graze them at the 2 - 2.5 leaf stage (or 2 - 2.5 leaves/tiller) because it's the easiest way to maintain good residuals.

Tetraploid-based pastures (e.g. *4front* tetraploid perennial ryegrass) hold quality longer, and still graze well at higher covers. This creates cascading benefits in efficiency, photosynthesis and growth. Plus potentially less N leaching and GHG emission, key outcomes our industry is seeking.

Your cows will love you too, as tetraploids like *4front* are easier to graze.

Principle 1: Growing more

Tetraploids can grow more DM because you can run them at higher covers, and capture more energy from the sun via the natural magic of photosynthesis.

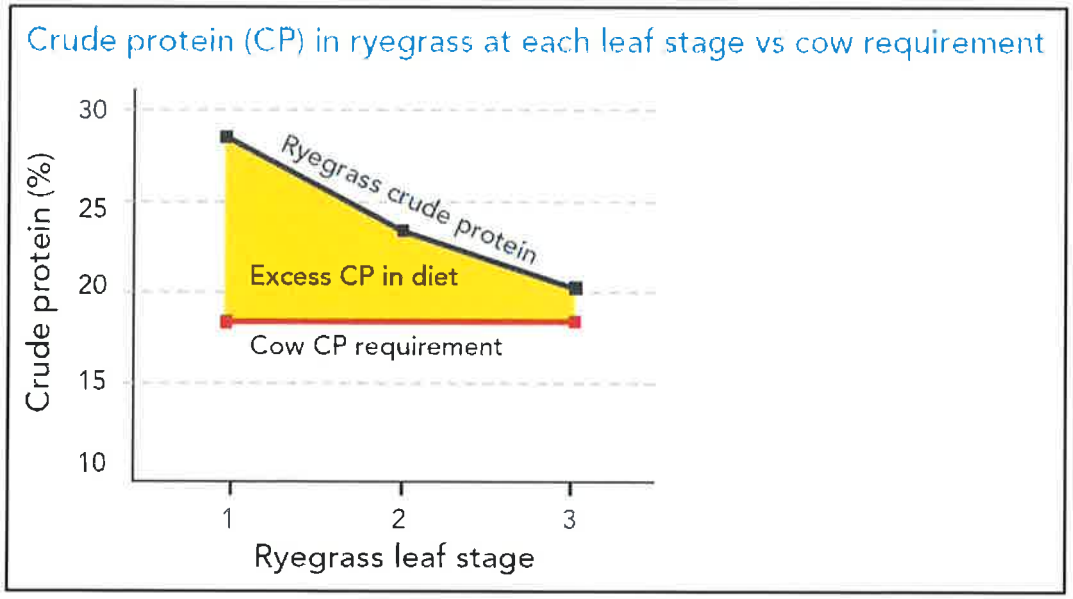
For LUDF, this adds up to around +1.2 t DM/ha/year. Over 200ha farm this is 240 t more drymatter. **If you had to buy that in, that's about $100k of extra feed!**

LUDF grazes longer covers, at about 3500-3600 kg DM/ha. This sounds like a small change, but pasture growth accelerates over time, so if we typically graze around 2 - 2.5 leaves/tiller, we lose the fastest growth that comes with the growth of the third leaf, which is 40-45% of the total growth available. This is the basis of the adage 'grass grows grass'.

At higher covers surpluses happen quicker, so monitoring cover and reacting is important. But tetraploid pastures remain more palatable even when too long, so are easier to graze.

Principle 2: Better balanced grass

As ryegrass regrows after grazing, the crude protein (CP) or N content in the plant drop, as below.



Lactating cows in spring need around 18% CP in their diet (= red line), so a pasture with 22% protein supplies 4% too much. This excess protein, excreted as urine and dung, is what causes N loading of soils. **Grazing 0.5 leaf/tiller later can reduce CP by 1.5%, dropping excess N by 30%.**

Principle 3: Fewer grazings = ↑ N efficiency (& easier management)

Higher pre-grazing covers mean a longer grazing round, more time for the plant to respond to N fertiliser, and a proportionately higher N response (i.e. more kgDM grown per kg N fertiliser).

At LUDF, changing the system to graze at covers 300 kg DM/ha higher– thanks to tetraploid pastures – lengthened the grazing round by 4 days from October to May, and **improved N response by 30%.**

This also reduced the number of times each paddock is grazed, by an average 1.7 grazings a year, making grazing management easier.

Principle 4: Higher cow intakes

Tetraploid ryegrass can increase cow production by around 10%. A key reason is that their basal leaves and leaf sheaths remain softer and lower in fibre.

Animals work hard when grazing a pasture diet – **a lactating cow takes about 25,000 bites a day**, so softer leaves and stems to bite of the likes of *4front* make a big difference to their quality of life!

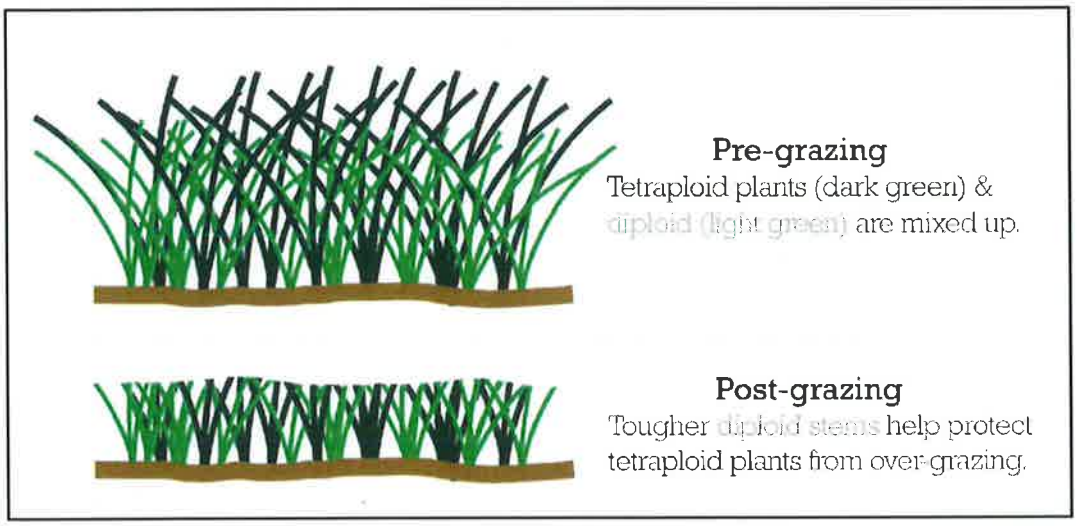
At LUDF peak cow intakes have climbed from 17-18 kg DM/day to 19-20 kg DM/day, and tetraploids have helped with this, while post-grazing residuals have been kept at a similar level.

Management tip: Tetraploid/diploid mix works well too

A high performance cultivar like *4front* can be sown as your sole ryegrass (typically mixed with clovers or plantain), but most of the 'tetraploid effect' can be gained mixing *4front* with a diploid perennial ryegrass like *Array* or *Maxsyn* – which increases resilience.

We know some of you have tried and struggled with straight tetraploid pastures. They are susceptible to treading damage in the wet, and easily overgrazed. This weakens their persistence.

Adding a diploid to the mix makes it more robust. Diploid plants have tougher stems, so protect the tetraploid.



Typical seed mix	kg/ha
4front perennial ryegrass	15
Array or *Maxsyn* perennial ryegrass	10
Kotuku white clover	2
Ruru white clover	2
Total kg/ha	29

White Clover: A Key Ingredient of Pasture Mixes Under a 190 kg N/ha/year Cap

Alistair Black

LINCOLN UNIVERSITY

1

Introduction

- White clover is a key ingredient of dairy pastures.
- What is the best pasture mix under 190 kg N/ha/y?
- Effects of mixing species and applying N.
- Series of mixture trials at Lincoln University.

