SIDDC
South Island Dairying Development Centre

LINCOLN UNIVERSITY
DEMONSTRATION DAIRY FARM

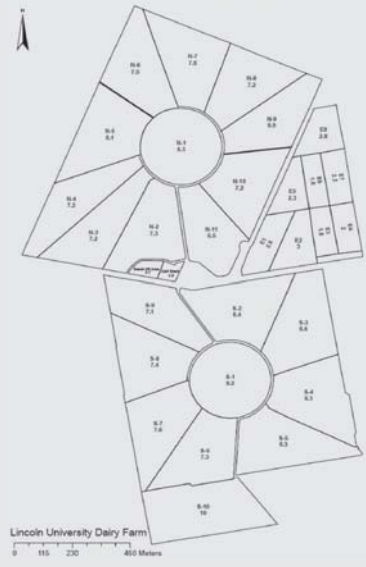
FOCUS DAY - OCTOBER 2015

STAFF

Peter Hancox	– Farm Manager
Matt Weatherhead	– 2IC
Alistair Linfoot	– Dairy Assistant
Matthew Costello	– 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

Lincoln University
New Zealand's specialist land-based university

DairyNZ

ravensdown

LIC

Plant & Food RESEARCH
RANGAHAU AHUMĀRA KAI

agresearch

SIDE
SOUTH ISLAND DAIRY EVENT

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 profitiability, 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 2011-2015:

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.

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

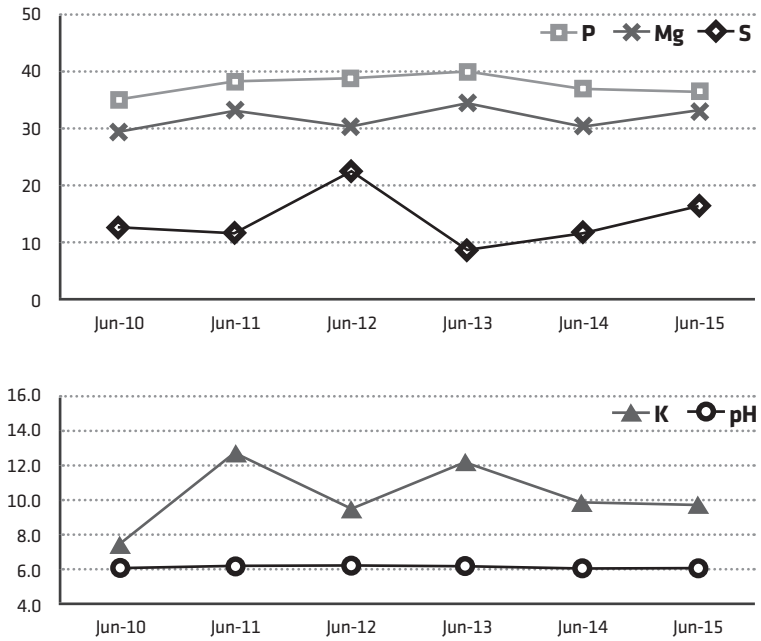
Target Soil Test Ranges:

pH: **5.8 – 6.2** P: **30 – 40** K: **5 – 8**
S: **10 – 12** Mg: **20+**

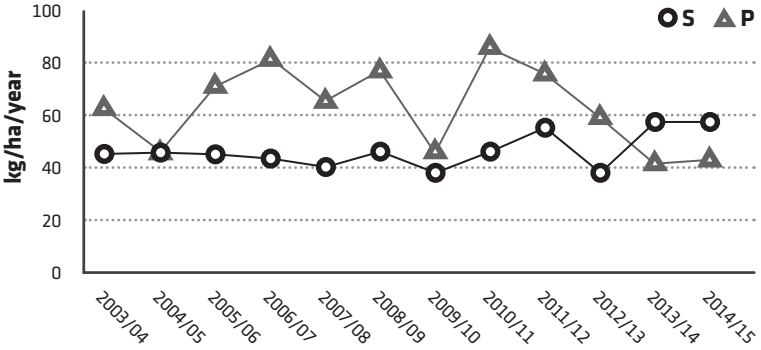
PASTURE

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 Regrassed	Grass Cultivar
N1	Feb-01	Brons. Imp
N2	Feb-11	Trojan
N3	Nov-12/Sept-13	Shogun + Chicory/Plantain
N4	Feb-14	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/Chicory/Plantain
N9	Oct-13	Bealey/Troj/Chicory/Plantain
N10	Jan-12	Tetraploids
N11	Nov-07	Bealey

