



LINCOLN UNIVERSITY

DEMONSTRATION DAIRY FARM

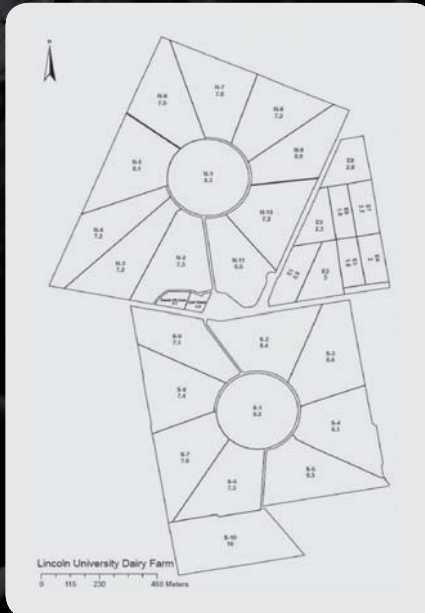
FOCUS DAY - OCTOBER 2016

STAFF

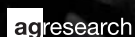
Peter Hancox - Farm Manager
 Sean Collins - 2IC
 Matthew Costello - Dairy Assistant
 Shaun Snoxell - Dairy Assistant

LUDDF HAZARDS NOTIFICATION

1. Children are the responsibility of their parent or guardian
2. Normal hazards associated with a dairy farm
3. Other vehicle traffic on farm roads and races
4. Crossing public roads
5. Underpass may be slippery



Partners Networking To Advance South Island Dairying



INTRODUCTION

The LUDDF is a progressive farming development facility that is committed to advancing dairy farming practice across the South Island, with particular consideration to productivity and environmental sustainability. Formerly the University sheep farm, the converted 186 hectare Dairy Farm is an excellent cross section of the various soil types evident across the Canterbury Plains. The property, of which 160 hectares is the milking platform, is irrigated using a spray system that includes two centre pivots, small portable lateral sprinklers and k-lines.

Stage 1: 2001/2 and 2002/3

The farm initially wintered approximately 630 cows, peak milking just over 600 and producing about 1400kgMS/ha from 200kgN/ha and up to 550kg DM/cow of imported feed. The milk payout (income) in 2002/3 was \$4.10/kgMS.

Stage 2: 2003/4 through to 2010/11

During this period the primary development was the increase of the stocking rate to between 4 and 4.3 cows per ha. 654-683 cows peak milked and as a result production averaged 1700kgMS/ha and 411kgMS/cow. LUDDF ran a single herd during stage two, to allow us to focus primarily on simple systems, and low and consistent grazing residuals.

Stage 3: 2011/12 to 2013/14

The further development of LUDDF during stage 3 was a move into 'Precision Dairying', resulting from the implementation of the strategic objective (below). This stage focused on minimum standards, two herds were run to increase productivity and profitability, from a similar environmental impact. Production lifted to 1878kgMS/ha or 477kgMS/cow (630 cows). A change in farm practice was initiated in 2013/14, with the temporary suspension of Eco-n (DCD), in an attempt to hold nitrogen losses without the mitigation effect of Eco-n.

Stage 4: 2014/15

LUDDF is adopting a 'Nil-Infrastructure, low input' farm system emerging from the P21 (Pastoral 21) research programme, in partial response to the tightening environmental requirements of some catchments across NZ. Targeted milk production is 1750kgMS/ha or 500kgMS/cow from 3.5 cows/ha with up to 150kgN/ha and 300kgDM/cow imported supplement.

LUDDF STRATEGIC OBJECTIVE:

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

ADDITIONAL OBJECTIVES

1. To develop and demonstrate world-best practice pasture based dairy farming systems and to transfer them to dairy farms throughout the South Island.
2. To ensure optimal use of all nutrients on farm, including effluent, fertiliser, nutrients imported from supplements and atmospheric nitrogen; through storage where necessary, distribution according to plant needs and retention in the root zone.
3. To manage pastures and grazing so per hectare energy production is optimised and milkers consume as much metabolisable energy [ME] as practicable (within the constraints of the current system and the associated nutrient losses).
4. To optimize the use of the farm automation systems and demonstrate / document improved efficiencies and subsequent effect on the business.
5. To achieve industry targets for mating performance within a 10 week mating period, including a 6 week in-calf rate of 78% and 10 week in calf rate greater than 89% i.e. empty rate of less than 11%.
6. To actively seek labour productivity gains through adoption of technologies and practices that reduce labour requirements or makes the work environment more satisfying.
7. To assist Lincoln University to attract top quality domestic and international students into the New Zealand dairy industry.

ONGOING RESEARCH

- The effect of farm management on groundwater and nutrient losses. (includes 10 groundwater monitoring wells, 60 lysimeters and 6 drainage plots to monitor and manage the effect of fertiliser, grazing, irrigation and effluent inputs over a variety of contrasting soil types.
- Pasture growth rates, pests and weeds monitoring, including a Forage Value Index paddock scale cultivar trial.
- Winter cropping effects on subsequent cow and calf performance.
- Yield mapping of pastures across the season
- Native Plantings – biodiversity effects
- Resource Inventory and Greenhouse Gas Footprint

CLIMATE

Mean Annual Maximum Temperature **32° C**

Mean Annual Minimum Temperature **4° C**

Average Days of Screen Frost

36 Days per annum

Mean Average Bright Sunshine

2040 Hours per annum

Average Annual Rainfall **666 mm**

SOIL TYPES

Free-draining shallow stony soils (Eyre soils) **5**

Deep sandy soils (Paparua and Templeton soils) **45**

Imperfectly drained soils (Wakanui soils) **30**

Heavy, poorly-drained soils (Temuka soils) **20**

FARM AREA

Milking Platform **160 ha**

Runoff [East Block] **15 ha**

Unproductive land on platform **6.7ha**

SOIL TEST RESULTS AND FERTILISER APPLICATIONS

Target Soil Test Ranges:

pH: **5.8 - 6.2**

P: **30 - 40**

K: **5 - 8**

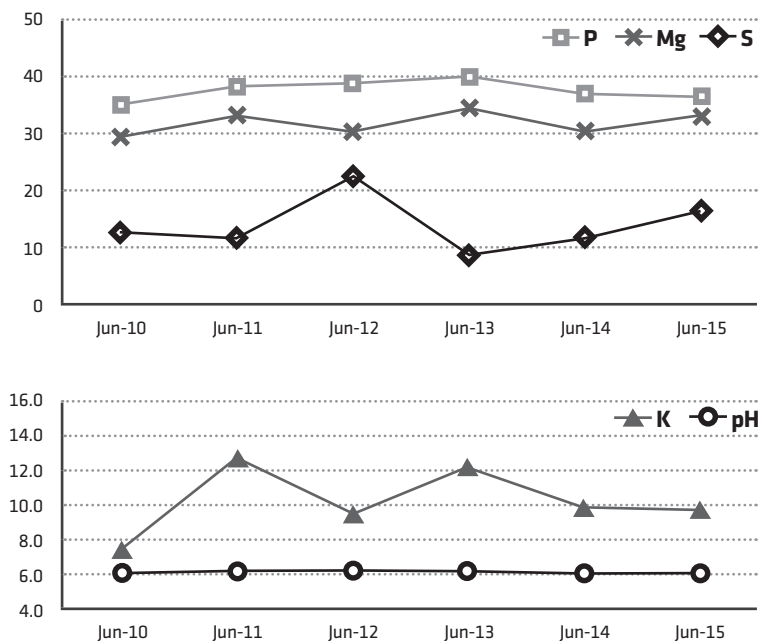
S: **10 - 12**

Mg: **20+**

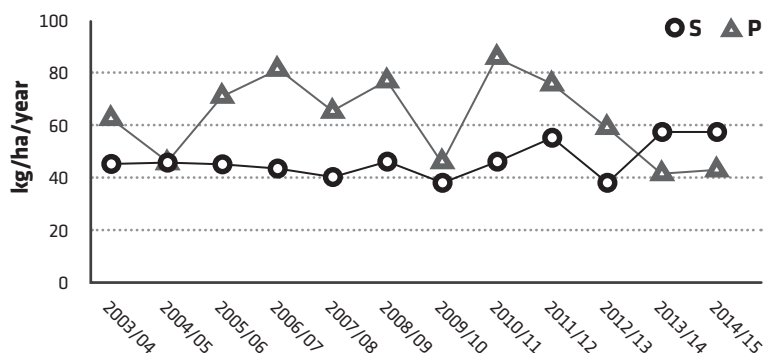
PASTURE

The milking platform was sown at conversion [March 2001] in a mix of 50/50 Bronsyn/ Impact ryegrasses with Aran and Sustain white clovers, and 1kg/ha of Timothy.

WHOLE FARM AVERAGE SOIL TEST RESULTS



WHOLE FARM AVERAGE P AND S APPLICATIONS 2003/04 - 2014/15



Paddock	Period Regressed	Grass Cultivar
N1	Feb-01	Brons. Imp
N2	Feb-11	Trojan
N3	Nov-12/Sept-13	Shogun/Chicory/Plantain/Troj
N4	Feb-15	Base/Troj/Chicory/Plantain
N5	Dec-11/Aug-13	Shogun
N6	Apr-14	Shogun (spray/drill)
N7	Jan-14	Bealey/Troj/Chicory/Plantain
N8	Jan-13	Bealey/Troj/Chicory/Plantain
N9	Oct-13	Bealey/Troj/Chicory/Plantain
N10	Jan-12	Tetraploids
N11	Nov-07	Bealey

Paddock	Period Regressed	Grass Cultivar
S1	Dec-05	Bealey
S2	Dec-10	Troj. Bealey
S3	Feb-10	Bealey/Arrow
S4	Dec-13	Bealey/Troj/Chicory/Plantain
S5	Dec-08	Arrow - Alto
S6	Dec-14	Shogan/Chi/Plant (spray/drill)
S7	Nov-15	Base/Troj/Plantain
S8	Oct-11	Troj. Bealey
S9	Dec-09	Bealey/Arrow
S10	Nov-14	Shogan/Chicory/Plantain

All paddocks also sown with clover

STAFFING AND MANAGEMENT

Roster System – 8 days on 2 off, 8 days on 3 off
 Milking Times – cups on 5.00am / 2.30pm

IRRIGATION AND EFFLUENT SYSTEM

Centre-pivots	127 ha
Long Laterals	24 ha
K-Lines	10 ha
Irrigation System Capacity	5.5 mm/day
Length of basic pivot	402
Well depth	90m

A full rotation completed in 20.8 hours for 5.5 mm [at 100% of maximum speed].

- Average Annual Rainfall = 666 mm. Average irrigation input applies an additional 450 mm.
- Average Evapotranspiration for Lincoln is 870 mm/year.

Effluent

- Sump capable of holding 33,000 litres and a 300,000 litre enviro saucer.
- 100 mm PVC pipe to base of North Block centre pivot, distribution through pot spray applicators.

MATING PROGRAMME – SPRING 2015

KiwiX DNA for 365 cows [F8-F16]; Holstein Friesian Daughter Proven for 280 cows [F0-F7 then follow with Jersey bulls. Heifers start mating 10 days early, Syncro + AI the natural mate for 9 weeks. 10 weeks mating for milking herd. Expect to rear 150 heifers.

HERD DETAILS – OCTOBER 2016

Breeding Worth (rel %) 99 / 46
 Production Worth (rel%) 128 / 66
 Recorded Ancestry 99%

Average weight / cow (Dec)
 Herd monitored walk over weighing
 488 kg [Dec 2015]

Calving start date 2016
 Heifers 18 July, Herd 1 August

Est. Median calving date
 12 August 2016

Mating start date
 25 October 2016 (heifers 10 days earlier)

Empty rate (nil induction policy) after 10 weeks mating - 14% (2015-16 mating). 6 week in-calf rate 69%.

	2002/03	2003-07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Total kg/MS supplied	228,420	277,204	278,560	261,423	273,605	264,460	297,740	300,484	276,019	278,654	289,906
Average kg/MS/cow	381	425	409	384	415	395	471	477	440	498	522
Average kg/MS/ha	1,414	1,720	1,744	1,634	1,710	1,653	1,861	1,878	1,725	1,742	1,812
Farm working expenses /kgMS	\$2.98	\$2.68	\$3.37	\$3.88	\$3.38	\$3.86	\$3.91	\$3.84	\$4.28	\$3.87	\$3.47
Dairy operating profit/ha	\$1,164	\$2,534	\$8,284	\$2,004	\$4,696	\$6,721	\$4,553	\$4,665	\$7,578	\$1,200	\$1,182
Payout (excl. levy) \$/kg (Milk price + div)	\$4.10	\$4.33	\$7.87	\$5.25	\$6.37	\$7.80	\$6.30	\$6.12	\$8.50F	\$4.60	\$4.30
Return on assets	4.4%	6.18%	14.6%	4.8%	7%	7%	6%	6%	10%	1.6%	1.6%
1 July cow numbers	631	675	704	704	685	694	665	650	650	580	578
Max. cows milked	604	654	680	683	660	669	632	630	628	560	555
Days in milk	-	-	263	254	266	271	272	273	259	263	267
Stocking rate cow equiv./ha	3.75	4.05	4.2	4.3	4.13	4.18	3.95	3.94	3.92	3.5	3.47
Stocking rate Kg liveweight/ha	1,838	1964	2,058	2,107	1,941	1,914	1,860	1,878	1,872	1,680	1,724
No. cows/weeks wintered off	500/8	515/7.8	546/9	547/7	570/9	652/8.4	650/9.8	650/9.8	650/11.4	580/10.7	578/11.6
No. yearlings grazed - On/Off	0/118	0/157	0/171	0/200	0/160	0/166	0/141	0/138	0/140	0/126	0/126
No. calves grazed - On/Off	0/141	0/163	0/200	0/170	0/160	0/194	0/190	0/156	0/150	0/126	0/155
Past eaten (dairybase) (tDM/ha)	-	-	17.9	17.2	16.2	16.9	17.3	16.8	14.9	15.7	16.6
Purch. Suppl - fed (kgDM/cow)	550	317	415	342	259	463	359	434	506.8	300	126
Made on dairy/platform (kgDM/cow)	0	194	95	64	144	160	154	93	0	40	277
Applied N/160 eff. Ha	-	-	164	200	185	260	340	350	250	143	179

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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.

Low Input, High Production, Highly Profitable, Low Nutrient Loss Farm System

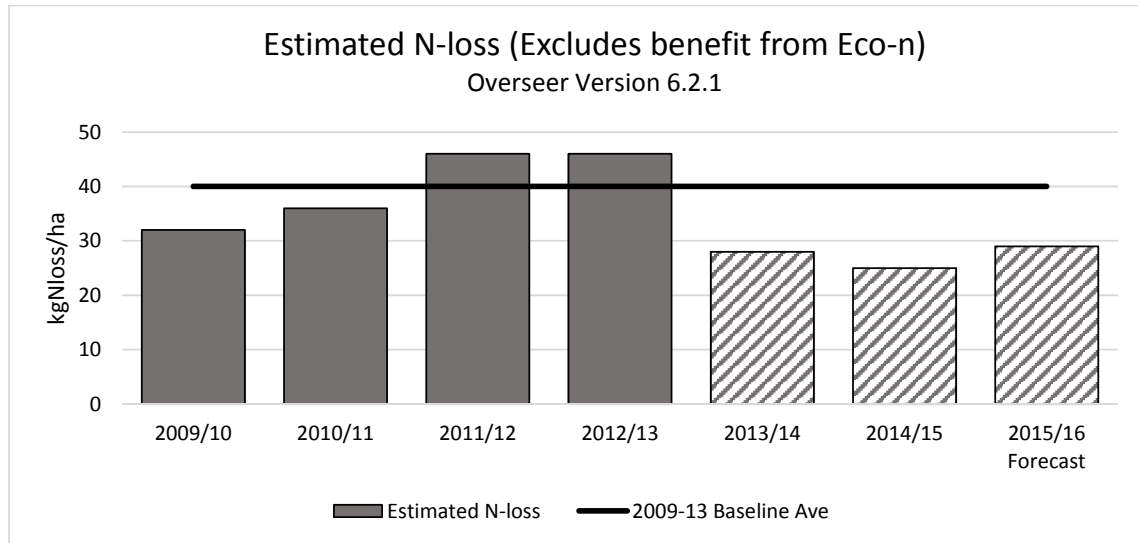
Targets / Results:

	Initial Target	2014/15 Result	2015/16 Result
Stocking Rate	3.5 cows /ha		
Nitrogen Fertiliser Input	150 kgN/ha	143 kgN/ha	179 kgN/ha
Imported Supplement	300 kgDM/cow + winter off		126 kgDM/cow + winter off
Milk Production	500 kgMS/cow and 1750 kgMS/ha	498 kgMS/cow and 1742 kgMS/ha	522 kgMS/cow and 1812 kgMS/ha
Farm Working Expenses	\$4.00 /kgMS	\$3.87 /kgMS	\$3.47 /kgMS

Results from the 2014-15 season identified the system was scalable, but could be improved at LUDF. In particular, the research had not included any regrassing, where-as LUDF, based on prior identification of poorer performing paddocks planned to, and regrassed 3 paddocks (15%) in the 2014-15 season. This put considerable pressure on the farms feed supply, so the plan was reduced to 10% in 2015-16. The reduction in payout subsequently led to this being restricted to only 5% last season. This was a much more manageable area in a low input system and contributed to generating a surplus of home grown silage that was cost effectively fed back to extend lactation of 'cull' cows.



Environmental footprint: estimated Nitrogen Loss with Overseer

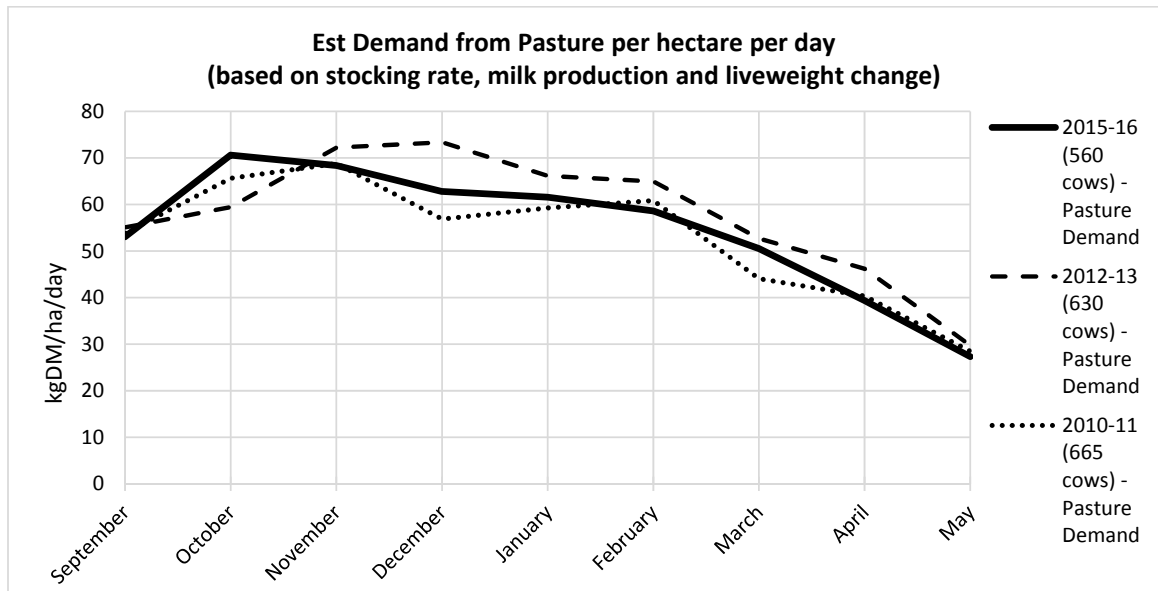


Estimated N losses for LUDF through 7 seasons, compared to baseline as run through Overseer.

Overseer estimated the farm system in 2014-15 reduced its N-leaching by over 30%, providing confidence the farm could allow the use of a little more Nitrogen fertiliser to push total drymatter production, milk production and profitability. Total N applied as fertiliser therefore increased from 143 kgN/ha to 179kgN/ha last season. The additional Nitrogen was largely applied in the late spring / summer when irrigation plus Nitrogen was likely to give high N-response rates.

Feed Conversion Efficiency

Using the energy requirements for maintenance, walking, change in CS and milk production, enables calculation of the proportion of pasture consumed for milk production to be compared to that required for maintenance (etc). Total pasture consumed for milk production has increased since 2010-11 and changed from 61% of pasture eaten to 69% pasture. The farm is thus now both 'harvesting' more pasture, AND turning this into more milk for sale.

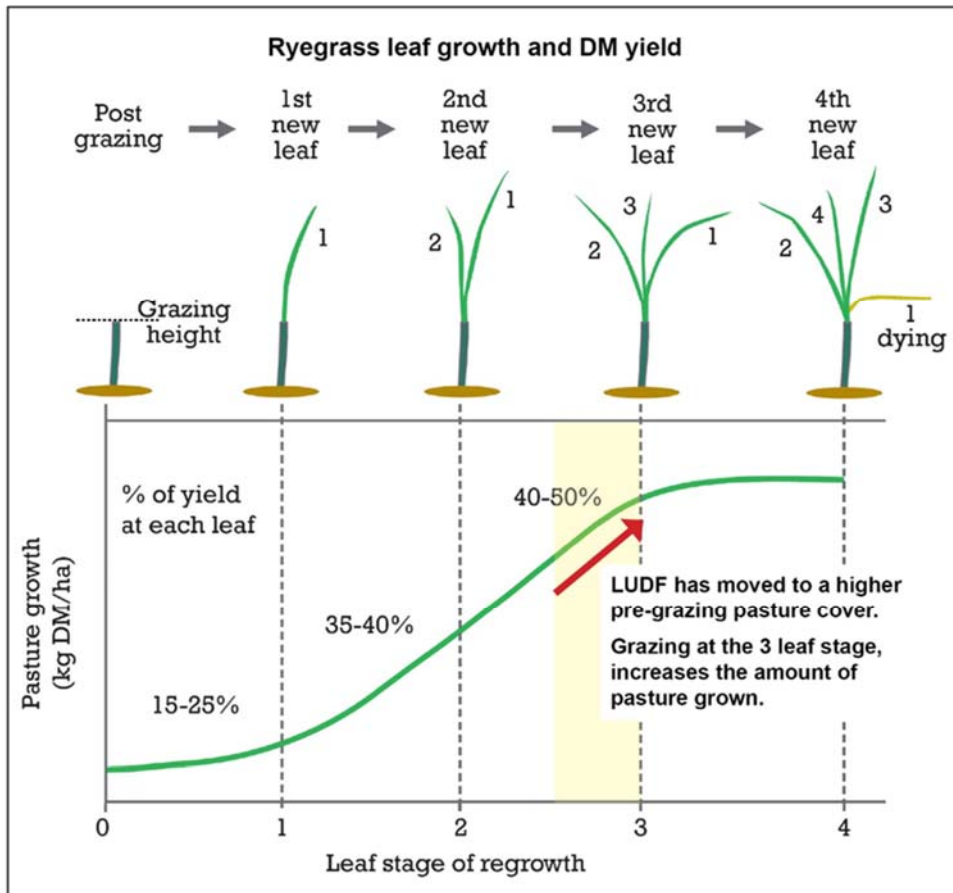


Why (how) LUDF has grown more pasture

A key reason is that LUDF has increased its pre-grazing pasture cover by 200 kgDM/ha. The science behind this is shown in the diagram below.

The farm has moved from grazing ryegrass at around 2.5 *leaves/tiller* to around 3 *leaves/tiller*. This has a significant effect as 40-50% of the ryegrass DM yield in a regrowth cycle is produced with the third leaf. Simply put “grass grows grass”, and with more leaves the pasture captures more light, has greater photosynthesis, and grows faster.

Post-grazing residual has remained similar to previously (average 15 kgDM/ha higher) and a consistent, even post-grazing residual remains a key requirement for LUDF. Running higher pre-grazing covers means the grazing round is longer (by an average of 6 days) and each paddock will be grazed 1-2 times less over the season.



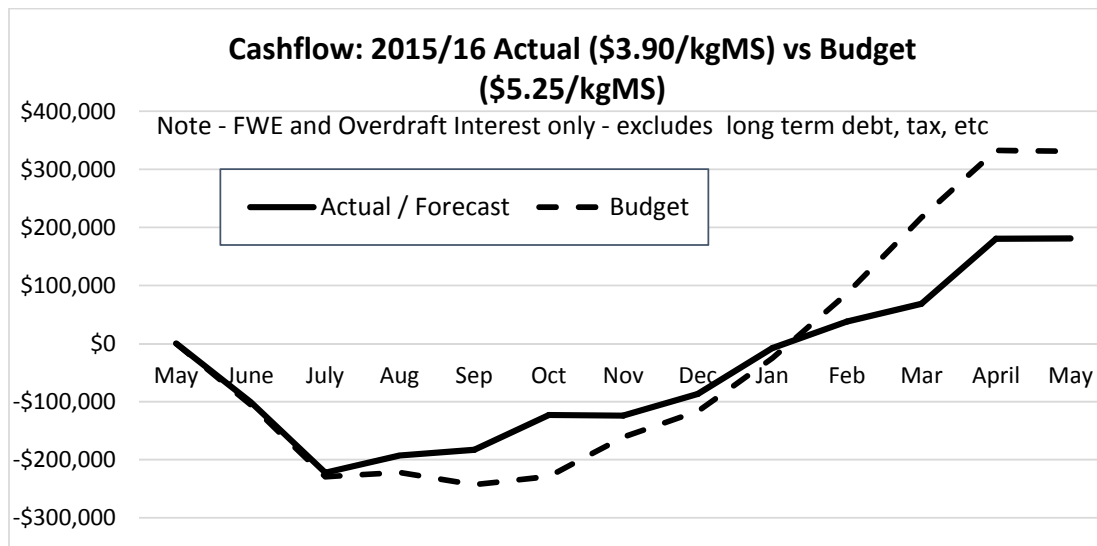
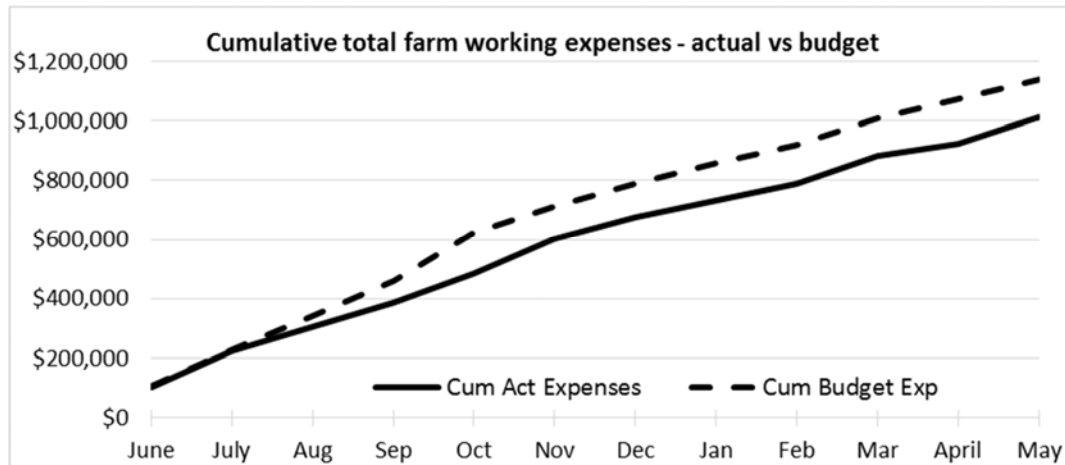
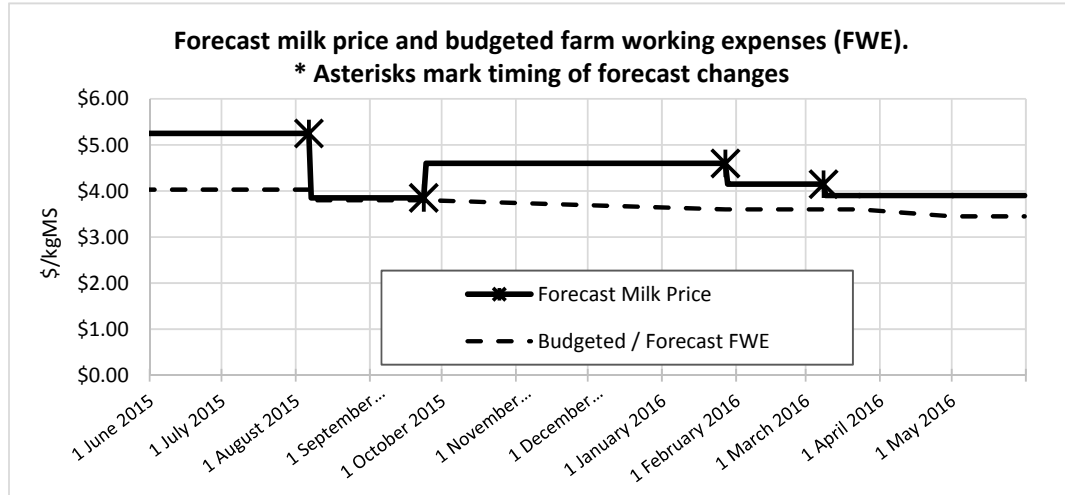
Two other things are key to managing higher pre-grazing covers (as LUDF has):

- Tetraploid ryegrass, or a tetraploid/diploid ryegrass mix, have a significant advantage for this system. On LUDF 18 of its 21 paddocks have tetraploids, which maintain high cow intakes at higher covers. Whereas cows may struggle to graze a straight diploid ryegrass >3300 kgDM/ha, a tetraploid/diploid mix will typically still be well grazed at 3600.
- Pasture quality issues occur more quickly – Pasture ME is still very high (12+) at the 3 leaf/tiller stage of ryegrass growth, but beyond this it starts to drop off. Having higher covers means your farm is growing more, and you can move past 3 leaves/tiller into quality issues more quickly. Monitoring and controlling pasture quality when necessary (e.g. pre-graze mowing, making silage) are important.