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2

A seed mixture recommendation

Diploid Perennial Mixes

Spring Performance Mix

Excess (+7 days)	Rate (kg/ha)
Excess (AR37 or AR1) perennial ryegrass	20
Legacy white clover	3
Quartz white clover	2
Total	**25**

Excess is a high performance mid flowering diploid variety providing maximum spring production. Excess is suitable for use in a wide range of scenarios. Available in AR37 and AR1.

3

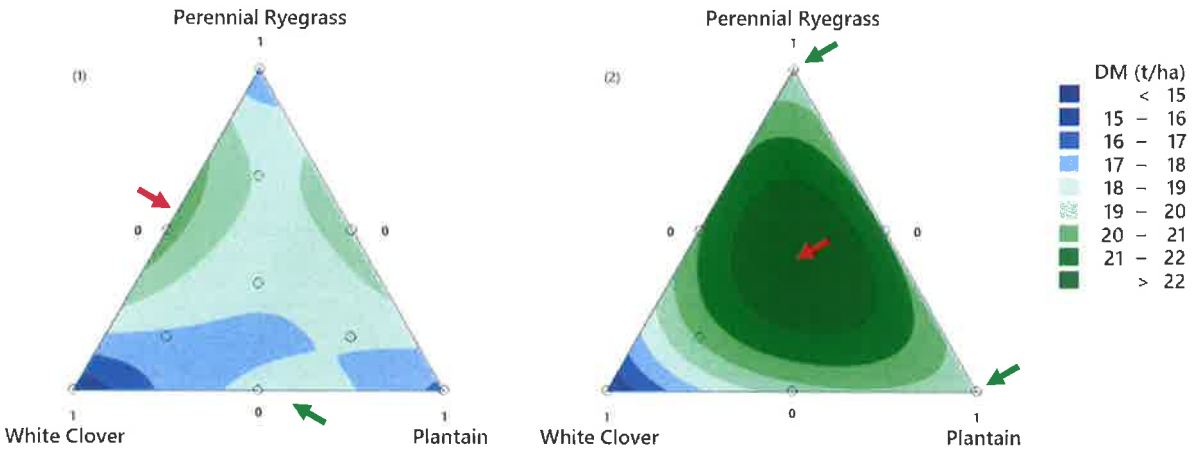
Let's analyse the mix

Cultivar	Species	Rate (kg/ha)	TSW (g)	Seeds/ m^2	% of kg/ha	% of seeds/ m^2
Excess	Perennial ryegrass	20	2	1000	80	55
Legacy	White clover	3	0.6	500	12	27
Quartz	White clover	2	0.6	333	8	18
		25		1833		

For reasonably accurate seed weights of pasture species, see page 24 in Pasture and Forage Plants for New Zealand (Stewart *et al.* 2022).

4

Figure 1: Annual DM yield response to species proportions in seed mix and applied N (1) = none, (2) = 200 kg N/ha/y.



Repeated at 1000 and 2000 seeds/m^2 and 4 years (2017-2021)

5

Figure 2: Crude protein response to species proportions in seed mix and applied N (1) = none, (2) = 200 kg N/ha/y.

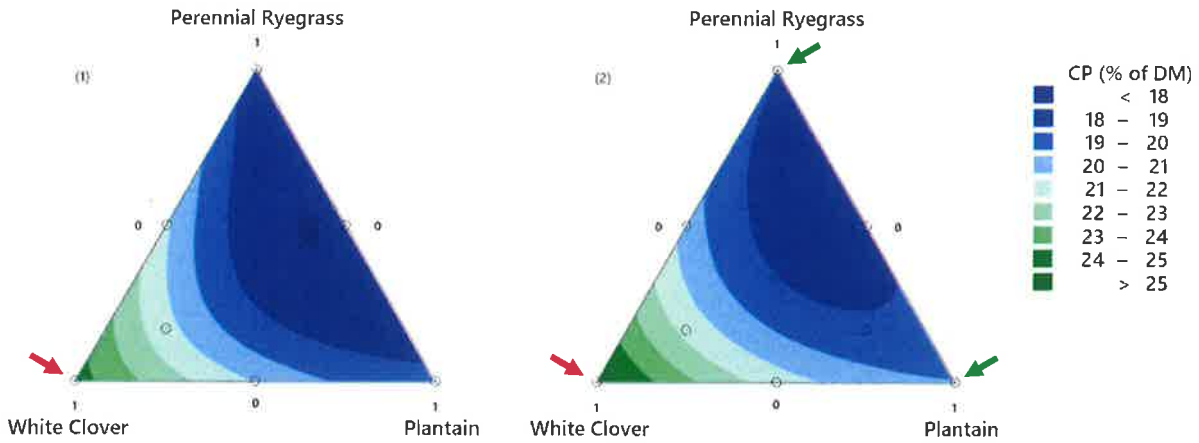


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Figure 3: Fibre (NDF) response to species proportions in seed mix and applied N (1) = none, (2) = 200 kg N/ha/y.

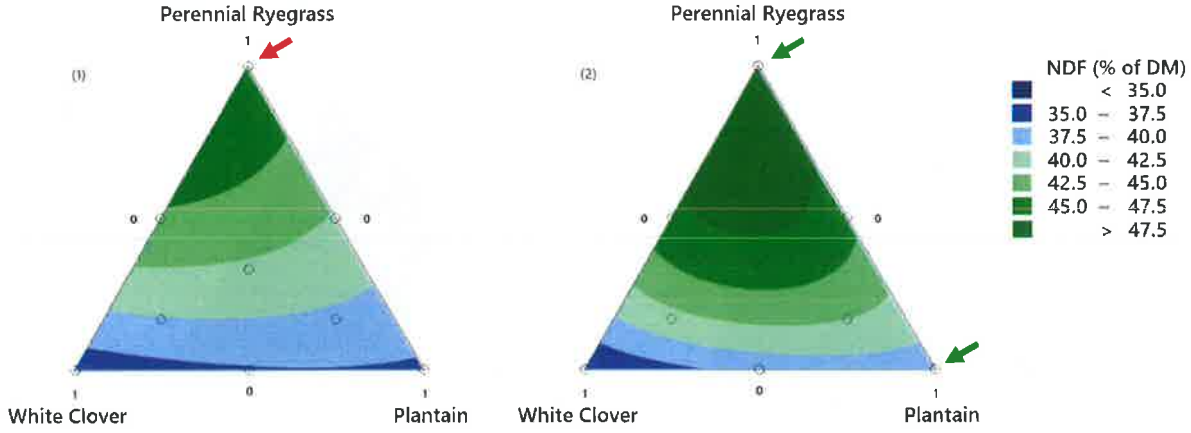

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Figure 4: Metabolisable energy response to species proportions in seed mix and applied N (1) = none, (2) = 200 kg N/ha/y.

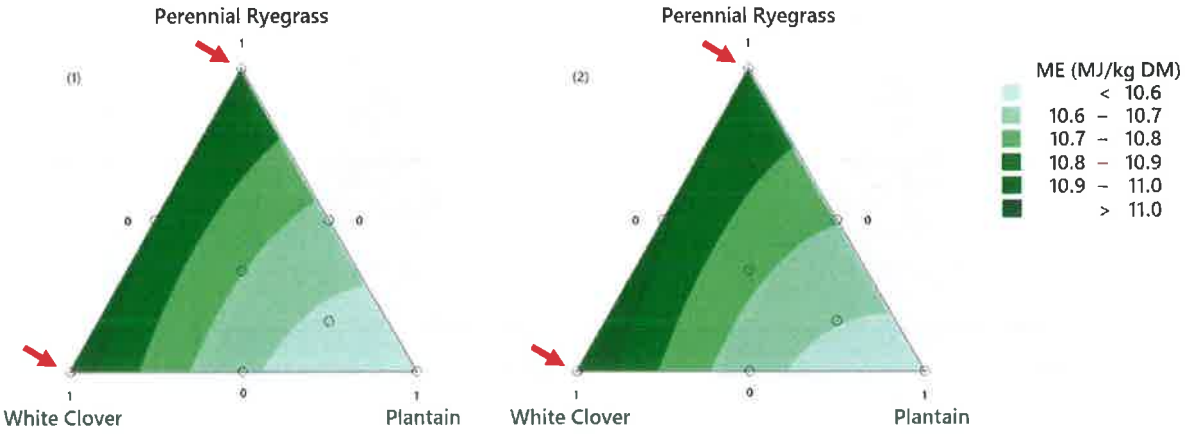

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Figure 5: Weed content response to species proportions in seed mix and applied N (1) = none, (2) = 200 kg N/ha/y.

