SIDDC
South Island Dairying Development Centre

LUDF Open Day

February 2019
9:00 am - 11.00 am

LUDF
New focus

- **Focus on People**
- **Milking shed efficiencies**
- **Environmental Audits**
- **Greenhouse gasses emissions**

Venue: ***LUDF – Parking ONLY off Ellesmere Junction Rd, Lincoln***

Enquiries: Ph: 03 4230598 Email: office@siddc.org.nz

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

Further information on SIDDC strategic plan for LUDF coming soon to your email

SIDDC South Island Dairying Development Centre
Partners Networking To Advance South Island Dairying
DairyNZ ravensdown LIC agresearch SIDE

Contents

LUDF Strategic Objectives

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.*
- *LUDF is to accept a higher level of risk (than may be acceptable to many farmers) in the initial or transition phase of this project.*

To achieve the above objectives, and considering the changing environmental regulations to reduce nutrient losses, LUDF has since the beginning of the 2014/15 season adopted and scaled up research emerging from the P21 Phase 2 programme. This research (jointly funded by the Ministry of Business, Innovation and Employment, DairyNZ, Fonterra, Beef + Lamb New Zealand and the Dairy Companies Association of New Zealand) identified a "low input, highly productive farming system" that reduced nutrient losses while maintaining profitability when estimated against the LUDF data at the time.

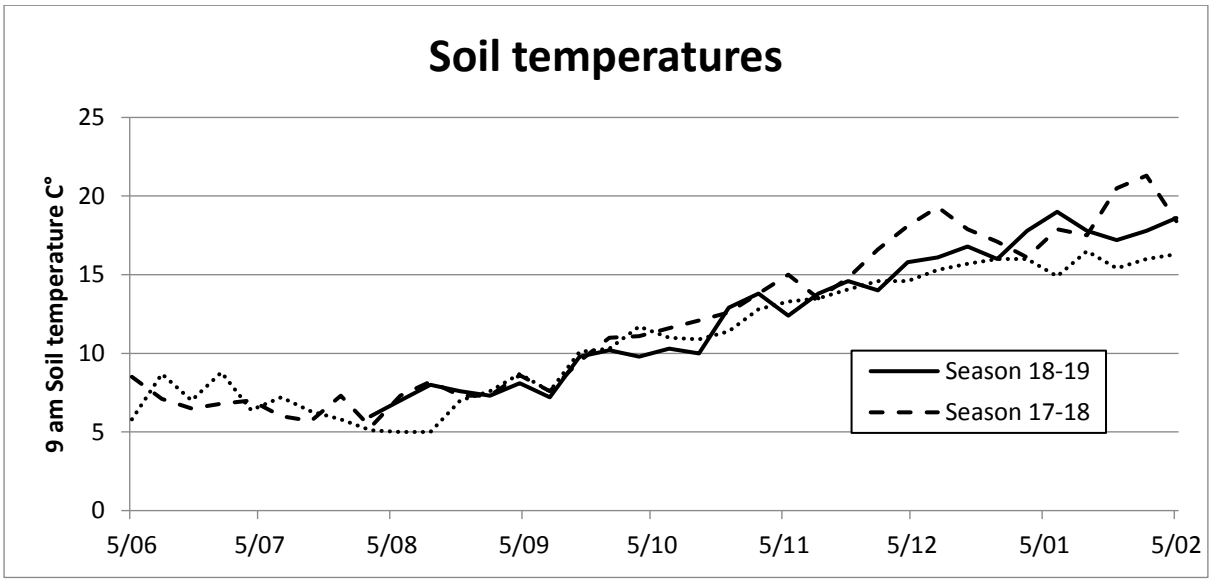
This Low Input, High Production, Highly Profitable, Low Nutrient Loss Farm System has been run at LDF for 4 seasons already.

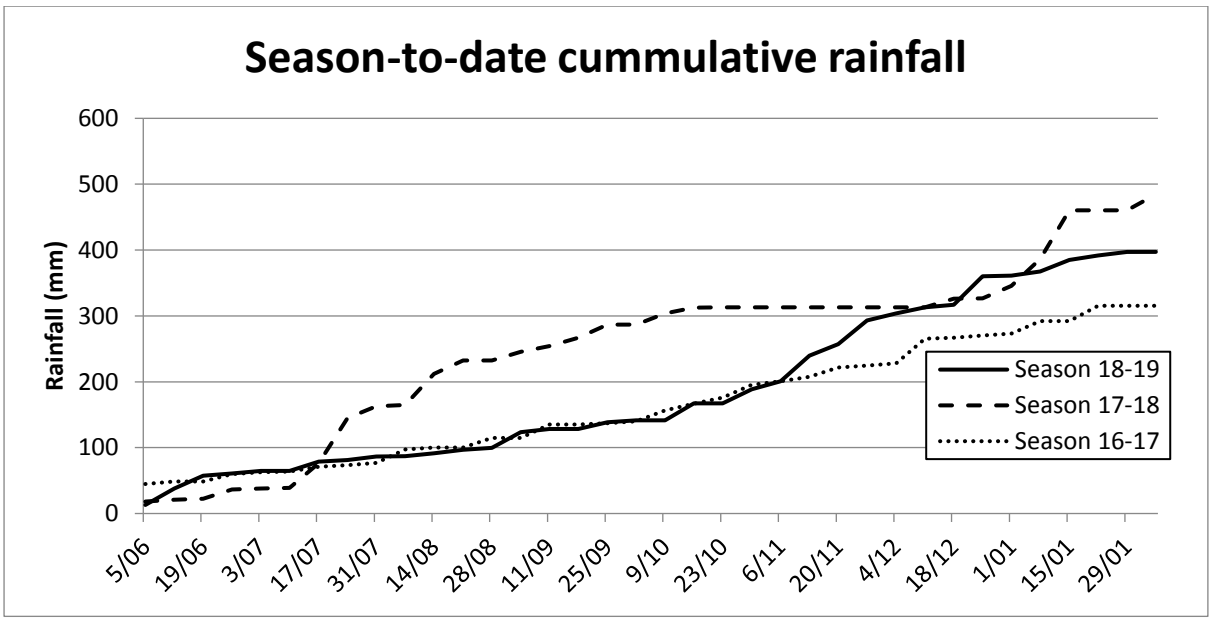
Season-to-date farm performance 2018-19

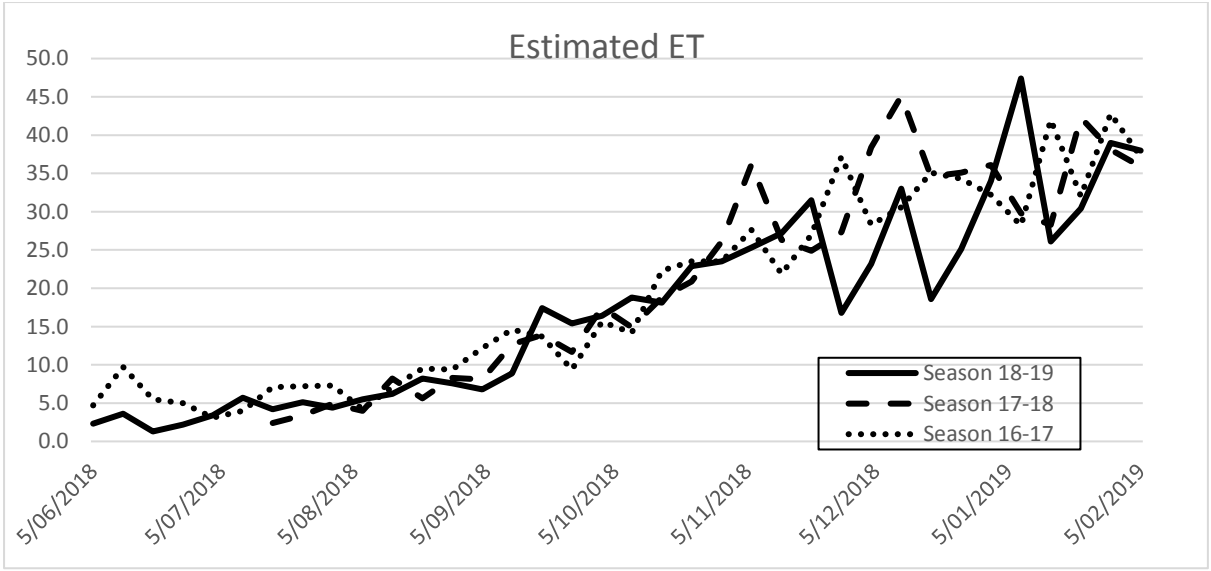
Weather and Environment

The 2018-19 season, so far, has been described by many as one of the best springs experienced in a while for calving. Exceptional calving conditions for cows with warm dry weather, which has allowed for good winter growth as well as good utilization of pastures during spring and good conditions for regrowth in the second round.

Accordion to NIWA records, air temperature at the Lincoln Broadfield site was just below 8°C during July and by September the average temperature was up around the 10.5°C.



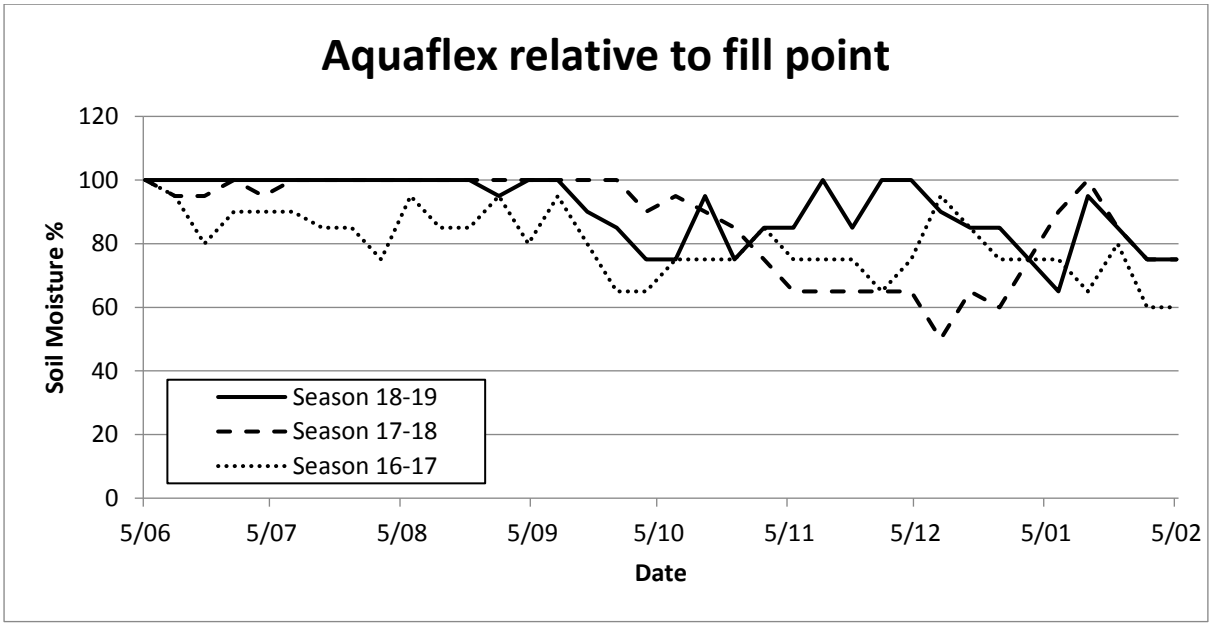


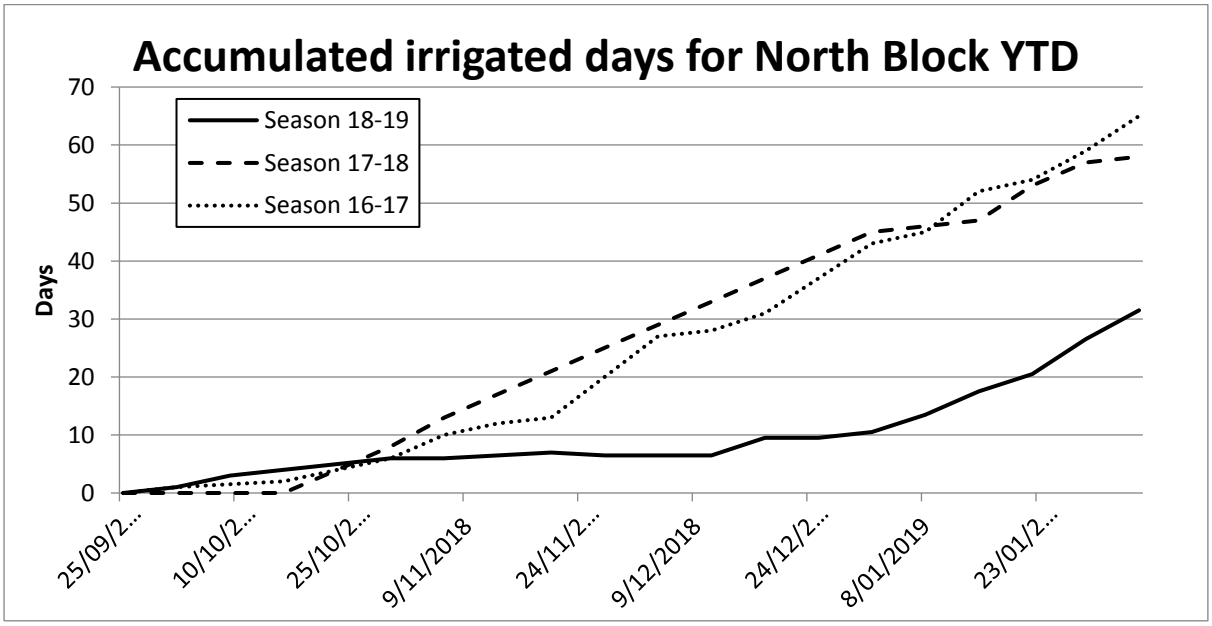


The dry winter with high growths allowed the farm to be very well set up for the start of calving.