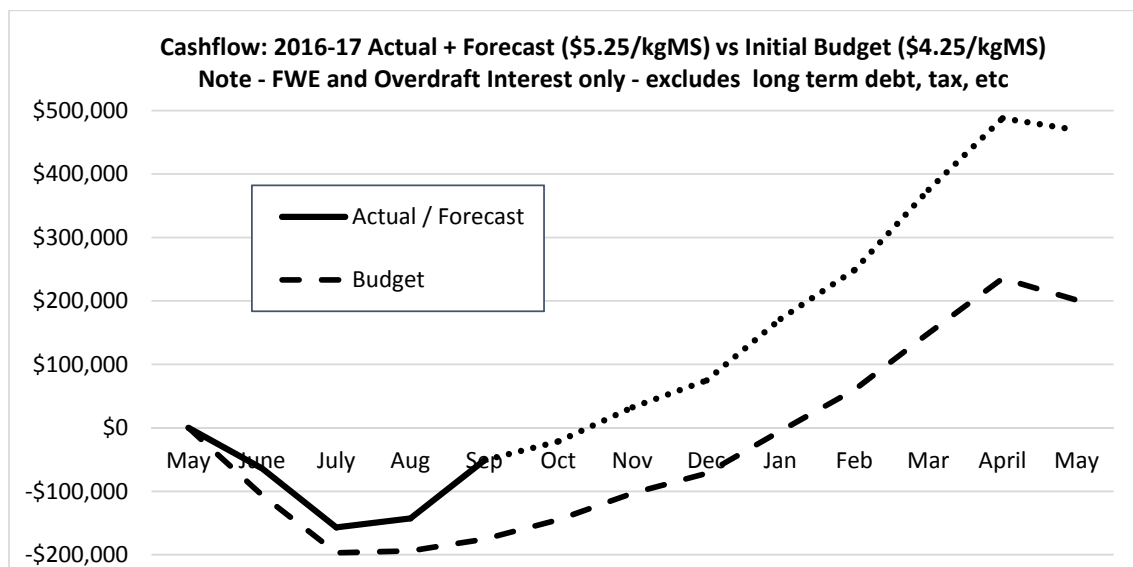
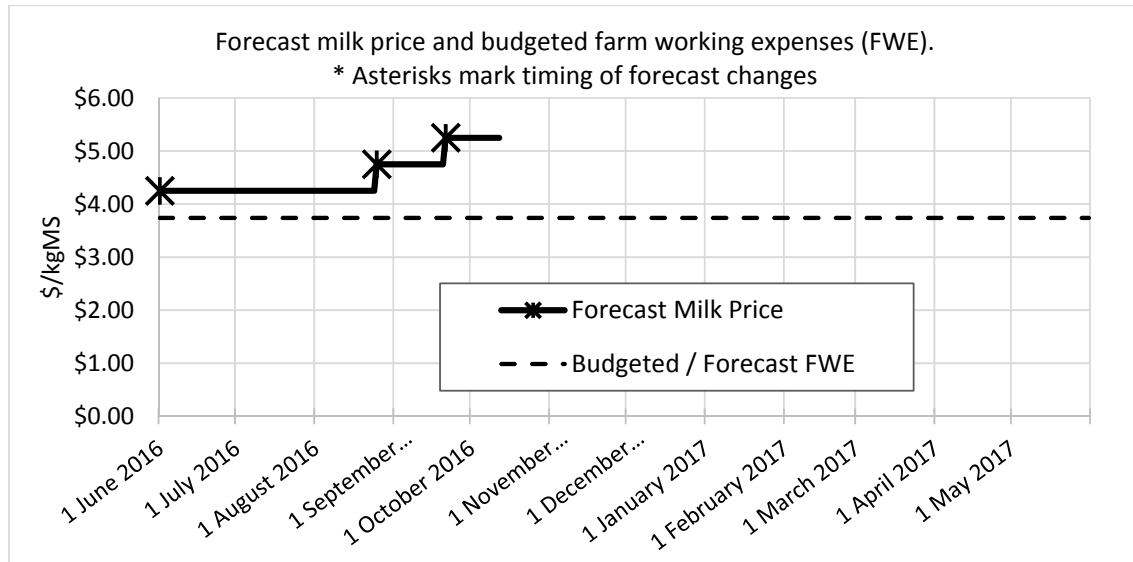
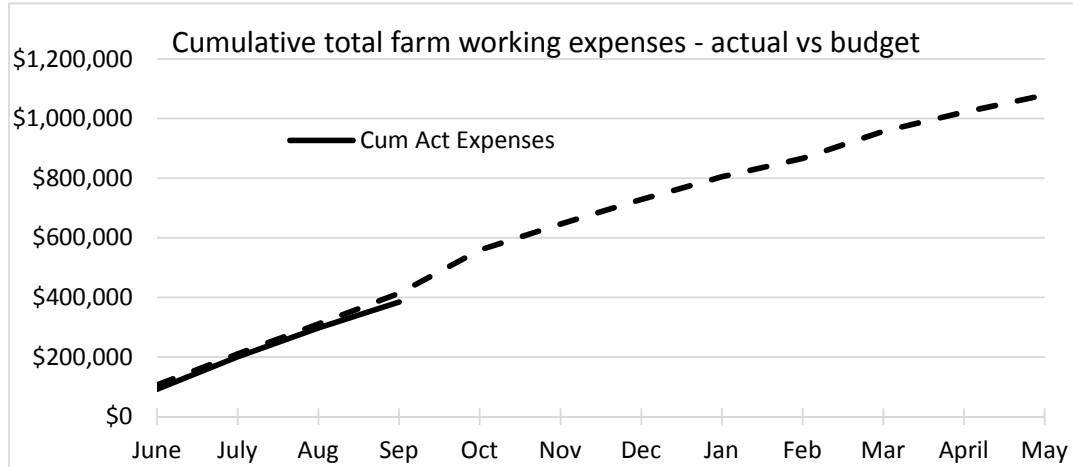
Results to date (to the end of September):

	2012/13	2013/14	2014/15	2015/16	2016/17
Total kgMS sold	45,896	46,877	46,059	46293	47386
Ave kgMS /cow /day (peak cows)	1.98	2.15	2.37	2.5	2.45
Total Cows in Milk (vat)	600	583	536	523	516
Total N fert applied	82	48	28	32	29
Total Silage Fed tDM	42.2	85.7	38.1	52.1	0
Total Silage Fed / peak cows (kgDM/cow)	67	136	68	93	0
Whole Herd Average Liveweight (WOW)	465	468	480	490	485
Herd Ave CS	4.5	4.6	4.4	4.9	4.9

2015-16 Income and Expenses – Summary



2016-17 Income and Expenses – Summary



LUDF – Budget and Year to Date Income / Expenses

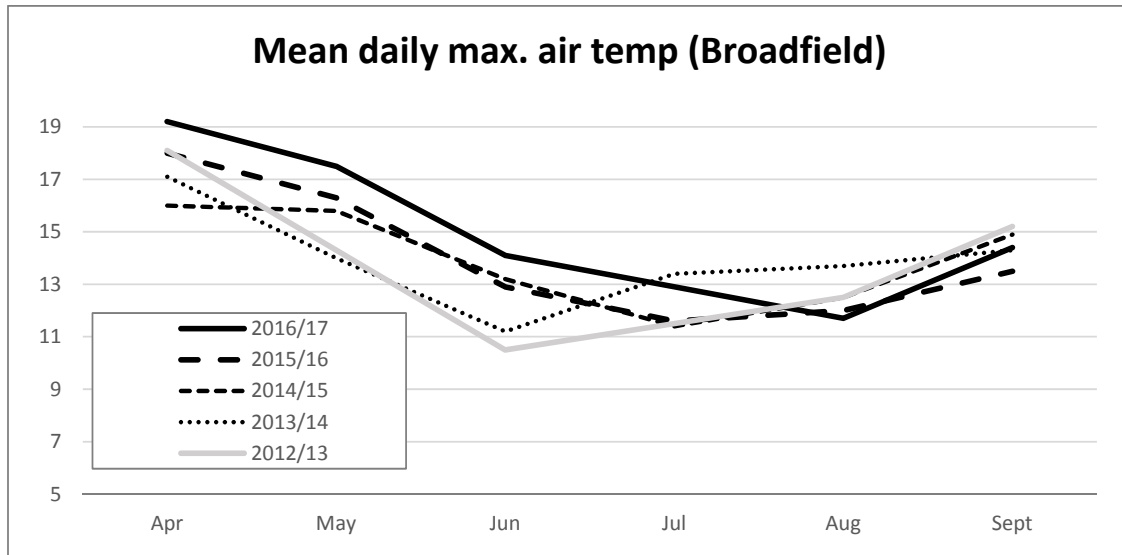
Year ending May 31	2015/16 Actual	2016/17 Budget	Actual to end Sept	Budget to End Sept	Variance (Act-budg)	Forecast Year End	Notes
Milk production (kgMS) 160ha	289906 1,812kg/ha	280,000 1750 /ha	47,386	45,506	1,880 0	281,880	1
Peak Cow Nos and Prod.	555	560			0		
Staff	3.70	3.7			0		
Income							
Milk - \$/kgMS	\$3.90	\$4.25	\$3.60	\$3.00	1		
Dividend /share	\$0.40	\$0.40/share			0		
Milksolid Revenue	\$1,130,633	\$1,190,000	\$170,590	\$136,518	34,072	1,224,072	2
Dividend	\$115,962	\$112,000	\$0	\$0	0	112,000	
Surplus dairy stock	129243	\$112,959	\$11,688	\$8,660	3,028	115,987	3
DairyNZ Levy	-\$10,437	-\$10,080	-\$1,706	-\$1,638	-68		
Stock Purchases	-84960	-24,000	24,000	24,000	0	-24,000	
Gross Farm Revenue	\$1,280,442	\$1,380,879			\$0	1,380,879	
Expenses					\$0	0	
Cow Costs							
Animal Health	\$57,851	\$53,562	\$22,571	\$25,833	-\$3,262	50,300	4
Breeding Expenses	\$42,230	\$42,881	\$8,572	\$8,535	\$37	42,918	
Replacemnt grazing & meal	\$135,151	\$149,091	\$50,299	\$56,032	-\$5,733	143,358	5
Wint grazing – Herd+freight	\$195,655	\$149,952	\$140,339	\$143,202	-\$2,863	147,089	6
Feed							
Grass silage purch.	\$24,668	\$62,160	\$120	\$0	\$120	62,280	
Silage making & delivery	\$20,088	\$18,240			\$0	18,240	
Giberillic Acid	\$234	\$13,120	\$0	\$9,120	-\$9,120	4,000	7
Nitrogen	\$45,093	\$45,485	\$4,162	\$11,371	-\$7,209	38,276	8
Fertiliser & Lime	\$14,853	\$26,255	\$24,176	\$16,240	\$7,936	34,191	9
Irrigation - All Costs	\$76,030	\$64,600	\$15,059	\$8,518	\$6,541	71,141	10
Re-grassing	\$8,654	\$20,215	\$4,796	\$4,335	\$461	20,676	
Staff							
Employment	\$228,413	\$261,945	\$68,297	\$83,569	-\$15,272	246,673	11
Land							
Electricity-farm	\$25,379	\$30,000	\$6,088	\$7,600	-\$1,512	28,488	12
Administration	\$24,965	\$24,700	\$6,410	\$7,268	-\$858	23,842	
Rates & Insurance	\$21,020	\$21,020			\$0	21,020	
Repairs & Maintenance	\$53,042	\$54,000	\$26,368	\$17,842	\$8,526	62,526	13
Shed Expenses excl. power	\$9,119	\$9,850	\$2,534	\$3,524	-\$990	8,860	
Vehicle Expenses	\$22,989	\$31,336	\$4,695	\$10,667	-\$5,972	25,364	14
Weed & Pest	\$1,174	\$500		\$500	-\$500	0	
Cash Farm Working Exps	\$1,006,608	\$1,078,912	\$384,486	\$414,156	-\$29,670	1,049,242	15
FWE/kgMS	\$3.47	\$3.85				\$3.72	
Depreciation est.	\$116,000	\$116,000				116,000	
Total Operating Expenses	\$1,122,608	\$1,194,912	\$384,486	\$414,156	-\$29,670	1,165,242	
Dairy Operating Profit	\$157,834	\$185,967				\$215,637	
DOP/ha	\$986.46	\$1,162				\$1,348	
Cash Operating Surplus	\$273,834	\$301,967				\$331,637	
Cash Oper. Surplus per ha	\$1,711	\$1,887				\$2,073	

Notes to the above production and expenses to date:

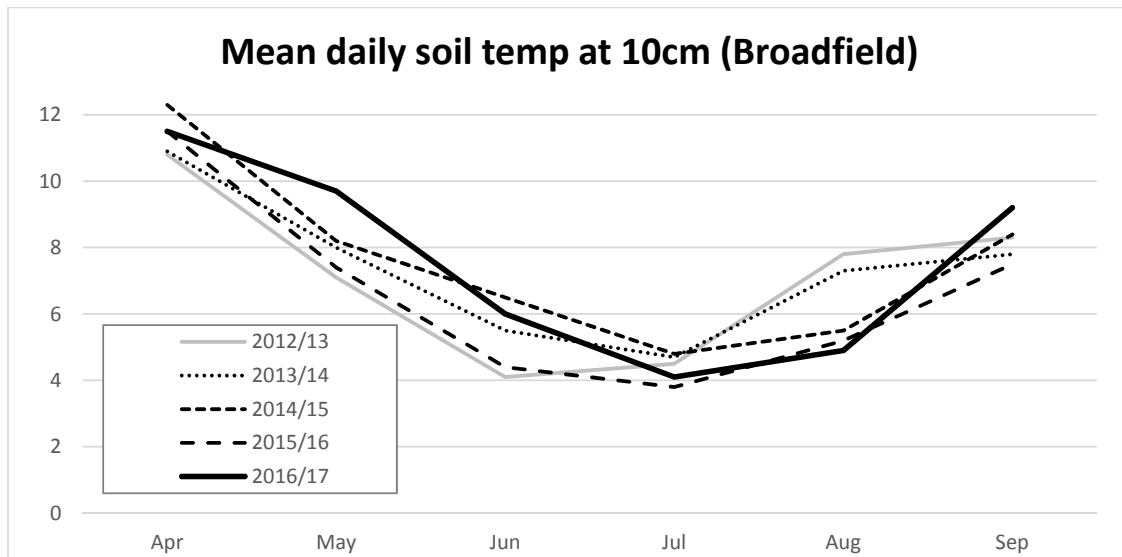
1. Production for August was ahead of last year and similar to last year for September
2. Milk revenue is ahead of budget primarily due to the increase in advance payments – and inclusion of these in the above numbers.
3. Bobby calves have generated higher revenue than budgeted. Also includes sale of 3 empty heifers.
4. Animal health – Primarily timing differences
5. Similar for Replacement grazing costs
6. Lower freight costs on winter cow grazing (compared to budget)
7. No GA has been used this season
8. A little less Nitrogen fertiliser applied and a reduction in urea price (compared to budget)
9. Fertiliser expenditure brought forward as ground conditions allowed this to be applied in August and September
10. Higher maintenance costs for irrigation, offset a little by minimal irrigation electricity till the end of September.
11. Delayed start / gap between staff at the end of last season and the beginning of this season
12. Less cowshed electricity used than budgeted
13. Significant winter expenditure on the milking platform – cup remover maintenance and replacement of perishables (rubbers etc.) in the cowshed. Track Maintenance budgeted and spend but not yet invoiced. Also minor fencing (of south block after track repairs) that was not budgeted for this period and winter maintenance on the mower.
14. Replacement of motorbikes (as per 2 yearly cycle) has reduced bike maintenance expenses, coupled with less expenditure on fuel and minimal maintenance spend on the ute which is to be replaced shortly.
15. Overall, the farm is nearly \$30,000 under-budget year to date (this is a 3% saving or annual expenditure). Whilst some of the differences to date are timing related, others include more expense brought forward (such as maintenance fertiliser) which should help the farm maintain this advantage over the season.

2016-17 Farm Production data

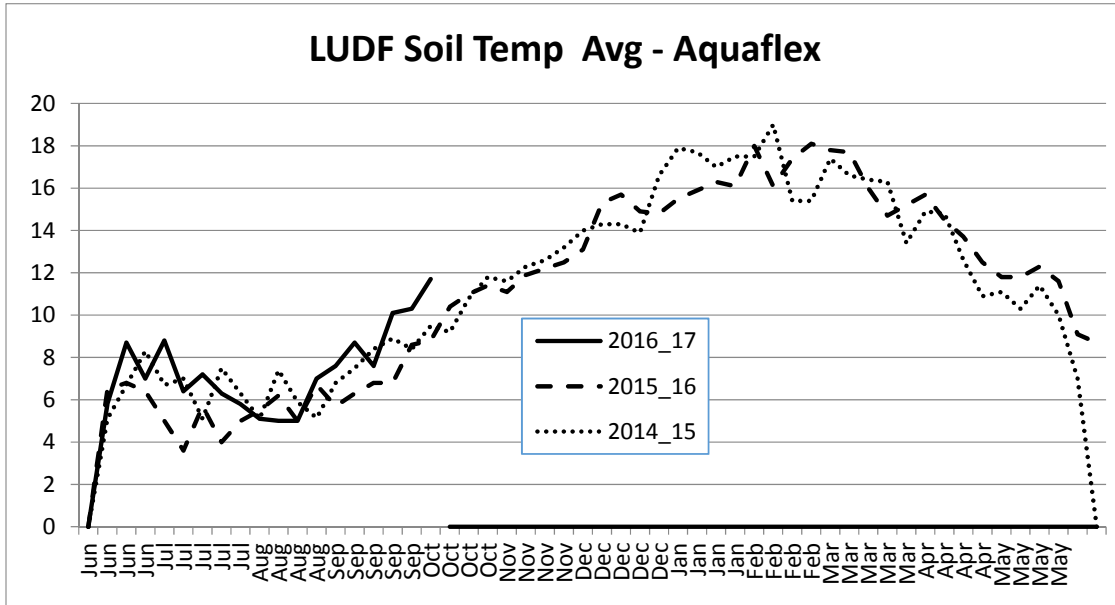
Weather and Environment



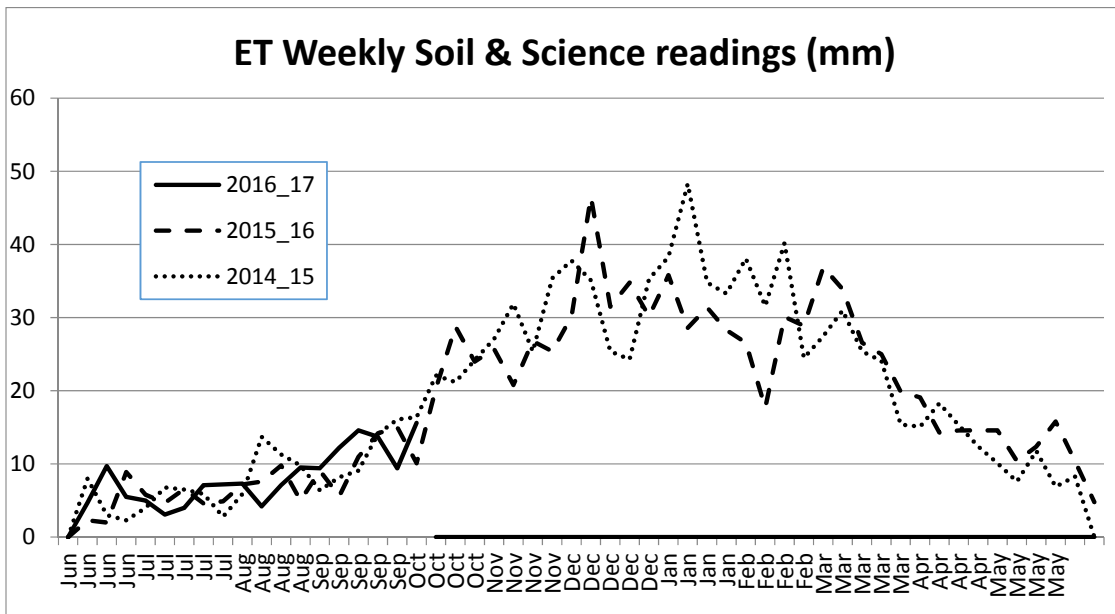
April, May and June mean daily maximum air temperatures were higher than any of the previous 5 years. August was as cold as last year, and colder than the previous 3 seasons, but September temperatures increased again. Noticeably, the area is 1-2 degrees hotter at the end of September than the same time last season.



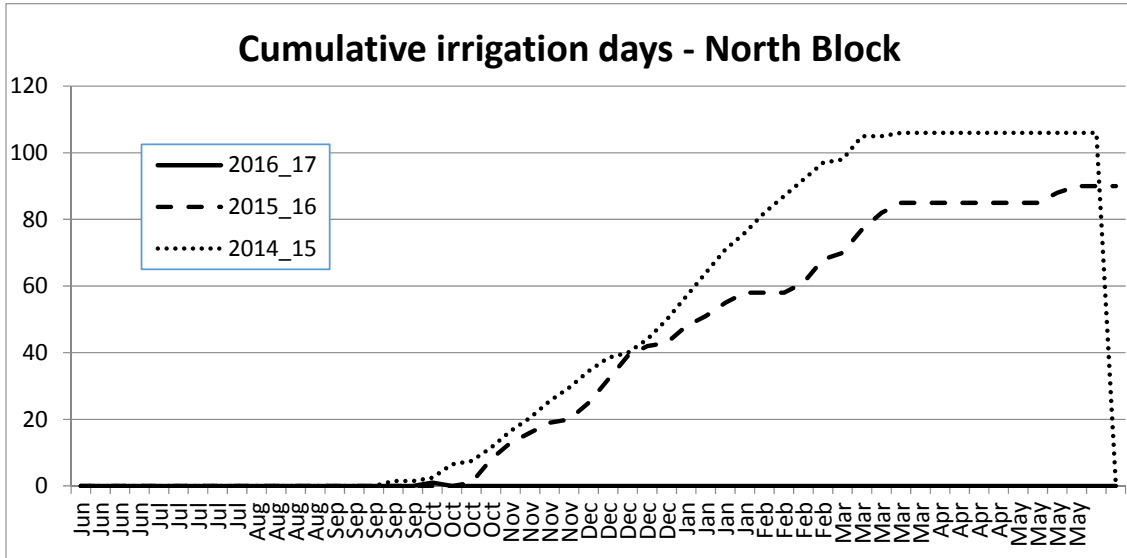
Soil temperatures follow the same trend as air temperatures in late autumn / early winter but were relatively lower than past years in July this year. September soil temperatures climbed significantly this season compared to past years.



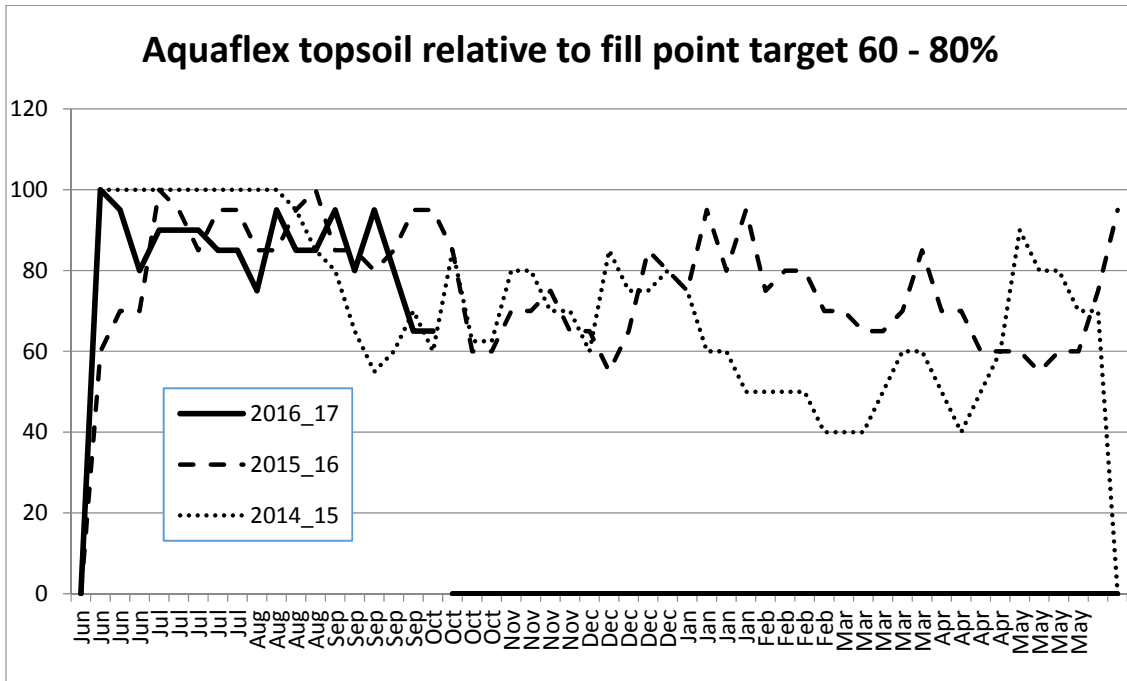
Weekly soil temperatures at LUDF show the same effect as the monthly average data from the NIWA Broadfield site. Of note is September temperatures have been similar to October temperatures of past years.