Paddock	Period Regrassed	Grass Cultivar
S1	Dec-05	Bealey
S2	Dec-10	Troj. Bealey
S3	Feb-10	Bealey
S4	Dec-13	Bealey/Troj/Chicory/Plantain
S5	Dec-08	Arrow - Alto
S6	Dec-14	Shogan/Chicory/Plantain
S7	Sep-06	Arrow - Alto
S8	Oct-11	Troj. Bealey
S9	Dec-09	Bealey
S10	Feb-05	Bealey
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 2014

KiwiX DNA for 365 cows (F8-F16); Holstein Friesian Daughter Proven for 280 cows (F0-F7); KiwiX Premier Sires Daughter proven for yearling Heifers. All mate for 3 weeks in heifers and 6 weeks in main herd then follow with Jersey bulls. Heifers start mating 10 days early. 10 weeks mating for milking herd. Expect to rear 150 heifers.

HERD DETAILS – FEBRUARY 2014

Breeding Worth 143 / 49%
(rel%) / Production Worth (rel%)181 / 74%
Recorded Ancestry 99%

Average weight / cow (Dec)
Herd monitored walk over weighing
480 kg [Dec 2014]

Calving start date
Heifers 23 July, Herd 3 August 2014

Est Median calving date
16 August 2014

Mating start date
25 October 2014

Empty rate (nil induction policy) after 10 weeks mating - 13% (2014-15 mating). 6 week in-calf rate 73%.

	2002/03	2003-07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Total kg/MS supplied	228,420	**277,204**	278,560	261,423	273,605	264,460	297,740	300,484	276,019	278,654
Average kg/MS/cow	381	**425**	409	384	415	395	471	477	440	498
Average kg/MS/ha	1,414	**1,720**	1,744	1,634	1,710	1,653	1,861	1,878	1,725	1742
Farm working expenses /kgMS	$2.98	**$2.68**	$3.37	$3.88	$3.38	$3.86	$3.91	$3.84	$4.28	$3.87
Dairy operating profit/ha	$1,164	**$2,534**	$8,284	$2,004	$4,696	$6,721	$4,553	$4,665	$7,578	$1200
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
Return on assets	4.4%	**6.18%**	14.6%	4.8%	7%	7%	6%	6%	10%	1.6%
1 July cow numbers	631	**675**	704	704	685	694	665	650	650	580
Max. cows milked	604	**654**	680	683	660	669	632	630	628	560
Days in milk	-	**-**	263	254	266	271	272	273	259	263
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
Stocking rate Kg liveweight/ha	1,838	**1964**	2,058	2,107	1,941	1914	1860	1878	1872	1680
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
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
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
Past eaten (dairybase) (tDM/ha)	-	**-**	17.9	17.2	16.2	16.9	17.3	16.8	14.9	15.7
Purch. Suppl - fed (kgDM/cow)	550	**317**	415	342	259	463	359	434	506.8	300
Made on dairy/platform (kgDM/cow)	0	**194**	95	64	144	160	154	93	0	40
Applied N/160 eff. Ha	-	**-**	164	200	185	260	340	350	250	143

SIDDC
South Island Dairying Development Centre
T: 03 423 0022
E: office@siddc.org.nz
W: www.siddc.org.nz