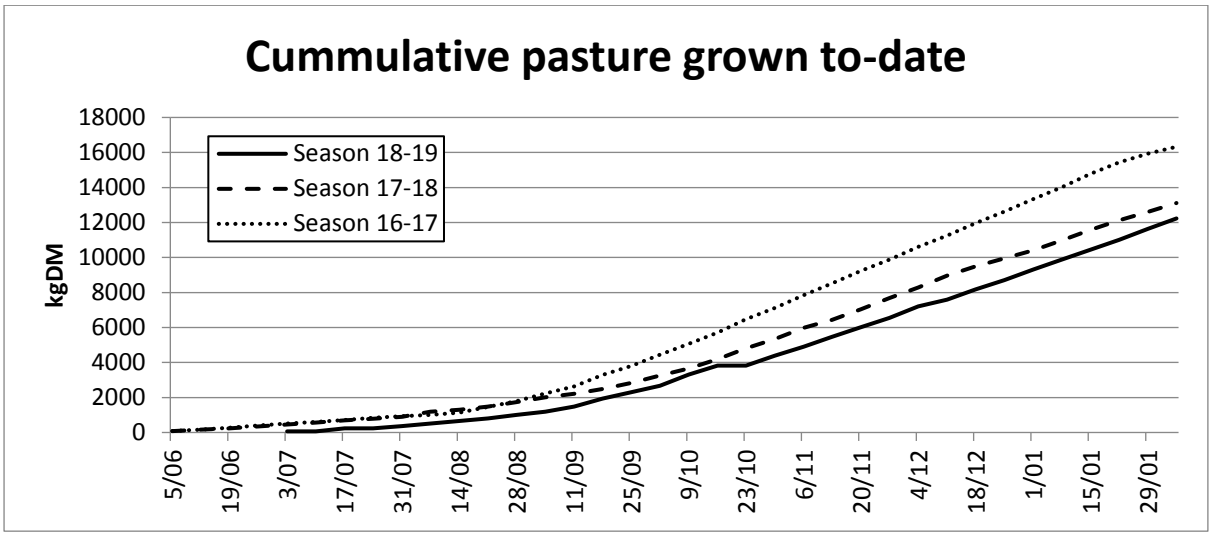
The LUDF Irrigation infrastructure underwent a big change in the north block through winter. The large centre pivot lost it corner arm and move toward the south west end of the north block and a smaller 4 span pivot was installed in the northern end of the north block.

Irrigation commenced in early October this year (only in the north block so far), same as the 16-17 season and due to the high ET's experienced during September, which have been the highest of the last 3 seasons. The intermittent and timely rainfall events between late September and late December meant that the total requirement for irrigation on the farm has remained well below its usual utilization.



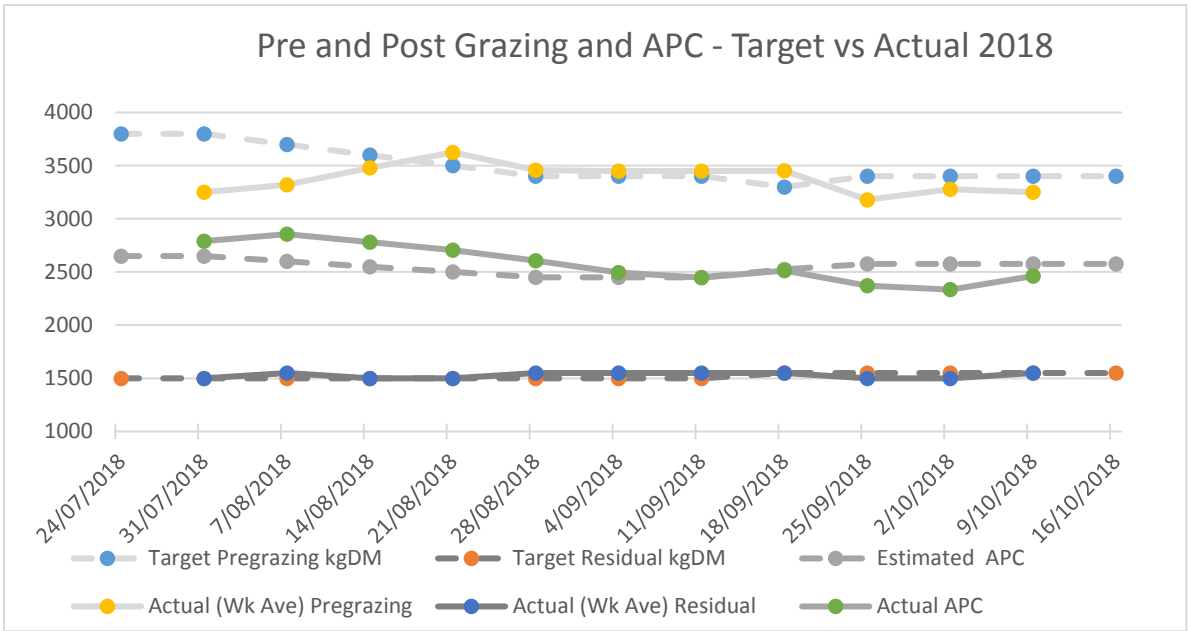


LUDF dried off at the end season 17-18 at an average pasture cover of 1900 kgDM/ha, the lowest in the last 4 years. The warm dry winter allowed the farm to start calving with 2600 kgDM/ha average pasture cover.

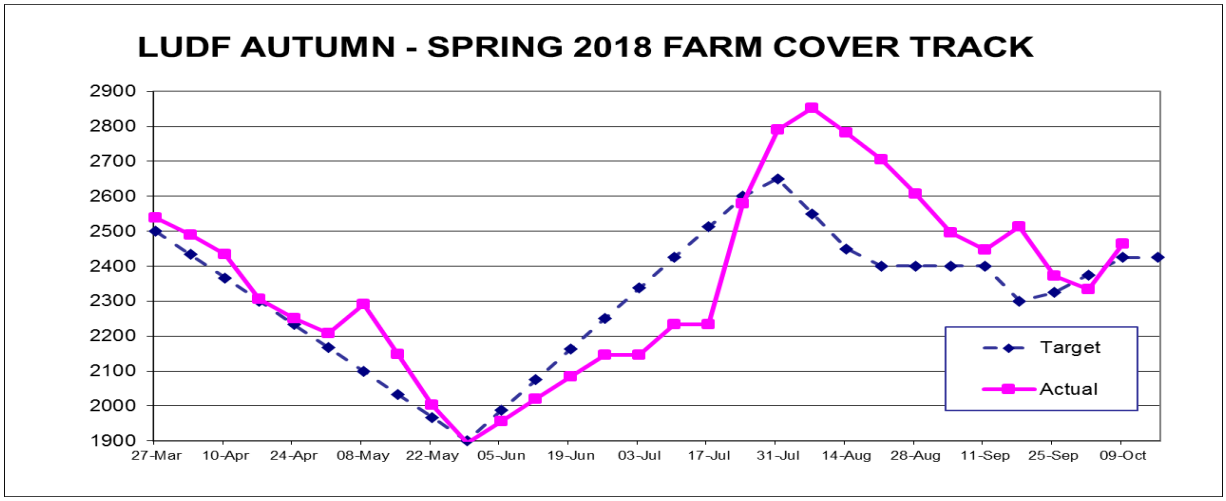


The good growth rates during winter allowed the farm to be able to adhere to the planned spring rotation planner rigorously in terms of the area grazed per day and finish the first round a few days ahead of the plan and without the need for any supplements (bearing in mind that LUDF brings cows onto the platform as calved animals and grazes no springer or dry mobs). The SRP started mid-July due to earlier start of mating last season and was planned to have the first round finished by the 20th September. Below are the tables showing the progress of the SRP and the cover tracker through this period:

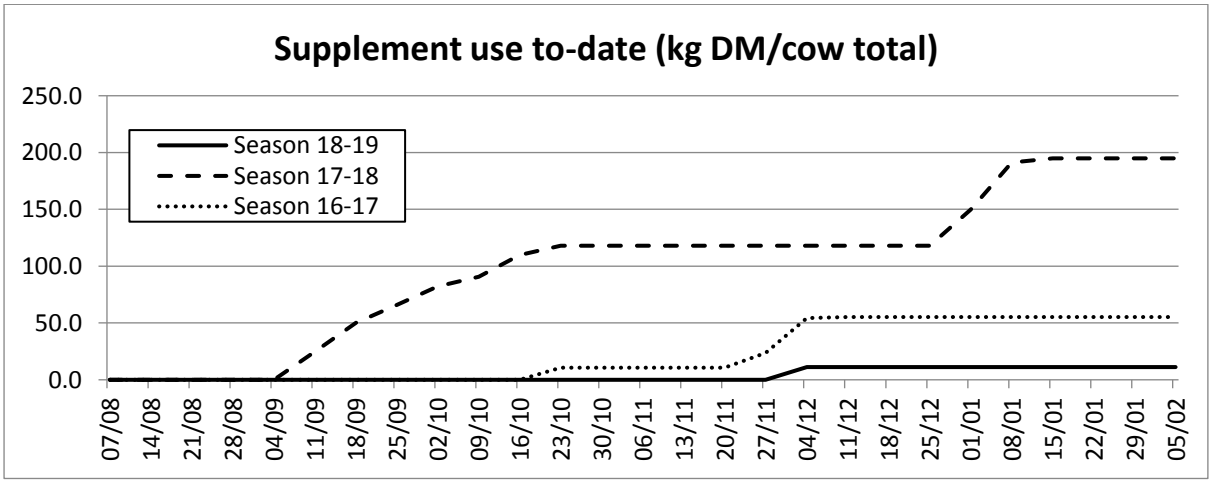
Spring Rotation Plan – Target vs Actual



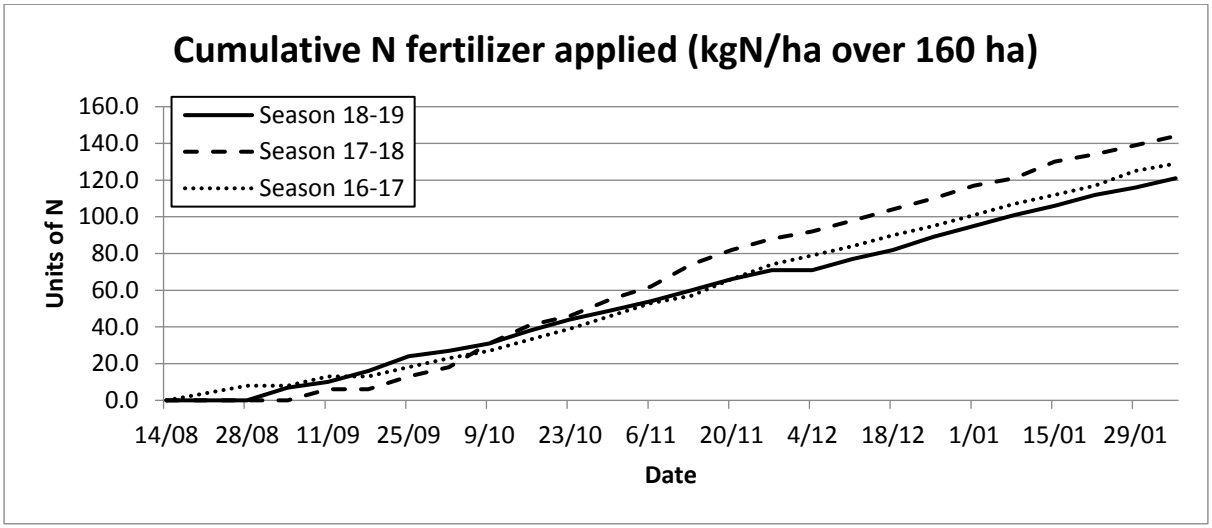
Week Ending	Average Number Milking and colostrum Cows	Planned area grazed per week	Planned Cumulative area grazed	Planned Cumulative Supplements fed (kgDM/wk)	Actual area grazed per week	Actual Cumulative area grazed per week	Actual Supplements fed (kgDM/week)	Actual Cum. Suppl fed (tot kgDM)
17/07/2018	14							
24/07/2018	76	2.3	2.3	578		0	0	0
31/07/2018	157	5.8	8.1	2743	4	4	0	0
07/08/2018	236	9.1	17.2	9594	6.93	10.93	0	0
14/08/2018	340	13.3	30.5	21669	14.25	25.18	0	0
21/08/2018	413	19.3	49.8	37769	19.16	44.34	0	0
28/08/2018	476	21.1	70.9	59776	21.93	66.27	0	0
04/09/2018	494	25.0	96.0	77661	27.86	94.13	0	0
11/09/2018	501	28.7	124.7	88883	24.67	118.8	0	0
18/09/2018	518	33.3	158.0	89548	32	150.8	0	0
25/09/2018	531	34.1	192.1	89548	41.65	192.45	0	0
02/10/2018	541	42.6	234.7	89548	39.02	231.47	0	0
09/10/2018	556	43.4	234.7	89548	42.7	274.17	0	0
16/10/2018		43.7	278.1	89548		274.17		0