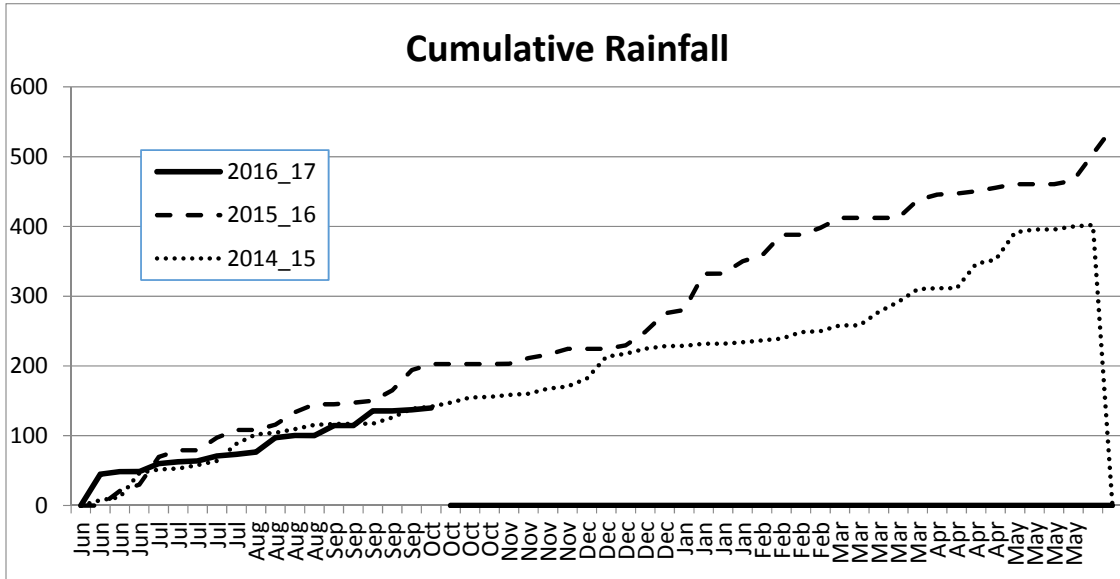
Higher soil temperatures have also shown on the weekly ET readings. Warmer overnight temperatures through September have contributed to higher ET levels.



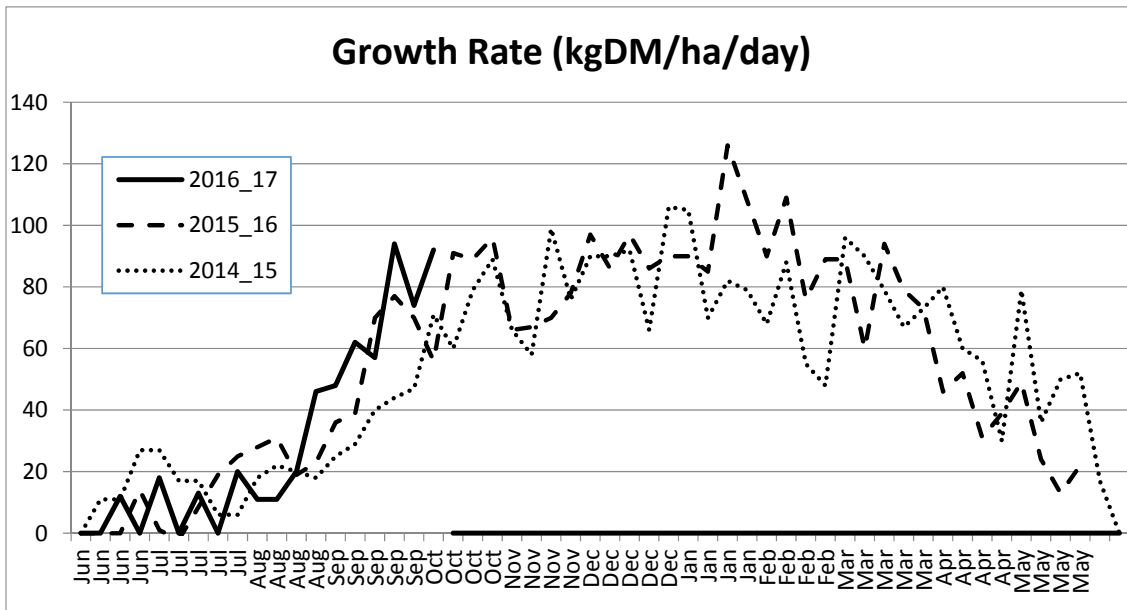
Irrigation commenced in early October this year, earlier than last season but later than the previous season. Conditions underfoot have been firm through the whole winter, which has meant that utilization has been very good. The farm continues to monitor soil moisture content and considers forecast rainfall when considering irrigation.



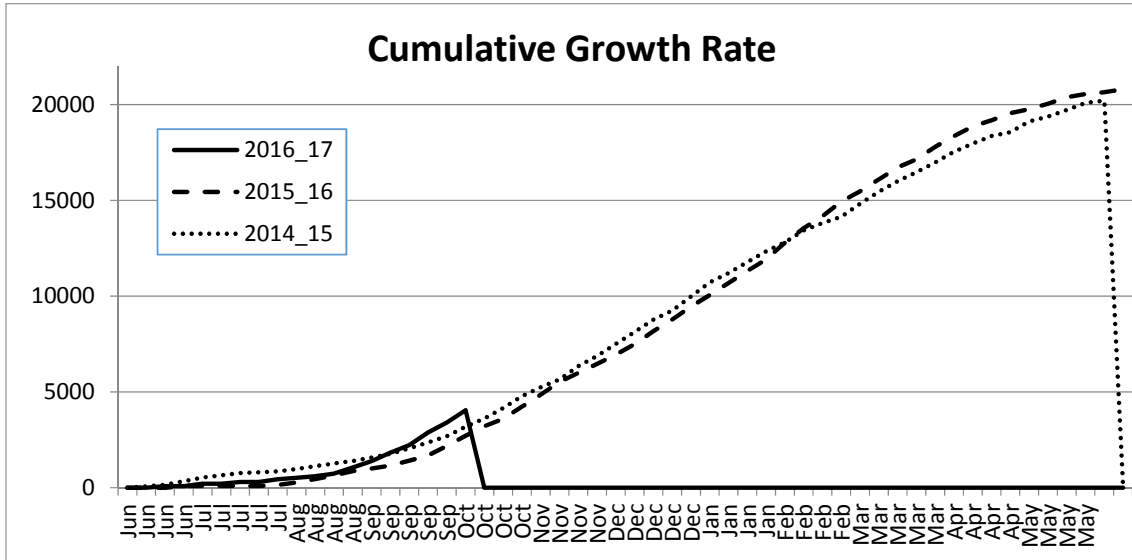
Soil moisture content dropped rapidly through September, a consequence of higher than 'normal' soil temperatures plus the limited rainfall.



Cumulative rainfall from June - September is similar to the previous three seasons. Minimal wet periods during calving meant only small areas of damage - limited to parts of only 3 paddocks on the farm. Year to date (calendar year) rainfall is higher this year at approximately 400mm compared to approximately 300mm in 2015.

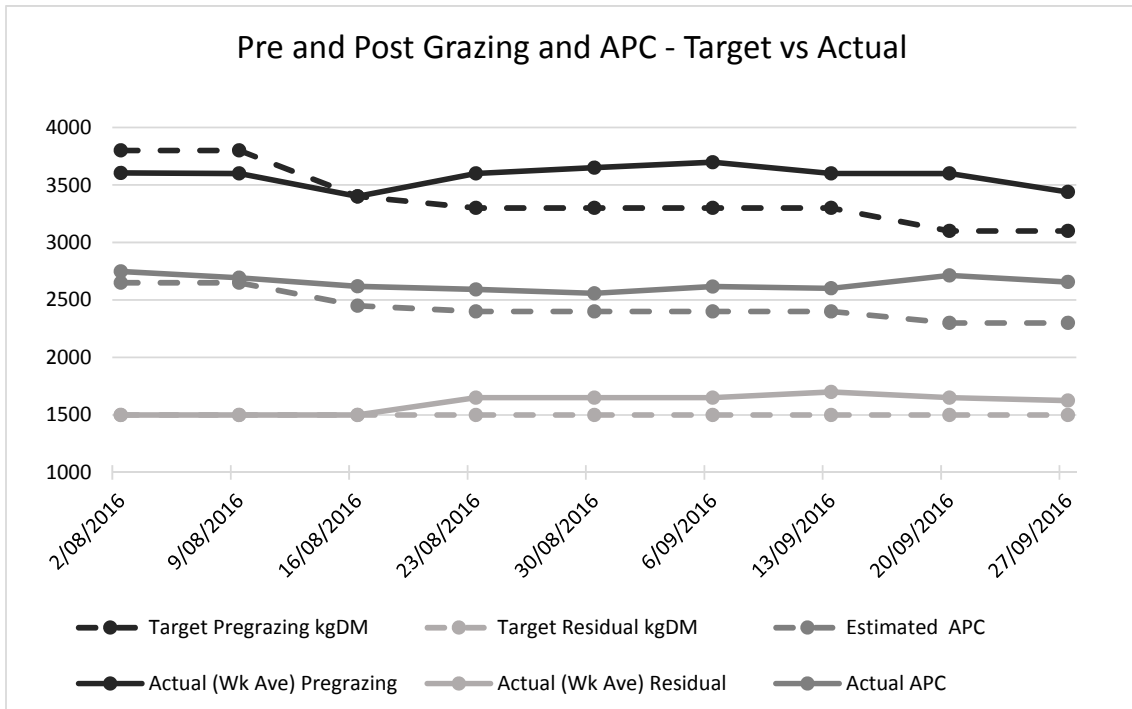


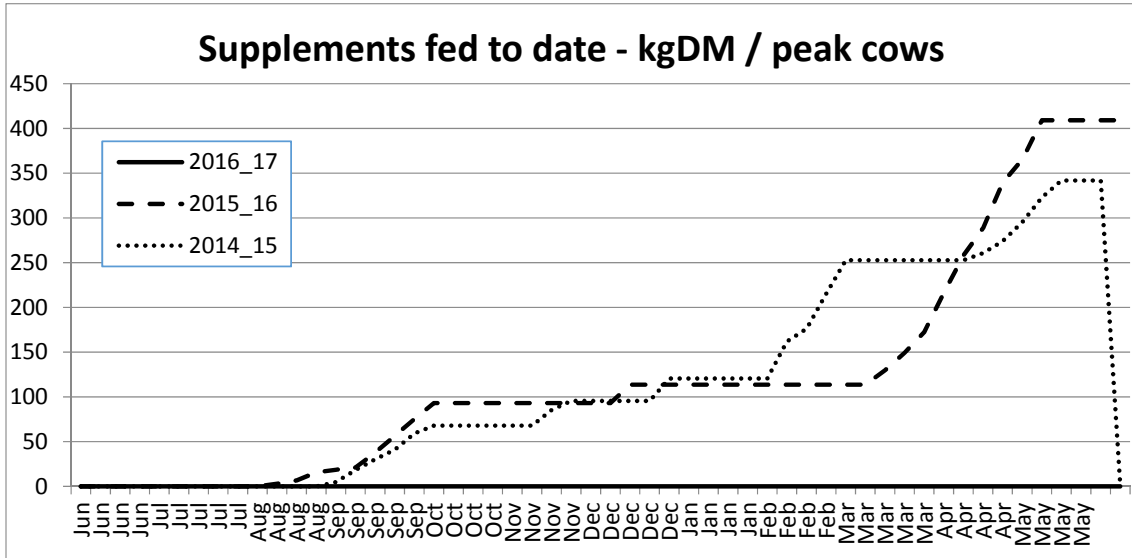
The relatively mild winter and early spring conditions have, since mid-August, resulted in growth rates well above last season's. This has been the major factor enabling the farm to get through spring without the need to feed any supplements.



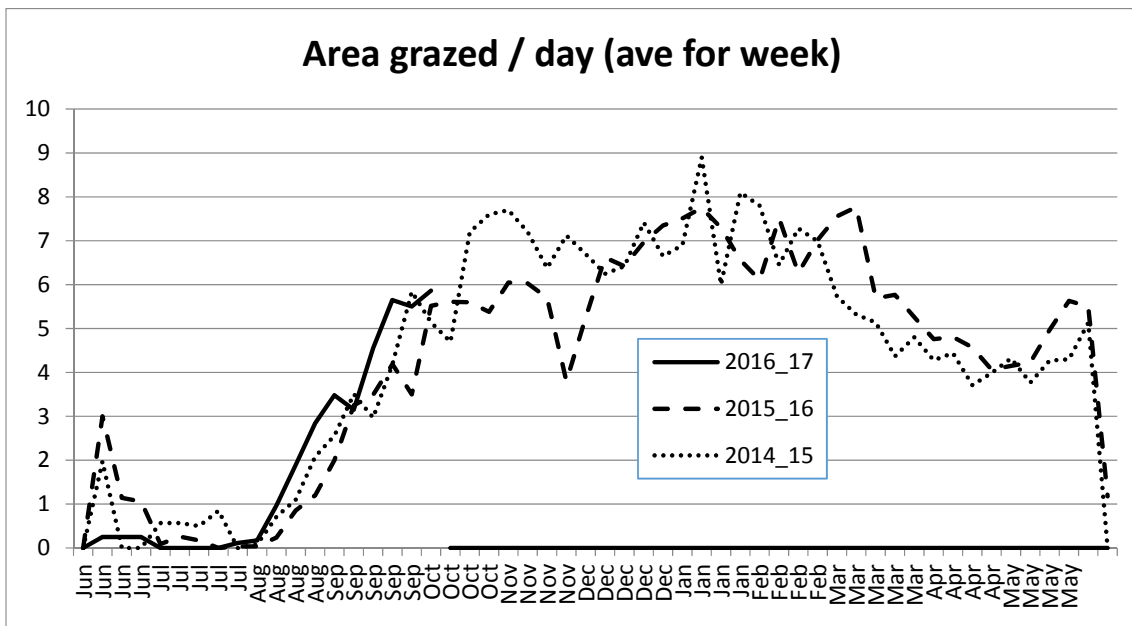
Higher growth rates in September have also resulted in more total pasture grown to date this season.

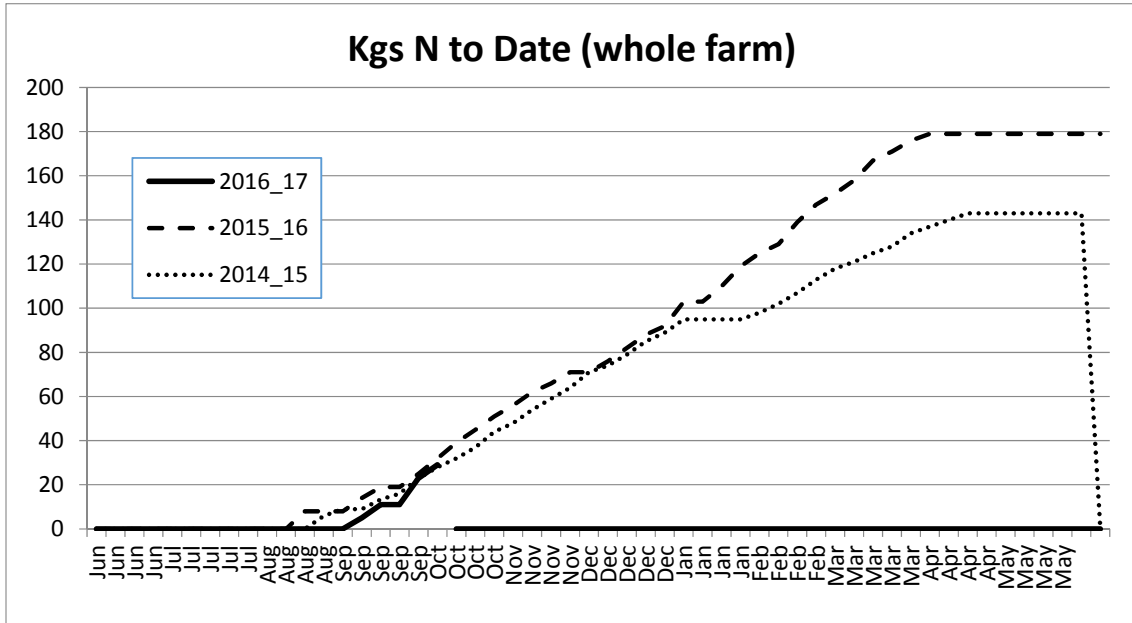
Spring Rotation Plan – Target vs Actual





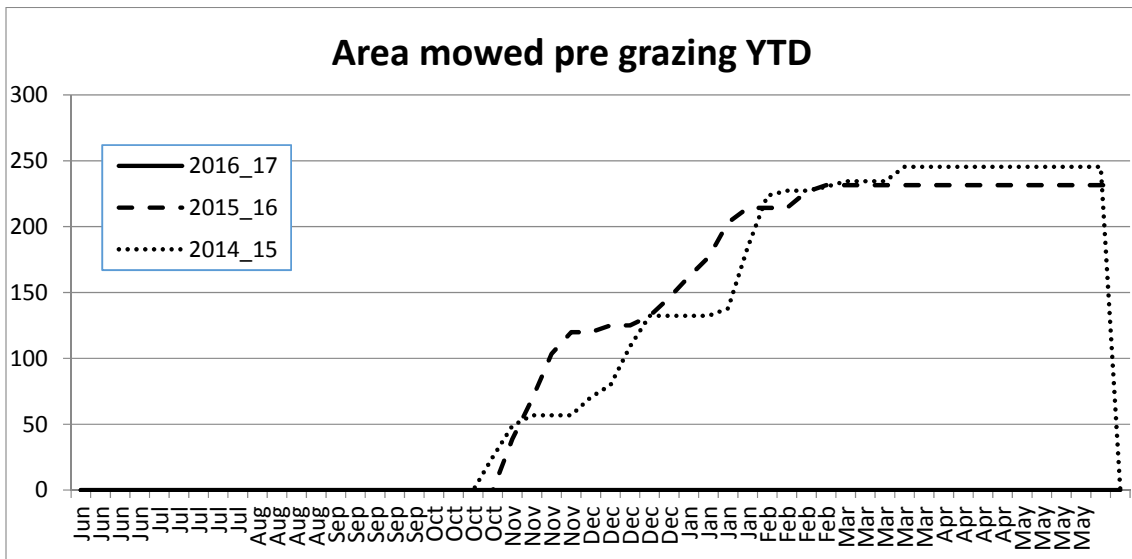
While the Spring Rotation Plan allowed for approximately 100 kgDM/cow of supplement (milking cows), the combination of calving spread, pasture cover on farm and growth rates this season enabled the farm to feed the herd on pasture only (without excessive loss of body condition or limiting milk production).



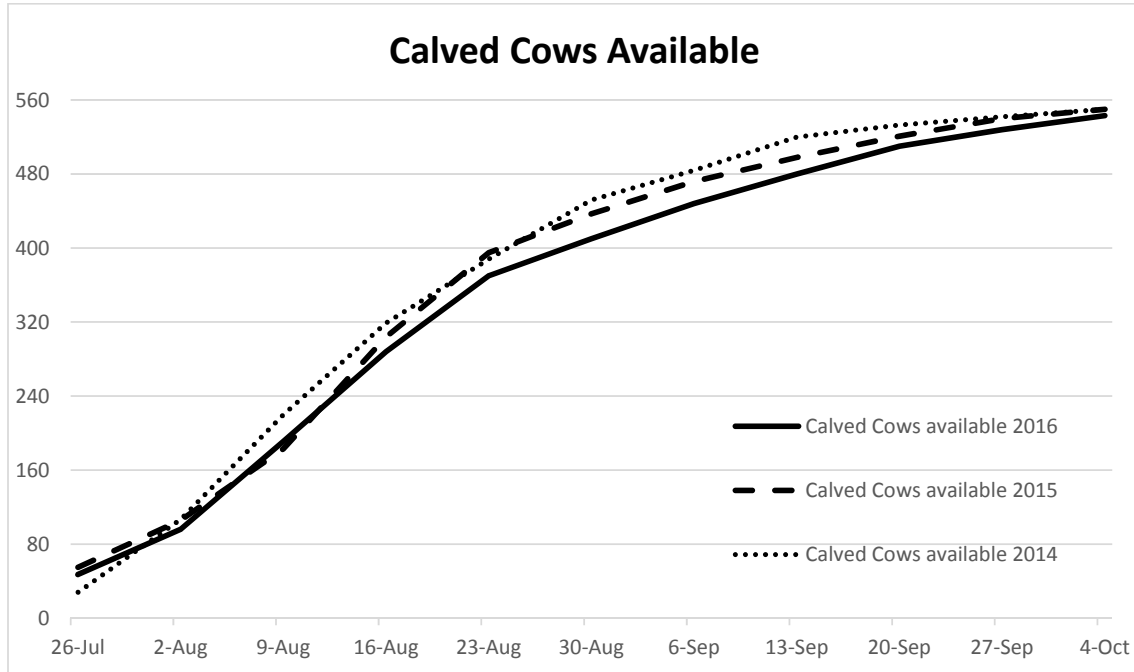


Nitrogen has been applied to paddocks following grazing in the first round. All applications are at 25kgN/ha. This season the effluent area has not had any nitrogen - typically the effluent area has also had N in the form of Ammonium Sulphate applied following the first grazing round.

Maintenance fertiliser (superphosphate) applications have also occurred during the first round of grazing (as per soil tests and fertiliser recommendations). Normally wet ground conditions delay the application of super until later in the spring, requiring ammonium sulphate at this time of the year to provide sulphur and nitrogen.



Pre-graze mowing will again be used as a tool to help manage small surpluses and achieve low and consistent grazing residuals in a timely manner.



Cows wintered vs cows available:

Total Cows Wintered: 579 (140 R2's and 439 MA cows)

	June	July	August	September	Total
Deaths	0	0	3	6	9
Culls	0	1	4	2	7
Total Cows Available	579	578	571	563	563

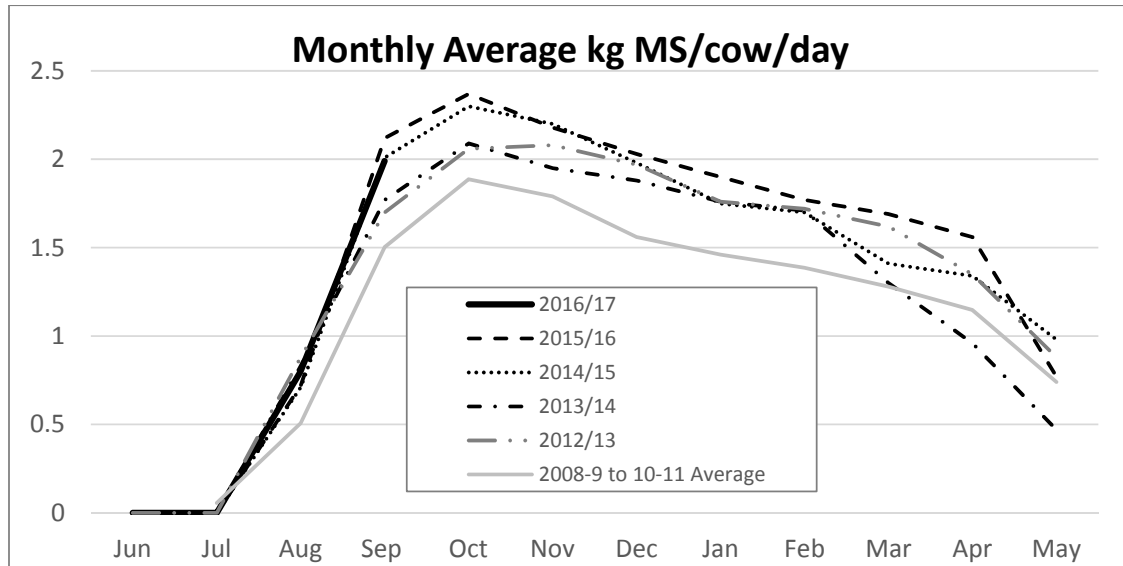
There remains potentially a further 4-6 cows to be culled (cows that are unlikely to perform through the season, and ideally would have been culled last season if available cow numbers were higher).

Deaths:

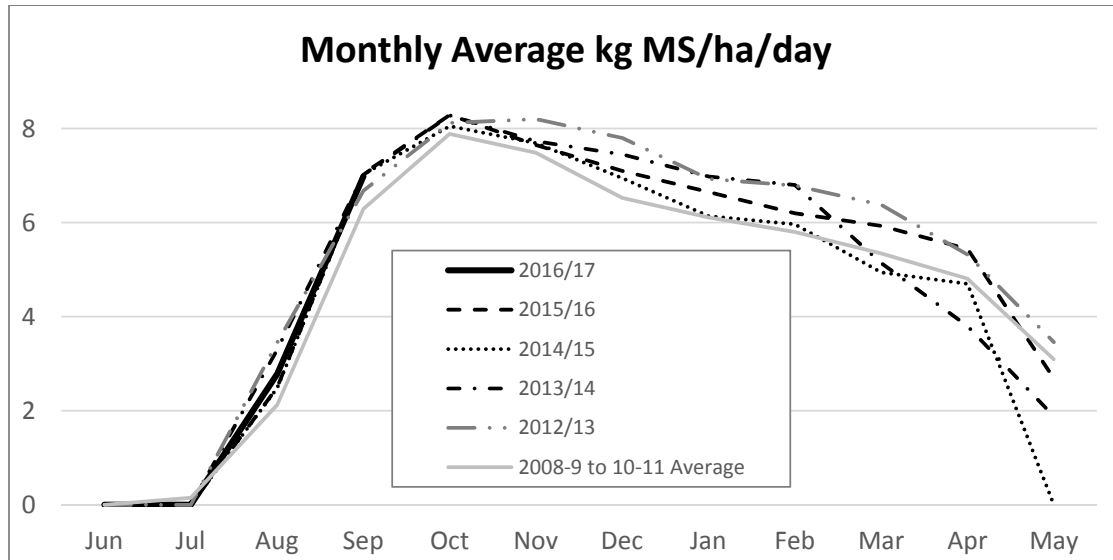
Veterinary investigation of the deaths this spring indicated the following likely causes of death:

- a. Milk fever - 4
- b. Black mastitis (euthanised) – 1
- c. Calving issues (euthanised) – 1
- d. Ruptured liver abscess and peritonitis - 1
- e. Severe Cellulitis (euthanised) – 1
- f. Undetermined – 1