Contents

LUDF Strategic Objective 2011-2015 2
Summary of Performance – Results to the End September: 3
Comparing LUDF results across seasons: 3
Indicative N-losses across years / farm systems at LUDF: 3
LUDF Review – Season to Date 4
Weather and growing conditions through the first part of the season 4
Spring Grass Management 7
Milk Production - performance to-date 12
Herd health 15
Pasture Quality: 16
LUDF – Financial Analysis: 19
Actual 14/15 Expenses / 2015-16 Initial Budget and Revised Forecast 19
LUDF Budget for 2015/16 (with 2014/5 Actuals) and updated forecast to end September 22
Variances and changes between the budget, revised forecast and last years expenses: 23
Variances in Expenses to date (compared to budget) 25
Re-jigging the system to maintain viability 26
Options to maintain viability 26
Impact Wintering On and / or Rearing Young Stock on the milking platform. 26
Reduced / No Regrassing 27
Minimising Phosphate Fertiliser 27
Staffing 29
Calf Milk Powder and Number of Calves Reared 29
Variations to the Breeding Programme 29
System adjustment to integrate fodder beet into the milking platform – Canterbury 30
Key Points 30
Principles of Decision making 31
Scenarios Considered 31
Sensitivities 32
Additional considerations 34
References 34
Appendix 1: Marginal cost of growing beet 35
Appendix 2: Sensitivity – Net Fodderbeet available at different crop yields and utilisation: 35
Lincoln University Dairy Farm - Farm Walk notes 36

LUDF Strategic Objective 2011-2015

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.*

2011/12 to 2013/14

The strategic objective (above) was implemented in a move into 'Precision Dairying' in the 2011/12 season. This focused on minimum standards not averages, two herds, higher productivity and initially higher profitability from a similar environmental impact. Production lifted to 1878kgMS/ha or 477kgMS/cow from 630 cows and costs were similar per kgMS in 2011/12 and 2012/13.

The temporary suspension of Eco-n (DCD) in 2013 required a change in farm practice in 2013/14 in the attempt to hold nitrogen losses without the mitigation effect of Eco-n. The farm had to cull its surplus cows early in autumn 2014 to meet the farms N-loss target (at a cost of $84,000 in loss profit).

2014/15 and 2015/16

In 2014/15 LUDF adopted a 'Nil-Infrastructure, low input' farm system emerging from the P21 (Pastoral 21) research programme, in response to the tightening environmental requirements of some catchments across NZ, and to meet its historical N-loss (as above). In essence LUDF sought to upscale results from the P21 – LSE herd where 3 years of data have shown similar total production and profit was achieved with less total N-leaching than had occurred at LUDF.

The systems targets and results for last season, and targets for 2015/16 are as follows:

	2014/15 Target	**2014/15 Result**	**2015/16 Target**
Stocking Rate	3.5 cows /ha		
Nitrogen Fertiliser Input	150 kgN/ha	143 kgN/ha	160-170kgN/ha
Imported Supplement	300 kgDM/cow + winter off		
Milk Production	500 kgMS/cow and 1750 kgMS/ha	498 kgMS/cow and 1742 kgMS/ha	> 500 kgMS/cow and > 1750 kgMS/ha
Farm Working Expenses	$4.00 /kgMS	$3.87 /kgMS	$3.80 /kgMS

Summary of Performance – Results to the End September:

	2012/13	2013/14	2014/15	2015/16
Total kgMS sold	45,896 kgMS	46,877 kgMS	46,059 kgMS	46,293 kgMS
Total Cows in Milk	617	610	542	540
Total N fert applied	82 kgN/ha	48 kgN/ha	28 kgN/ha	32 kgN/ha
Total Silage Fed/cow	63 kgDM/cow	135 kgDMcow	68 kgDM/cow	93 kgDM/cow
Total Silage Fed tDM	40 t DM	85 t DM	38 t DM	52 tDM
Whole Herd WOW	466 kg	469 kg	487 kg	490 kg
Herd Ave CS	4.5	4.6	4.4	4.9 (at 15 Sept)