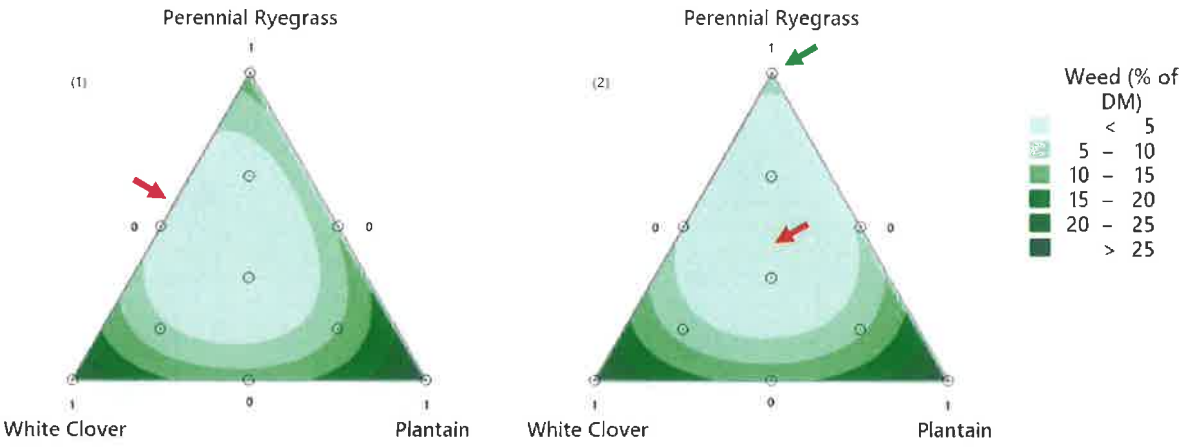

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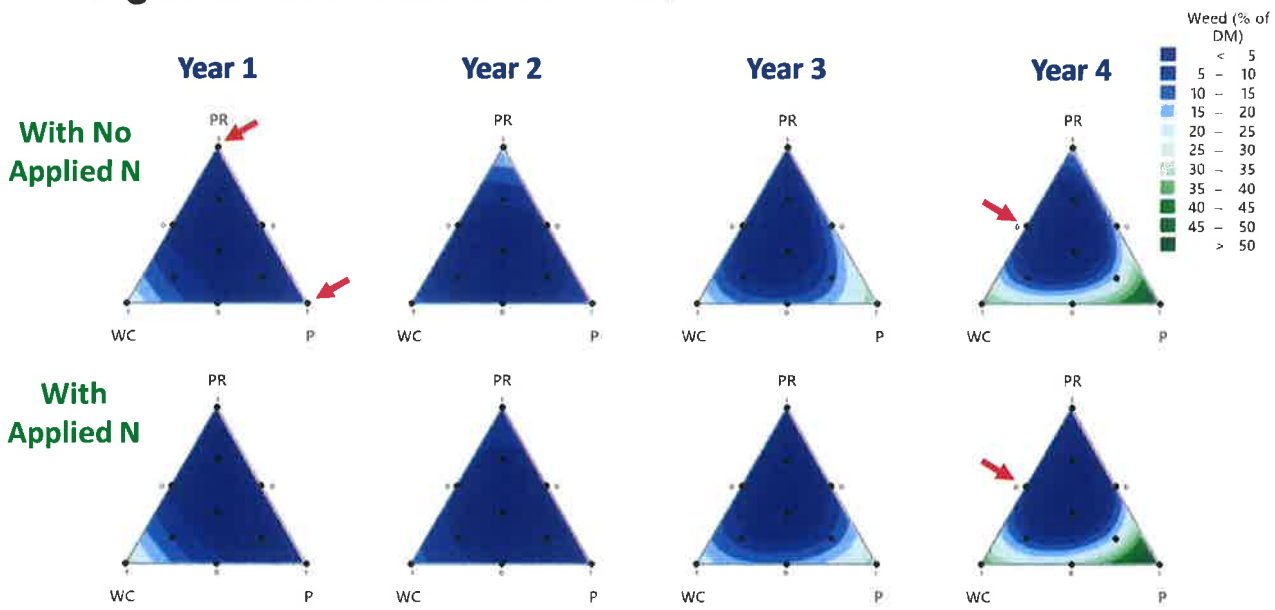
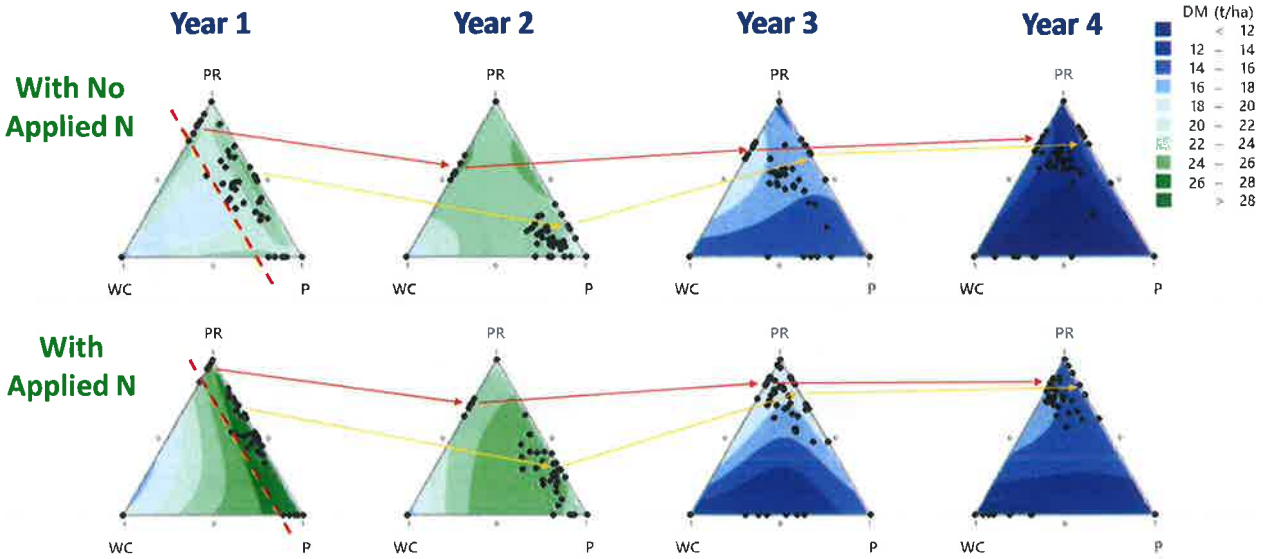
Figure 6. Weed content over time.



10

Figure 7. Species proportions in sown DM yield (total – weed).



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Conclusions

- Pasture growth and quality relate to species proportions in the pasture mix, i.e. 5% of a species in mix = just 5% of its effect!
- DM yield increases nonlinearly as species proportions in seeds/m^2 change to optimum 50% WC and 50% PR or P with no applied N.
- Applied N modifies the relations through its positive effects on PR and P, and negative effects on WC-PR and WC-P interactions.
- Species proportions in pasture, including weeds, change with applied N and time such that WC seldom exceeds 20% of annual DM yield.
- Informed seed mix formulations combine with other management strategies to increase white clover content on farm.