Milk Production

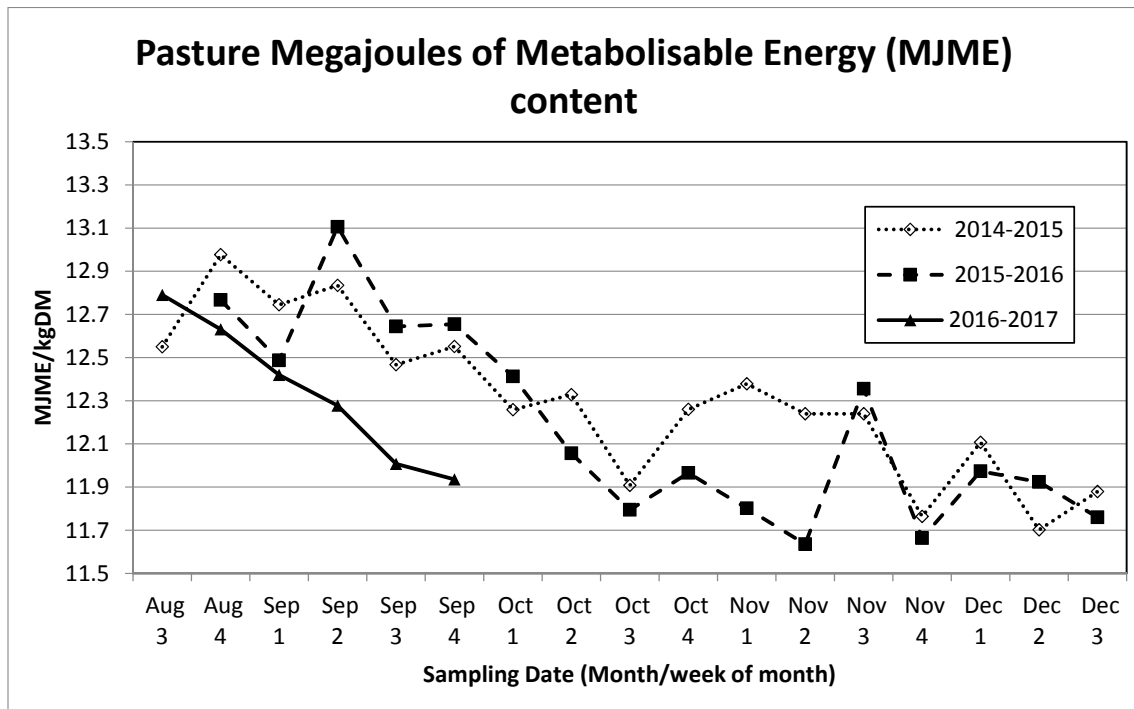
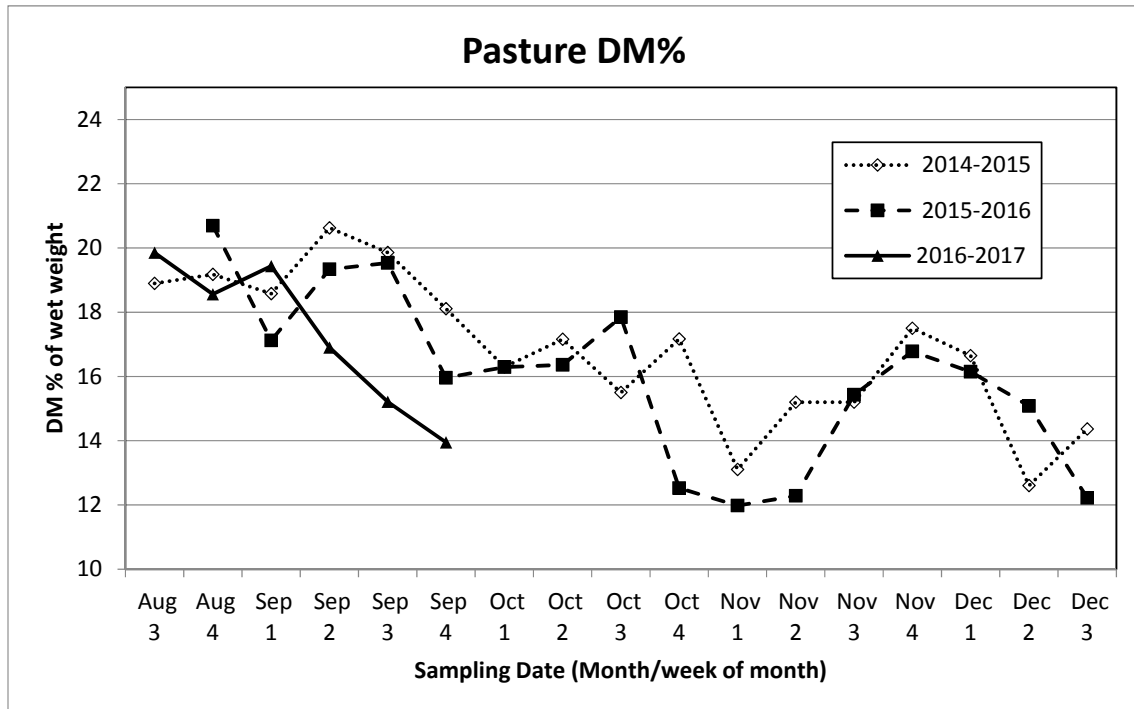


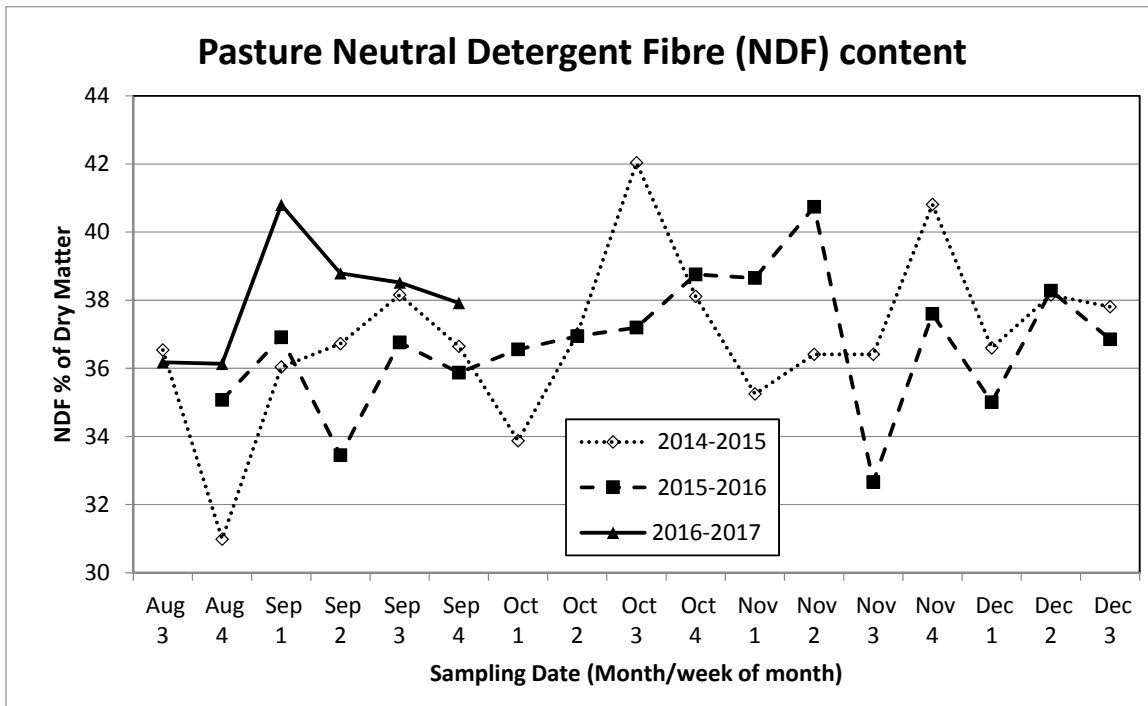
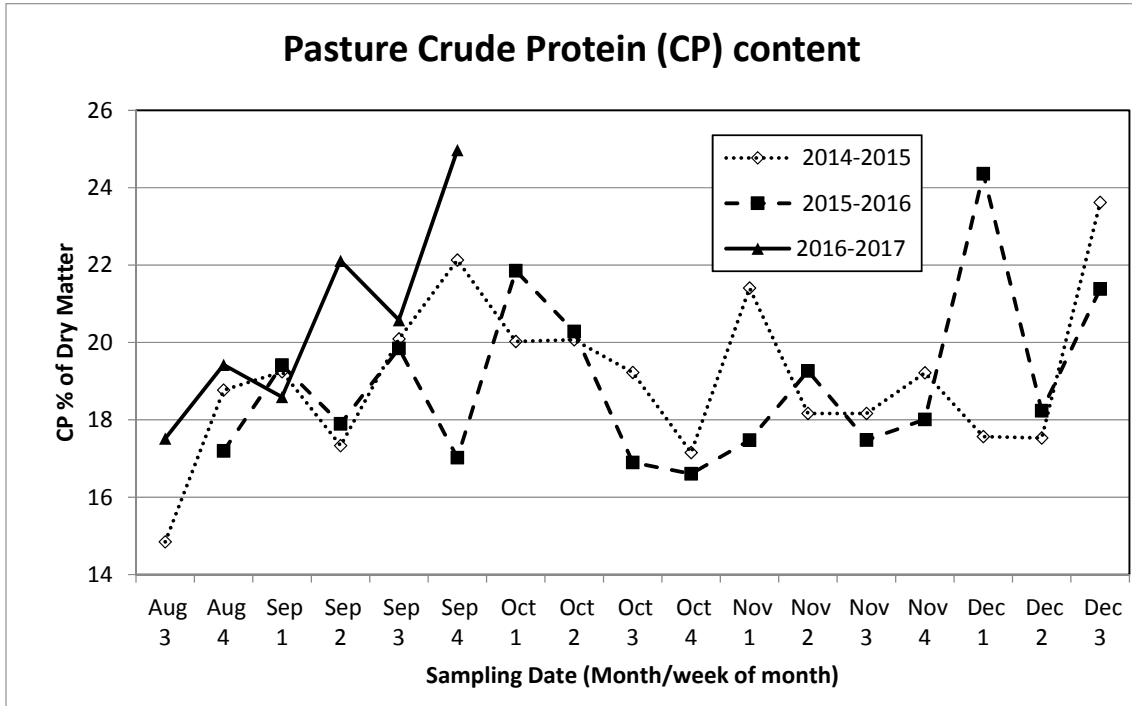
Average milk production per day per cow for August and September is on par with the last couple of years, allowing for the variances of the actual calving spread.

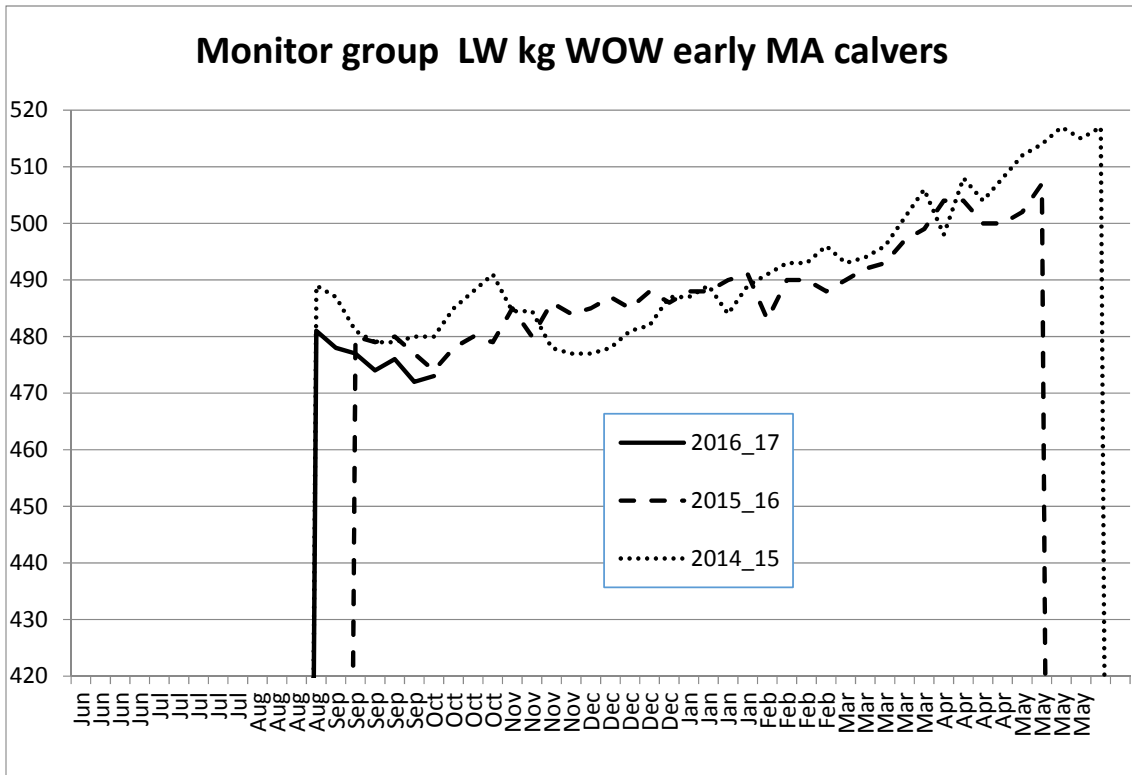
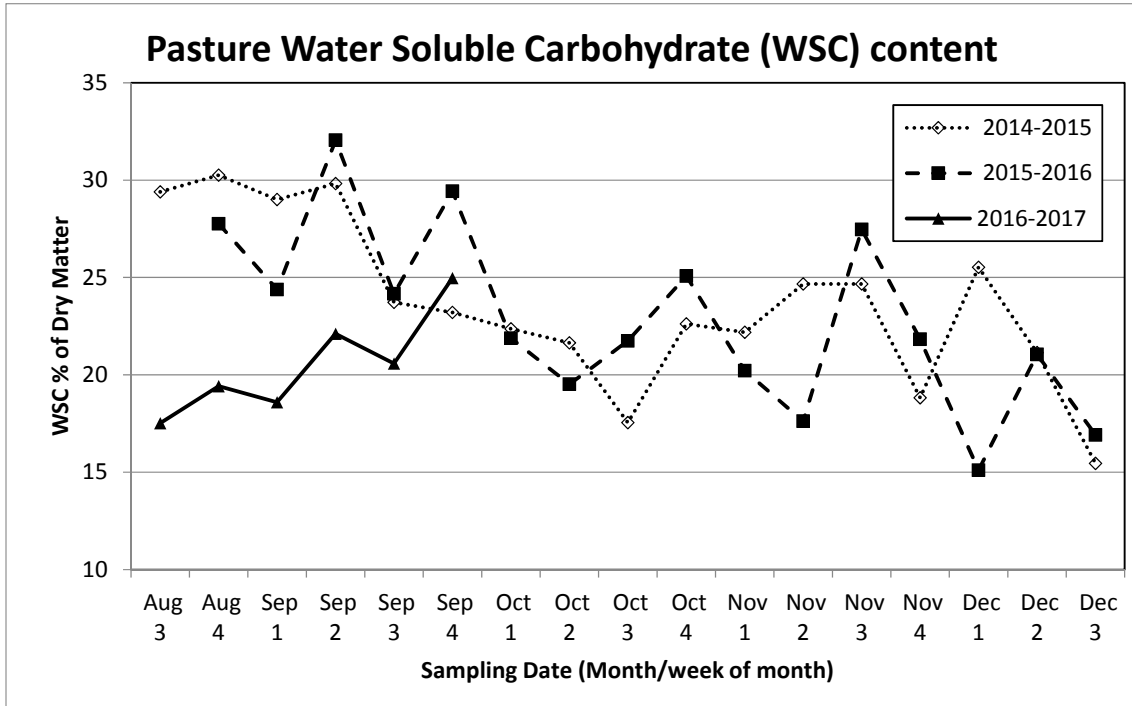


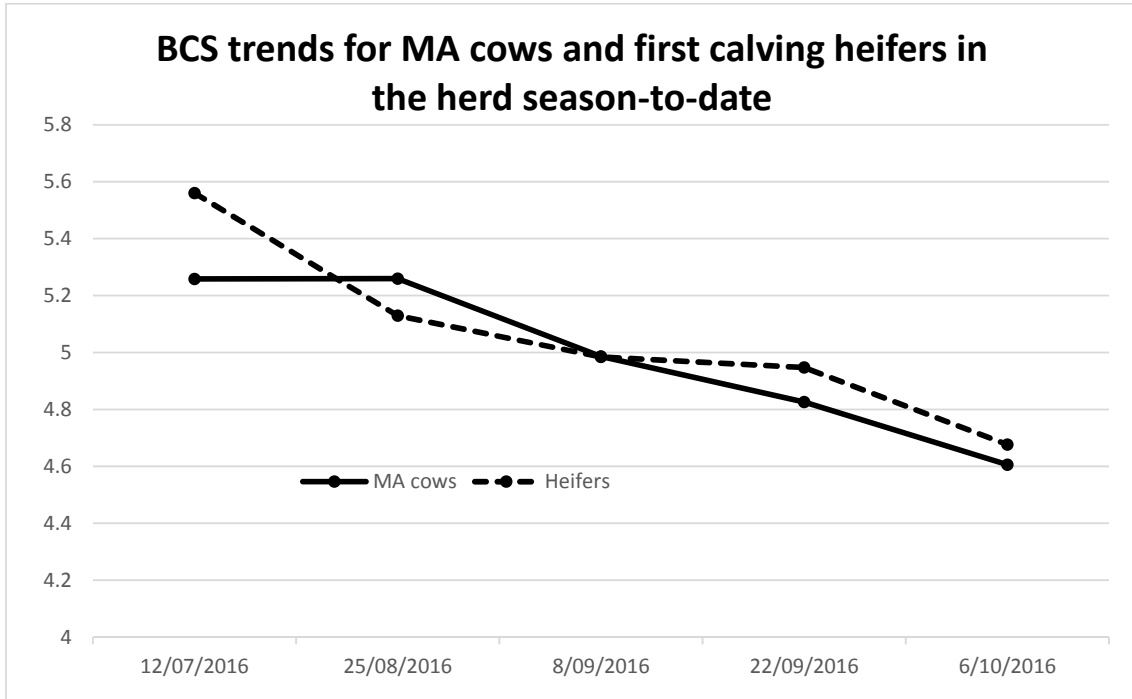
Similarly, milk production per hectare is following the same trend as the past few seasons.

Pasture Quality



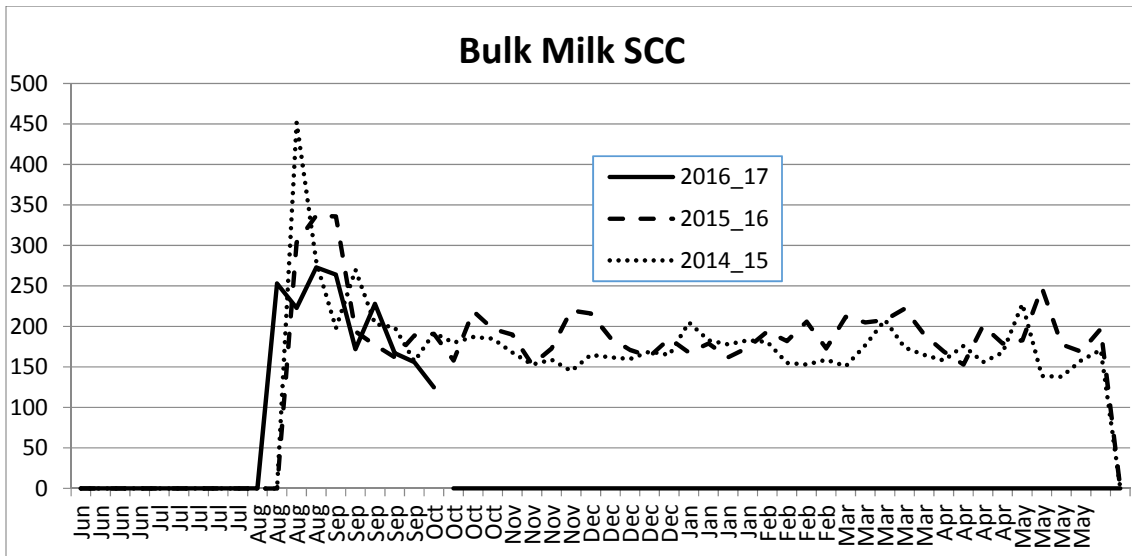






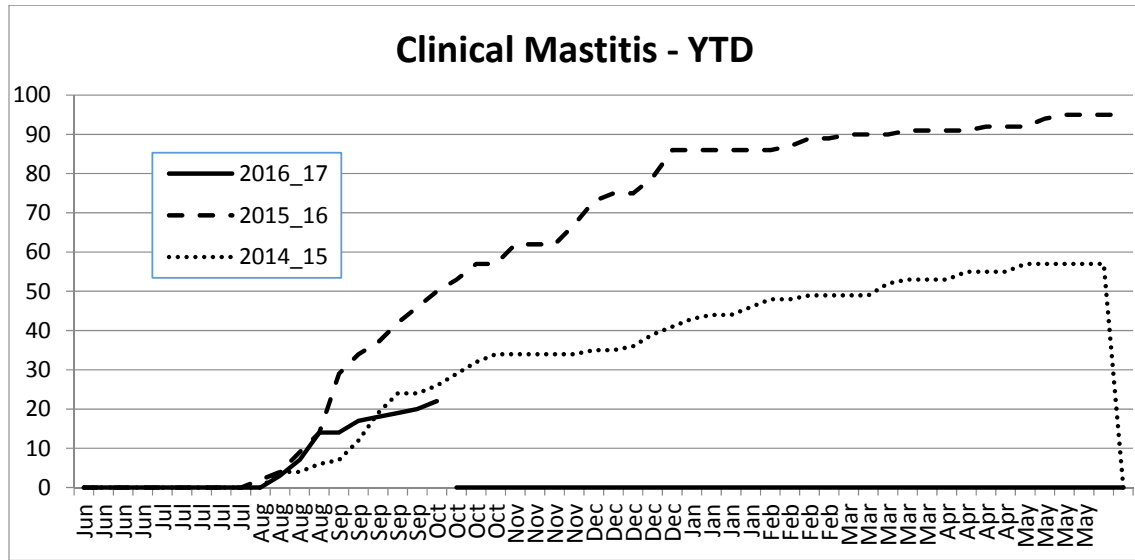
Both cows and heifers calved in an exceptionally good BCS, with cows at an average of 5.3 and heifers averaging 5.6 precalving. Heifers have lost more condition than the MA cows, though remain on average 0.1 BCS above the MA cows for the last 2 BCS events.

Cow Health



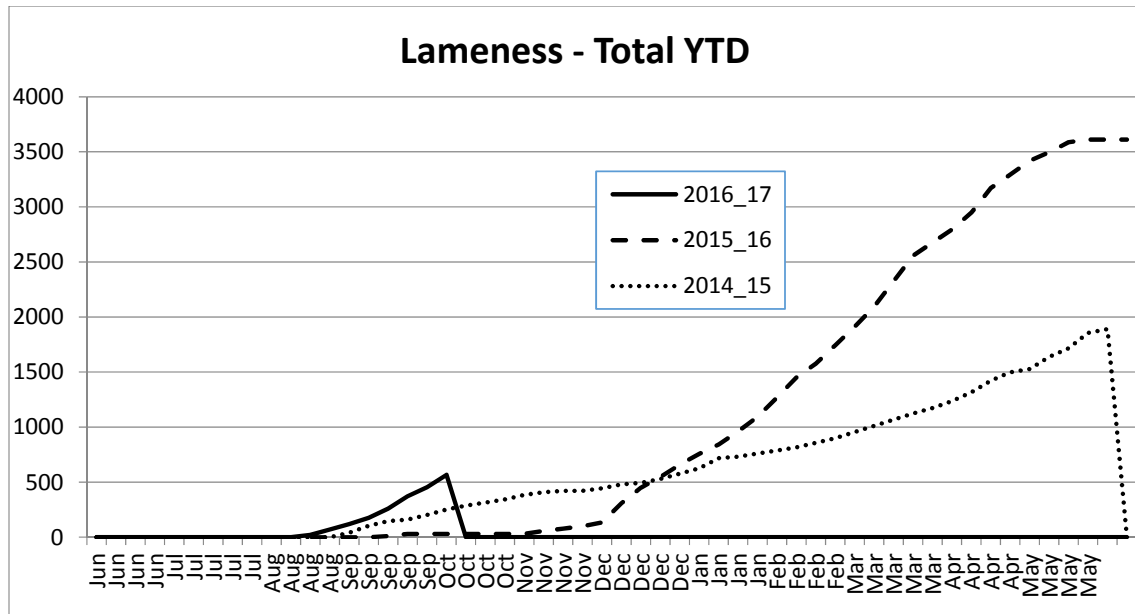
BMSCC is to date trending better than the past 2 seasons so far. There have been less mastitis cases (see below).

Mastitis



As above, the herd has had less cases of clinical mastitis season-to-date when compared with both previous seasons.

Lameness



Unfortunately, lameness has not followed the same trend as clinical mastitis. The straight part of the farm's lanes have been rolled and relevelled, which we would have expected to have the opposite effect on lameness. Some of it will be the result of the intense sampling that the herd is undergoing during milking as part of a research trial on metabolic challenges during spring. Cows may have been a bit less settled than in previous seasons due to this.

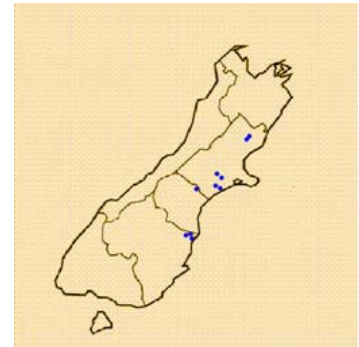
October 2016

Trial set-up

- 10 irrigated dairy farms throughout Canterbury and North Otago.
- The farmer selected a 'runout' pasture and a top-producing ('Good') pasture on each farm
- One half of the 'runout' pasture was left unrenewed (Unrenewed), and half was renewed (Renewed).
- All pastures went from grass to grass. The unrenewed and renewed pastures had the same history.
- Pastures were sown with either Samson AR37 or Halo AR37, at 16 kg/ha, with 3 kg/ha of white clover
- Pastures were sown in autumn 2010 (8 farms) and spring 2010 (2 farms).

Measurements

- Pasture growth
- Botanical composition
- Endophyte infection frequency
- Soil invertebrates - grass grub, porina, clover root weevil, earthworms
- Soil nutrients
- Pasture Quality (MJ ME/kgDM) was not measured



Results

Establishment phase herbage production

In the renewed pasture, the loss of production during establishment was compensated by greater growth relative to unrenewed pastures.

Although renewing a pasture takes it out of the rotation for a short period, this is unlikely to compromise the overall production from the paddock.

Post-establishment phase herbage production

- On average there was no difference between Unrenewed, Renewed and Good pastures in seasonal herbage production or in total annual drymatter herbage production
- Total annual herbage production ranged from 12.6 – 17.5 t DM/ha.

Table 1. Herbage production (t DM/ha) of the Unrenewed, Renewed and Good pastures in the establishment phase

	<i>Herbage production (t DM/ha)</i>	
	Autumn sown	Spring sown
	Establishment to July 2010 (5 months)	Establishment to July 2011 (10 months)
Unrenewed	4.5	15.1
Renewed	3.9	15.0
Good	5.3	18.3

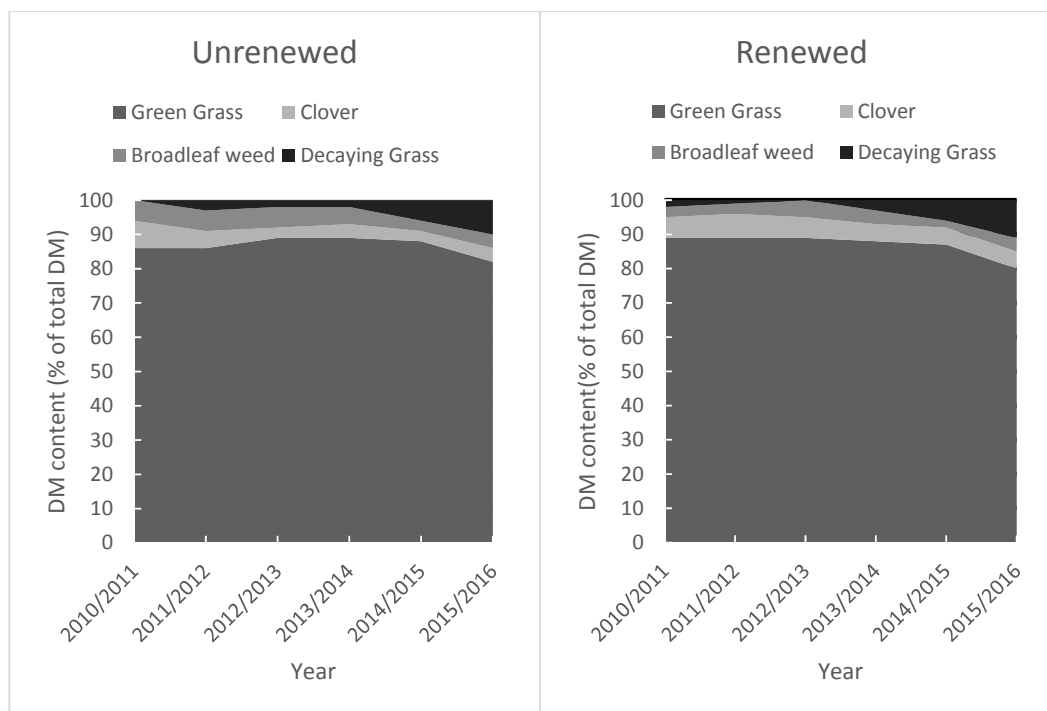
Table 2. Total annual average herbage production (t DM/ha) for Good, Renewed and Unrenewed pasture

Year	Total annual average herbage production (t DM/ha)			
	Unrenewed	Renewed	Good	<i>Average</i>
2010-2011	16.2	16.9	17.5	<i>16.8</i>
2011-2012	16.1	16.1	16.2	<i>16.2</i>
2012-2013	12.6	12.6	13.2	<i>12.8</i>
2013-2014	14.1	14.9	14.8	<i>14.6</i>

Botanical composition

- There was no difference between Unrenewed, Renewed and Good pastures in total grass content for any of the seasons or years.
- The Good (summer 2012-2013) and Renewed (autumn 2015) had greater clover content than the Unrenewed pastures.
- The content of broadleaf weeds was lower in Renewed than Unrenewed pastures in summer 2010-2011 (3 vs 8%), and in the second year (2011-2012: 3 vs 6% of total DM, $P < 0.05$).
- From 2015 onwards, more dead material was detected (Fig. 1). This is because pasture monitoring was reduced, and we used a less time-consuming sampling method.