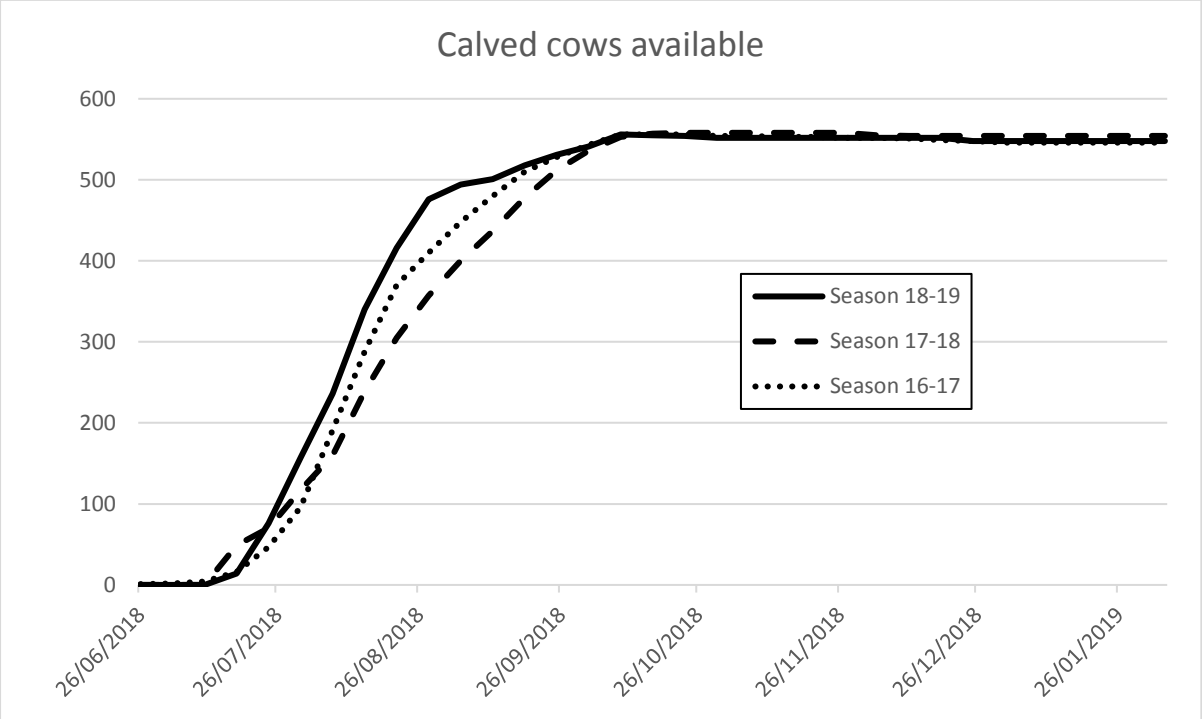
In terms of supplements they have only been required for the first 4 days in December, so they remain at large still available for autumn production. This is the lowest use of supplements the farm has experimented in the last 3 seasons



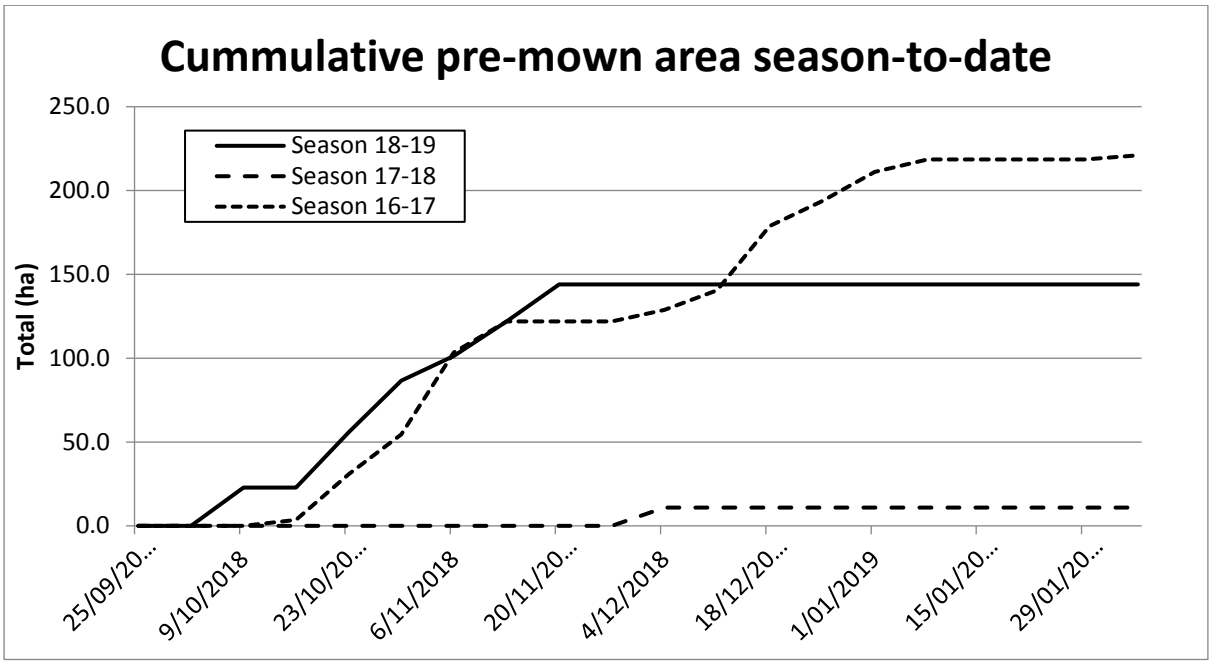
The good conditions have allowed for AMMO 36 to be applied across the whole farm starting in late august and capital fertilizer was applied by end September. Nitrogen fertilizer continued to be used as of the start of the second round.



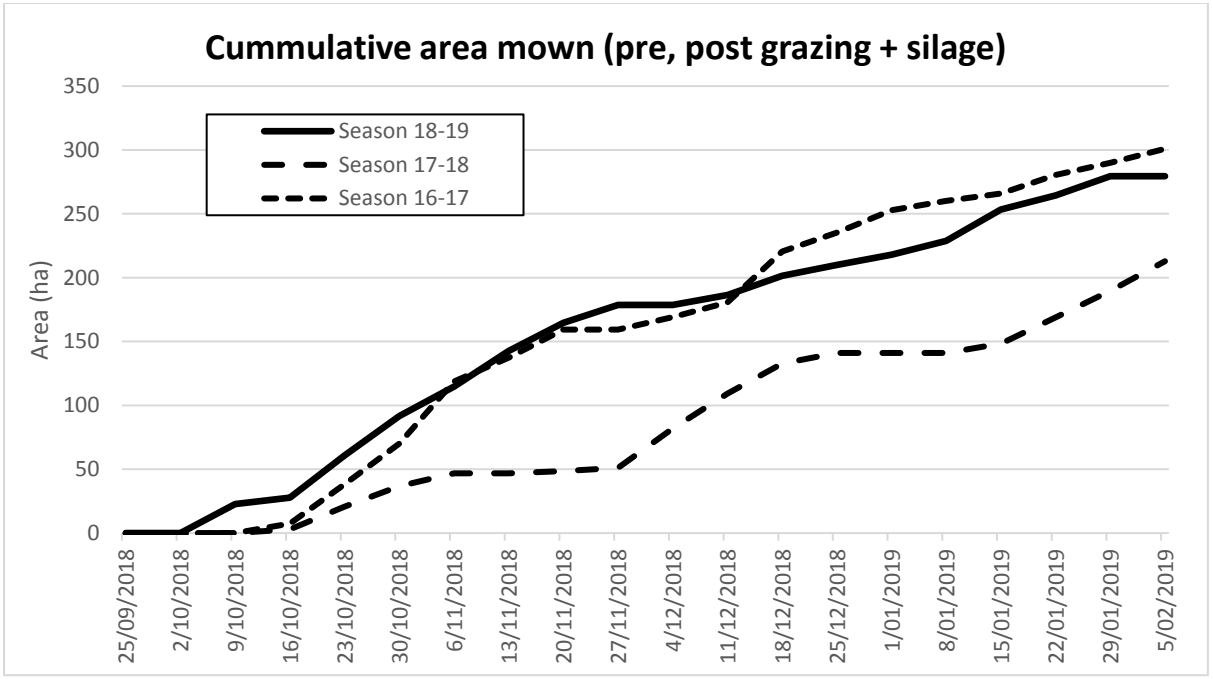
Even with the good conditions and the high average pasture cover at the planned start of calving, surpluses have not yet been experienced at LUDF season-to-date. This is due to the fact that that herd started calving one week earlier compared to previous seasons (due to mating starting 1 weeks earlier last season), which increased grazing pressure on the platform from late July onwards (rather than early august onwards)

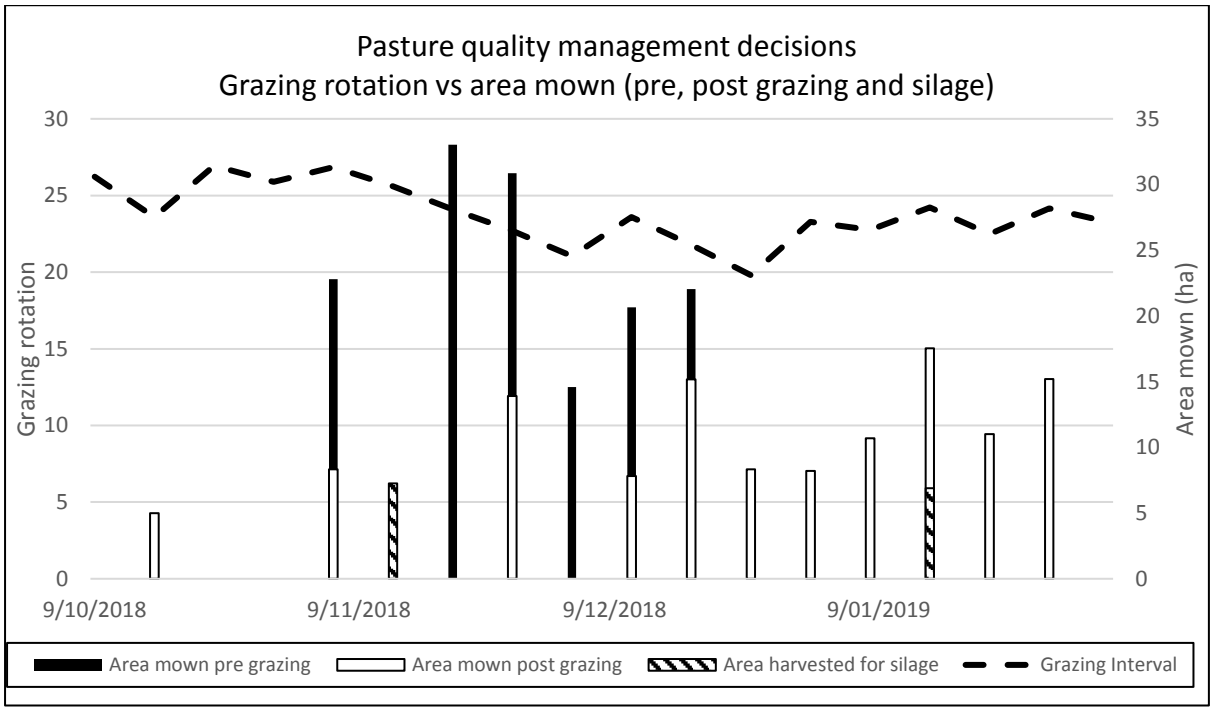


Comparing to previous season, though, pre-graze mowing started on the 2nd October this season (roughly same time as the 16-17 season) and remained as the tool of choice for pasture quality preservation until mid-November when it was not required and a little supplement was used to ensure the round length remained at 24-25 days.



Post grazing mowing was used to keep pasture quality during the late December-January period when the weather turned hot and dry quickly, bringing the total mown are to about the same level as this time last year.