12

Acknowledgments

HILL COUNTRY FUTURES

DRYLAND PASTURES RESEARCH
Lincoln University

beef+lamb new zealand

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Seed Force
the power to grow

PGG Wrightson Seeds

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PASTURE101 – Key points to remember

- Light powers photosynthesis and therefore milk production.
- Pasture growth relates to recovery of leaf canopy after grazing.
- Species differ in how they rebuild their leaf canopy – e.g. WC must regrow leaves from stolons to top 1/3 of canopy so let it!
- Applied N reduces time from defoliation to canopy closure through fuelling leaf area recovery of grass and herbs, not clover.
- Legumes capture N in the atmosphere – about 25 kg N/t legume DM.
- Leaf size-stolon density relation informs WC cultivar decisions.
- Use alternative legumes in situations less suitable for WC.
- Include botanical composition e.g. clover % in pasture measurement.

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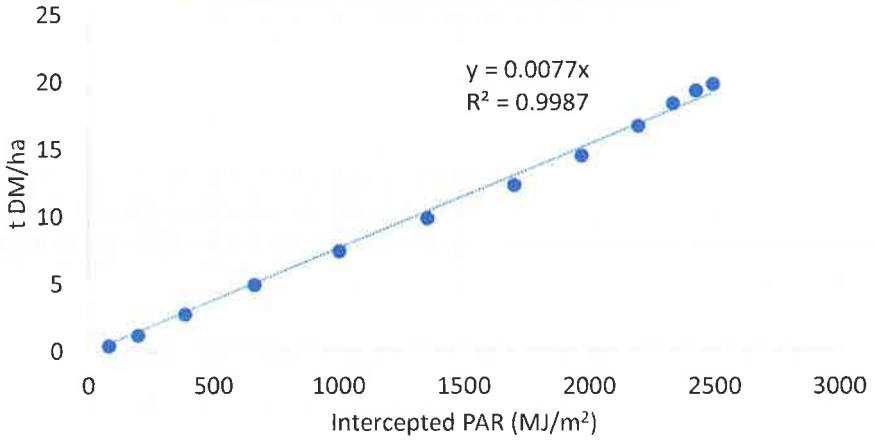
Light powers pasture production at LUDF

Radiation use efficiency = 0.8 g DM/MJ



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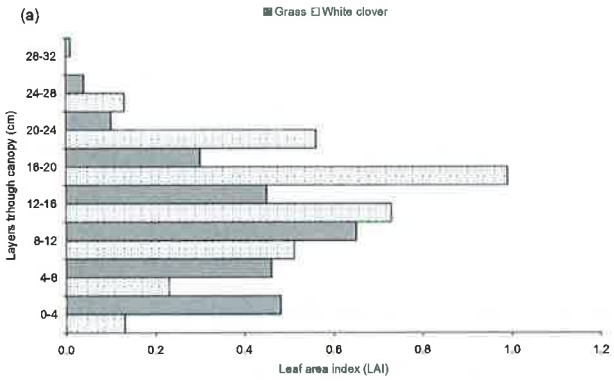
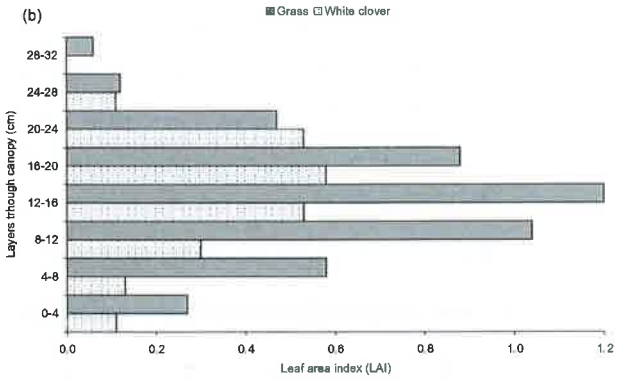
Leaf area through the canopy

With No N Applied



With N Applied



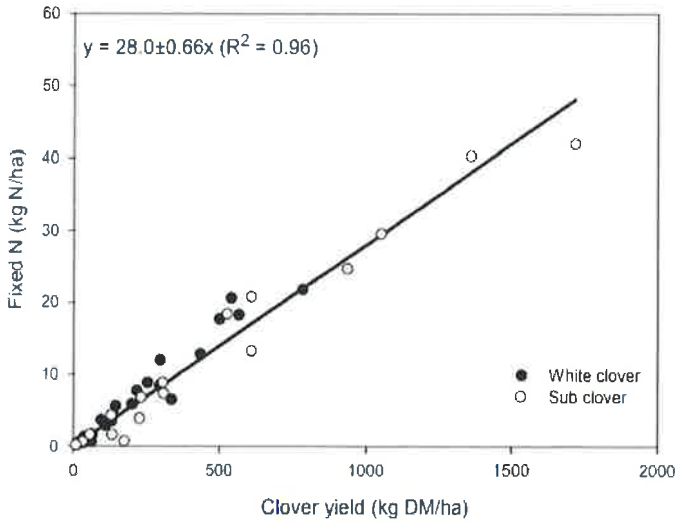
Laidlaw & Withers 1997

16

A white clover branch (stolon)

17

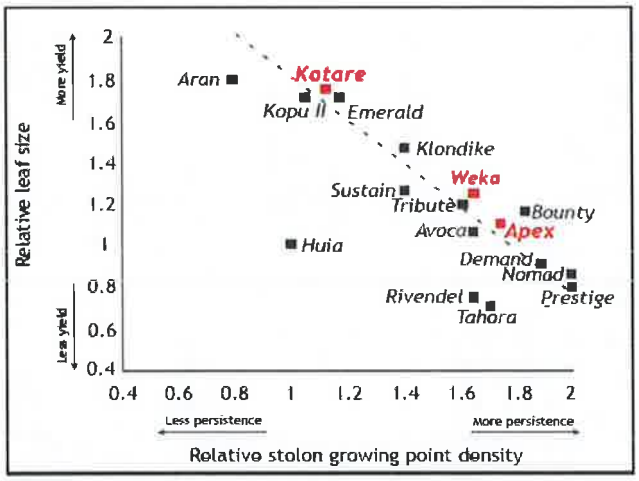
Nitrogen fixation = 25-30 kg/t legume DM



Lucas *et al.* 2010

18

Choosing white clover cultivars



* Base data for graph produced by AgResearch. *Kotare* and *Weka* positions estimated on six stolon growing point density and leaf size measurements by Agriseeds 2005-08.