Figure 1. Pasture composition of percentage of total DM of Unrenewed and Renewed pastures averaged over all farms



Endophyte

There was little change in endophyte infection frequency between 2010 and 2016, in Unrenewed, Renewed and Good pastures (table 3).

Some paddocks were old pastures and we do not know what endophytes were present.

Table 3. Percentage of ryegrass tillers with endophyte present (averaged over all farms)

Paddock ID	<i>Percent of ryegrass tillers with endophyte present</i>						
	2010	2011	2012	2013	2014	2015	2016
Unrenewed	45	48	46	49	48	68	58
Renewed	80	74	75	78	83	71	79
Good	62	63	59	65	70	67	51

On most farms the percentage of endophyte positive perennial ryegrass tillers infected with AR37 was above 90% (when tested in 2012, 2013 and 2016) (table 4). This indicates that AR37 persisted.

There were contaminant endophytes on most farms, mainly wild-type and AR1.

Table 4. Perennial ryegrass tillers infected with AR37, expressed as a percentage of the total number of endophyte infected tillers, in renewed pastures. 'Other endophytes' were detected in at least one of the three years.

Farm	Mar 2012		Feb 2013		Feb 2016		Other endophytes present
	Mean (%)	Confidence interval (%)	Mean (%)	Confidence interval (%)	Mean (%)	Confidence interval (%)	
1	97	85-100	94	79-99	89	76-96	AR1, Standard
2	100	91-100	92	79-98	96	86-99	Standard
3	93	77-99	100	82-100	93	80-98	AR1, Standard
4	100	86-100	97	83-100	100	92-100	Standard
5	100	87-100	100	85-100	98	88-100	Standard
6	100	91-100	100	90-100	- ²	- ²	
7	100	91-100	100	91-100	- ²	- ²	
8	67	47-83	- ¹	- ¹	76	58-89	AR1
9	100	89-100	100	89-100	- ²	- ²	AR1, Standard
10	100	89-100	97	83-100	81	66-91	Standard

¹Not sampled; ²Paddock renewed and removed from study

Invertebrates

Pasture soil pests were similar across Unrenewed, Renewed and Good pastures and were in low numbers.

Grass grub and porina were present at low numbers throughout the trial (numbers considered damaging above *ca.* 100/m² and 30/ m² consecutively). Clover root weevil (CRW) numbers increased dramatically from 0/m² to an average of 85/m² in the 2012 sampling and are now present on all farms (considered damaging at 250/ m²).

Table 5. Average of soil invertebrates sampled in autumn, in Good, Renewed and Unrenewed pastures.

Abundance (per m ²)	2010	2011	2012	2013	2014	2015	2016
Earthworms	453	553	456	494	592	570	553
Grass grub larvae	39	- ¹	18	30	36	- ¹	13
Porina larvae	- ¹	4	7	6	- ¹	- ¹	3
Clover root weevil	- ¹	27	85	56	35	65	37
Total insects	41	41	111	92	73	90	54

¹ Not present or numbers too small to analyse



Production benefits

- Defined as the difference in total annual DM production between a Renewed and Unrenewed pasture, and a Good and Unrenewed pasture, on the same farm
- Were highly variable for the Renewed and Good pastures between farms and between years
- The benefit of Renewed pasture ranged from -2.5 to +3.5 t DM/ha

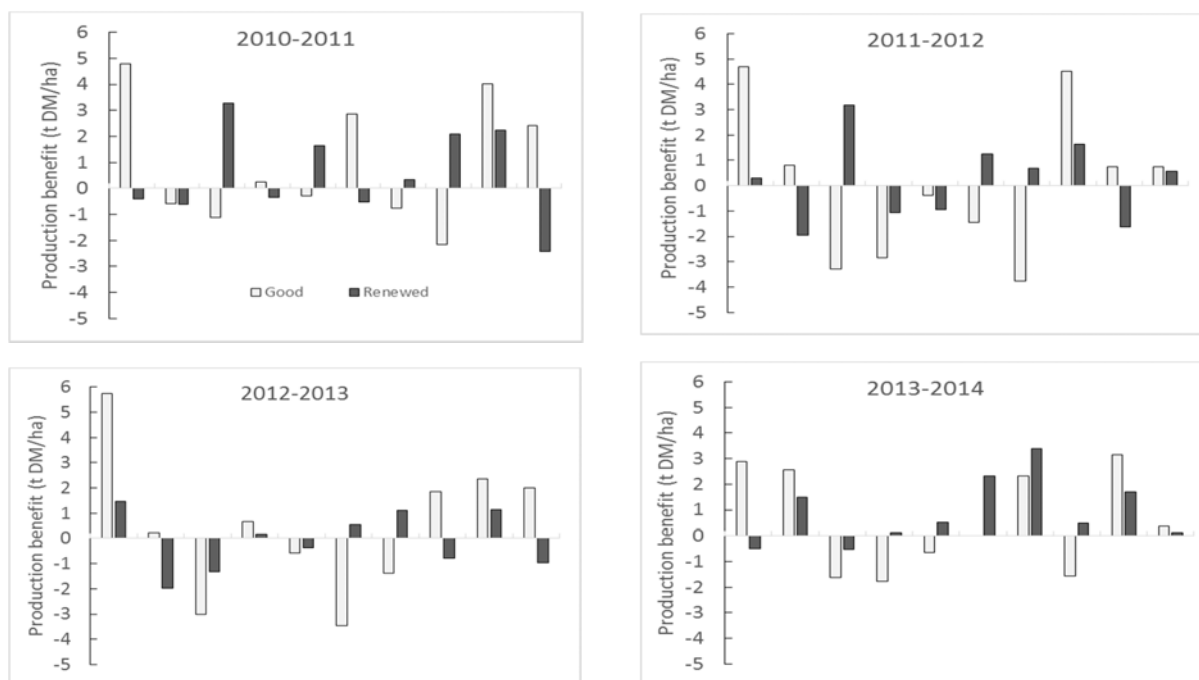


Figure 2. Production benefits relative to the Unrenewed pasture for Good pastures and for Renewed pastures (comparisons within a farm).

Each bar represents the difference in pasture production between either a Renewed and Unrenewed pasture, or a Good and Unrenewed pasture, on the same farm.

A positive number indicates that the Renewed (or Good) pasture produced more than the Unrenewed pasture and a negative number indicates that the Renewed (or Good) pasture produced less than the Unrenewed pasture, within any given farm and year.

The order of comparisons is the same for all years in all figures.

Key findings

- Loss of production during pasture establishment was recouped within the first 5-10 months.
- Some individual farms saw a production benefit to pasture renewal
When averaged across all ten farms there was no difference in herbage production between Unrenewed, Renewed and Good pastures.

Conclusions

- Selection of under-performing pastures, and addressing reasons why pastures are not performing is critical for renewal benefits to be realised.
- If a poorly performing pasture is not identified, there is a high risk that there will be no renewal benefit.
- Management of pastures to ensure genetic potential of novel germplasm and a return on investment is achieved
- Utilisation and intake was not measured and so not taken into account. Anecdotally farmers comment that “new pastures are easier to graze to good residual”

Recommendations

- Measure pasture production of individual paddocks to ensure you choose and unproductive pasture for renewal.
- Determine what the potential production of a pasture is. Is renewal going to overcome production obstacles
- Use the Forage value index (FVI) to choose cultivars that can perform well in your area and have the desired attributes including tetraploid / diploid, seasonality, endophyte etc.
- Deal with underlying poor performance before renewing a pasture.

Before renewing a pasture – (ensure your new pasture will be productive)

Getting a new pasture properly established is a 12 month process and pre-sowing preparation is a critical part. Here’s what you should be doing to ensure your pasture renewal plans are on track:

Walk your pastures

To assess their condition and identify work required before sowing new pasture. Why do you believe this pasture requires renewal? Is the problem actually the pasture, or is there some other underlying problem that will still exist and continue to limit production following renewal? If the pasture is patchy, what is causing the poor areas to be poor? Dig some holes to assess the soil profile in the seed and root zone, and to identify soil borne pests. Seek advice from an experienced advisor, and preferably have them walk pastures with you.

Soil test

If the pasture has been cropped you should have some good soil test data to work with. Otherwise, soil test the specific pastures being renewed – do not rely on tests from farm soil tests or transects.



Weed control

Is important to ensure previous pasture, crop and weeds are fully sprayed out. Remember you need 5-10 cm actively growing leaf for effective glyphosate absorption and kill - and add a broadleaf spray if required.

Where spray-drilling in situations with hard to kill weeds, or where there are high soil weed seed loadings, consider a double spray with a fallow period. Mixed results often occur when direct drilling into the residual browntop and grass weeds / thatch common on many Canterbury dairy farms. Going through a double spray programme, or through an annual ryegrass option (giving a double spray over time) or cultivation typically improves the probability of success.

Identify any pests

Talk to your advisor about remedies. If spray-drilling, apply slugbait and use treated seed

Prepare a good seedbed

Appropriate for the chosen sowing method. Some form of cultivation may be required if conditions in the seed zone are not conducive to a rapid germination and even emergence.

If cultivating, ensure a fine, firm and moist seedbed. Manage trash from the previous crop or pasture – this can harbour pests, lead to uneven sowing or poor seed-to-soil contact.

Discuss all spraying, cultivation and sowing requirements with your **contractor** well in advance of work required.

Seed selection

The seed genetics determine the future pasture performance, so are an important choice. Consider:

- Persistence required – e.g. annual, hybrid or perennial ryegrass. Annuals or Italians are useful in a double spray programme.
- Tetraploid vs diploid (or a tetraploid diploid mix) – while tetraploids are more palatable, easier to manage and can be grown to high covers, diploid ryegrasses are more robust and tend to persist better.
- DM yield and seasonality of growth – the DairyNZ Forage Value Index presents useful data on this.
- Endophyte – in irrigated Canterbury generally AR1, NEA2 and AR37 pastures all persist well.

Cost/benefit of pasture renewal at LUDF

Renewal programme

On the LUDF, as on many farms, pasture renewal is undertaken for two reasons:

1. **To improve profitability** – LUDF has a continual process of identifying under-performing paddocks, and investing in pasture renewal to improve pasture yield and feed value. This section deals with this.
2. **Event response** – e.g. if pugging occurs, or an Italian ryegrass suddenly thins. Immediate action is necessary, often simply with undersowing (ie. Direct-drilling seed with no prior herbicide).

Identifying under-performing paddocks

Potential benefit from renewal (t DM/ha) for each paddock is calculated as the difference between *Actual yield* and what we believe the *paddock should produce*, as in the table below.

The LUDF has 3 soil types, and the 'potential' for growth is taken as the best paddock with that soil type. The heavier South block soils produce around 2 t DM/ha/year less.

Paddock Number	Disappearance t DM/ha	Potential Growth t DM/ha	Potential Benefit from Renewal t DM/ha	Sown dates	Comments
Templeton silt loam – potential benefit 18.5 t DM/ha (based on paddock N1)					
N1	18.5	18.5	0.0	Feb-01	
N7	18.4	18.5	0.1	Jan-14	
N10	18.2	18.5	0.3	Jan-12	
N5	18.0	18.5	0.5	Dec-11/Aug 13	
N8	17.5	18.5	1.0	Jan-13	
N9	17.1	18.5	1.4	Oct-13	
N3	16.7	18.5	1.8	Nov-12/Sept-13	
N6	16.0	18.5	2.5	Apr-14	Paddock is thinning out
S2	16.0	18.5	2.5	Dec-10	
S3	15.9	18.5	2.6	Feb-10	
N4	14.7	18.5	3.8	Feb-15	
N2	14.1	18.5	4.4	Feb-11	
N11	12.3	18.5	6.2	Nov-07	Paddock thinning out
Wakanui Soils - Potential benefit 16.4 t DM/ha (based on paddock S4)					
S4	16.4	16.4	0.0	Dec-13	
S1	16.4	16.4	0.0	Dec-05	
S9	13.5	16.4	2.9	Dec-09	
S8	10.9	16.4	5.5	Oct-11	
Temuka Soils - Potential benefit 16.2 t DM/ha (based on paddock S6)					
S6	16.2	16.2	0.0	Dec-14	
S5	15.1	16.2	1.1	Dec-08	
S10	14.7	16.2	1.5	Nov-14	
S7	11.2	16.2	5.0	Oct-15	Poor growth

Cost/benefit of pasture renewal on LUDF

- Historic results at LUDF report an average 0.4 t DM/ha increase in DM eaten in the season of sowing (i.e. yield loss through renovation process is recovered from the higher yield immediately following planting). After this paddocks have on average shown a subsequent gain of 3 t DM/ha/year eaten.
- LUDF's cost of renewal is around \$825/ha excluding loss of pasture. Conservatively discounting the yield gains from 3000kgDM/ha/year eaten back to 2000kgDM/ha/yr and a \$4.50/kgMS milkprice, gives an accumulated total net benefit of nearly \$1800/ha at the end of year 3 (ie. A 218% return for an \$825 investment). This rises to \$3000/ha if achieving LUDF's average increase in yield of 3000kgDM/ha/year (ie A 360% return for an \$825 investment).

Effect of renewing pasture on LUDF at \$4.50 payout				
	Year 0	Year 1	Year 2	Year 3
Cost of renewal¹	-\$825			
Average kgDM/ha increase from renewal	400	2000	2000	2000
ME value (MJ ME/kgDM)	12	12	12	12
Extra ME/ha eaten	4800	24000	24000	24000
kgMS/ha (Conversion 120MJ/kgMS) ²	40	200	200	200
Value of extra DM grown at \$4.50/kg MS	\$180	\$900	\$900	\$900
Marginal costs extra MS ³	\$18	\$90	\$90	\$90
Net benefit (\$/ha/year)	-\$663	\$810	\$810	\$810
Total accumulated Benefit (\$/ha)	-\$663	\$147	\$957	\$1,767

Notes:

1 Cost of renewal includes pre-cultivation herbicide (\$80), cultivation (\$150), drilling (\$100), seed (\$400), and broadleaf herbicides (\$95). Cost of lost pasture is not included, as is accounted for in yield.

2 Assumes pasture 12 ME, conversion to milk of 120 MJ/kgMS.

3 Assumes marginal cost of extra MS produced of 10% of income.

- There have also been additional benefits in LUDF's move from diploid ryegrass, to tetraploid or diploid/tetraploid mix pastures, as a result of regrassing.–They have provided:
 - added flexibility in pregrazing management,
 - enabled higher pre-grazing covers, which in turn has increased pasture production (3 leaf principle)
 - still enabled low and consistent grazing residuals in a timely manner, and
 - helped lift / maintain high pasture ME. Together these gains have significantly helped LUDF achieve levels of milk production from pasture that were previously not commonly believed possible.
- Experience at LUDF therefore validates the above recommendations to choose paddocks for renovation based on potential gain in yield, then identify and rectify reasons for low performance before beginning the 'regrassing' process.

Regrassing at LUDF – 2016-17 Season:

Paddock yield assessment has identified only one paddock that LUDF wants to regrass this season. The older Shogun pastures were considered for regrassing as they don't have the longevity of perennials, but as they are still persisting well, will not be targeted for renovation this year.

Some undersowing has occurred in small parts of the farm that were damaged a little during calving. Similarly N6 and N11 have both been undersown as they were visibly looking thin and on the above yield data showed had the possibility of higher yield potential (but did not justify full renovation).

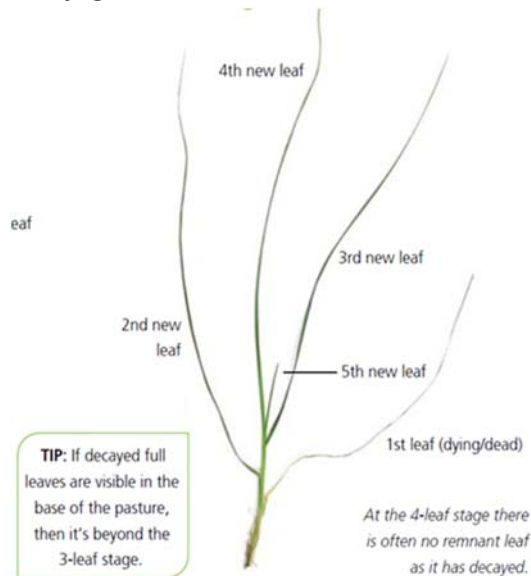
After much deliberation, LUDF has decided to sow Shogun plus Trojan, plantain and clover into S5. The paddock was sprayed on 3 October, will be grazed, then fully cultivated and sown with a roller drill to achieve uniform seed distribution. Shogun was chosen for its yield advantage as a hybrid perennial ryegrass, with the expectation that the paddock has historically not performed well and may benefit from further renovation again in 4-5 years time.

The DairyNZ Forage Value Index (FVI) does not yet rank hybrid ryegrasses but clearly identifies the value of shoulder season growth that Shogun provides. The sowing mix for S5 will be as follows:

Cultivar	kg/ha
Shogun NEA	17
Trojan NEA2	8
Kotare clover	2
Weka clover	2
Tonic plantain	0.75
Total	29.75

Understanding the ryegrass plant

The ryegrass tiller



A ryegrass pasture is made up of a population of individual tillers. These are the basic unit of a grass pasture and 1 ha has about 50 million tillers!

These tillers live a maximum of one year, so each year pastures 'replace' themselves.

So to ensure the persistence of a pasture we need to encourage new tillers, or "daughter tillers" to be produced from tiny buds at the base of tillers.

The most important period for this is October-December. This is when a tiller produces a seedhead, and when this seedhead is grazed or mown that tiller dies.

A tiller can have a maximum of three green leaves at any one time.

New daughter tillers, as shown on the right, grow from the bud at the base of an existing tiller.

"Good management" can thicken a pasture, increasing the number of tillers, so improving its persistence and DM yield.

The same management improves white clover growth, and pasture quality too.

So what are the principles behind this good management?



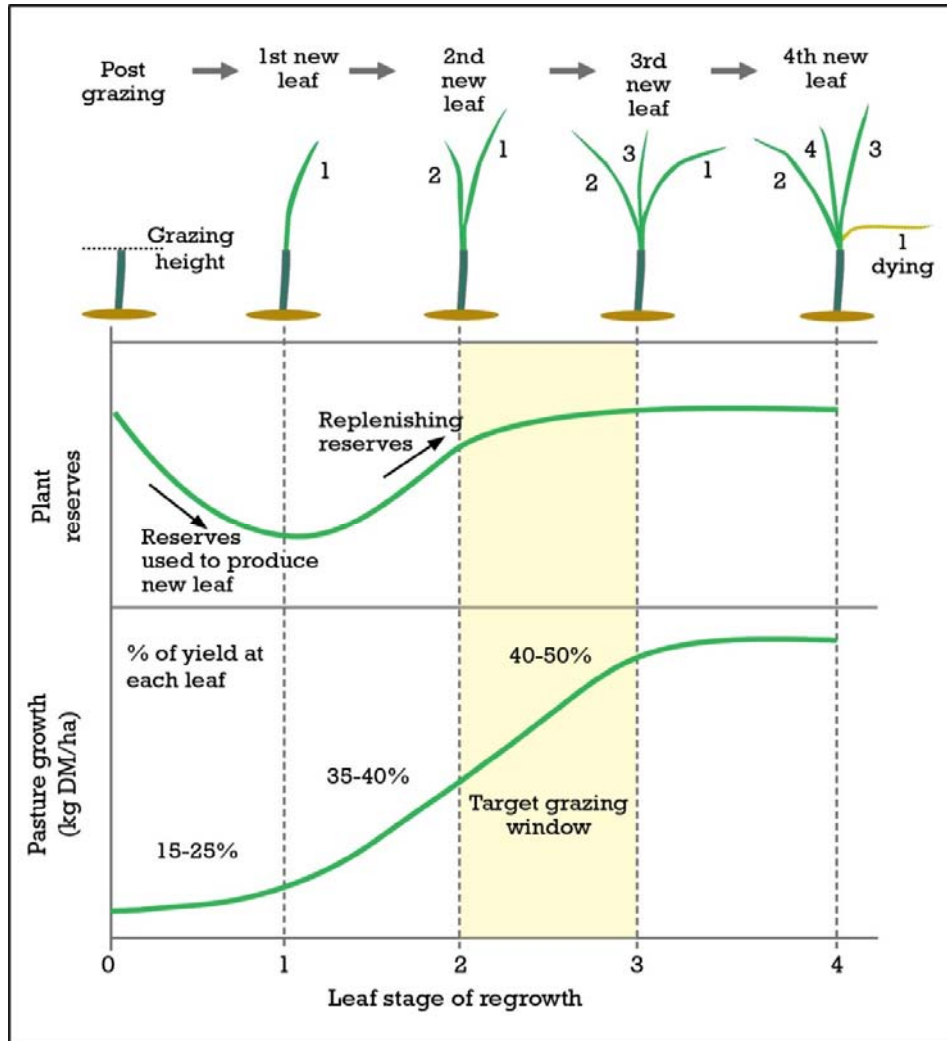
Understanding tillers – to get persistence

After grazing tillers produce a maximum of **three green, growing leaves** as in the top of the following diagram. Tillers don't stop growing after this, but produce a 4th leaf then a 5th leaf and so on, but these older leaves die. For strong tillers, and to get good survival of daughter tillers, two rules are important:

- **Tillers need light** – letting a pasture get too long means fewer tillers and less daughter tillers. So *graze a pasture up to the 3 leaf per tiller stage.*

- **Tillers need to replenish reserves** – the ryegrass plant reserves are shown in the middle curve of the diagram following. The 1st leaf is powered up from the reserves, then photosynthesis from 1st and 2nd leaves both replenish reserves and powers up future leaves. So *grazing at less than 2 leaves per tiller weakens a pasture.*

Pasture regrowth cycle – showing tiller energy reserves and DM yield



Understanding tillers – to get DM yield

Through a regrowth cycle pasture growth accelerates, with 40-50% of total DM growth between 2 and 3 leaves as shown in the bottom graph of the diagram above. This is the old adage “Grass grows Grass”, as higher cover/ha means more photosynthesis. So:

- **To maximise yield** – *graze as close to the 3 full leaves per tiller as possible.* This can grow up to 1 t DM/ha/year more than grazing at the 2-2.5 leaves per tiller. Note however this means running higher pasture covers. So surpluses develop more quickly, and prompt identification and action on these is important.

Understanding tillers – to get pasture quality

Pasture quality is good up to 3 leaves per tiller, after this as pasture get longer older leaves die and pasture quality decreases.

- **To maximise ME – Don't let a ryegrass go past the 3 leaves per tiller stage.**

Summary of good pasture management

Good management	Negative effect on pasture
<ul style="list-style-type: none"> • Graze at 2.5-3 leaves per tiller – to maximise growth & quality 	<ul style="list-style-type: none"> • Grazing at 1-2 leaves per tiller – will weaken pasture and slow regrowth. • Graze past 3 leaves per tiller – pasture quality and milksolids production can drop
<ul style="list-style-type: none"> • Light silage crops – this limits shading of new tillers, means better pasture density and regrowth. (Plus paddocks are back to grazing quickly.) 	<ul style="list-style-type: none"> • Heavy silage crops – reduces tiller density, weakens pasture, slow regrowth (if it turns dry this can severely damage pasture).
<ul style="list-style-type: none"> • Graze to consistent residuals – pastures like the same thing happening every day (like cows!) and adapt to this. 	<ul style="list-style-type: none"> • Graze inconsistent residuals – this lowers pasture utilisation. It can also affect the plant reserves in the bottom 4cm so slow regrowth. Also can effect quality and milksolids production.

Rates of leaf emergence

The following table gives approximate rates of leaf emergence based on average temperatures. This allows an estimate for the time it will take a tiller to reach the grazing window of 2.5 leaves. Using Canterbury in summer as an example, if it takes 10-13 days for a leaf to fully grow a well grazed paddock will be ready in 25- 32 days. (i.e. 10-13 days x 2.5 leaves).

NOTE: this is just a guideline – actual rates will vary with temperature and soil moisture.

	Spring	Summer	Autumn	Winter
Top of South Island/Westland				
Average temperature	10-16°C	14-18°C	10-18°C	7-9°C
Time taken for one leaf to fully grow	9-15 days	10-12 days	10-17 days	16-21 days
Canterbury/North Otago				
Average temperature	7-14°C	13-18°C	6-16°C	2-8°C
Time taken for one leaf to fully grow	10-21 days	10-13 days	11-28 days	18-72 days
Southland/South Otago				
Average temperature	7-13°C	13-18°C	6-15°C	2-8°C
Time taken for one leaf to fully grow	11-21 days	10-13 days	12-28 days	18-72 days

Also see the following articles at dairynz.co.nz:

- Perennial Ryegrass Management in Spring – Paddock guide (publication)
- Tillering in ryegrass pastures. Inside Dairy, September 2014.
- Maximising leaf availability using pasture growth principles. Technical Series, August 2014



Cost Benefit Analysis of using N Protect during the spring/summer/autumn applications at LUDF

Context

The N fertiliser application strategy for LUDF was discussed at the LUDF August Management Advisory Group (MAG) meeting and the suggestion raised to consider using N Protect (a urease inhibitor treated urea fertiliser product) when applying N over the months October to March. The Group then asked for a brief cost benefit analysis of using this technology before committing to it.

Assumptions

1. Cost of products (at 31/08/16)

Urea	\$460/tonne (\$1.00/kg N)
N Protect	\$510/tonne (\$1.11/kg N)
2. Cost of application is the same therefore not considered.
3. Average volatilisation spring/summer/autumn 18% (Bishop and Manning 2011)¹
4. Average inhibition of volatilisation: 50% (Zaman et al.2013; Sherlock et al. 2011)^{2,3}
5. Rate of application 25 kg N/ha
6. No rain/irrigation >10mm within the first 8 hours after application

Cost Benefit Calculation

1. 0% volatilisation	Urea \$25/ha N Protect \$27.75/ha	Costs \$2.75/ha more for NO benefit
2. 18% volatilisation	Using N Protect will reduce N loss by 50% i.e., loss is 9% cf urea = 2.25 kg N/ha saved.	Costs \$2.75/ha more to save \$2.25/ha in lost N (at above urea price)
3. 35% volatilisation - Worst case scenario	Using N Protect will reduce N loss by 50% i.e., loss is 17.5% cf urea = 4.38 kg N/ha saved.	Costs \$2.75/ha more to save \$4.38/ha lost (at above urea price). Net gain \$1.63/ha

Trigger conditions

Volatilisation risk is greatest when the following conditions occur:

- High rates of N applied (50-100+kg N/ha)³
- Less than 10 mm rain/irrigation within 8 hours of application⁴
- No plant cover/bare soil¹
- High wind run^{1,3}
- High temperature^{1,3}

It is not possible to be specific about exactly what pasture cover, wind run or temperatures are critical to determining % volatilisation loss, except to say that the more pasture cover there is the lower the volatilisation risk. Conversely the higher the wind run and temperature the higher the volatilisation risk.



Conclusions

Because LUDF is using low rates of urea-N application (i.e., c. 25 kg N/ha) the risk of volatilisation loss of ammonia gas is lower than at higher rates (e.g. 50 or 100 kg N/ha)⁴.

Provided that irrigation is applied at rates greater than 10 mm within 8 hours the risk of ammonia volatilisation can be minimised. (It is suggested that LUDF should review its irrigation management to ensure this can occur).

Under 'average' volatilisation conditions (i.e., c.18% N loss) there is no financial advantage from using 'N-Protect'. Under 'extreme' volatilisation conditions (i.e., c. 35% N loss) there would be a financial benefit from using 'N-Protect'. Extreme conditions would be where there are high temperatures, high wind velocities and the irrigator is unable to apply 10mm of water within 8 hours of application.