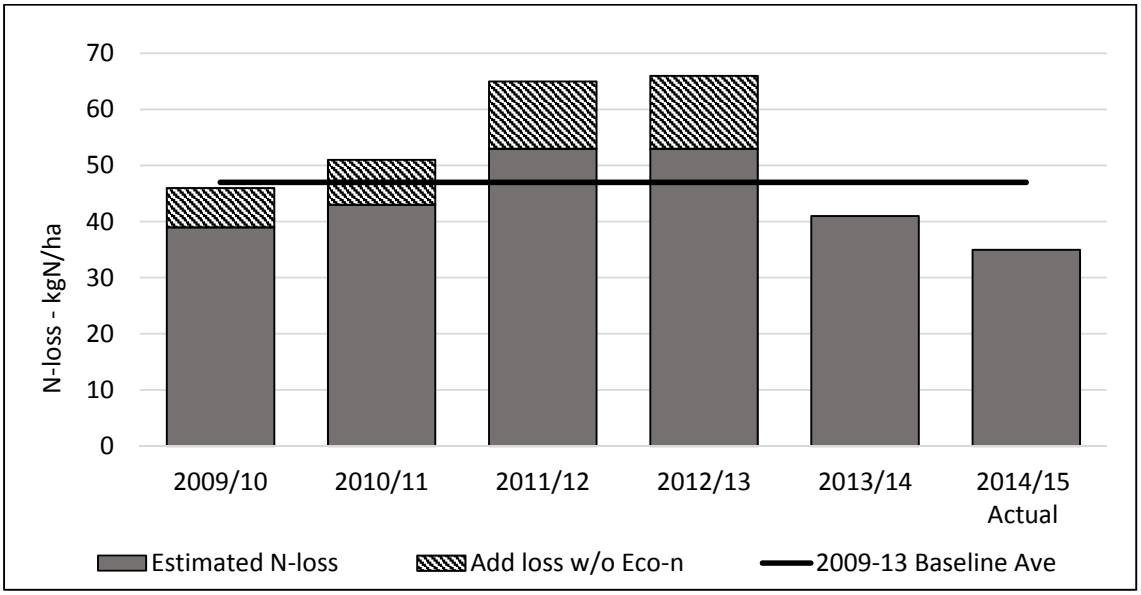
Comparing LUDF results across seasons:

This season and last season are very similar to date. Compared to the previous farm systems operated at LUDF, results thus far show

- Very similar milk production,
- from 11% fewer cows with the use of
- on average 50% less nitrogen fertiliser and
- on average 28% less bought in silage.
- Farm Working Expenses are also lower.

Indicative N-losses across years / farm systems at LUDF:

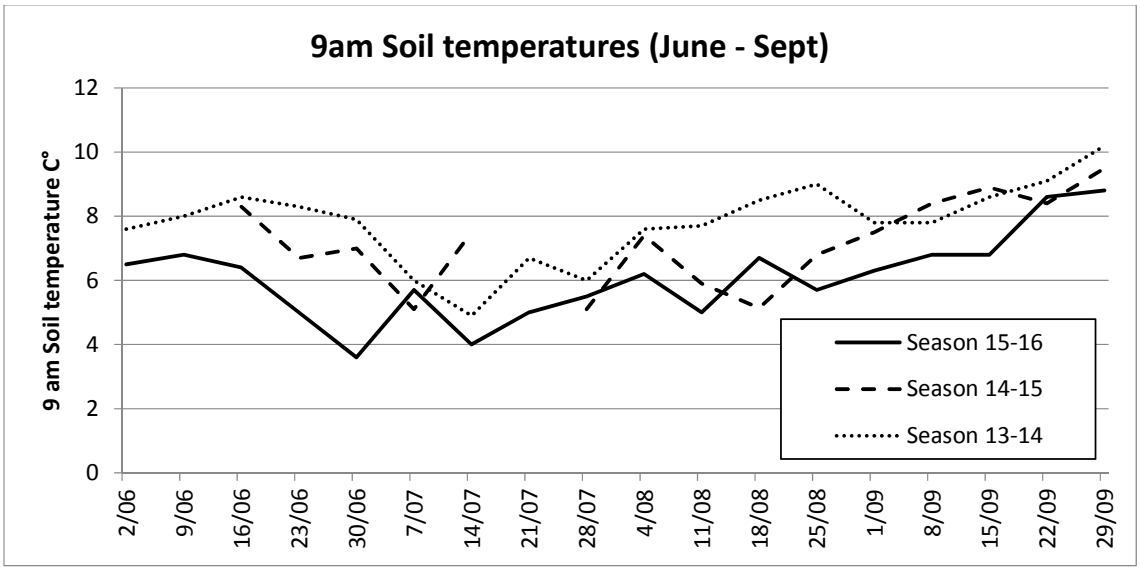
Figure 1: Overseer® v6.2 Estimated N-loss per hectare