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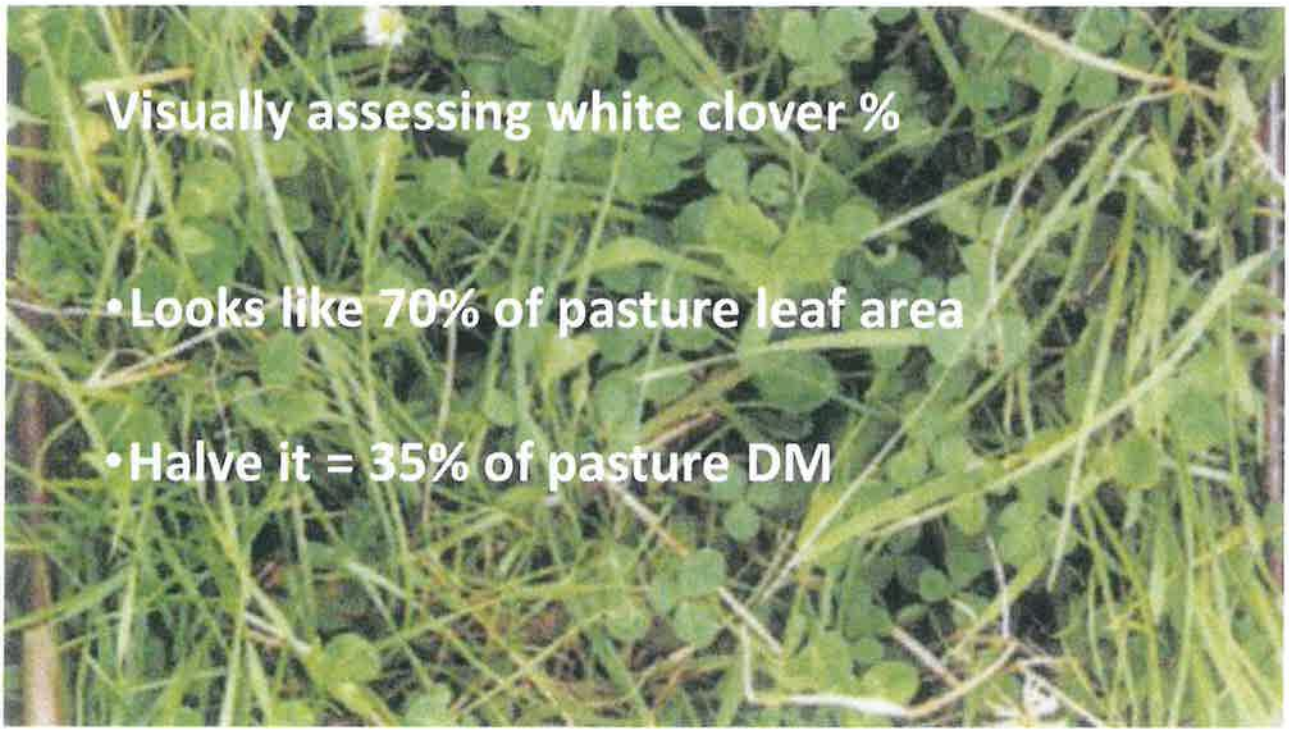
Legume species – industry standard and novel

Some examples:

- *Trifolium repens* White Clover
- *Trifolium pratense* Red Clover
- *Trifolium ambiguum* Caucasian Clover
- *Trifolium fragiferum* Strawberry Clover
- *Trifolium subterraneum* Subterranean Clover
- *Trifolium michelianum* Balansa Clover
- *Trifolium resupinatum* Persian Clover
- *Medicago sativa* Lucerne
- *Lotus corniculatus* Birdsfoot Trefoil

20


Visually assessing white clover %
•Looks like 70% of pasture leaf area
•Halve it = 35% of pasture DM

21

LUDF/Alderbrook Farm Reproduction Benchmarking Project

Jeremy Savage – Farm Consultant - MacFarlane Rural Business

Liam Kelly – Director of Ahipine Farming Ltd - 50:50 sharemilker on Alderbrook Farm

Alderbrook Farm

- 659 cows, 200 Ha farm, Rakaia.
- Season supply (spring calving).
- Fully irrigated with pivots, fixed grid + small amount of K line and sprinklers .
- Rakaia stony sandy loam (PAW 56)
- 3.3 stocking rate with 60% wintered on farm
- Twice a day milking, 3 in 2 from Feb onwards
- 525 – 540 kgMS/cow production
- Empty rates typically 10% or less.
- 3 FTW + Liam

FARMAX **Physical Summary for Alderbrook**

Jun 22 - May 23

Category	Description	Value	Units
Farm	Effective Area	200	ha
	Stocking Rate	3.3	cows/ha
	Potential Pasture Growth	16.0	t DM/ha
	Nitrogen Use per farm ha	159	kg N/ha
	Feed Conversion Efficiency (eaten)	10.4	kg DM eaten/kg MS
Herd	Cow Numbers (1st July)	659	cows
	Peak Cows Milked	659	cows
	Days in Milk	275	days
	Avg. BCS at calving	5.1	BCS
	Liveweight per farm ha	1,579	kg/ha
Production (to Factory)	Milk Solids total	342,668	kg
	Milk Solids per farm ha	1,713	kg/ha
	Milk Solids per cow	520	kg/cow
	Peak Milk Solids production	2.47	kg/cow/day
	Milk Solids as % of live weight	108.5	%
Feeding	Pasture Eaten per cow *	3.8	t DM/cow
	Supplements Eaten per cow *	1.1	t DM/cow
	Off-farm Grazing Eaten per cow *	0.6	t DM/cow
	Total Feed Eaten per cow *	5.4	t DM/cow
	Pasture Eaten per farm ha	12.5	t DM/ha
	Supplements Eaten per farm ha	3.8	t DM/ha
	Off-farm Grazing Eaten per farm ha	3.7	t DM/ha
	Total Feed Eaten per farm ha	20.0	t DM/ha
	Supplements and Grazing / Feed Eaten *	30.2	%
	Bought Feed / Feed Eaten *	16.9	%

(*) feed eaten by females > 20 months old / peak cows milked

Farmax Dairy 8.2.0.37

Goals

- To be respected as good farmers with high animal welfare expectations and good employees by maintaining team culture and providing flexibility.
- Maintaining a good work/life balance and purchase Alderbrook Farm in the future.
- 425,000 MS /yr with a cost structure of under $3.00 FWE in share milking business.
- Previously contact milked another farm + share milked Alderbrook. However, contract milking farm recently

sold and Liam is next season increasing cow numbers to 850 on Alderbrook.

Summary

Previous seasons poor mating results at LUDF (20% empty 2021/22 season) has resulted in setting up a benchmarking project with top quartile local performing farmer, Liam Kelly to help determine what the issues are. Mating program is the similar as Liam's farm. Liam achieves consistently high performance, 525 – 540 kgMS/cow production with empty (Open Rates) typically 10%. Through this project we have been able to benchmark between the 2 farms:

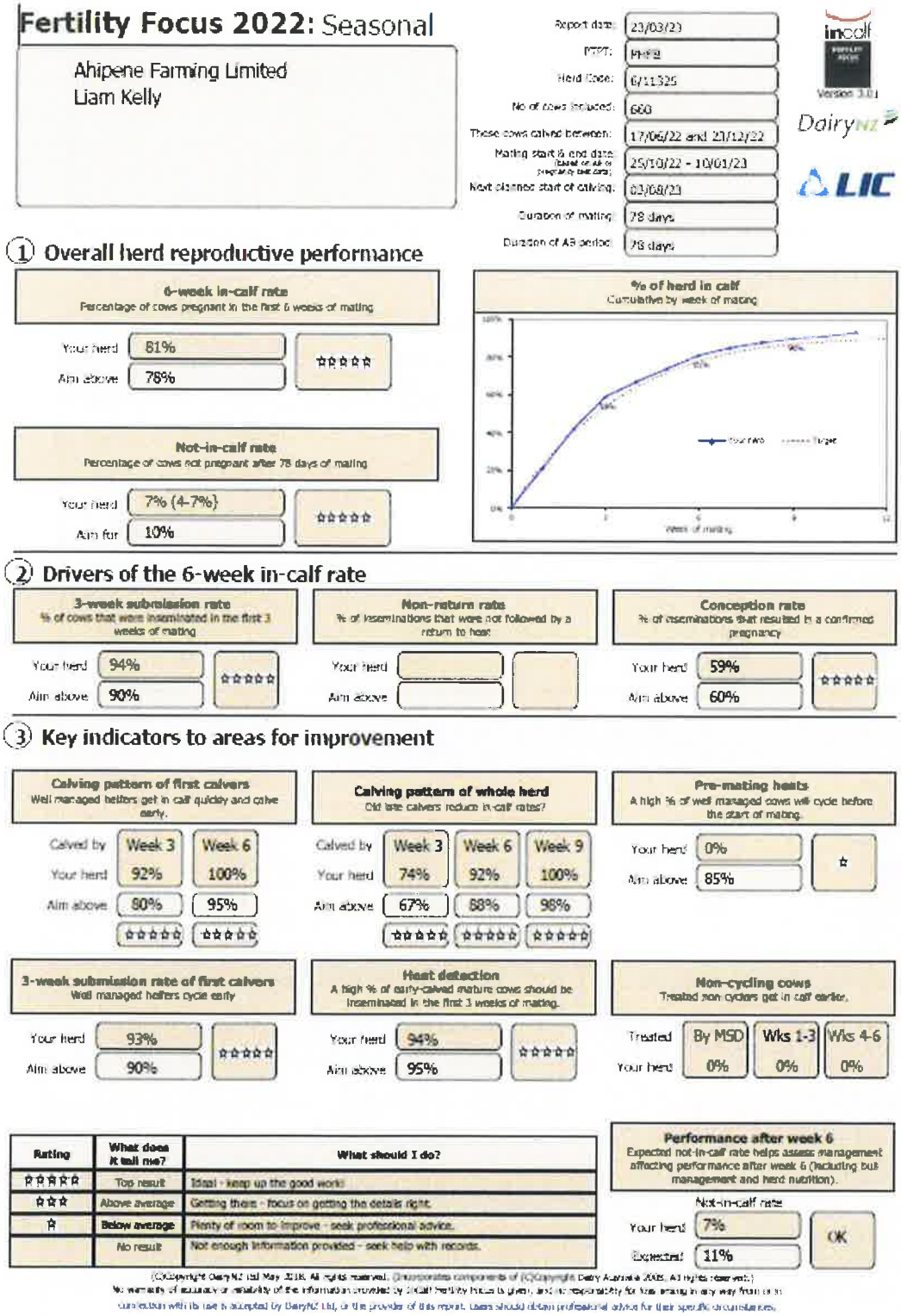
1. Reproduction
2. Milk Production
3. Rumination, activity and feeding Levels
4. Cow Condition.