References

¹Bishop, P.; Manning, M. 2011. Urea volatilisation: The risk management and mitigation strategies. In: *Adding to the knowledge base of the nutrient manager*. (Eds. L.D. Currie and C.L. Christensen. <http://flrc.massey.ac.nz/publications.html>. Occasional Report 24. Fertiliser and Lime Research Centre, Massey University, Palmerston North, New Zealand. 13p.

²Zaman, M.; Saggar, S.; Strafford, A.D. 2013. Mitigation of ammonia losses from urea applied to a pastoral system: The effect of nBTPT and timing and amount of irrigation. *Proceedings of the New Zealand Grassland Association* 75: 209-214.

³Sherlock, R.R.; Jewell, P.; Clough, T. 2011. Review of New Zealand specific FRAC_{GASM} and FRAC_{GASF} emissions factors. MAF Technical Paper No. 2011/32. Ministry for Primary Industries, Pastoral House, 25 The Terrace, Wellington 6140.

⁴Black, A.S.; Sherlock, R.R.; Smith, N.P.; Cameron, K.C.; Goh, K.M. 1985. Effects of form of nitrogen, season, and urea application rate on ammonia volatilisation from pastures. *NZ Journal of Agricultural Research* 28: 469-474.

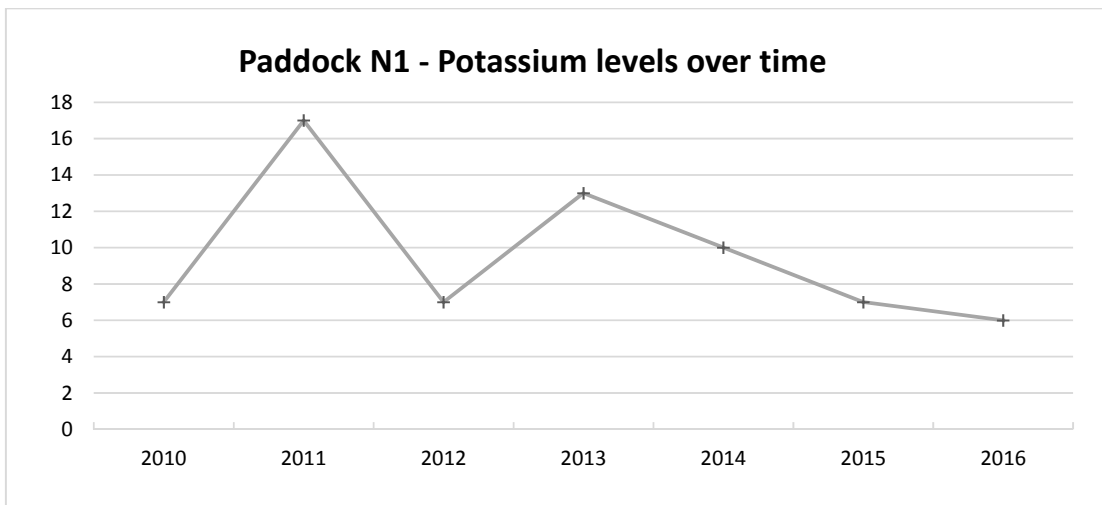
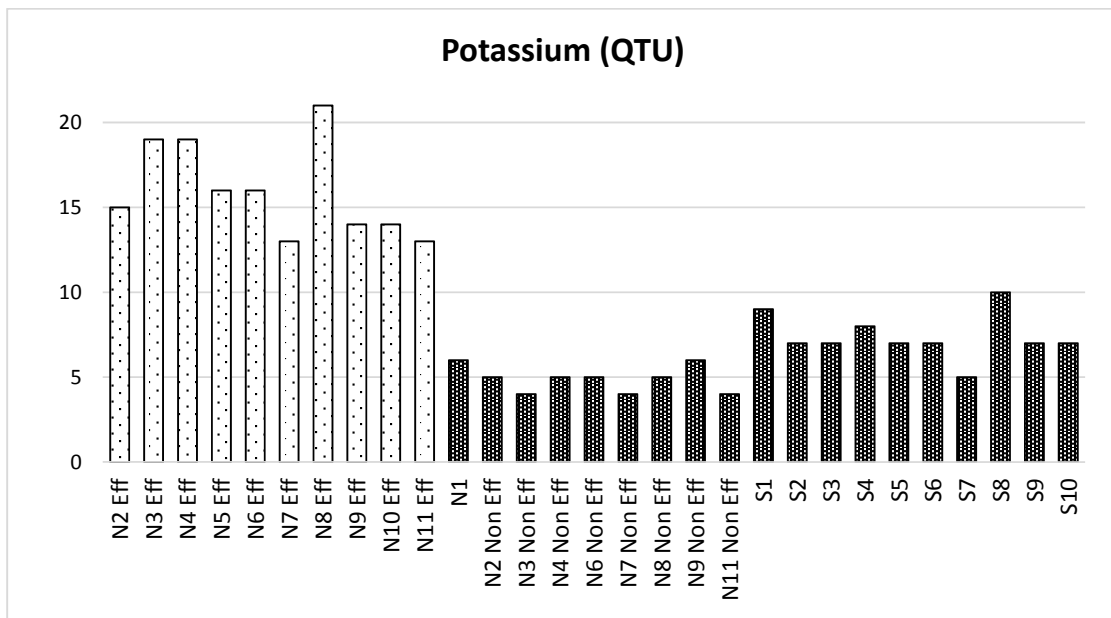
Dr AHC Roberts, Ravensdown. Professor Keith Cameron, Lincoln University. 6th September 2016



Soil tests - Potassium levels across effluent / non effluent area:

Individual paddock soil testing, including where appropriate separating the effluent and non-effluent sections of paddocks has identified the potassium levels on farm vary significantly between the effluent and non-effluent areas, with the non-effluent soil test levels now at the low end of the 'optimum' range.

To address this, a urea / potassium chloride blend will be applied to the non-effluent areas of the farm at a rate of 25kgN / 50kg Potassium per hectare. This will be applied in mid summer to lessen possible effects of this amount of potassium on animal health. Note this is a maintenance level of potassium, and is not at this stage seeking to lift soil potassium levels.



Mating Plans for 2016-17

LUDF has investigated a number of aspects relating to improving mating performance, actively wanting to increase the 6 week incalf rate and decrease the not-in-calf rate.

A detailed analysis was presented back in February, which shed little light on factors that were inhibiting reproductive performance at LUDF.

Closer attention is occurring with the mineral status of the herd, recent blood tests show selenium levels remain at the lower end of the 'normal range', despite the herd receiving selenium in the drinking water and short acting selenium at drying off and precalving. Similarly, total feed and pasture composition / pasture quality will be more carefully considered through the mating period this year with more likelihood of shorter grazing rounds and lower pregraze covers this season than has occurred in the past 2 years over the mating period (target maximum return period between grazings of 25 rather than 28-30 days, and pregraze covers of 32-3400 rather than 34-3800 kgDM/ha).

Yearling Heifers:

Mating of the yearling heifers begins on 11th October. Heifers will be AI mated to Premier Sires Daughter Proven Kiwicross, using observed heats for the first 6 days. Heifers not mated at that point will receive Prostaglandin, and mating to visual heats will continue for another 3-5 days depending on the number of heifers over this time. Jersey bulls will then be run with the heifers.

Milking Herd:

Current plans for mating remain based around 6 weeks AI followed by 4 weeks bulls for the milking herd. As the heifers are also to be AI mated this season the farm has a little more choice around AI use to generate its replacements.

Consideration was given to mating lower BW animals to beef straws to increase the value of this progeny. However as the LUDF herd generally comprises higher than average BW cows, the farm believes it can generate similar value and potentially has more options by mating some of these lower BW cows to premier sires. The intention is therefore to mate as follows:

- Predominantly Jersey cows will be mated to PS Friesian daughter proven bulls
- Remaining higher BW cows will be mated to PS Kiwicross daughter proven bulls
- 75 low BW cows are likely to receive a Hereford straw, either Short Gestation if the animal could be retained but is not one that LUDF wants to breed from, or standard Hereford beef pak if the animal is an early mated or likely cull.

Other options:

A number of farmers are successfully using extended AI and either using short gestation straws to help tighten the calving spread next season, or (and / or) using dedicated beef genetics to produce animals of higher worth at calving. These options remain available for LUDF.

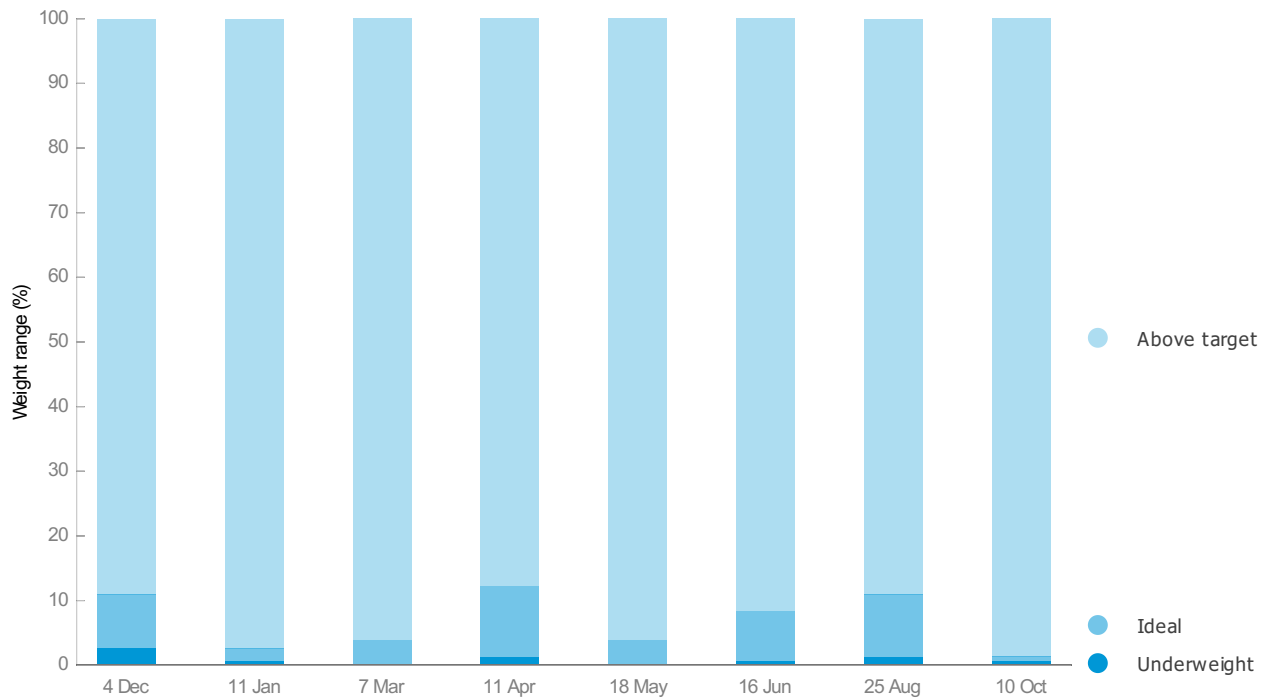


2015 Spring Born

10/10/2016

BQCY

Weight ranges



Weight dates

Range	December 2015		January 2016		March 2016		April 2016		May 2016		June 2016		August 2016		October 2016	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Above target</i>	138	89	151	97.4	149	96.1	136	87.7	149	96.1	142	91.6	138	89	153	98.7
<i>Ideal</i>	13	8.4	3	1.9	6	3.9	17	11	6	3.9	12	7.7	15	9.7	1	0.6
<i>Underweight</i>	4	2.6	1	0.6	0	0	2	1.3	0	0	1	0.6	2	1.3	1	0.6
Total Animals	155		155		155		155		155		155		155		155	



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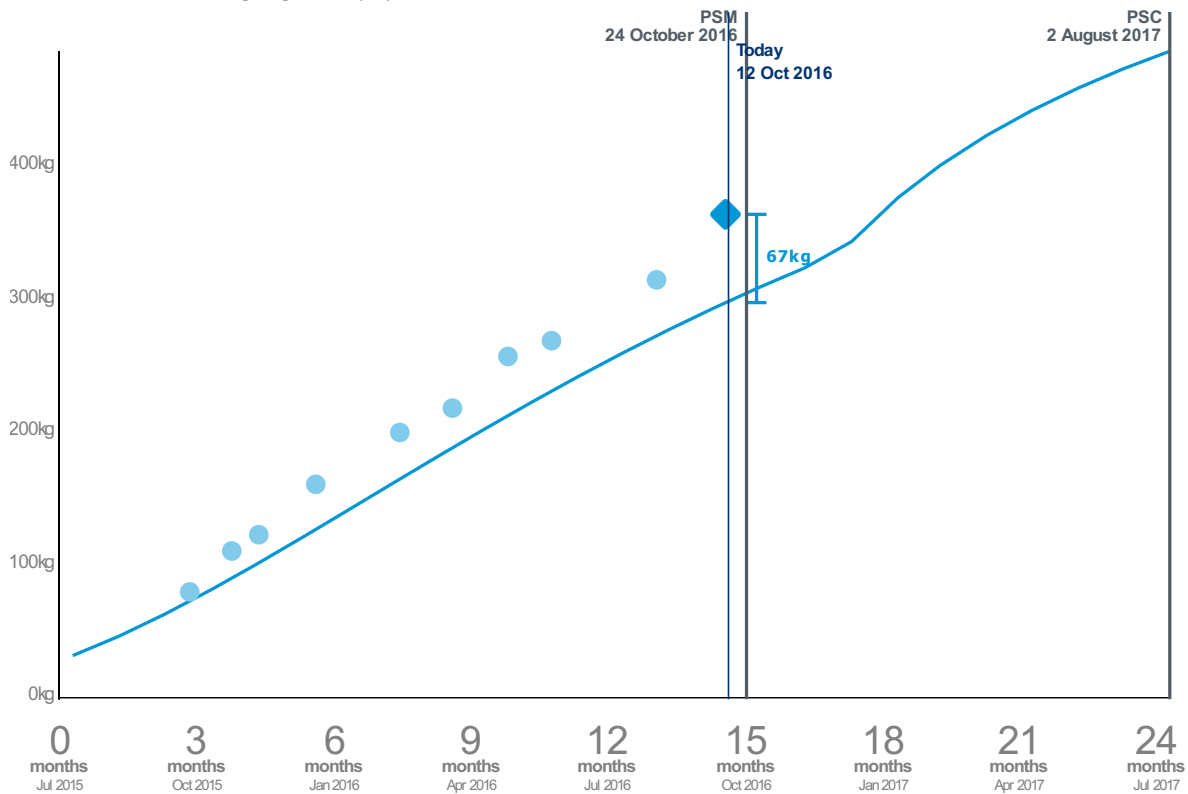
2015 Spring Born

10/10/2016

BQCY

Young stock trend

All 155 animals in this weighing are displayed



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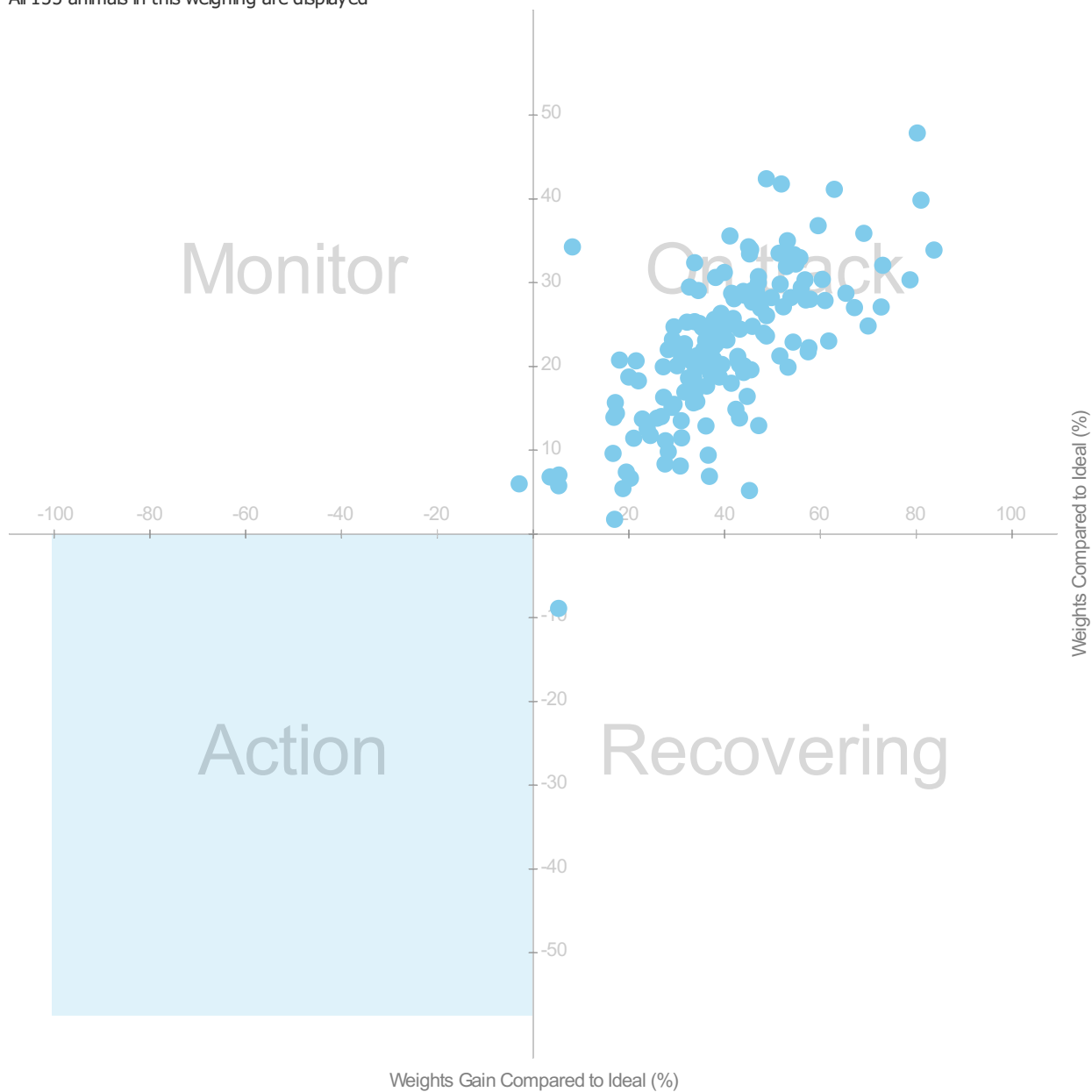
2015 Spring Born

10/10/2016

BQCY

Animal performance

All 155 animals in this weighing are displayed



Take action with these animals

Official Id ▲	AE Breed ◆	Current Weight (Kg) ◆	Weight Gain (Kg/day) ◆	Gain Required by PSM (Kg/day) ◆	Variation from Ideal (%) ◆	Previous Category ◆
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Showing 0 to 0 of 0 entries



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DairyNZ - Pre-graze mowing experiment

An experiment examining the effects of pre-graze mowing as a management tool during a pasture surplus on pasture growth rate, ME and animal performance (dry matter intake, milk production, BCS, and liveweight) will be running at the Lincoln University Research Dairy Farm (LURDF) from October 2016 to February 2017.

The experiment will allow us to determine the costs and benefits of pre-graze mowing. Preliminary results will be published on the DairyNZ and SIDDC websites as the trial progresses with a final report available June 2017.

Why pre-graze mowing?

The use of pre-graze mowing in NZ has increased. The perceived benefits are:





- increased DM and total ME intake
- reduced energy expended in foraging and harvesting pasture
- increased MS production

The concept of grazing paddocks at higher pre-grazing covers (ensuring plants are at or close to the 3 leaf stage) and therefore capitalising on longer rotation lengths to achieve additional pasture growth is also generating interest.

The use of higher pre-grazing covers can make achieving target residuals challenging. Pre-graze mowing has been proposed by some as a way of meeting target residuals and maximising pasture utilisation, particularly for those with a lower stocking rate.

The experiment

To test the theory an experiment with four treatments, with two replicates has been designed (eight individual farmlets in total). The treatments are shown in the diagram.

		Harvesting	
		Grazing	Mowing
Pre-grazing cover	Low 2900kg DM/ha		
	High 3500kg DM/ha		

Data collection

The following data will be collected during the experiment

Daily	Weekly	Other
<ul style="list-style-type: none"> • individual cow milk volume and liveweight • Time required to mow • Pregraze (pre mown) covers and residuals 	<ul style="list-style-type: none"> • Farm walk/pasture covers • Feed wedge • Growth rate • Pre- and post- grazing pasture cover for each paddock (+ pictures) • Refused pasture in mown paddocks and silage • DM intake (from pre and post covers) • Pasture botanical composition (from standing and mown pasture) • Pasture nutritive value • Individual cow milk composition 	<ul style="list-style-type: none"> • Fortnightly BCS scoring • Tiller plugs at the start and end of the experiment • Grazing behaviour from SensOor eartags

How to find out about the trial data as it progresses

Keep an eye out on the DairyNZ and SIDDC websites where very soon you will be able to subscribe to a weekly update. You can also get involved in the discussion around the information via Facebook and Twitter.



Lincoln University Dairy Farm - Farm Walk notes

Tuesday 11 October 2016

LUDF – focus for 2016/17 Season: Nil-Infrastructure, low input, low N-loss, maximise profit.
 Farm system comprises 3.5 cows/ha (peak milked), Target up to 170kgN/ha, 300kgDM/cow imported supplement, plus winter most cows off farm. FWE of less than \$1 million and Target production of over 500kgMS/cow (>100% liveweight in milk production).

Critical issues for the short term

1. **Monitor average pasture cover and pasture quality through the let spring period to ensure enough good quality grass is put in front of cows daily to ensure good production and reproductive results.**
2. **Monitor cow BCS changes through the first half of lactation.**
3. **Prepare stock and team for mating**

Key Numbers - week ending Tuesday 11th October 2016

Ave Pasture Cover	2,820 kgDM/ha	Pasture Growth Rate	88 kgDM/ha/day
Round length	25 days (for 160 ha)	Ave Supplement used	0
No Cows on farm	561	Ave Soil Temp (week)	11.0°C
Kg MS/cow (531 cows)	2.4	SCC	142
Protein : Fat ratio	0.77	Protein: 3.86%	Fat: 5.20%

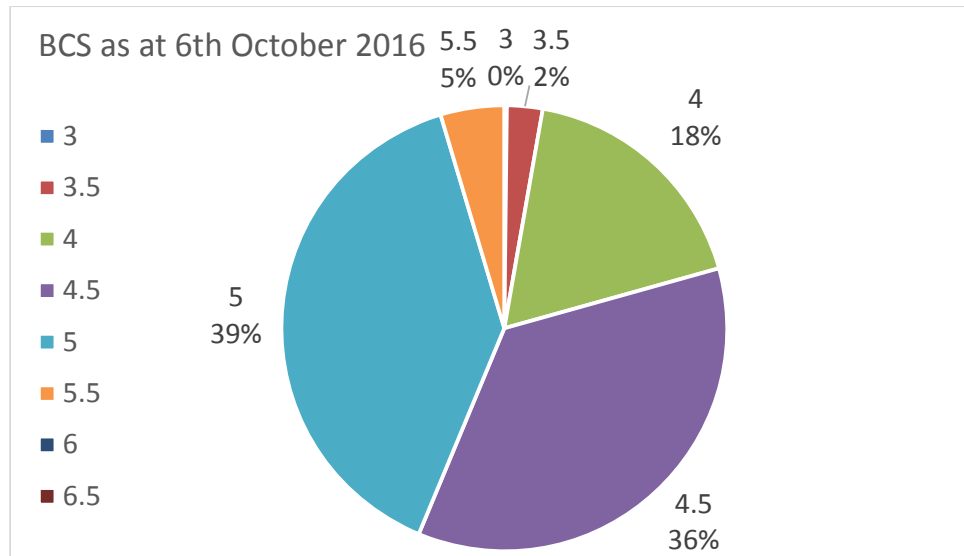
Herd Management

4. A total of 555 calved cows are on farm as of today (a total 561 cows in the platform area). There are 2 milking herds on farm, a small herd of 153 first calvers and low BCS cows and a large herd with 369 mixed age cows. Slight preferential grazing for the small herd has been established as per usual management for LUDF.
5. There are 543 cows going into the vat (522 on twice a day milking and 21 once a day) and 9 colostrum cows.
6. All AB pregnant cows have now calved. There is only 5 cows to calf and no cows left on the East Block. These cows are excluded from the number of cows on farm in the summary table above.
7. All cows are being fed pasture only and there are no cows left out grazing.
8. There has been 4 new case of mastitis over the past week (26 clinical cases to date compared to 57 cases this same time last year) and 4 new cases of lameness (36 cases vs 15 cases at this same time last season).
9. Trace minerals and magnesium chloride are running through the stock water to all cows on the milking platform.
10. 152 heifer replacements have been tagged, and all calves are now outside on East Block. Most heifer replacements are on calf milk replacer.
11. The 155, 2015 born R 2 heifers away grazing were weighed yesterday and are on average 42 kg above their target LW (breeding value). They have been bled for trace mineral status and have received a selenium/Vitamin B12 injection. They have also received additional copper as an oral copper bullet and an anthelmintic drench early last week. They are receiving multi-mineral



supplementation through the stock water (at half of the milking cows daily rate) as well as additional stock iodine after blood tests showed marginal iodine status.

12. The herd was condition scored on 6th October - the average BCS for the whole herd was 4.6 with 20% of the herd at BCS below 4.5, 36% at 4.5 and 44% of the herd at BCS 5 or more. In mid July (pre calving), the average of 500 cows condition scored was 5.3.



On average the herd lost 0.7 BCS between mid-July and early October. This trend is not unusual at this time of year. With around 80% of the herd at BCS of 4.5 and above, the cows look good and are producing well.

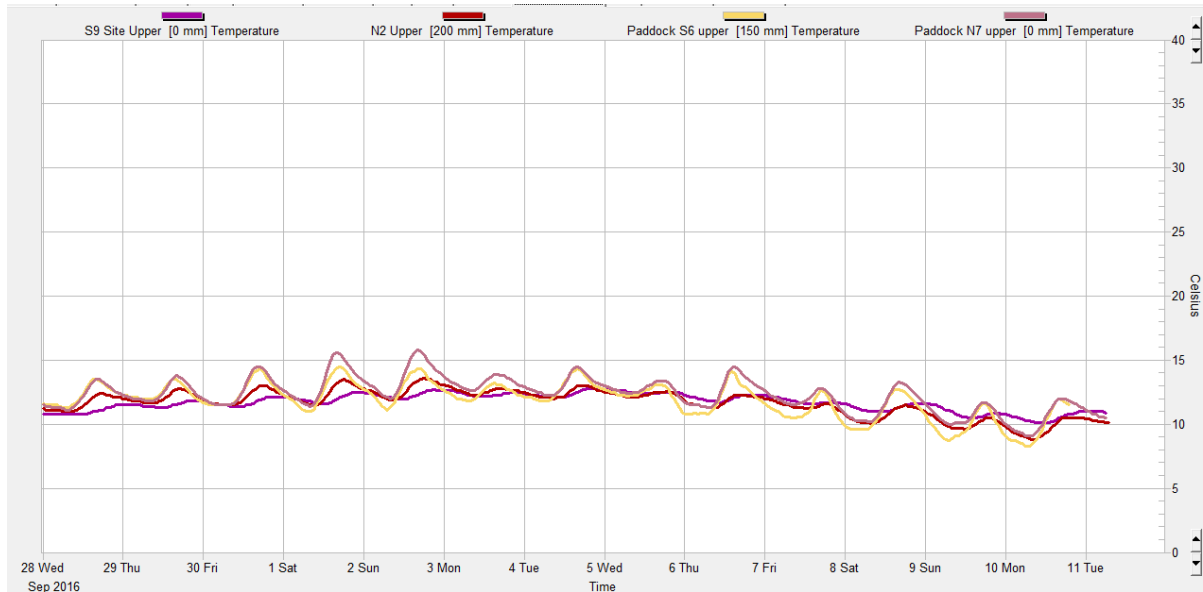
Mating preparedness

13. All cows are being Metricechecked at 5 weeks post calving.
14. Pre-mating heats started on Monday 19th September. So far 285 cows have shown signs of heat – about 50% of the herd so far. Week on week and increasing number of cows are showing pre-mating heats (76, 88 and 121 in weeks 1, 2 and 3 of pre-mating heats respectively). This will help the herd achieve (or get closer to) industry target of 85% pre-mating heats by PSM.
15. Breeding bulls have been purchased some weeks ago. All bulls have been blood tested for BVD. They have also been vaccinated with a 7 in 1 vaccine, a BVD booster, selenium and copper injections and a pour on drench, all in preparedness for mating.
16. AI mating of 2014 born replacement heifers started today and will have a total length of 9 weeks. KMars were applied yesterday (Monday 10th October). We will AB for 6 days. Then any heifers that have not shown signs of heat will be PG'd. AB will continue for another 3 days and then bulls will go out with the herd until completing the 9 weeks of mating (12th December).