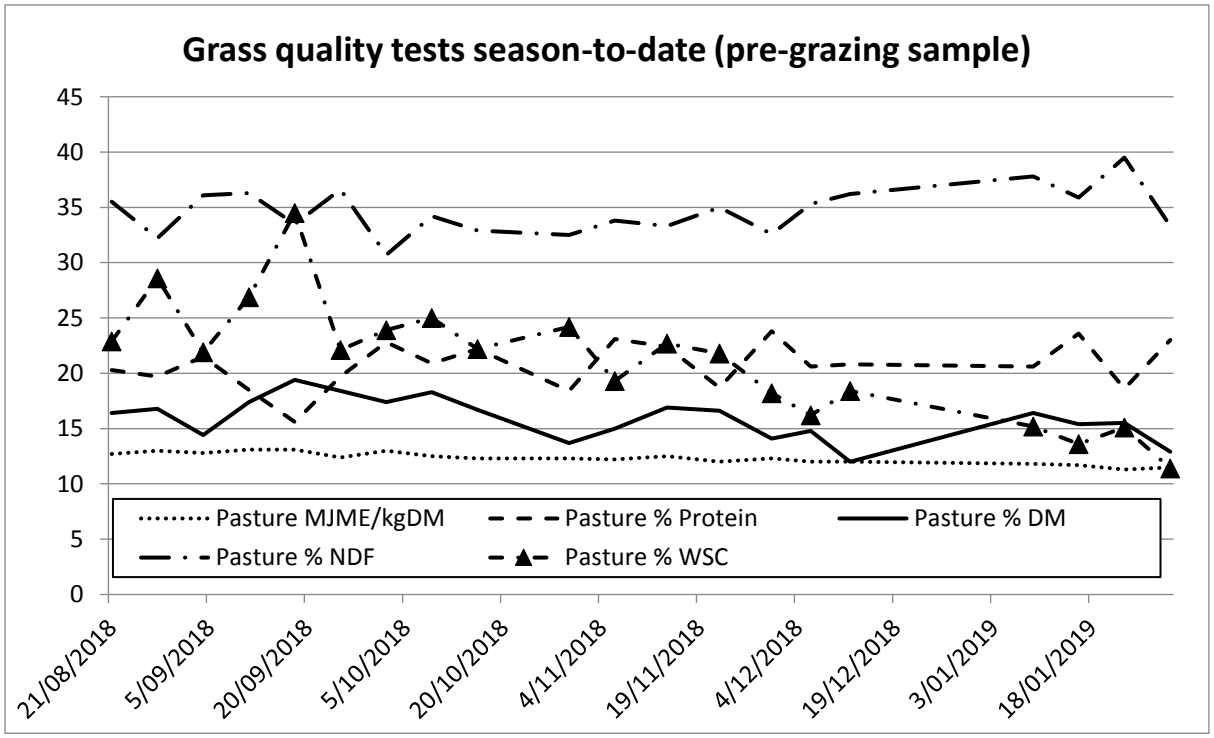


Pasture surpluses have been taken care of with the use of pre and post graze mowing as well as the harvest of silage through the peak growth period.

Pre grazing mowing was mostly used October and November and post graze mowing was used mostly from mid-December to late January.

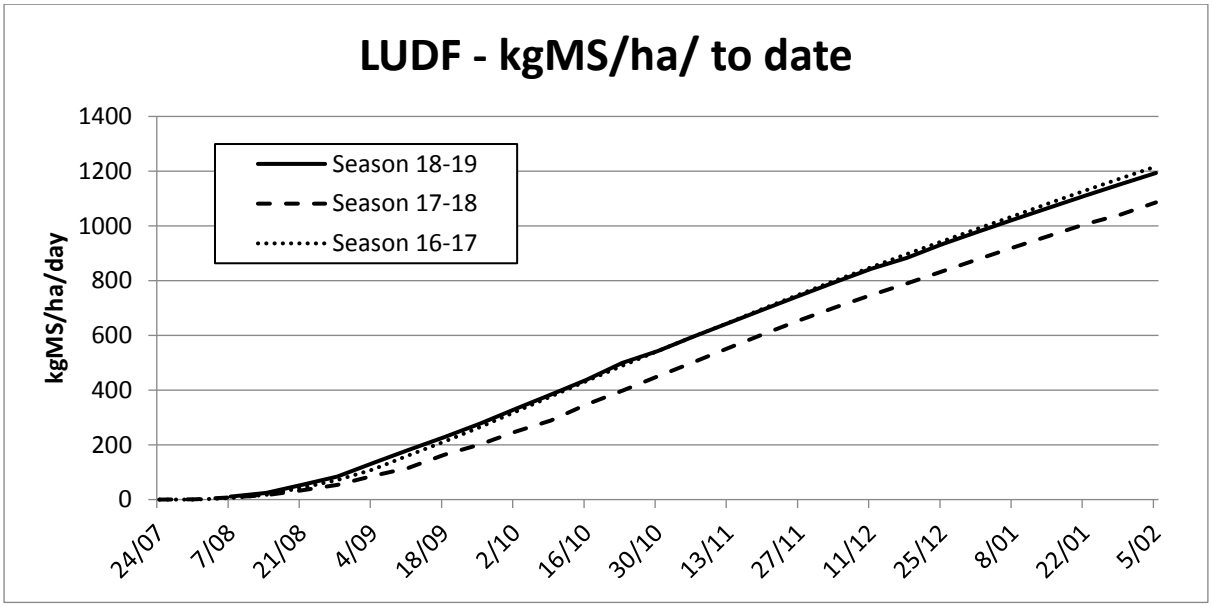
About 15 hectares have been harvested for silage

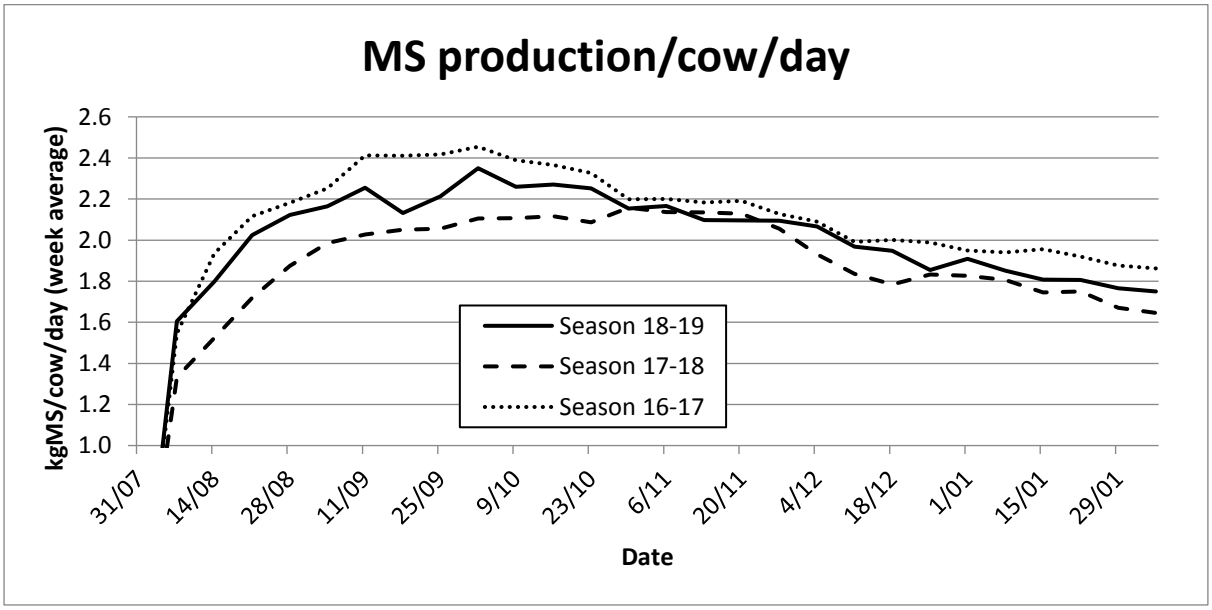
Pasture quality information



Herd production and health

With the main herd starting to calve slightly earlier than in previous seasons, and with the exceptional winter and spring conditions, pasture quality and growth, the herd was able to produce to the same levels of the 16-17 season in terms of milk production until mid December when the weather turned hot and dry. Currently the farm is 10% ahead of last season.





In terms of calving, the graph on page 8 shows the difference in calving numbers between the last 3 seasons. The increased milk production is due to a higher Days in Milk (DIM) derived from moving planned start of mating forward by a week in 2017. Therefore, in 2018 Planned Start of Calving (PSC) also shifted from 3 August to 27 July.

The gain in DIM has been that more cows calved by the 31 August 2018 due to the earlier start. There has been little impact to the % cows calved by PSC. The calving spread of the herd was improved by weeks 3 and 6 of calving, but got worse given that only 90% of cows had calved by the end of 9 weeks compared to previous season's 96%.

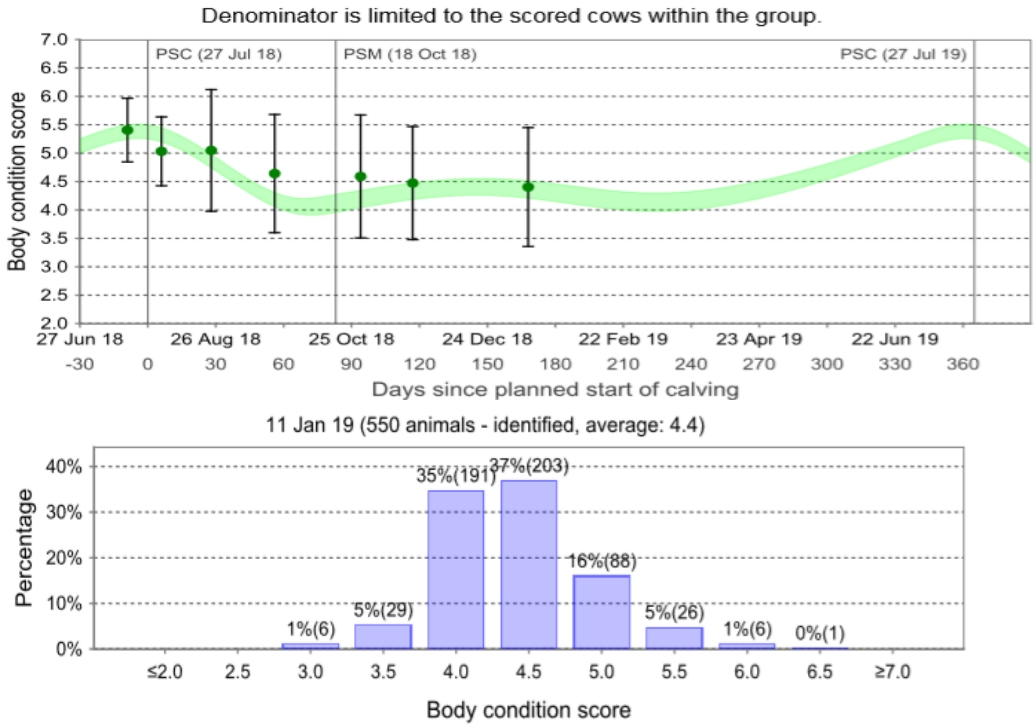
This means that the demand of feed during the first and second 3-weeks periods has been higher than in previous season. The good growth achieved during winter and the dry spring have allowed LUDF to been able to manage feed quality well and make the best of this earlier calving (there was an abundance of feed) with well utilized pastures.
Moving calving forward by one week, though, can be risky if winter conditions don't promote good growth rates of pasture or if spring gets very wet (such as spring 2017) not allowing for good utilization of the grown winter feed (which makes managing for good residuals while avoiding pugging becomes a change). Careful feed and wet management strategies need to be planned if considering the option of moving calving forward by ay period of time.

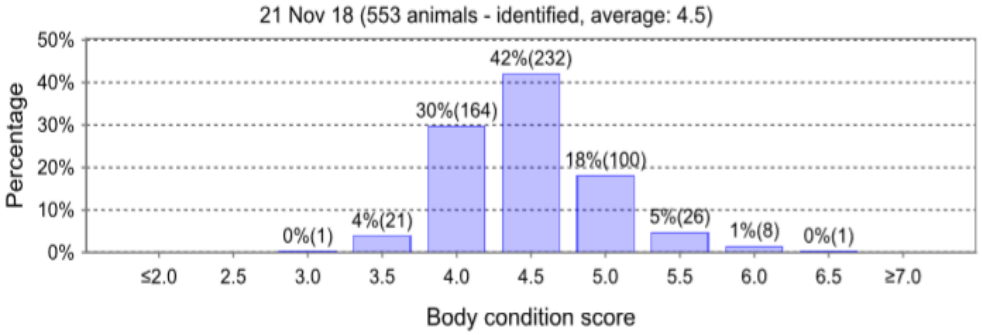
The table below shows the % of the herd calved by 3, 6 and 9 weeks of calving.