Results from the project on Alderbrook farm have been summarised in the following handout:

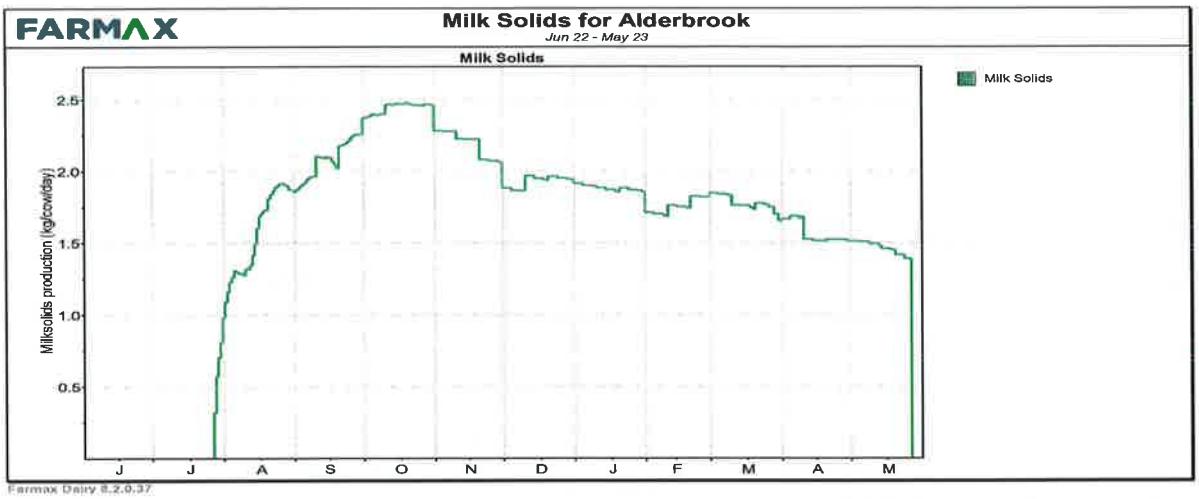
1. Reproduction

Difference between LUDF and Kelly – Day 78

Kelly = 78 days	11 Weeks	94 % (excl slips)
LUDF		87 %
Difference		7 %



2. Milk production



3. Rumination, activity and feeding levels

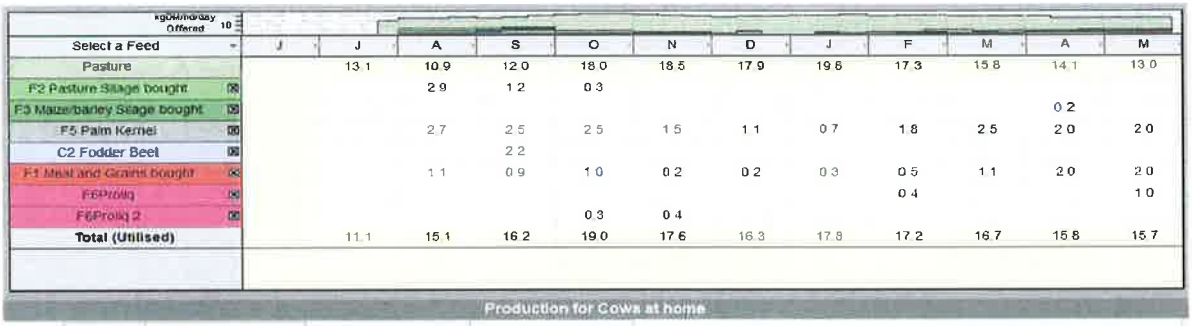
FARMAX

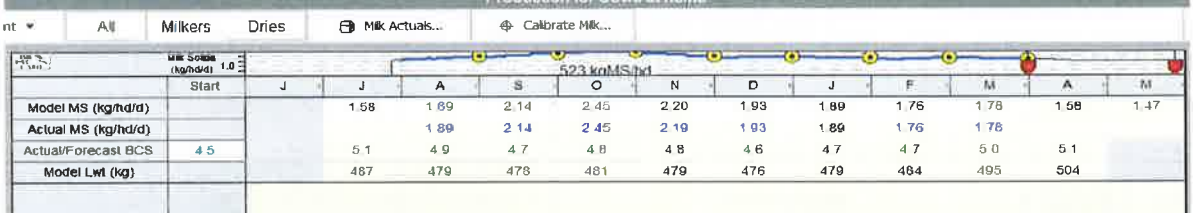
Supplement Feeding for Alderbrook

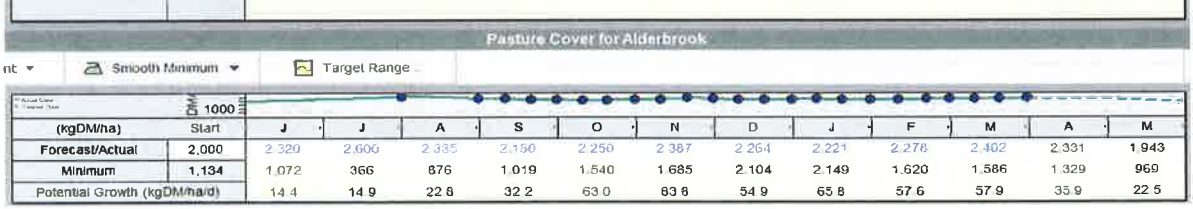
Jun 22 - May 23

DM Offered tonnes	F1 Meal ... Grains b...	F2 Pasture Silage bo...	F3 Maize/... Silage bo...	F5 Palm Kernel	C2 Fodder Beet	F2 Pasture Silage	F4 Hay/ Straw bo...	F6Prollq	C1 Kale	F6Prollq 2	Total
Jun 22		0.060					0.030				0.090
Jul 22		11.5					5.77		51.9		69.2
Aug 22	13.8	44.3		33.8			15.6		39.2		147
Sep 22	16.3	22.7		45.9	39.5		3.41				128
Oct 22	20.4	6.00		51.3						6.13	83.9
Nov 22	3.95			29.7						6.92	40.5
Dec 22	3.44			21.7							25.1
Jan 23	6.88			13.5							20.4
Feb 23	8.60			32.4				7.74			48.7
Mar 23	21.5			49.6							71.1
Apr 23	34.6		2.76	34.6							71.9
May 23	27.6			27.6				13.8			69.0
Total	**157**	**84.6**	**2.76**	**340**	**39.5**		**24.8**	**21.5**	**91.0**	**13.0**	**774**
kg/Milker	*238*	*128*	*4.19*	*516*	*59.9*		*37.6*	*32.7*	*138*	*19.8*	*1,175*

Farmax Dairy 8.2.0.37







Springers

Springer Rumination on Liam's great (LUDF average).