Growing Conditions

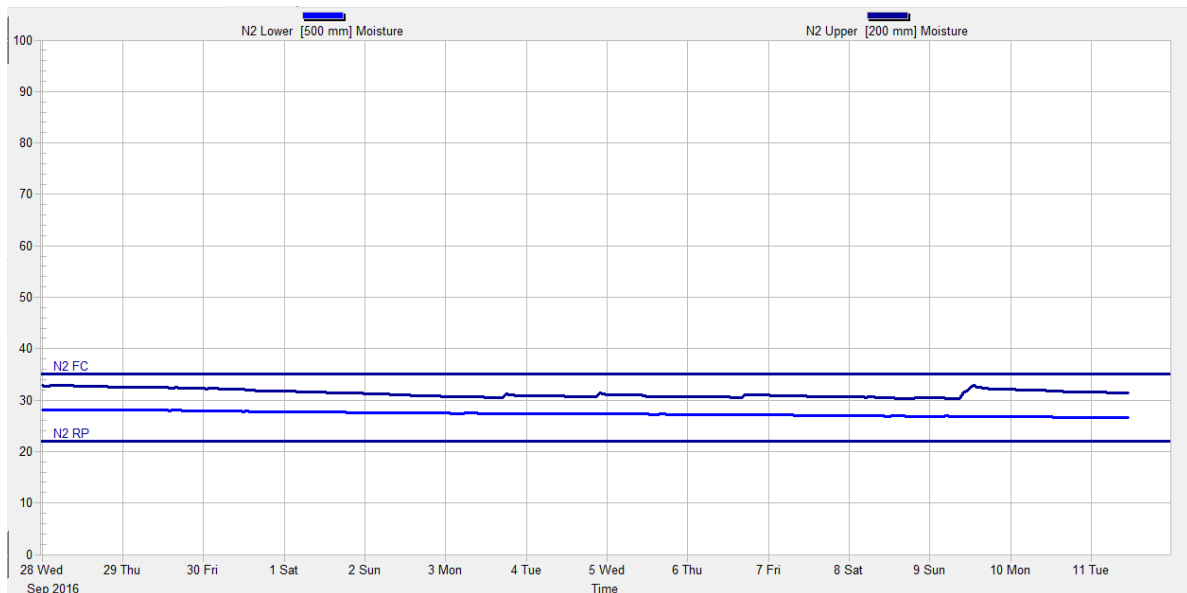
17. The average 9 am soil temperature for the past week was 11.0°C, 0.7°C below last week's temperature (and on par with this same week last year).
18. The spell of cooler weather seen through the weekend and early week is evident in the soil temperature graph below.

Figure 1: Soil temperature history for the last 2 weeks



- 19. The farm received 16.6 ml of rain in the weekend, followed by lower temperatures through the southerly during the weekend. It also continues to be predominantly overcast.
- 20. In terms of soils moisture: irrigation was started last week (as identified with the small increases in soil fill capacity seen in the graph below). However, following the rainfall event, irrigation was stopped and has not yet started again. This will continue to be monitored so irrigation can be started again according to weather and ET.

Figure 2: Soil moisture history for the last 2 weeks (Paddock N2)



- 21. Fertilizer applications continue on the fully grazed paddocks:

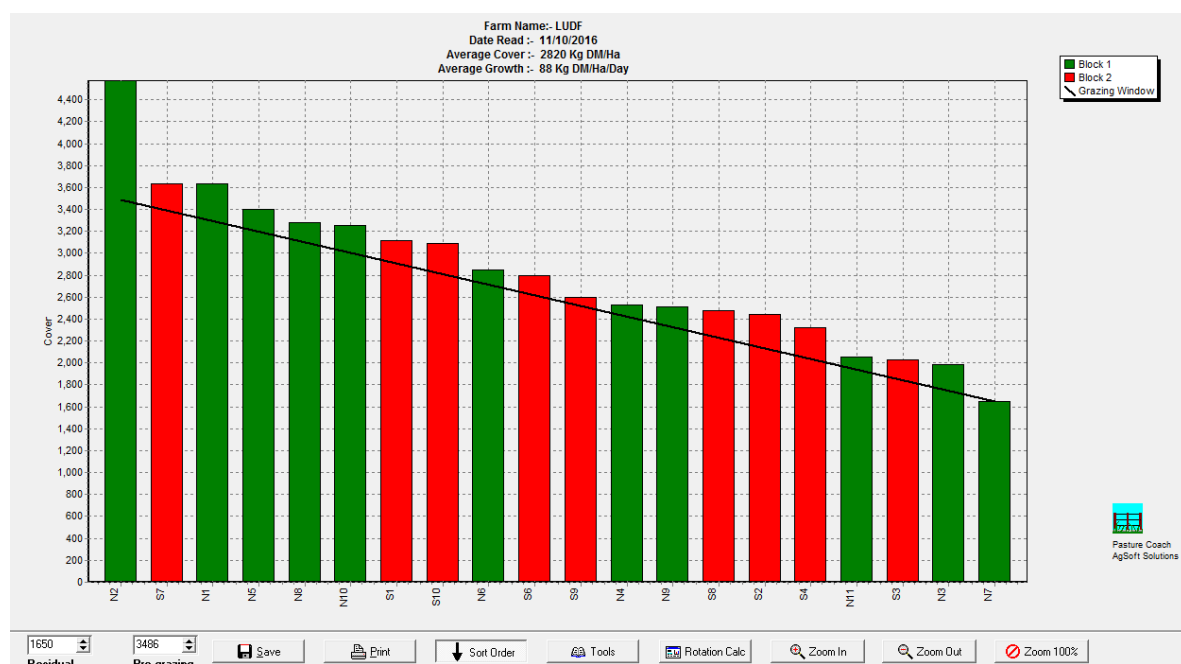


- a. 28.2 ha have received nitrogen at a rate of 25 kgN/ha over the past week.

Pasture and Feed Management

22. All undersown areas that were damaged during the wet spell of spring (2.6 ha in N3; 1 ha in S2 parts of N6 and N11) are now showing sign of emergence.
23. First round grazing finished on 21st September and the higher-than-usual growth rates and the mild winter- August – September allowed the farm to go through spring rotation planner without feeding any supplements, whilst finishing first round largely on target.
24. Paddock S5 was sprayed out for regrassing on Tuesday 3rd October. The plan was to harvest it for silage, then cultivate and resow. However, wet weather conditions have meant that cows have had to graze this paddocks instead (7th October). The paddocks is now waiting to be fully cultivated to assist with aeration and levelling before re-establishing pastures.
25. Paddock N2 was targeted for silage harvest last week. However, wet weather conditions and contractor commitments have meant that the paddock has not yet been harvested.

Figure 3: This week's feed wedge



26. The demand line on the above pasture wedge graph is calculated as follows:
- We will have all 560 cows calved for next week and calculations will be based on 152 ha as S5 is now considered out of the round
 - Planned round length for the coming week is 25 days over 152 ha or 6.1 ha/day
 - The intake for the level of production is around 20 kgDM/cow/day
 - Total demand: 20 kgDM/cow/day x 560 average cows for the week = 11,200 kgDM/day (73kgDM/ha/day over the 152ha milking platform)
 - Demand of 11,200 kgDM/day from 6.1 ha /day requires 1,836 kgDM/ha available.
 - As the target residual is 1650kgDM/ha, target pregraze covers are as follows - 1,650 kgDM/ha + 1,836 kgDM/ha = 3,486 kgDM/ha pregraze covers required.

27. Feed wedge information:

- a. Average pasture cover this week is 2,820 kgDM/ha, an increase of 50kgDM/ha. This makes sense with a growth rate of 88 kgDM/ha/day and a demand of 73 kgDM/day/ha.
- b. The feed wedge above shows a surplus of 37.3 tonnes DM total.

28. Observation from the feed wedge above:

- a. Paddocks N2 is still showing on the wedge (first paddock). This paddock is waiting to be harvested for silage. If we take that paddock as harvested then the average pasture cover of the farm would drop to 2680 kgDM/ha and the surplus to 16 t DM total. Calculations are as follows:
 - i. current cover 4574 kgDM/ha
 - ii. residual after silage harvested: 1650 kgDM/ha
 - iii. Paddocks size: 7.3 ha
 - iv. Total hectares available to graze: 152 ha
 - v. Surplus to be harvested: $(4574-1650)*7.3 = 21,345$ (or 21.3 t DM total)
 - vi. Surplus left over: $37.3 \text{ t DM} - 21.3 \text{ t DM} = 16 \text{ t DM total}$
 - vii. Average pasture cover drop: $21,345/152=140$ kgDM/ha
 - viii. New average pasture cover on farm: $1820 \text{ kgDM/ha}-140= 2680 \text{ kgDM/ha}$
- b. Pre-graze mowing was expected to happen during last week too, to help cows achieve residuals and look after quality for the next round. However, again due to wet weather conditions this has not yet happened.

29. Visually, the pasture this week appears to be lush and of high quality

30. From the calculations above, the true surplus of the farm (taking N2 out of the equation) is around that 16t DM total. With a daily demand of 11.2tDM/day, the surplus is just over 1 day's feed.

31. Cows are continuing to be fully fed on pasture even as demand continues to increase with the last of the cows calving and per cow MS production steady from last week.

32. No silage has been fed to milking cows, season to date. In contrast at the same stage of the season last year, milking cows had been offered an average of 93.3 kgDM of silage/cow.

33. Paddocks at the top end of the feed wedge (even N2) remain of good quality (12 MJME/kgDM) and are on average being well utilised by milkers. Post grazing residuals are starting to lift so pre-graze mowing will start today.

Feeding Management for the coming week:

34. For the coming week our aim is:

- a. Grazing management: Our focus moving forward remains making sure we put enough of the highest quality grass possible in front of cows for harvest. To achieve this we will:
 - i. Target a 25 day grazing round for the coming week on 152 ha.
 - ii. S5 has already been sprayed and is out of the round
 - iii. Paddock N2 will be harvested for silage early as soon as the conditions allow and the contractor is available.
 - iv. At that same time pre-graze mowing will start today to help deal with the smaller surplus available. This is earlier than last season, however, the whole season seems to have happened earlier.
- b. The key target for the coming week remains to feed cows as much pasture as they can effectively eat, every day, to minimise loss of cow condition whilst ensuring postgrazing residuals and per cow and per ha MS production targets are achieved.

35. Continue to apply fertilizer as enough area becomes available. Application rates will be as follows:

a. Apply Urea at 25kgN/ha (except in the effluent area) to paddocks already grazed

LUDF Weekly report	13-Sep-16	20-Sep-16	27-Sep-16	4-Oct-16	11-Oct-16
Farm grazing ha (available to milkers)	160	160	160	160	160
Dry Cows on farm / East blk /Jackies/other	88/0/0/0	56/0/0/0	34/0/0/0	17/0/0/0	5/0/0/0
Culls (Includes culls put down & empties)	1	0	1	0	3
Culls total to date	6	6	7	7	10
Deaths (Includes cows put down)	2	2	1	0	0
Deaths total to date	6	8	9	9	9
Calved Cows available (Peak Number 560)	480	510	528	543	556
Treatment / Sick mob total	2	1	1	2	4
Mastitis clinical treatment	1	1	1	2	4
Mastitis clinical YTD (tgt below 64 yr end)	18	19	20	22	26
Bulk milk SCC (tgt Avg below 150)	228	167	156	125	142
Lame new cases	5	0	6	6	4
Lame ytd	20	20	26	32	36
Lame days YTD (Tgt below 1000 yr end)	259	371	455	567	693
Other/Colostrum	25	0	9	7	9
Milking twice a day into vat	434	470	490	515	522
Milking once a day into vat	15	14	12	16	21
Small herd	136	148	155	155	153
Main Herd	298	322	335	362	369
MS/cow/day (Actual kg / Cows into vat only)	2.41	2.41	2.42	2.45	2.39
MS/cow to date (total kgs / Peak Cows	46	60	75	91	0.77
MS/ha/day (total kgs / ha used)	6.47	7.13	7.60	7.99	5.02
Herd Average Cond'n Score	5.10		4.90	0.00	3.86
Monitor group LW kg WOW early MA calvers	474	476	472	473	107
Soil Temp Avg Aquaflex	7.6	10.1	10.3	11.7	8.02
Growth Rate (kgDM/ha/day)	57	94	74	92	4.60
Plate meter height - ave half-cms	15.0		15.4	16.2	474
Ave Pasture Cover (x140 + 500)	2601	2713	2656	2770	11.0
Surplus/[deficit] on feed wedge- tonnes				24	88
Pre Grazing cover (ave for week)	3667	3608	3439	3619	16.6
Post Grazing cover (ave for week)	1550	1550	1550	1550	2820
Highest pregrazing cover	3794	3692	3596	3790	0
Area grazed / day (ave for week)	4.55	5.65	5.50	5.86	3623
Grazing Interval	35	28	29	27	1550
Milkers Offered/grazed kg DM pasture		19.5	19.5	20	4145
Estimated intake pasture MJME		240	240	240	6.38
Milkers offered kg DM Grass silage		0	0	0	25
Silage MJME/cow offered				0	0.0
Estimated intake Silage MJME		0		0	12
Estimated total intake MJME		240	240	241	0
Target MJME Offered/eaten (includes 6% waste)		240	240		0

Pasture ME (pre grazing sample)	12.4	12.3	0.0	0.0	0
Pasture % Protein	21.7	22.1	0.0	0.0	239
Pasture % DM - Concern below 16%	19.4	16.9	0.0	0.0	0
Pasture % NDF Concern < 33	40.8	38.8	0.0	0.0	11.9
Mowed pre or post grazing YTD	0.0	0.0	0.0	0.0	23.8
Total area mowed YTD	0.0	0.0	0.0	0.0	11.6
Supplements fed to date kg per cow (560 peak)	0.0	0.0	0.0	0.0	39.4
Supplements Made Kg DM / ha cumulative	0	0	0	0	0.0
Units N applied/ha and % of farm	25units/20%	0	25units/20.5%	25units/21%	25units/17.6%
Kgs N to Date (whole farm)	11	11	23	29	35
Rainfall (mm)	20.8	0	1.8	2.6	16.6
Aquaflex topsoil rel. to fill point target 60 - 80%	90-100	70-90	50-70	50-70	70-80

Next farm walk: Tuesday 18th October 2016 at 9am. Farmers or their managers and staff are always welcome to walk with us. Please call to notify us of your intention and bring your plate meter and gumboots. Phone SIDDC – 03 423 0022.

Peter Hancox, Farm Manager, Natalia Benquet, Charlotte Westwood.



Lincoln University Dairy Farm Focus Day

Farming activity land use consents

13 October 2016

Michaela Rees, Tami Woods, Sylvia McAslan
Environment Canterbury

www.canterburywater.farm

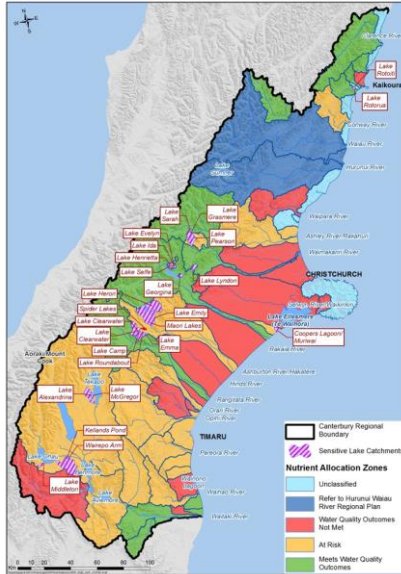


The big picture

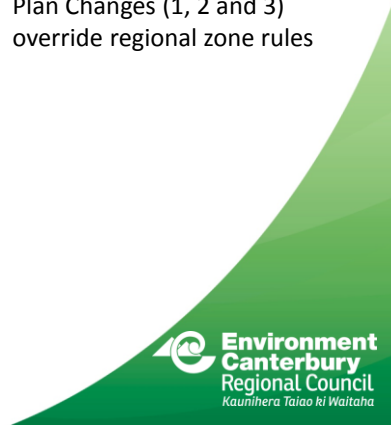
- Rising expectations & increasing scrutiny
- Water quality is declining and it's everyone's problem
- Farmers and communities under pressure
- National Policy Statement for Freshwater Management
- Canterbury Water Management Strategy
- New Land and Water Regional Plan with farming activity rules



Regional Nutrient Management Zones



Note: Selwyn-Te Waihora, Hinds and South Canterbury Plan Changes (1, 2 and 3) override regional zone rules



Regional Nutrient Management Zones



Water Quality Objectives not met



Water Quality Objectives “at risk”



Water Quality Objs met



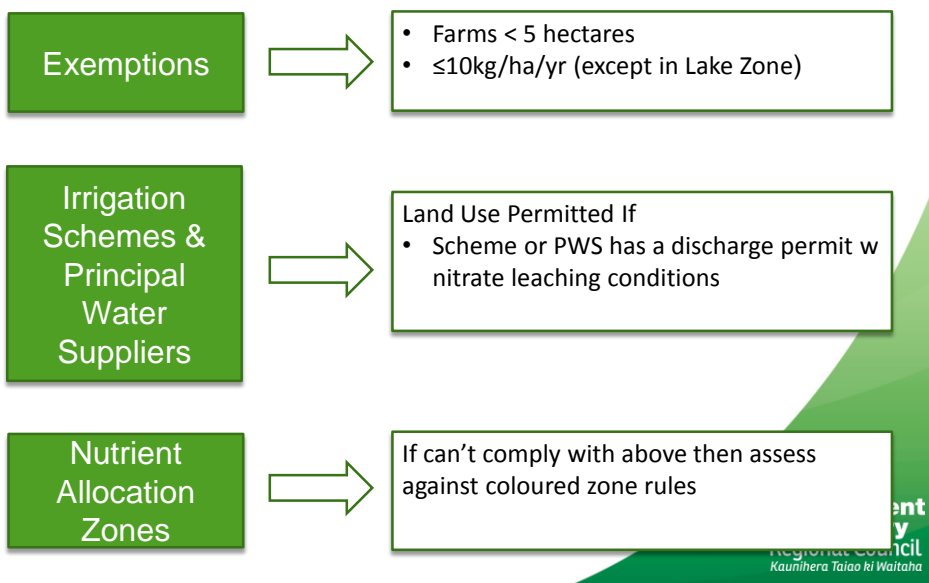
Nutrient Management: Key Terms

- **Nitrogen Baseline (NBaseline)**
 - Average nitrogen loss between 1 July 2009 – 30 June 2013 calculated using OVERSEER®*
- **Nitrogen Loss Calculation (N-loss)**
 - Average nitrogen loss over the most recent four year period
- **Baseline GMP Loss Rate**
 - Average nitrogen loss between 1 July 2009 – 30 June 2013 calculated using OVERSEER®* at Good Management Practice
- **Good Management Practice**
 - Practices described in the document entitled **Industry-agreed Good Management Practices relating to water quality**

* Or alternative model approved by ECan

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Regional Council
Kaunihera Taiao ki Waitaha

Current Regional Nutrient Rule Pathways



 **Environment
Canterbury**
Regional Council
Kaunihera Taiao ki Waitaha

Regional Nutrient Allocation Zones & current consent triggers

LAKE ZONES

- Prohibited → Increase above NBaseline
- Consent → All required to apply within 6 months after plan became operative

RED ZONES

- Prohibited → Increase above NBaseline
- Consent → Farms leaching > 20kg/ha/yr
1 January 2017
- Permitted → Everything else

Regional Nutrient Allocation Zones & current consent triggers

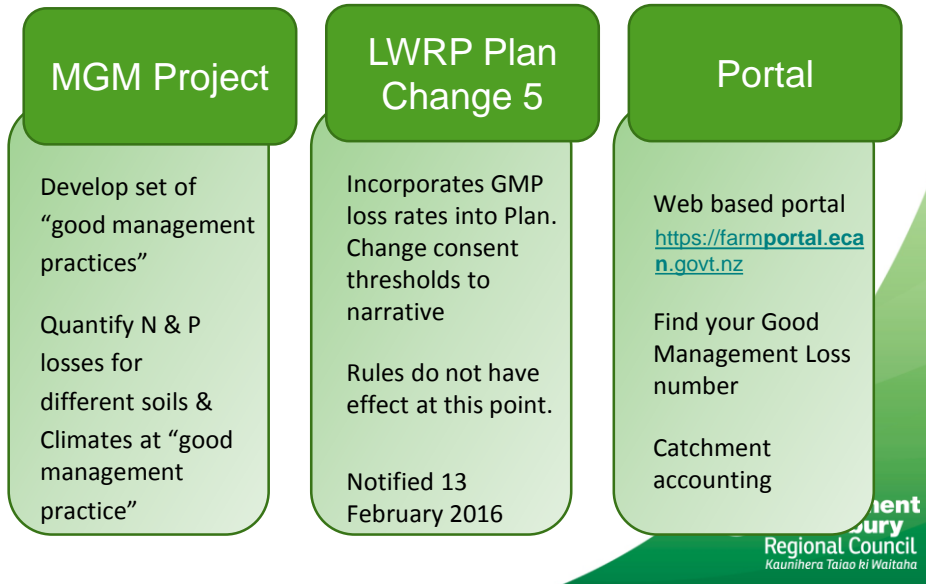
ORANGE ZONES

- Permitted → If $\leq 20\text{kg/ha/yr}$ or
If $> 20\text{ kg/ha/yr}$ & property $< 50\text{ha}$
& no increase above NBaseline
- Consent → Everything else
1 January 2016

GREEN & BLUE ZONES

- Permitted → If $\leq 20\text{kg/ha/yr}$ or
If $> 20\text{ kg/ha/yr}$
& property $< 50\text{ha}$, or
increase in N-loss $\leq 5\text{kg/ha/yr}$
- Consent → Everything else

MGM & Plan Change 5



Sub-regional Nutrient Management

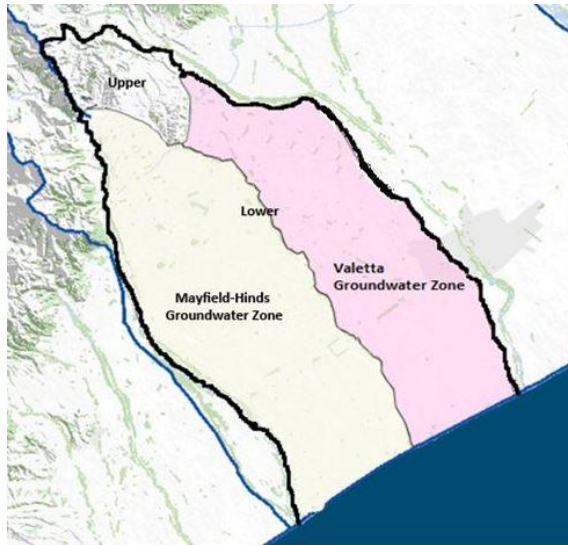
Hinds

Selwyn Te Waihora

South Canterbury Coastal Streams

Specific catchment rules and actions to meet water quality outcomes and limits

Sub-regional: Hinds Area




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Regional Council
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Hinds Area Nutrient Allocation

Hinds
(less than
15kgN/ha/yr)

Permitted → < 5 hectares and/or
≤15kg/ha/yr

Hinds
(greater than
15kgN/ha/yr)

Prohibited → Increase above NBaseline

Consent* → from 1 Jan 2017

- Can increase up to 20kgN/ha/yr in Lower Hinds
- > 20kgN/ha/yr NBaseline (consistent with GMP booklet)

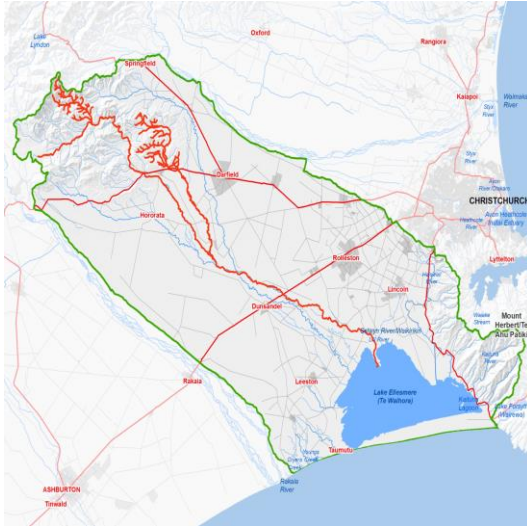
→ from 1 Jan 2025 further reduce by:

- 15% reduction
- 2030 25% reduction
- 2035 36% reduction

* Irrigation scheme shareholders managed by scheme discharge consent


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Sub-regional: Selwyn Te Waihora Catchment



 **Environment
Canterbury
Regional Council**
Kaunihera Taiao ki Waitaha

Selwyn Te Waihora Catchment Nutrient Allocation

Selwyn Te Waihora
(less than
15kgN/ha/yr)

Permitted*¹ → if < 10 hectares, or don't require consent

Consent*² → from 1 Jan 2017 if:

- Within Cultural Landscape Values Management Area
- Phosphorus & Sediment risk area

Selwyn Te Waihora
(greater than
15kgN/ha/yr)

Prohibited → Increase above NBaseline*³

Consent*² → from 1 Jan 2017 NBaseline (consistent with GMP booklet)

→ from 1 Jan 2022 further reduce by **30%** for dairy to achieve the catchment load limit

*¹ Permitted to increase up to 15kgN/ha/yr

*² CPW shareholders managed by scheme discharge consent

*³ In some circumstances can increase to max annual loss during baseline (2009-13) years

 **Environment
Canterbury
Regional Council**
Kaunihera Taiao ki Waitaha

What you will need to have in place to apply for consent

- A completed consent application
- A Farm Environment Plan
- OVERSEER® file(s)* for the NBaseline (this can be one representative file for the four year period if farm was in 'steady state') and current land use if increasing Nitrogen losses outside a Red Zone or $\leq 15\text{kgN/ha/yr}$ in Selwyn.