	PSC	3	6	9	12
2015	19%	68%	88%	99%	100%
2016	20%	65%	85%	97%	100%
2017	22%	56%	81%	96%	100%
2018	18%	61%	83%	90%	

Body Condition Scores and Walk-over-weighing

The last BCS event at LUDF was on the 11th January 2019.
The graph below shows the BCS trends for the past couple months:

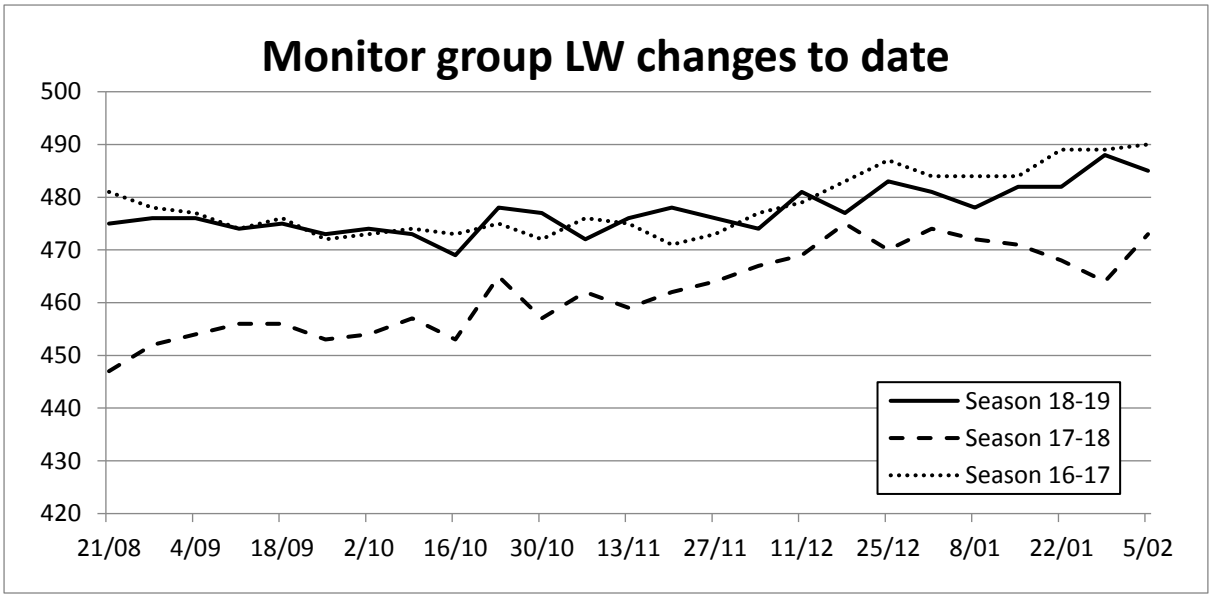




LUDF runs a 2 herd system. The small herd is milked first and will get the front of every paddocks, without being pushed to achieve residuals, effectively providing them with the best chances of an increased grazing time and lower grazing pressure.

The composition of the small herd changes through the season. It is made of all heifers and low BCS cows after the BCS in August in preparation for mating. In January, the small herd becomes all early calving lowest BCS cows and any other animal requiring special attention.

The management of the small herd as described above allows the team on farm to better manage weight gains and look after at-risk cows during the whole season, whether the focus is preparedness for mating or preparedness for dry-off.

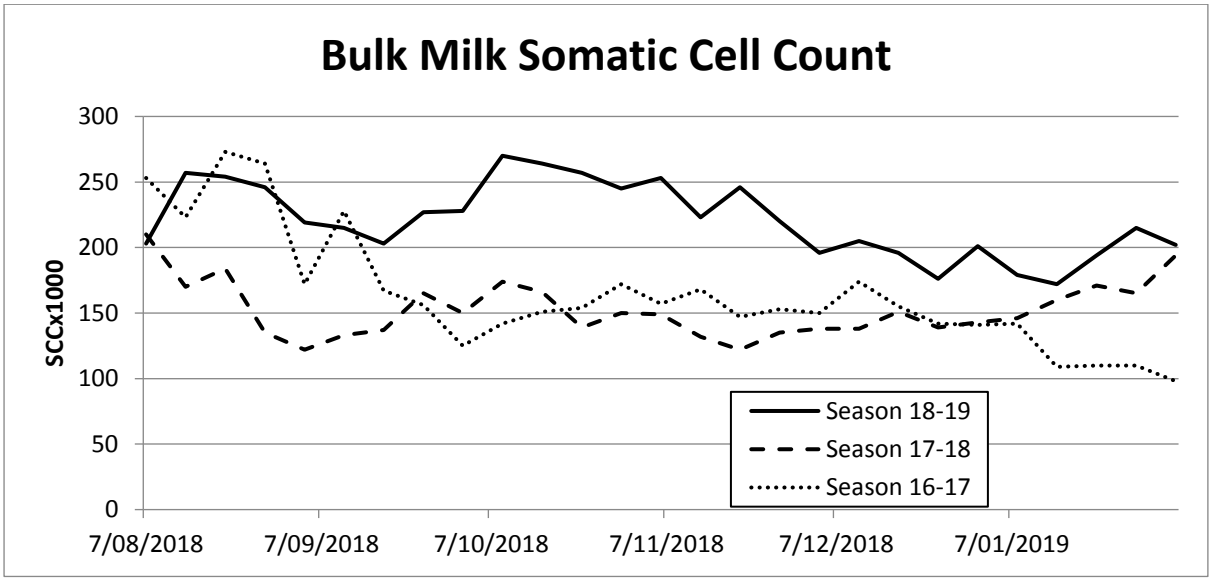


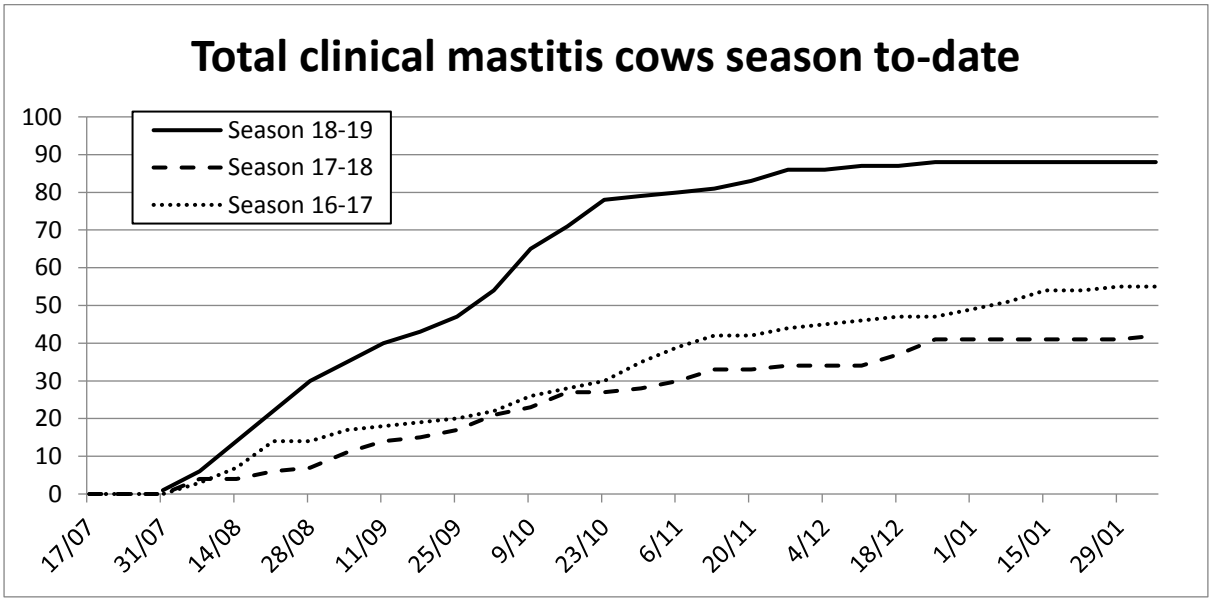
Cow Health

In general spring has been relaxed when it comes to metabolic issues and retained foetal membranes.

Cows that came down with milk fever, did so as they calved during their first day in the colostrum mob. Treatment was easy, with cows reacting positively to one down cow treatment and not repeating.

BMSCC and mastitis have been the challenge this season.



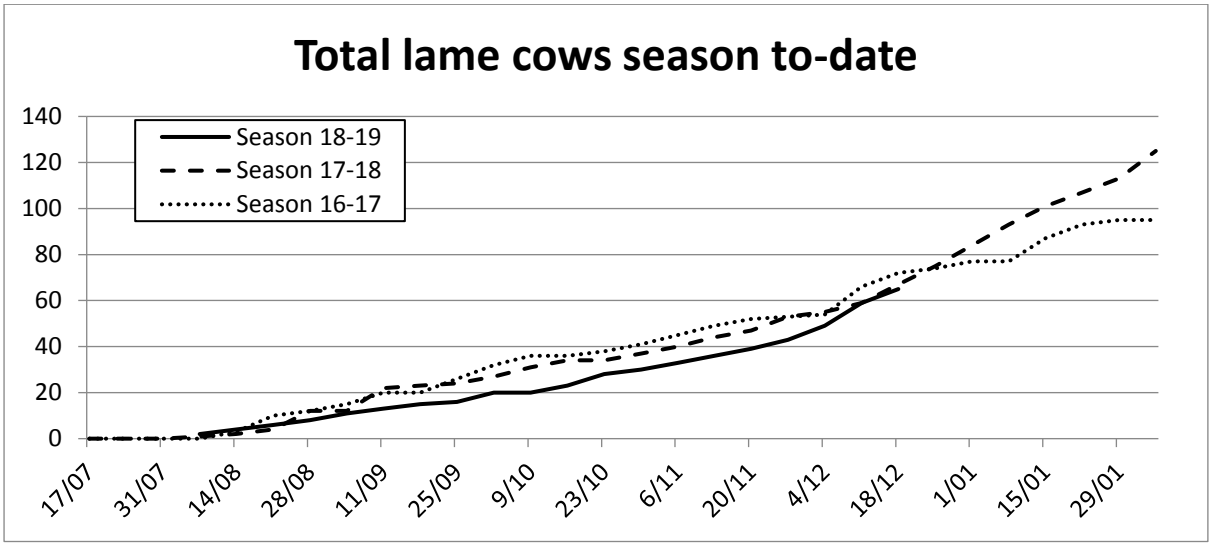


At first it was thought the strategic dry off done last season could have had something to do with this, however, later analysis shows that only 5 % of the affected cows received only teat seal, while 16% of the affected cows comes from the animals treated with dry cow therapy and teat seal.

Milk samples were taken from the highest SCC cows after herd testing. Many came back testing positive to *Staphylococcus aureus*. The affected animals are being treated and have been separated to be milked last at milking time. A second round of testing was done and further cows were identified, separated, treated and milked last. The number of new cases seems to have remained relatively low since mid-December.

One aspect that is thought to be the cause of this outbreak is the fact that the teat spray stopped functioning properly for a period of time. This was due to some work done on farm in the water pipes, which resulted in a drop in pressure of the water going through the teat spray, and teat spraying not be achieved properly. This was fixed as soon it was identified and together with specific treatment and management of the affected animals, it would seem to have resulted in reduction in the number of new cases from mid-December onwards.

Lameness



With the dry winter and summer conditions, lameness has not been an issue

Mating plan for LUDF 2018

Given the surge of *Mycoplasma bovis* across the country, it was deemed that LUDF would undergo mating without the use of bull as a way to control biosecurity for M.Bovis.

Mating plan for yearling heifers:

To manage without he bulls, and given the distance to the grazing block (Ashburton), daily heat detection and planning for AB was understood to be a big challenge. To manage this challenge, a CIDR programme was used to fix the insemination dates:

Mating Plan for heifers

Month	Day	Activity	Result
October	2nd	CIDR all heifers	
	9th	All CIDRS out	
	11th	Blanket AB	
	28th	All CIDRs re-inserted	
November	1st	All CIDRs removed + Tail paint on + Kmars on	
	2nd	Mating to observed heat	
	3rd	Mating to observed heat	
	15th	Pregnancy testing	60 heifers pregnant
	19th	CIDRs in all empty heifers	
	23rd	All CIDRs removed + Tail paint on + Kmars on	
	24th	Mating to observed heat	
	25th	Mating to observed heat	
December	11th	Pregnancy testing + CIDR all empty heifers	77 heifers pregnant
	15th	CIDR out + tail paint + Kmars on	
	16th	Mating to observed heat	
	17th	Mating to observed heat	
	28th	Pregnancy testing	28% not InCalf

With natural bull mating of heifers the empty rates are typically 5%. PG programs and a cycle of AB with heifers typically deliver an 8% empty rate. The empty rate is 20% higher than it should be. Due to pressure on the stock reconciliation, the empty heifers will need to be traded for incalf heifers.

Cull Value of Heifers (approx.)	$800	
Cost of incalf heifers	$1,700	
Cost per animal	$900	+ $50 freight

The high empty rate is going to have a direct cash cost of $37,050 with the 39 extra empty heifers. We are going to have to import/bring in additional animals to maintain the herd size for 2019. The irony of the situation is that the CIDR program was implemented to avoid the risk of MBovis with the use of bulls. Now we are going to have to take these risks with importation of heifers.

Carry-overs:

35 cows (1st, 2nd and 3rd calving) have been carried over from last season to help replacement numbers next season and allow for appropriate culling of animals, should not-InCalf rate remain high this season. These have undergone the same treatment as the yearling heifers for mating.
21 of these were empty leaving only 40% incalf.