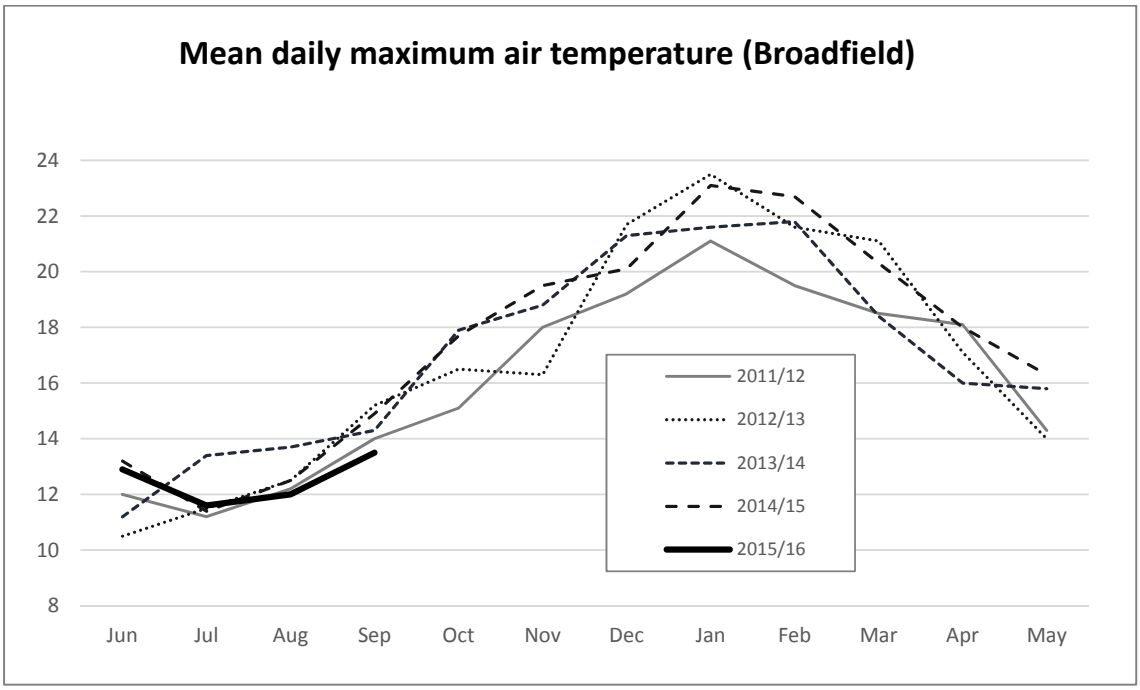
Note: N-losses are indicative only.