Springer (day -7 to – 1)

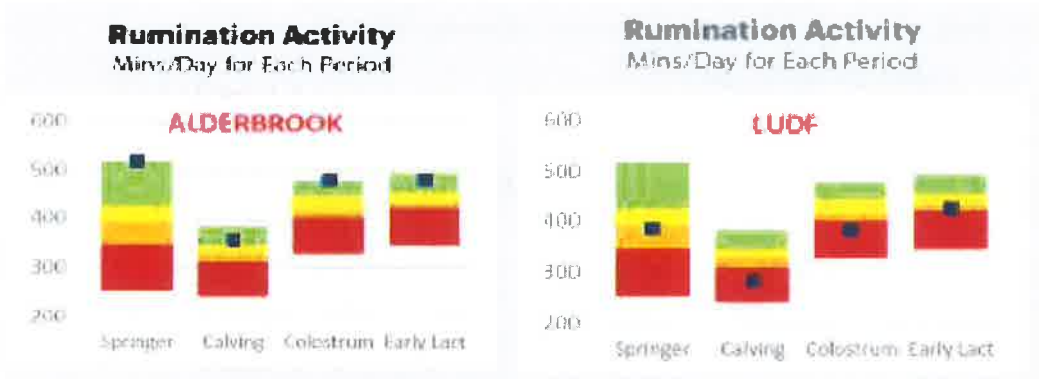
Springer Diet –

Grass	4
Bailage	4
Straw	ab - lib

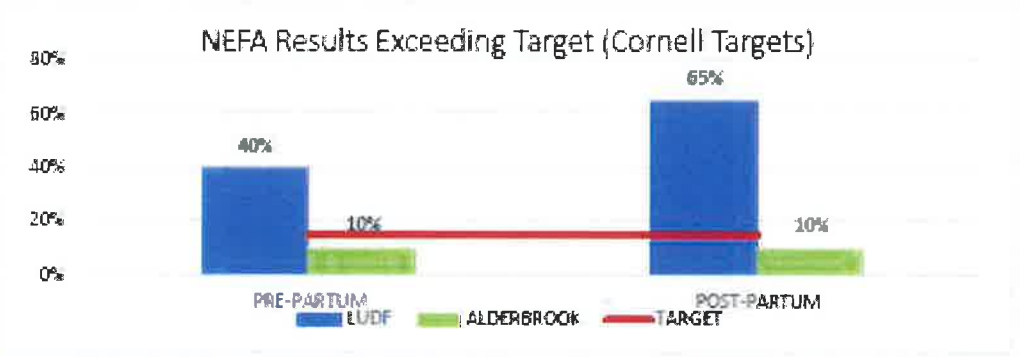
Calving on dry soils.

Transition (Springers to Early Lactation)

Transition Rumination Rates:



NEFA Blood Test Results:



CORNELL University Herd Level NEFA Interpretations

Negative energy balance in dairy cows: Dairy cows in the periparturient (transition) period are always in a state of negative energy balance due to high energy demands from the developing foetus and milk production (particularly with the emphasis on selection for high milk-producers). However, this state of negative energy balance can be excessive and affected cows are at risk of gastrointestinal (displaced abomasum), metabolic (clinical ketosis), and infectious (e.g. metritis) diseases in the early postpartum period. Thus, dairy practitioners frequently monitor dairy herds for excess negative energy balance by testing for NEFAs. Results of these tests can be interpreted at the herd level (i.e. a proportion of tested cows have NEFA values over a certain cut-off value). Identification of excess negative energy balance in individual cows (and more importantly) in the herd indicates the need for changes in nutrition and transition cow management to decrease energy demands and stresses on transition cows.

Cornell herd level target is < 15% high prepartum and <15% high postpartum

Colostrum's

Liam – feed ab lib bailage to colostrum. Residuals 1,700.

OAD colostrums. Both prepared to miss a day milking on 1st Day.

Early Lactation Rumination (days 8-10 average)

Colostrums OAD (4 days)

OAD early lactation until 10th Aug, all cows then into herd, 1st calvers +struggling cows kept on OAD , 1st 14 days), 2 herds until end of august. OAD and TAD.

Diet Early Lactation

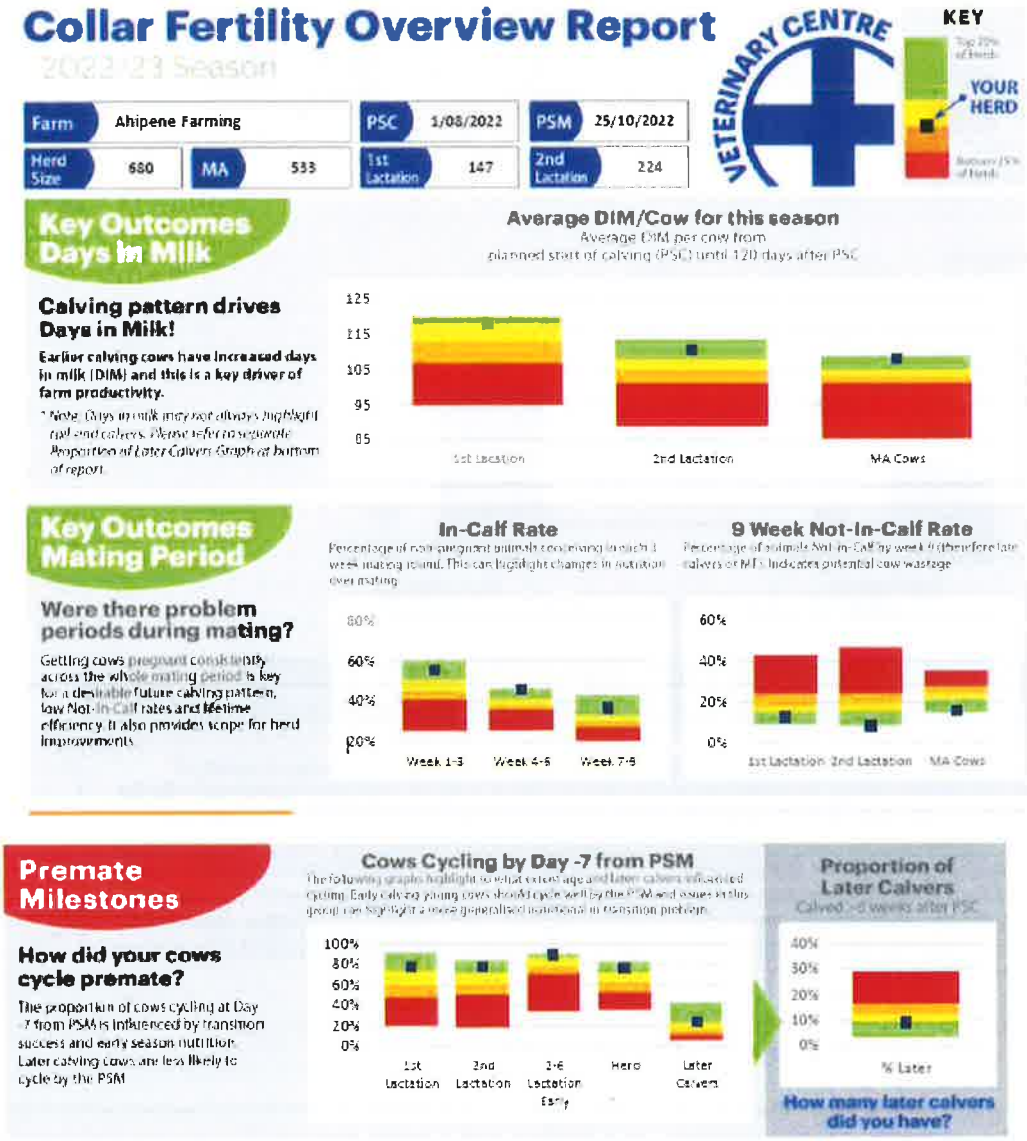
PKE – AB Lib, 3-4 kgDM + 1-2 kgDM of Grain. 1 kgDM of silage if FEI high.