Milking herd reproductive health:

September	3rd	Metricheck Random bloods	33 cows treated (6%) Increased Iodina and Selenium levels through dosatron
	13th	Tail paint all milking cows	
	20th	Premating heats starts	98 cows with signs of heat, Week 1
	27th	Pre mating heat check	123 cows with signs of heat, week 2
	28th	Metricheck	9 cows treated
October	4th	Pre mating heat check	133 cows with signs of heat, week 3
	11th	Pre mating heat check	162 cows with signs of heat, week 4
	Total cows with pre mating heats: 75% (418 cows)		
	18th	AB Week 1	Sexed semen
		AB Week 2	Premier Sires
November		AB Week 3	
		AB Week 4	
December		AB Week 5 to 11 (December 30th AB ends)	Short Gestation Semen
January	7th	Pregnancy testing	
KPI's	Total mating period		10 weeks + 4 days
	3 week submission rate		88% (486 cows)
	6 weeks InCalf rate		70%
	Total cows mated		99% (546)

Results have improved from last season, which is a welcome change.

There remains work to be done regarding analysis of these results which will be presented at the end-of-season Focus Day.

Fertility Focus 2018: Seasonal

Lincoln University
The Manager (University Dairy Farm) Hancox

Report date:	13/02/19
PTPT:	BQCY
Herd Code:	6/114
No of cows included:	556
These cows calved between:	10/06/18 and 16/12/18
Mating start & end date: (based on AB or pregnancy test date)	18/10/18 - 30/12/18
Next planned start of calving:	27/07/19
Duration of mating:	74 days
Duration of AB period:	74 days

incalf FERTILITY FOCUS Version 2.15

DairyNZ

LIC

1 Overall herd reproductive performance

6-week in-calf rate
Percentage of cows pregnant in the first 6 weeks of mating

Your herd	70% (70-71%)
Aim above	78%

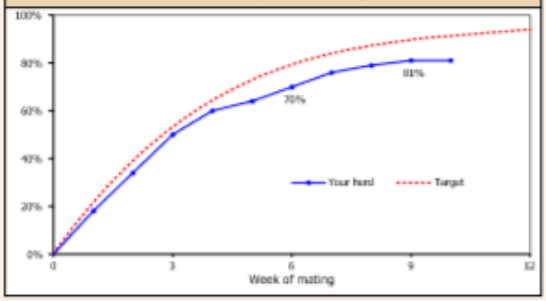
☆☆☆

Not-in-calf rate
Percentage of cows not pregnant after 74 days of mating

Your herd	17%
Aim for	7%

☆

% of herd in calf
Cumulative by week of mating



2 Drivers of the 6-week in-calf rate

3-week submission rate
% of cows that were inseminated in the first 3 weeks of mating

Your herd	88%
Aim above	90%

☆☆☆☆☆

Non-return rate
% of inseminations that were not followed by a return to heat

Your herd	
Aim above	

Conception rate
% of inseminations that resulted in a confirmed pregnancy

Your herd	50%
Aim above	60%

☆

3 Key indicators to areas for improvement

Calving pattern of first calvers
Well managed heifers get in calf quickly and calve early.

Calved by	Week 3	Week 6
Your herd	90%	99%
Aim above	75%	92%
	☆☆☆☆☆	☆☆☆☆☆

Calving pattern of whole herd
Did late calvers reduce in-calf rates?

Calved by	Week 3	Week 6	Week 9
Your herd	65%	89%	96%
Aim above	60%	87%	98%
	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆

Pre-mating heats
A high % of well managed cows will cycle before the start of mating.

Your herd	81%
Aim above	85%

☆☆☆☆☆

3-week submission rate of first calvers
Well managed heifers cycle early

Your herd	90%
Aim above	90%

☆☆☆☆☆

Heat detection
A high % of early-calved mature cows should be inseminated in the first 3 weeks of mating.

Your herd	95%
Aim above	95%

☆☆☆☆☆

Non-cycling cows
Treated non-cyclers get in calf earlier.

Treated	By MSD	Wks 1-3	Wks 4-6
Your herd	0%	0%	0%

Rating	What does it tell me?	What should I do?
☆☆☆☆☆	Top result	Ideal - keep up the good work!
☆☆☆	Above average	Getting there - focus on getting the details right.
☆	Below average	Plenty of room to improve - seek professional advice.
	No result	Not enough information provided - seek help with records.

Performance after week 6
Expected not-in-calf rate helps assess management affecting performance after week 6 (including bull management and herd nutrition).

	Not-in-calf rate
Your herd	17%
Expected	10%

Seek advice

Behind Your Detailed Fertility Focus Report

Report period: Cows calved between 10/06/18 and 16/12/18.
This was the most recent period with sufficient herd records that enabled an analysis to be completed.

Calving system: Seasonal
Your herd has been classified as seasonal calving because most calvings occurred in a single batch lasting less than 21 weeks.

Level of analysis: Detailed.
Your good record keeping means a detailed analysis was possible for your herd.

Report date:	13/02/19
PTPT:	BQCY
Herd Code:	6/114
Calvings up to this date requested for analysis:	12/02/19
No of cows included:	556
These cows calved between:	10/06/18 and 16/12/18
Mating start & end date: (based on AB or pregnancy test data)	18/10/18 - 30/12/18

Version 2.15

Part A) Herd records cross check

Check that the herd records in the table are complete and correct.

2018/19	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
No. of calvings		161	330	49	16								556
No. of AB matings					395	416	168						979
No. of preg tests								585	141				726
No. of non-aged/late aged positive preg tests													0
No. of cows culled or died					2		4	21					27

Part B) Notes on the calculations

Use the following notes to see how your results were calculated.

1 Overall herd reproductive performance

6-week in-calf rate

Your report has been based on the mating and pregnancy test results you supplied. The ACTUAL 6 week in-calf rate is shown for your herd.

Records available for not-in-calf rate

Recorded pregnant	458
Recorded empty	92
Doubtful/recheck*	0
Culled without pregnancy test	6
No record of cull or pregnancy test	0
Cows analysed	556

*Includes cows whose most recent empty diagnosis was less than 35 days after mating end date.

2 Drivers of the 6-week in-calf rate

3-week submission rate

554 cows had calving dates in the required range and were not culled before day 21 of mating and 88% of these were submitted during the first 21 days of mating.

Non-return rate

Non-return rate is not calculated when pregnancy test results provide an accurate estimate of conception rate.

Conception rate

The conception rate was calculated for 906 AB inseminations on and between 18.10.18 and 30.12.18.

3 Key indicators to areas for improvement

Calving pattern of first calvers

135 cows with eligible calving dates were recorded as calving at less than 34 months of age. The calving pattern of first calvers was calculated from their records.

Calving pattern of whole herd

556 cows had calving dates that were eligible for this report.

3-week submission rate of first calvers

135 first calvers had calving dates in the required range and were not culled before day 21 of mating and 90% of these were submitted during the first 21 days of mating.

Heat detection

225 cows at least 4 years old at calving had calved at least 8 weeks before mating start date and were not culled before day 21 of mating and 95% of these were submitted during the first 21 days of mating.

Pre-mating heats

554 cows had calving dates in the required range and were not culled before day 21 of mating and 448 of these had a pre-mating heat recorded.

Non-cycling cows

No cows were identified as being treated for non-cycling. If you did treat non-cycling cows, please supply records to ensure those cows are identified.

Performance after week 6

Your herd's not-in-calf rate and 6-week in-calf rate were used to determine the success of your herd's mating program after the first six weeks. If bulls were used after week 6 of mating, this gives an assessment of how well they got cows in calf.

Induced cows

No cows were identified as having induced calvings. If cows were induced, ensure all inductions are recorded.

LUDF focus on People

Potential

- Fair pay. Being paid for your ability and effort, not based on the length time you have been in the job for.
- Flexible time. Able to take flexible time off farm during the working day to support family, personal activities and sports.
- Sociable hours. Start early, finish early and enjoy time off farm.
- Being able to progress your career with structured roles.
- Being able to learn and train on the job while being paid.

Workload

- Maximum weekly workload of 50 hours for high productivity (Researched). Limit the big weeks to the spring only.
- Average 45 hours per week over the season.

Roster

- Need 2 days off for a meaningful break.
- 6 days “on” max to maintain a positive work rate.
- Ensuring staff get an average of 5 to 5 ½ days on per week.
- Develop a roster than meets the needs and personal obligations of your staff.

Outcomes

- Improved productivity (kgMS per hours worked)
- Greater staff retention.
- Meeting Compliance, minimum wage.
- Lower accident rates, less lost time to injury.
- Less cost mistakes and incidences.
- Improved lifestyle and wellbeing for all.
- Developing an engaged culture – that develops and implements systems efficiencies, That grows people. “Train people well enough so they can leave, treat them well enough so they don’t want to leave”. Richard Branson

Focus on your team:

Pathways to having good staff

DairyNZ

Dairy Tomorrow- Industry strategy

- Commitment 5: We will build great workplaces for NZ most talented workforce
- Pillars of work: Attract, Grow, Retain, Design
- Retain= Provide a great work environment and a good lifestyle
- Currently we have a churn of 5000 employees a year nationally
  - Hours of work and leadership are key factors
  - Reducing hours of work and shortening roster periods improves productivity

DairyNZ

- LUDF wanted to test and demonstrate some ways of reducing hours of work and improving leadership
- Our process was to plan the costs and benefits ,measure current performance, change practices, remeasure for improvements and benefits
- Leadership we are using a new tool DairyNZ will launch this year to measure strengths and opportunities for change: Workplace 360
- Since milking uses 50-55% of hours on farm we have started there. To reduce milking time we have progressed though a planned sequence of changes as per DairyNZ's Milk Smart programme
- Pulsation Ratio, Rotation speed, MaxT, Cow flow, Cupping technique, Cups and liners, Others
- For a whole farm approach to working smarter contact Sarah Watson, People Mad, about Farm Tune.

DairyNZ

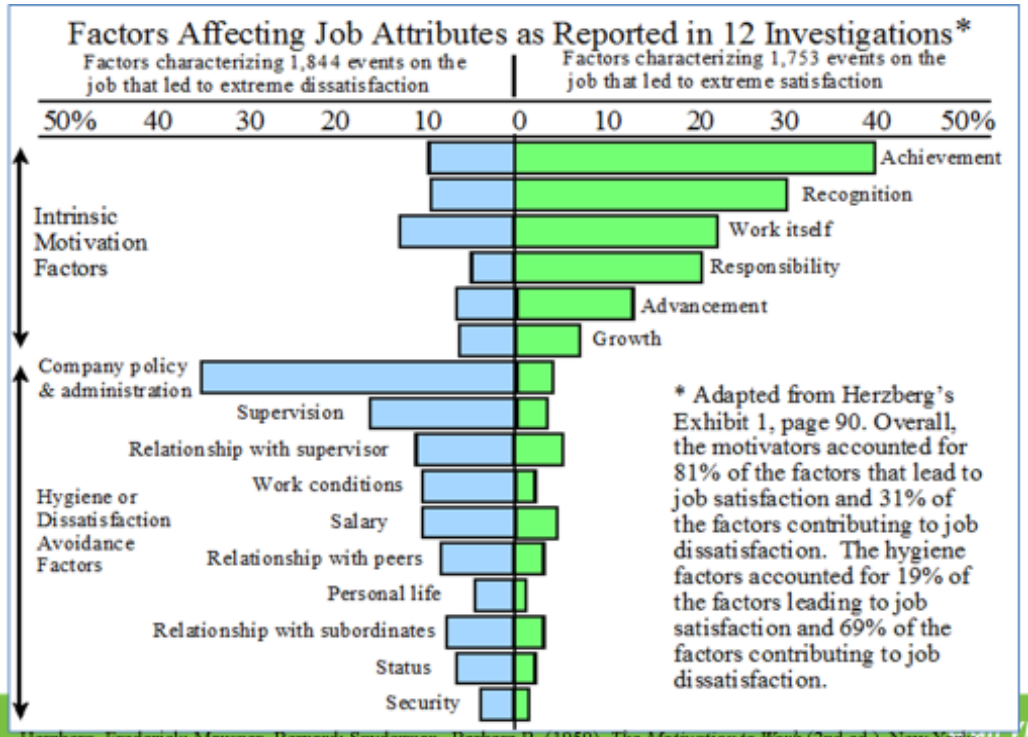
Tom Chapman, LUDF 2IC: What do Staff want from a job?

- Tom Chapman is currently employed as second in charge here at LUDF. His role is to assist Peter to supervise and implement the farm management plan to ensure KPI's are met.
- He graduated from Lincoln University with a B.com (Ag) in 2017. Tom is striving to move up within the dairy industry.
- In his spare time, he enjoys exploring the outdoors and spending time with friends and family.

DairyNZ

What the Research Tells us: John Greer, People Team at DairyNZ

- The research on staff satisfaction, staff engagement and motivation has been very consistent over the years:
  - It can be summed up as Autonomy, Relatedness and Competency (ARC)
- The Gallup Q12 engagement questions amplify these
- Herzberg's research from the last century is an easy way to look at it. It matches Tom's comments about staff requirements.