** Or alternative model approved by Environment Canterbury*

Consent forms available @ www.canterburywater.farm



Likely Conditions on Consent

- Requirement to maintain a Farm Environment Plan (FEP)
- Requirements for the Farm Environment Plan to be Audited
- Nitrogen Discharge Limits
 - Regional: Limit that reflects NBaseline - then from 2020 Baseline GMP Loss Rate
 - Selwyn Te Waihora Catchment: Limit that reflects NBaseline then from 2022 further 30% reduction
 - Hinds Area: Limit that reflects NBaseline then:
 - 2025 further 15% reduction
 - 2030 25% reduction
 - 2035 36% reduction



Compliance Monitoring and Enforcement

- Monitoring is triggered by the date the AUDIT is due – typically 12 months after consent exercised
- Compliance is determined, in general, on the Audit Grade
 - A or B grade = Compliant
 - C or D grade = Non-compliant
- First C or D grade in three years = Farmer ALERT
- Second C or D grade in three years = Enforcement

** If you are a member of an Irrigation Scheme or Principal Water Supplier discuss what is required with them.*

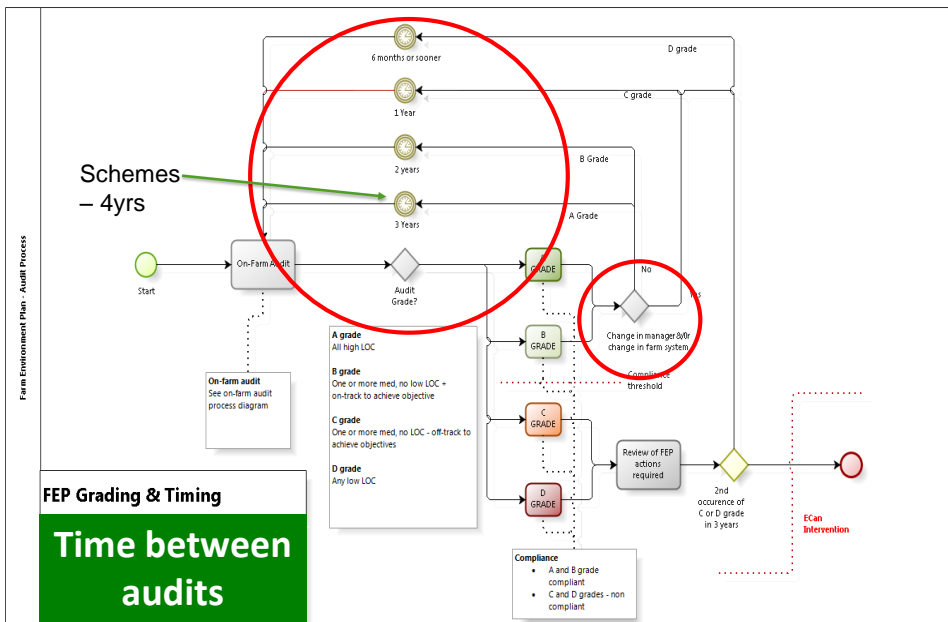
FEP Audit

An FEP audit is an independent assessment of the implementation of:

- The programme to manage the identified risks;
- Good Management Practices (GMPs) that would contribute towards the management of the identified risks to minimise the impact on water quality and thereby protect cultural values that can be affected by that water quality.
- Water Efficiency; and
- Robust Nutrient Budgeting

The auditors task

- The auditors task is to find out:
 - Is it happening?
 - Is it understood?
 - Is it effective?
- *“Management system audits depend upon people demonstrating their knowledge and implementation of the requirements”*



Making an Application: Selwyn example

What's involved in making a Consent Application?

- Since March 2015 all applications must include a long list of items...
 - *Full name and address of applicant*
 - *The correct deposit for the application*
 - *Full name and address of owner/occupier of land if different from the applicant*
 - *Identification of all relevant consents and Permitted Activities needed for the proposal*
 - *A description of the activity and its location with a legal description of the site*
 - *A location plan and site map*
 - *A description of the affected environment*
 - *Any written approval supplied by affected parties*
 - *An Assessment of Environmental Effects (AEE; see next slide for more detail);*
 - *A description of the mitigation measures proposed*
 - *An analysis of the policies relevant to the proposed activity from any relevant legal and planning framework*
 - *An assessment against Part 2 of the RMA*

Key Matters in making an Application Selwyn Example

- Application Forms (e.g. Selwyn Form CON 509) and Planning Assessment Sheets are designed to help you tick off the long list of requirements
- Decide whether you want to use your Farm Environment Plan to form as part of your application
 - Minimises questions you will need to answer
 - FEP will be made publicly available, if forms part of your application
- When specifying consent term sought - keep in mind:
 - The Plan contains a policy that the consent term should not exceeding 15 years - in over allocated catchments
 - If subject to reductions - but don't agree to reductions, policies direct that the consent term should be limited to 2022.



Key Matters in making an Application cont .. Selwyn Example

- Nitrogen loss management
 - Need to include your N loss numbers for the Nitrogen Baseline period*¹
 - May use one representative file, if land use didn't change during 2009-13
 - Nitrogen baseline can be modelled using any version of OVERSEER®
 - Nitrogen Baseline needs to be consistent with the Industry Good Management Practice booklet
 - Asked if agree to a Nitrogen Discharge Limit based on your Nitrogen Baseline.
 - Asked if you agree to percentage reductions from 2022
 - Can seek longer time to implement reductions (in certain circumstances)

*¹ or for your current land use if $\leq 15\text{kgN/ha/yr}$



Key Matters in making an Application cont .. Selwyn Example

- Phosphorus and Sediment Risk Area
Identify Phosphorus and Sediment Risk on your property and your practices in your Farm Environment Plan
- Cultural Landscape Values Management Area, if within
 - Identify whether your property contains any wāhi tapu or wāhi taonga, if it does you will need to consult with rūnanga
 - Asked whether agree to additional management objective and targets about managing waterways and protecting mahinga kai.



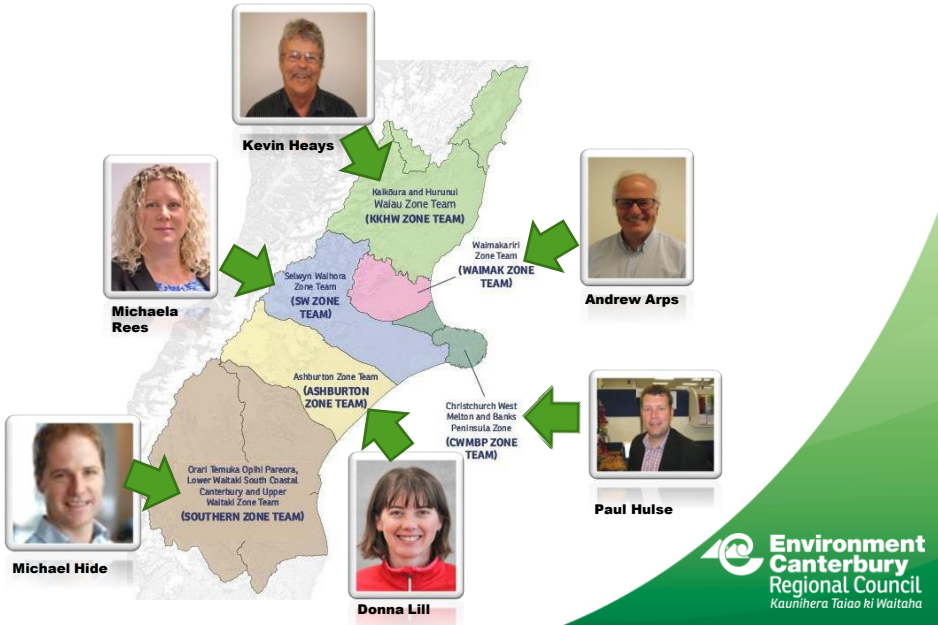
Who to talk to?

- Environment Canterbury Zone Delivery Team's
See contact handout for details
- Environment Canterbury Customer Services
- Relevant Consents Team

(03) 353 9007 or toll free on 0800 324 636 or
ecinfo@ecan.govt.nz



Zone Delivery Teams: Managers



Questions?

For further information visit www.canterburywater.farm



Advice and actions for farmers - Ashburton Zone (outside of the Hinds / Hekeao Plains area)

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming practice.

Talk to your Irrigation Scheme

If you are supplied water from BCI or RDR, you won't need to obtain a land use consent as you will be managed under their consent.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant industry links.

If you're not covered by a scheme, you will need a consent if

ORANGE ZONE:

Your farm's nitrogen loss exceeds 20kg/ha/yr and:

- Your property is larger than 50ha; OR
- Your nitrogen loss calculation has increased above your nitrogen baseline

RED ZONE:

Your property is over 5ha and your nitrogen loss calculation exceeds 20kg/ha/yr. An increase above baseline is prohibited.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline if you are >20 kg/ha/yr and
- In the Orange Zone only, if you are proposing to increase nitrogen losses above your Nitrogen Baseline, a Nitrogen Loss Calculation for your proposed activity.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

If you require a consent and you are in the orange zone, apply for it now. If you require a consent and you are in the red zone, lodge your application by July 2017.

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Farm Environment Plan Audit.

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The canterburywater.farm website offers guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2020

Your farm should be operating at its Baseline GMP Loss Rate.

This is the nitrogen loss rate if you were operating at good management practice in the baseline period (2009-2013) as estimated by the Farm Portal.

Advice and actions for farmers - Christchurch Banks Peninsula

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant industry links.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

You will need a consent if

GREEN AND LIGHT BLUE ZONE:

Your nitrogen loss calculation exceeds 20kg/ha/yr and

- Your property is larger than 50ha; AND
- Your nitrogen loss calculation increased above your nitrogen baseline by more than 5kg/ha.

RED ZONE:

Your property is over 5ha and your nitrogen loss calculation exceeds 20kg/ha/yr. An increase above baseline is prohibited.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need

- A Nitrogen Baseline if you are >20 kg/ha/yr and
- In the Green and Light Blue Zone only, if you are proposing to increase more than 5kg/ha above your Nitrogen Baseline, a Nitrogen Loss Calculation for your proposed activity.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

If you require a consent and you are in the green and light blue zone, apply for it now. If you require a consent and you are in the red zone, get your consent by July 2017.

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Farm Environment Plan Audit.

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The above website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2020

Your farm should be operating at its Baseline GMP Loss Rate.

This is the nitrogen loss rate if you were operating at good management practice in the baseline period (2009-2013) as estimated by the Farm Portal.

Advice and actions for farmers - Hinds / Hekeao Plains

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

- Good Management Practices (GMP)**
Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and put in place Good Management Practices related to your farming practice.
- Talk to your Irrigation Scheme**
If you are supplied with water from BCI or RDR, you won't need to obtain a land use consent as you will be managed under theirs.
- You will need a consent if your farm is**
Larger than 5 ha and your nitrogen loss calculation exceeds 15 kg/ha/yr (unless you are covered by BCI or RDR).

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

- Prepare your Farm Environment Plan (FEP)**
The canterburywater.farm website offers many approved Farm Environment Plan Templates.
For more information and help, talk to your industry sector representative or farm advisor about your options.
- Get your Nutrient Budgets done*, or at least be on the list****
Find yourself a trusted nutrient management advisor that will help you understand how to make your budget work for you. Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. You will need:
 - A Nitrogen Baseline, and
 - A nitrogen loss calculation for 1 September 2015

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** We know there may be a delay in getting your budgets done. Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

- Use the GMP Loss Estimator**
Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 15kg/ha/yr.
- Connect with your Primary Industry Body**
They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant industry links.

TIMELINE



Advice and actions for farmers - Hurunui Zone - Conway and Waipara Areas

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Talk to your Irrigation Scheme

If you are a member of a scheme, their consent may meet your requirements and they can help you with your nutrient budgets, Farm Environment Plans and the Audit.

If you're not covered by a scheme, you will need a consent if:

ORANGE ZONE:

You increase above your Nitrogen Baseline, or if your property is larger than 50ha and your nitrogen loss exceeds 20kg/ha/yr.

RED ZONE:

Your property is larger than 5ha and your nitrogen loss exceeds 20kg/ha/yr. An increase above baseline is prohibited.

GREEN AND BLUE ZONE:

You increase by more than 5kg/ha above your Nitrogen Baseline and your property is larger than 50ha.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant industry links.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline and a Nitrogen Loss Calculation, in the Orange Zone if you are proposing to increase above your Nitrogen Baseline, or in the Green and Light Blue Zone an increase that's more than 5kg/ha over your Nitrogen Baseline; for your proposed activity.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** We know there may be a delay in getting your budgets done. Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW

If you require a consent and you are in the green and light blue zone or orange zone, apply for it now. If you require a consent and you are in the red zone, get your consent by July 2017

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order.

Call us on 0800 324 636 to arrange an appointment.

FUTURE

Farm Environment Plan Audit

Within one year of getting your consent you will need an audit of your Farm Environment Plan.

The above website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

Advice and actions for farmers - Hurunui Waiau Plan Area

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Talk to your Irrigation Scheme or Collective

They will have your regulatory obligations for nutrient management covered so discuss with them to see what you need to do.

Farms will need to

Become part of a Collective or group with an environmental management strategy that is approved by ECan, or apply for a resource consent by 1 January 2017.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses.

Connect with your Primary Industry Body

They can support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant links.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates.

For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen and Phosphorus long-term average discharge for the few years before the plan became operative (20 December 2013). If there is a lack of records to do this, we consider the year before the plan became operative as a sufficient indicator of a long-term average. This is best calculated using OVERSEER®.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** We know there may be a delay in getting your budgets done. Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW

Join a Collective prior to 1 January 2017, or submit an application for resource consent by this date

Contact the ECan Hurunui Zone Team to get information on the Collectives that are developing in your area. If applying for a consent, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

FUTURE

Farm Environment Plan Audit

You will need an audit of your Farm Environment Plan at a frequency that will be specified in your consent or set down by your Collective. You can find a list of registered Farm Environment Plan Auditors on the canterburywater.farm farming website.

Advice and actions for farmers - Kaikoura Zone

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant industry links.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

You will need a consent if:

RED ZONE:

Your property is over 5ha and your nitrogen loss calculation exceeds 20kg/ha/yr. An increase above baseline is prohibited.

GREEN AND LIGHT BLUE ZONE:

Your nitrogen loss calculation exceeds 20kg/ha/yr and
Your property is larger than 50ha;
AND Your nitrogen loss calculation increased above your nitrogen baseline by more than 5kg/ha.

*There is currently a proposed plan change to the Land and Water Regional Plan which could potentially change these requirements in the future.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline if you are >20 kg/ha/yr and
- In the Green and Light Blue Zone only, if you are proposing to increase more than 5kg/ha above your Nitrogen Baseline, a Nitrogen Loss Calculation for your proposed activity.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

If you require a consent and you are in the green and light blue zone, apply for it now. If you require a consent and you are in the red zone, get your consent by July 2017.

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Farm Environment Plan Audit.

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The canterburywater.farm website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2020

Your farm should be operating at its Baseline GMP Loss Rate.

This is the nitrogen loss rate if you were operating at good management practice in the baseline period (2009-2013) as estimated by the Farm Portal.

Advice and actions for farmers - Ophi-Temuka-Orari-Pareora Zone

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming practice.

Talk to your Primary Industry Body and Irrigation Scheme

They are able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant links.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

If you're not covered by an irrigation scheme, you will need a consent if

ORANGE ZONE:

Your farm's nitrogen loss exceeds 20kg/ha/yr and:

- Your property is larger than 50ha; OR
- Your nitrogen loss calculation has increased above your nitrogen baseline

RED ZONE:

Your property is over 5ha and your nitrogen loss calculation exceeds 20kg/ha/yr. An increase above baseline is prohibited.

GREEN ZONE:

You increase by more than 5kg/ha above your Nitrogen Baseline and your property is larger than 50ha.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline if you are more than 20 kg/ha/yr and
- A Nitrogen Loss Calculation: if you are in the Orange Zone and are proposing to increase nitrogen losses above your Nitrogen Baseline, or in the Green and Blue Zone and proposing to increase above your Nitrogen Baseline by more than 5kg/ha.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

If you require a consent and you are in the orange zone or green and blue zone, apply for it now. If you require a consent and you are in the red zone, get your consent by July 2017

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017
2018

Farm Environment Plan Audit.

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The canterburywater.farm website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2020

Your farm should be operating at its Baseline GMP Loss Rate.

This is the nitrogen loss rate if you were operating at good management practice in the baseline period (2009-2013) as estimated by the Farm Portal.

Advice and actions for farmers - Selwyn Waihora Zone

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet and your industry sector guides to identify and put in place Good Management Practices related to your farming practice.

Talk to Central Plains Water (CPW)

If CPW supplies your water, you won't need to obtain a land use consent as you will be managed under their consent.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 15kg/ha/yr.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant links.

You will need a consent (if not covered by CPW), if your farm is over 10ha and:

Your nitrogen loss calculation exceeds 15 kg/ha/yr; or

Any part of your property is within the Lake Area of the Cultural Landscape Values Management Area or the Phosphorus and Sediment Risk Area.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates.

For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline if your losses are more than 15 kg/ha/yr, or
- A nutrient budget showing your proposed losses if your losses are less than 15 kg/ha/yr

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

Get your consent, if required, by July 2017

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in your consent application found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Farm Environment Plan Audit

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The canterburywater.farm website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2022

Further Reductions by 2022

All farms (with losses over 15 kg/ha/yr) in the Selwyn Te Waihora area will need to make further reductions beyond what can be expected by implementing Good Management Practices on the farm. Use your Farm Environment Plan and Nutrient Budgets to help you plan those reductions.

Advice and actions for farmers - South Coastal Canterbury Streams

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Talk to your Primary Industry Body and Irrigation Scheme

They are able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant links.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses.

You may need a resource consent to manage nutrients on your farm.

The South Coastal Canterbury Streams plan change is well on its way. This means that your regulatory requirements have the potential to change in the near future.

To prepare for these changes, you should work out your nutrient losses and prepare a Farm Environment Plan.

Talk to a consent planner if you are proposing to increase above your nitrogen baseline or if you have any questions while we await decisions on the South Coastal Canterbury Streams plan.

TO APPLY FOR A CONSENT YOU WILL NEED TO:

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates.

For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline and
- If you are proposing to increase above your Nitrogen Baseline, a Nitrogen Loss Calculation for that proposal.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** We know there may be a delay in getting your budgets done. Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW

Keep Records

Regardless of whether you will require a consent or not, you will need to know your nitrogen losses. This is only possible if you are keeping good records.

Talk to your nutrient management advisor about what they will need from you to make the most of your nutrient budget.

COMING SOON

South Coastal Canterbury Streams Plan change

Specific regulations for your area are coming soon.

They are currently going through the planning process and the decisions are expected to come out in October 2016. Keep yourself updated through the Environment Canterbury website at www.ecan.govt.nz

Advice and actions for farmers - Waimakariri Zone

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Talk to Waimakariri Irrigation Ltd (WIL)

If WIL supplies you water, you won't need to obtain a land use consent as you will be managed under their consent.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Loss Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

Connect with your Primary Industry Body

They may be able to support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the above canterburywater.farm website for relevant industry links.

If you're not covered by a scheme, you will need a consent if

ORANGE ZONE:

Your farm's nitrogen loss exceeds 20kg/ha/yr and:

- Your property is larger than 50ha; OR
- Your nitrogen loss calculation has increased above your nitrogen baseline

RED ZONE:

Your property is over 5ha and your nitrogen loss calculation exceeds 20kg/ha/yr. An increase above baseline is prohibited.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates.

For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. A trusted nutrient management advisor will help you understand how to make your budget work for you. You will need:

- A Nitrogen Baseline if you are more than 20 kg/ha/yr and
- In the Orange Zone only, if you are proposing to increase nitrogen losses above your Nitrogen Baseline, a Nitrogen Loss Calculation for your proposed activity.

TIMELINE

NOW-
2017

If you require a consent and you are in the orange zone, apply for it now

If you require a consent and you are in the red zone, get your consent by July 2017

If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Farm Environment Plan Audit

Within one year of getting your consent you will need an audit of your Farm Environment Plan. The canterburywater.farm website offer guidance on preparing for your audit and has a list of registered Farm Environment Plan Auditors.

2020

Your farm should be operating at its Baseline GMP Loss Rate

This is the nitrogen loss rate if you were operating at good management practice in the baseline period (2009-2013) as estimated by the Farm Portal.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

Advice and actions for farmers - Waitaki Zone

A simple guide to help you navigate your way through environmental farming regulations and the things you should be doing on the road to improving water quality in your area.

Good Management Practices (GMP)

Future proof your farm – use the Good Management Practices booklet, and your industry sector guides to identify and carry out Good Management Practices for your farming type.

Talk to your Irrigation Scheme

If you are a member of a scheme, their consent may meet your requirements and they can help you with your nutrient budgets and Farm Environment Plans.

Connect with your Primary Industry Body

They can support and advise you on how to meet GMP, prepare Farm Environment Plans and nutrient budgets. There may also be events being held in your area. Check out the canterburywater.farm website for relevant links.

Use the GMP Loss Estimator

Live August 2016: Use the GMP Estimator tool to estimate your nitrogen losses, and assess if you are less than 20kg/ha/yr.

If you're not covered by a scheme, you will need a consent if

ORANGE ZONE:

If you increase above your Nitrogen Baseline.

RED ZONE:

Your property is larger than 5ha and your nitrogen loss exceeds 20kg/ha/yr. An increase above Nitrogen Baseline is prohibited.

GREEN AND BLUE ZONE:

Your nitrogen loss exceeds 20kg/ha/yr and you increase by more than 5kg/ha over your Nitrogen Baseline and your property is larger than 50ha.

If you have a Nitrogen Discharge Allowance (NDA) on your water permit, that will become your NDA on your land use consent. Talk to a consent planner if you are proposing to increase above your baseline or if you have any questions.

Please note, until the Waitaki sub-region planning process is complete, a consent is still currently required (as above) regardless of any proposed changes.

IF YOU DO REQUIRE A CONSENT, YOU WILL NEED TO

Prepare your Farm Environment Plan (FEP)

The canterburywater.farm website offers many approved Farm Environment Plan Templates. For more information and help, talk to your industry sector representative or farm advisor about your options.

Get your Nutrient Budgets done*, or at least be on the list**

If you have a Nitrogen Discharge Allowance (NDA) on your water permit, that will become your NDA on your land use consent.

If not, find yourself a trusted nutrient management advisor that will help you understand how to make your budget work for you. Talk to your industry sector representative, fertiliser representative, or refer to a list of Certified Nutrient Management Advisors on the canterburywater.farm website. You will need:

- A Nitrogen Baseline and
- A Nitrogen Loss Calculation, in the Orange Zone if you are proposing to increase above your Nitrogen Baseline, or in the Green and Light Blue Zone if you're proposing an increase that's more than 5kg/ha over your Nitrogen Baseline.

* The Foundation for Arable Research and Horticulture NZ are working with Environment Canterbury to develop an interim method for finding your N loss number, as an alternative to a full OVERSEER® budget. We will let you know when this is available for use.

** Let us know if you are unable to apply for your consent due to a backlog in nutrient budgets. We know there may be a delay in getting your budgets done. If you have your Farm Environment Plan prepared (and it is being implemented) and your records are prepared for budget calculations, we will note your progress so you can be reassured that we know you are on-track for lodging your application.

TIMELINE

NOW-
2017

If you require a consent and you are in the orange zone or green and light blue zone, apply for it now. If you require a consent and you are in the red zone, get your consent by July 2017

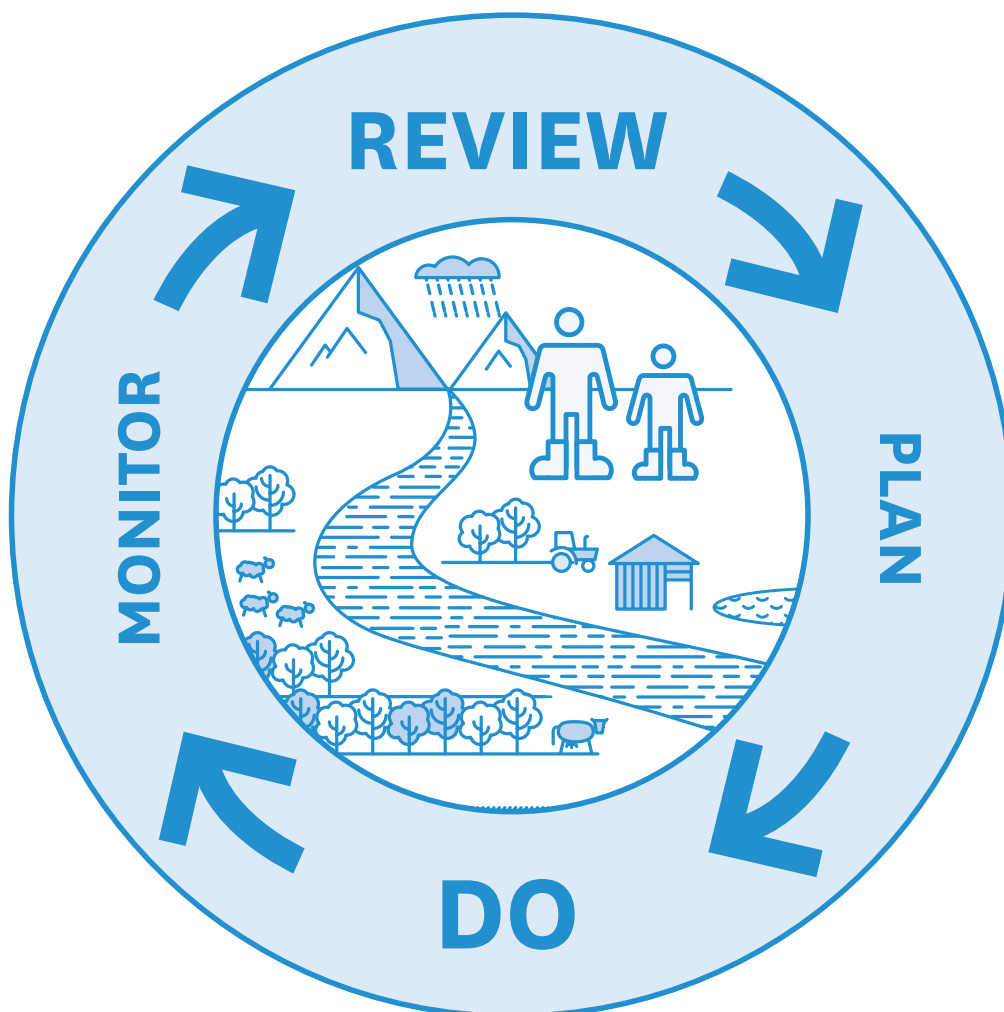
If you want to make sure you have your ducks in a row, use a free one-hour pre-application meeting with an Environment Canterbury Consent Planner. Fill in the consent application form found on the canterburywater.farm website, and ensure your Farm Environment Plan and Nutrient Budgets are in order. Call us on 0800 324 636 to arrange an appointment.

2017

Keep up to date with the Waitaki Plan change process.

Submissions on this plan change have now closed, and the hearing is expected to begin in August 2016. Check out the Environment Canterbury website to keep up with progress.

Be involved, there are lots of changes happening.
Let us know how you are going, we can help you find your way.



www.canterburywater.farm

Online: ecan.govt.nz Email: ecinfo@ecan.govt.nz Customer Services: 0800 EC INFO

Free phone: 0800 324 636 or Christchurch: 03 353 9007

ZONE MANAGERS

Hurunui/Waiau and Kaikoura - Kevin Heays

Waimakariri - Andrew Arps

Christchurch and Banks Peninsula - Paul Hulse

Selwyn Waihora - Michaela Rees

Ashburton - Donna Lill


Southern Zone Team - Michael Hide

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.

<p>People:</p> <ul style="list-style-type: none"> • Uninformed / ill prepared visitors may be the greatest risk 	<p>Animals:</p> <ul style="list-style-type: none"> • You are in their space 	<p>Milking shed:</p> <ul style="list-style-type: none"> • Moving rotary platform • Confined animals • Chemicals
<p>Eyes / Ears:</p> <ul style="list-style-type: none"> • Water / oil / milk / chemical splashes • Welding flashes • Loud machinery 		<p>Touch:</p> <ul style="list-style-type: none"> • Hot / cold surfaces, hot water, chemical burns • Electric fences – treat them as high voltage power sources
<p>On farm machinery and tools</p> <ul style="list-style-type: none"> • Chainsaws, hand tools etc. generate noise, fragments 	<p>Potential slips / trips:</p> <ul style="list-style-type: none"> • Uneven surfaces occur across the farm • Fences • Drains • Underpass • Effluent pond 	<p>Vehicles:</p> <ul style="list-style-type: none"> • 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.



How one idea fertilised an industry.

Every year, LIC's bulls sire approximately three out of four of New Zealand's AB calves. That they can do this, is down to something known as Long Last® Liquid semen.

This unique development by LIC keeps the sperm viable for three

days so that it can get to over 8,000 herds around the country.

It also allows a much higher utilisation - with approximately one tenth the sperm dose of conventional frozen straws - while maintaining optimal conception rates.

It means every dairy farmer has access to the top LIC bulls and top LIC genetics, helping to improve their productivity and that of the national herd.

It's improvement that counts.