Grass – 1,600 residuals.

Round Management:

Liam - 1st Round 20th Sept. Use silage late Aug / Sept to hold the round. 180 kgDM/cow

Supplement use Silage 180 kgDM/cow



4. Cow Condition

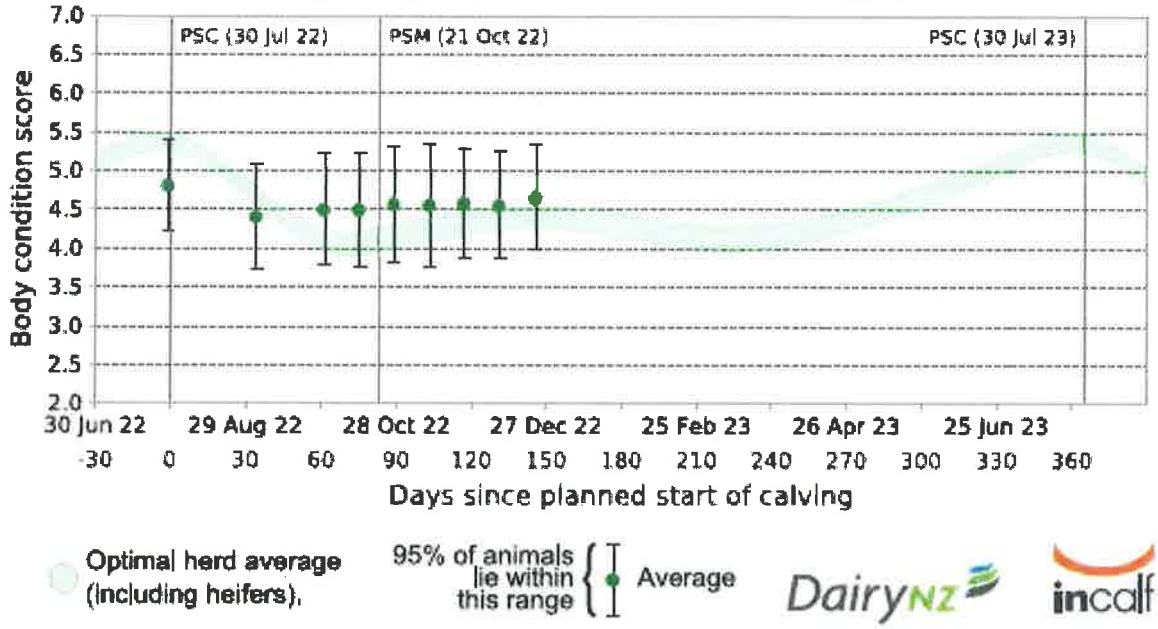
infovet ALDERBROOK #1 Report Date: 20 Mar 23

Body Condition Score

Animal group: Cows in Milk

Planned start of Calving: 30 Jul 22

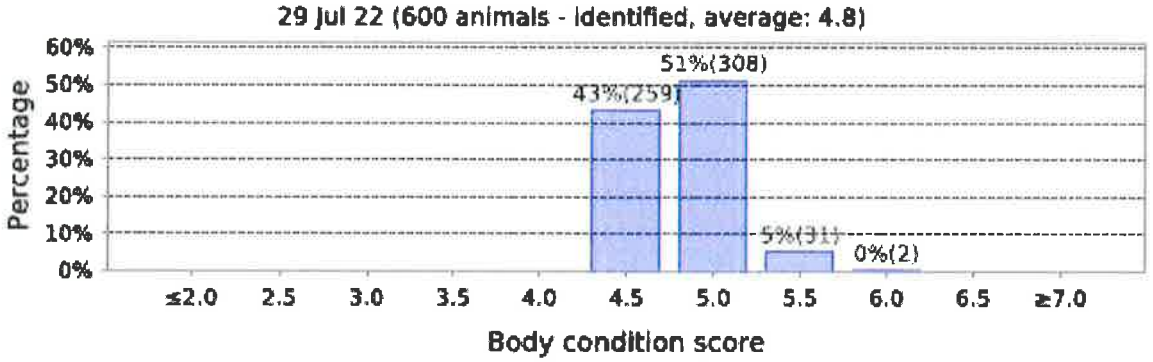
Denominator is limited to the scored cows within the group.

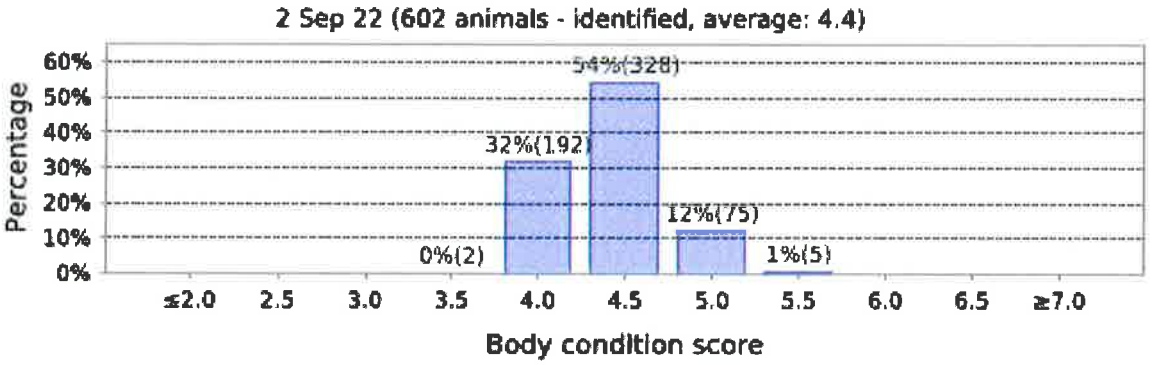


Optimal herd average (including heifers).

95% of animals lie within this range — Average

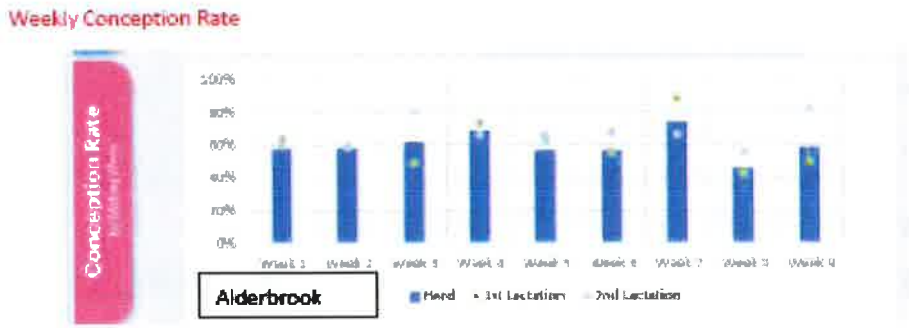
DairyNZ incalf





Liam = 4.8 @ 29th July.

2nd September, = 4.4. Liam's cows experienced a 0.4 CS drop.



Liam Maintains an exceptionally good conception rate throughout mating.