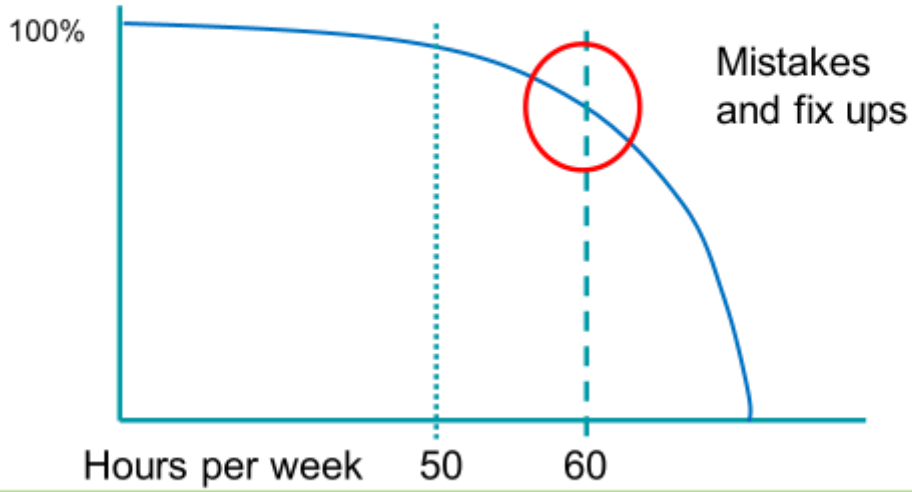


Herzberg, Frederick; Mausner, Bernard; Snyderman, Barbara B. (1959). *The Motivation to Work* (2nd ed.). New York: John Wiley and Sons. ISBN 0-471-37389-3.

- What are your opportunities to improve leadership?
- Ask your staff "What they want more of?"
- Listen and respond

DairyNZ

Work hours and productivity



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Improving Milking Effciency

Plan

- Increase pulsation ratio from 60:40 to 70:30
  - Increase milk flow rate
  - Monitor for a week
- Apply a maximum milking time (MaxT)
  - Aim to shorten the slowest 20% of cows
  - All cows exit the platform after 1 rotation

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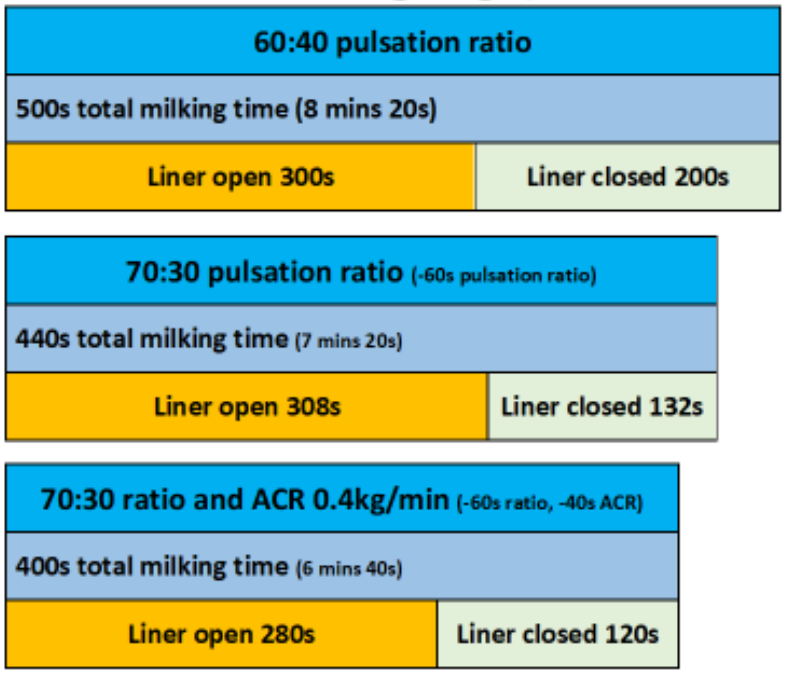
SIDDC South Island Dairying Development Centre
Partners Networking To Advance South Island Dairying
DairyNZ ravensdown LIC agresearch SIDE

Effect of changing pulsation ratio



With ACRs

Check d – phase >20%

MaxT Research

5 experiments in NZ, at least 5 overseas

35 week study in Taranaki	0.2 kg/min (Wk 1-35)	0.4 kg/min (Wk 1-35)	MaxT Early[1] (Wk 1-35)	MaxT Peak[1] (Wk 16-35)
Milksolids	255	261	250	262
Mastitis[2]	0.18	0.32	0.23	0.25
SCC (000s)	79	123	89	83

[1]MaxT times were 7.5 min (AM) and 5.4 min (PM)
[2]Proportion of cows with at least one clinical case

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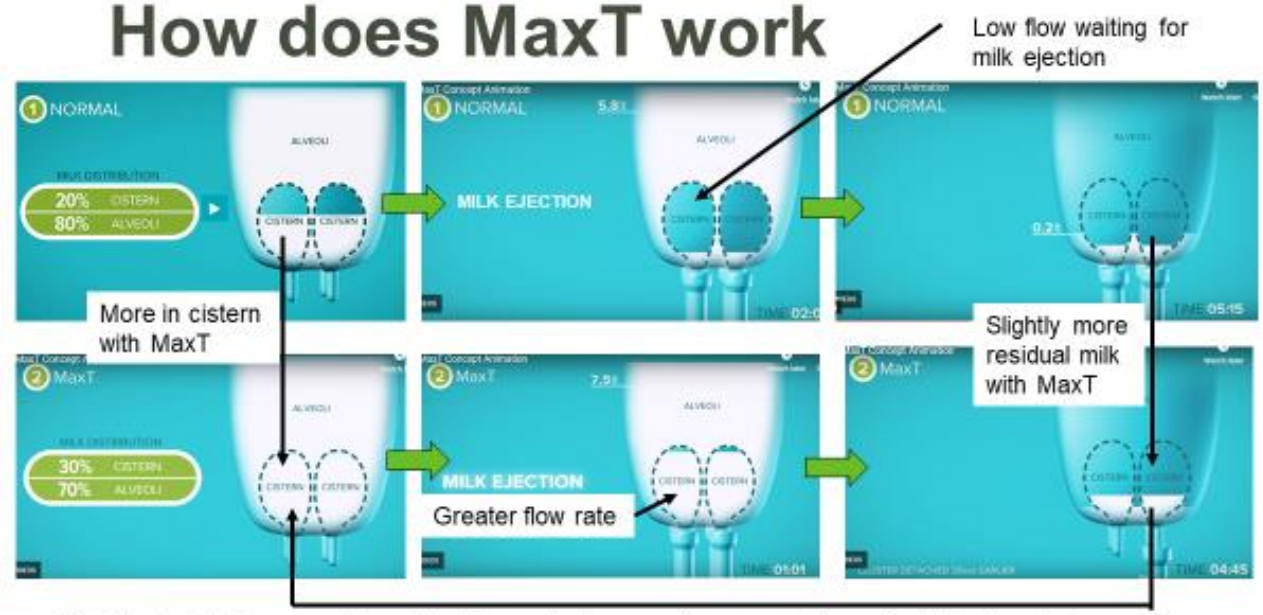
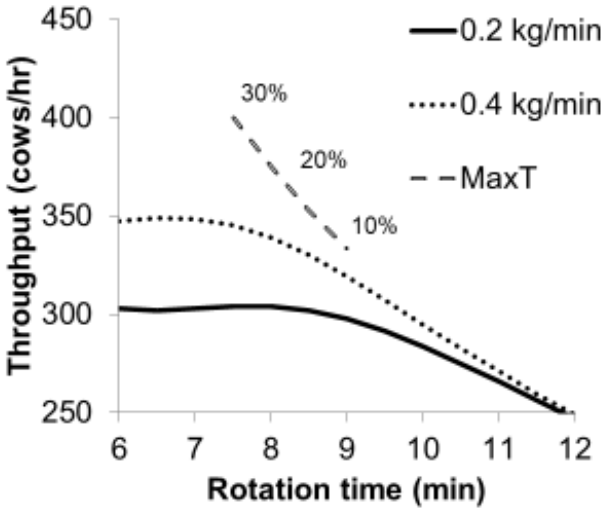
How does MaxT work



Residual milk from applying MaxT results in a greater proportion of milk in the cistern at the next milking. This results in a faster flow rate due to the cistern not emptying so the same volume can be harvested in less time.

= Residual milk shifted to the next milking where it can be harvested more efficiently

Impact of ACR/MaxT & speed



- If increasing ACR threshold must also increase speed
- Greatest increase going from 0.2 to 0.4 kg/min.
- 0.4 kg/min saves 30-40s per cow
- Max T saves 50-60s per cow

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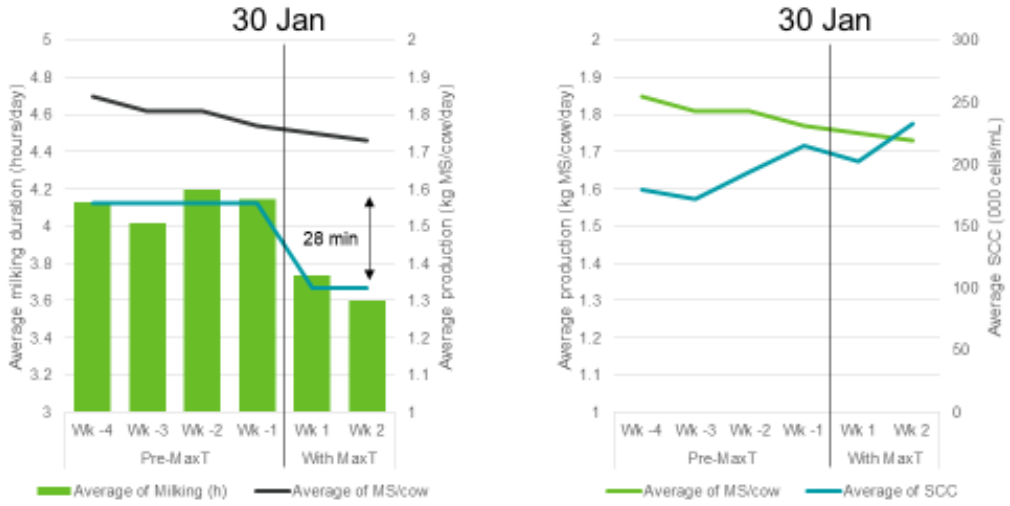
Outcomes @ LUDF



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How to apply MaxT

No ACRs

- Rotary rotation time = MaxT time
- Herringbone row time = MaxT time (even if there are ACRs)

'Point take-off' based ACRs

- Set to remove clusters at exit and rotation time = MaxT time

'Time' based ACRs

- Set maximum time to the MaxT time and adjust rotation time to match

'Flow' based ACRs

- Increase ACR threshold to 0.4 kg/min and set rotation time so 15-20% of cows 'go-around'

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Know your rotation time

- Lots of variation in controls between dairies
- Use stopwatch to time 5 bails
- Divide number by 5 and multiply by the number of bails
- Divide by 60
  - E.g. 45 sec ÷ 5 × 50 bails ÷ 60 sec = 7.5 min
  - Use 5 bails less than the rotary size to account for bridge
- Mark speeds on the dial or make a table for which each number equates to
  - E.g. for Protrack use number of bails ÷ cows/min value

Protrack cows/min	Rotation time (mins)
5	10.0
5.5	9.1
6	8.3
6.5	7.7
7	7.1
7.5	6.7
8	6.3
8.5	5.9

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Practical MaxT considerations

- Common milking intervals of 9-15 or 8-16 result in low milk volumes at PM
  - Often can't keep up (e.g. row/rot times of <6min)
- Use AM MaxT time both AM and PM milking
  - Shift milk from AM to PM
  - Save time at AM and maintain PM milking time
- Greatest opportunity to save time at AM milkings and in peak lactation

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Things to keep in mind

- Monitor milking
  - Where cows are finished milking
  - Adjust the row/rotation time throughout the season
- Cup as close to the bridge as possible
  - Cupping later reduces the time cows have to milk
- Practice MaxT now to gain confidence for using through peak next season

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Task- calculate milk volume

- Use milk processor app to look up your milk volume (Litres)
- Divide by the number of days in the vat
  - E.g. divide by 2 if skip-a-day pickup
- Divide by the number of cows

= Milk volume per cow (L/cow)

Example:
- 22000 L
- Skip-a-day
- 550 cows

= ___ L/cow

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Simplified MaxT table

Daily yield	MaxT
10	5.9
12	6.3
14	6.7
16	7.1
18	7.5
20	7.9
22	8.3
24	8.7
26	9.1
28	9.5
30	9.9

~20% shortened AM and ~5% shortened PM

More complicated version available online that estimates AM and PM time separately using milking intervals

www.dairynz.co.nz/media/3223525/Calculating_MaxT.pdf

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List of NZ MaxT research

Reference	Link	Duration	Tested
Jago et al. 2010	www.dx.doi.org/10.1080/00480169.2010.69298	26 weeks	ACR 0.35 kg/min (control) MaxT from peak
Jago et al. 2010	www.dx.doi.org/10.3168/jds.2009-2949	35 weeks	ACR 0.2 kg/min (control) MaxT full season MaxT from peak ACR 0.4 kg/min
Burke et al. 2011	www.dx.doi.org/10.1071/AN11042	4 weeks Peak lactation	ACR 0.2 kg/min (control) ACR 0.4 kg/min
Edwards et al. 2013	www.dx.doi.org/10.3168/jds.2012-6191	6 weeks Late lactation	ACR 0.2 kg/min (control) ACR 0.4 kg/min ACR 0.6 kg/min ACR 0.8 kg/min
Edwards et al. 2013	www.dx.doi.org/10.3168/jds.2012-6394	9 weeks Peak lactation	

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Farm Environment Plan Checklist

Farm Environment Plan Checklist: Are you ready for audit?

This preparation checklist has been developed for farmers in Canterbury that require an audit of their Farm Environment Plan (FEP).

Pre-Audit Planning

First Steps:	Check
Ensure your FEP is up to date and includes everything that your consent requires it to cover. You'll find these requirements in the consent conditions or potentially within an appendix to your consent. Provide a copy to the auditor.	
Make sure you have all your records in one place to use as evidence that you are meeting the objectives and/or targets.	
Remind yourself of the Industry-agreed Good Management Practices (GMPs) and any other more specific good management practices for your farm type (from your Industry Group). More information on GMPs can be found at www.canterburywater.farm/gmp	
Make sure you have had someone update your OVERSEER budgets have been updated or you've run NCheck Report for the latest year, so an auditor can assess whether the farm is within its consented nitrogen loss limit (where relevant).	
Book an audit date and time with an Environment Canterbury Certified FEP auditor. This list can be found on www.canterburywater.farm/fep/fep-audits/	
Advise the FEP auditor of any biosecurity and/or Health and Safety requirements for their visit.	

Pre-Audit: Do I have the information the auditor needs?

Nutrient Management		
Target Areas	**Examples of evidence to have available:**	**Check**
Identifying Nutrient Losses	Up to date nutrient budgets (Check your consent for type of budgets required), critical source areas mapped, risk map	
Phosphorus & Nitrogen Management	Soil test results, fertiliser and application records, advisor recommendations, spreader calibration records, proof of placement records, Spreadmark certification, deep soil Ntests, crop calculators, GPS records	
Winter grazing	Paddock selection, separation distances, grazing records, grazing plan, photos	

Irrigation		
Target Area	**Examples of evidence to have available:**	**Check**
New irrigation	System design specifications, installation certificates, post commissioning report	
Operation	Bucket test results, maintenance records including meter verifications, system assessment reports, water take records, GPS records, water application records	
Scheduling	Soil moisture records, rainfall and temperature records, soil water budget	
Staff	Staff training records, irrigation procedures, discussions with staff	

Cultivation and Soil Structure		
Target Area	**Examples of evidence to have available:**	**Check**
Erosion	Erosion risk maps and management plan, photos, Google Maps images showing ground cover	
Soil structure	Soil compaction checks, wet weather grazing management plan	

Animal Effluent and Solid Animal Waste		
Target Area	Examples of evidence to have available:	Check
Consents	Copies of monitoring compliance reports from Environment Canterbury	
Storage	Effluent calculator report, field observation, solid effluent or compost export information e.g. sales or transport details, reasoning for location	
Application	Discharge area map, effluent risk areas map, application records, soil moisture records, bucket test results, maintenance records	
Staff	Staff training records, discussions with staff	

Waterbodies (wetlands, riparian areas, drains, rivers lakes)		
Target Area	Examples of evidence to have available:	Check
Waterways and riparian	Riparian plans, actual plantings, photos, purchase receipts	
Livestock	Compliance with Environment Canterbury rules, fencing, stock exclusion plan	
Mahinga kai	Maps of all waterways, drains (with water), wetlands, springs, riparian areas and summary of management and/or any enhancements planned. For more information see www.canterburywater.farm/fep/mahinga-kai	

Point Sources		
Target Area	Examples of evidence to have available:	Check
Offal, silage and rubbish pits	Pit location map, contingency plan	

Water Use (excluding irrigation)		
Target Area	Examples of evidence to have available:	Check
Operation and efficiency	Water use data, maintenance records, water efficiency calculations	

Selwyn Te Waihora (Farms within Cultural Landscapes / Values Management Area)		
Target Area	Examples of evidence to have available:	Check
Cultural Landscapes/ Values Management Area (CLVMA)	Maps of all waterways, drains (with water), wetlands, springs, riparian areas, remnant native vegetation and summary of management and/or any enhancements planned. For more information see www.canterburywater.farm/fep/mahinga-kai	

Waitaki		
Target Area	Examples of evidence to have available:	Check
Mahinga kai	Maps of all waterways, drains (with water), wetlands, springs, riparian areas and summary of management and/or any enhancements planned. For more information see www.canterburywater.farm/fep/mahinga-kai	
Biodiversity	All springheads, wetlands and spring fed streams mapped. Planting, enhancement and protection plans, photos, purchase receipts	

The information and evidence that the auditor will ask to see at the farm visit will vary for each farm. The above list is indicative only and the auditor may ask for additional information to establish their level of confidence that you are meeting the objectives and targets in your FEP.

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

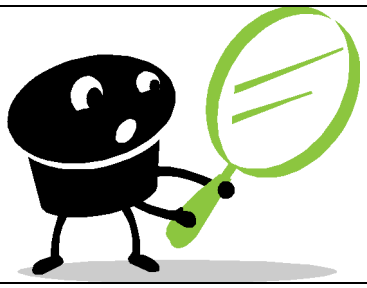
ER/7130

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 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.

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Greenhouse gas emissions

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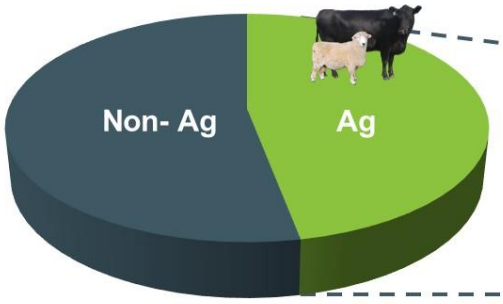
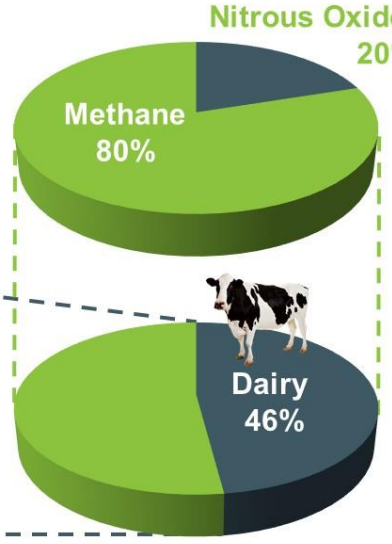
New Zealand GHG Emissions





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New Zealand's Target

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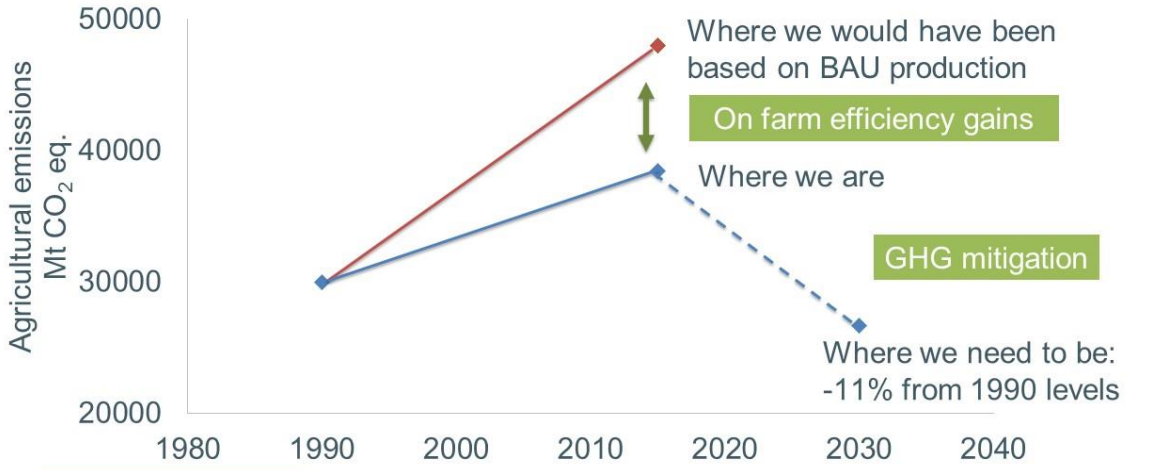
How are we tracking?



Adapted from NZAGRC, 2014

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GHG emissions from Lincoln University Dairy Farm

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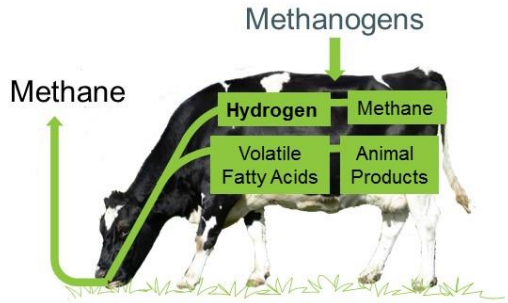
Methane emissions



Nitrous oxide emissions

Manage dry matter intake

Manage nitrogen surplus

N leaching

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LUDF: Changes from High Input to Low Input

N leach 19%

GHG 13%

Source: Beukes and Romera, 2017

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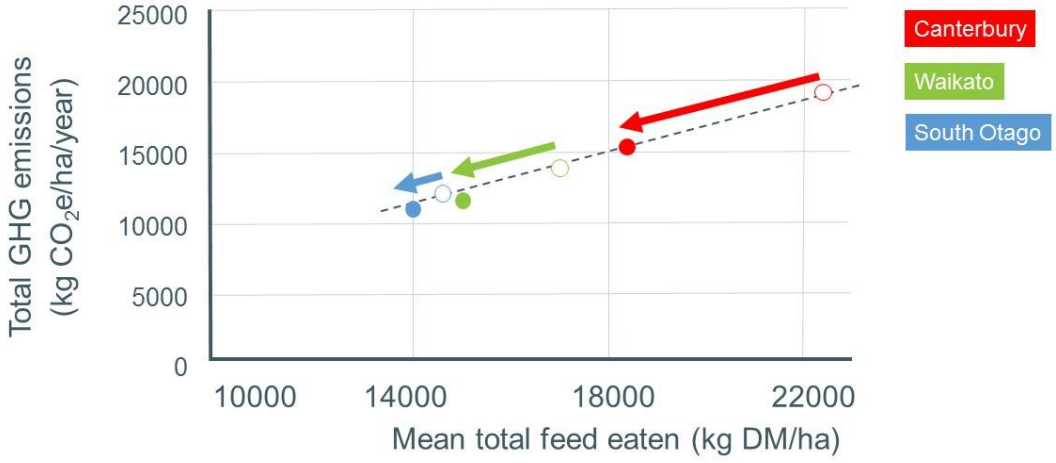
Managing dry matter intake



Source: van der Weerden et al. 2018

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= Total feed intake

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	2011-2013 ('High Input')	Current ('Low Input')
Targeted Milk production kg MS/ha	Max 1870	1730
kg MS/Cow	475	500 ↑
Cows/ha	3.9	3.5 ↓
Max Cows	630	560 ↓
N fertiliser	345	168 ↓

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LUDF farm management changes

1. Fewer, higher producing cows
2. Reduced N fertiliser and imported supplements
3. Improved pasture management

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Research into Mitigating GHG emissions

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Mitigation development

Is it effective? | Does it have other impacts? | Does it fit within the system? | Is it cost-effective? | What is national level impact?

PCE, 2016

Methane/ nitrous oxide mitigation → Trade-offs → Farm Systems → Farmer adoption

Co-development with farmers and industry

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Current methane (CH_4) mitigation research

1. Low CH_4 **feeds** (ca. 30% forage rape per unit DMI; available now; but need to consider total GHG footprint – work in progress)
2. Low CH_4 **animals** (Sheep: over time, *ca* 5% lower CH_4; breeding values available for pilot breeders this year; work on dairy cattle just starting)
3. CH_4 **inhibitors** (compounds currently under controlled animal testing, targeting 25% reduction)
4. CH_4 **vaccine** (targeting 30% reduction, still at proof-of-concept stage)

Ministry for Primary Industries
Manatū Ahu Matua

PGGRC
PASTORAL GREENHOUSE GAS RESEARCH CONSORTIUM

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Current nitrous oxide (N_2O) mitigation research

1. Low N_2O **forages** (*ca*. 10-14% reduction in N_2O with 50% diverse pasture sward cf std pasture → 2-3% reduction of total GHGs)
2. Duration controlled **grazing mgmt** (for poorly drained soils, up to *ca* 2% reduction in total GHG)
3. Replace some N fert with **low N supplements** (ca. 2% reduction of total GHGs)
4. **Nitrification Inhibitors**: alternatives to DCD (Lincoln University)

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Low input, efficient systems have potential to maintain production while reducing losses to water & air

Acknowledgements

New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC)

Pastoral Greenhouse gas Research consortium (PGgRc)

Sustainable Land Management and Climate Change (SLMACC/MPI)

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