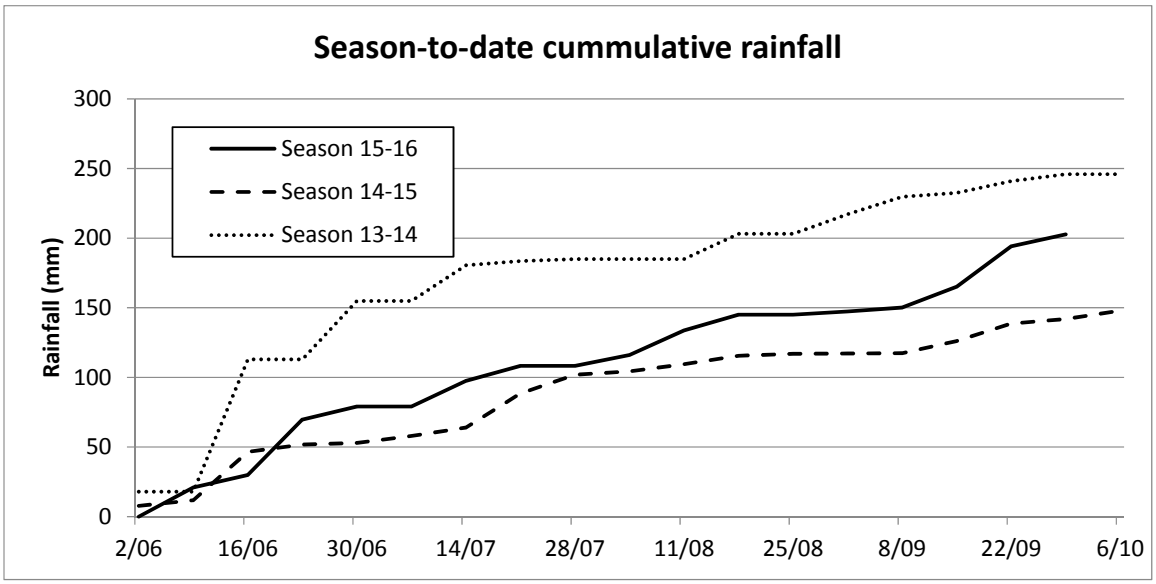
LUDF Review – Season to Date

Weather and growing conditions through the first part of the season



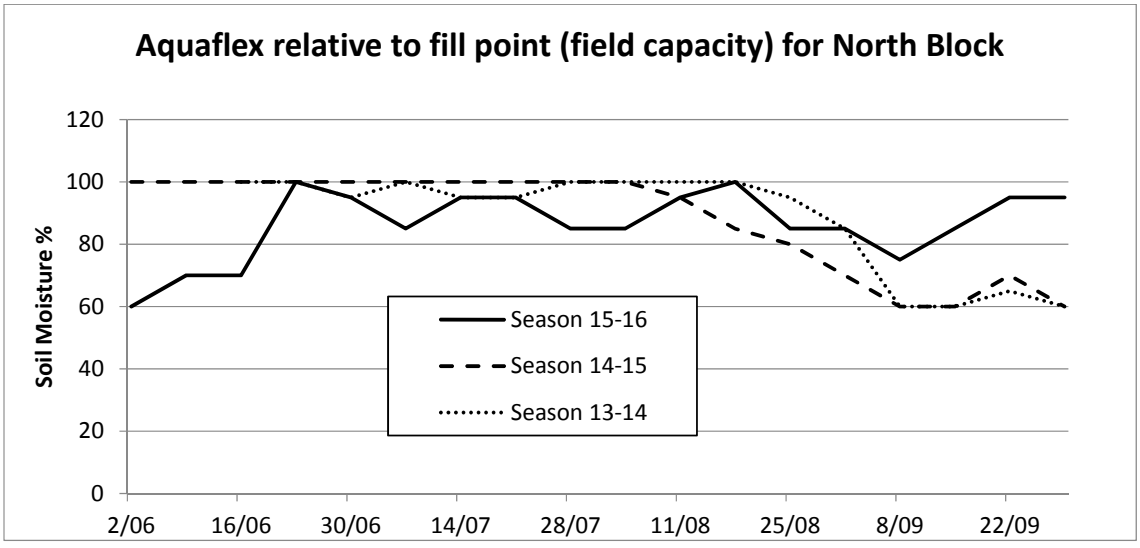
This winter has be characterised by soil temperatures 1-2 °C lower than the previous 2 years and similarly cooler air temperatures than recent years. Soil temperatures have only returned to more normal levels since mid-September.



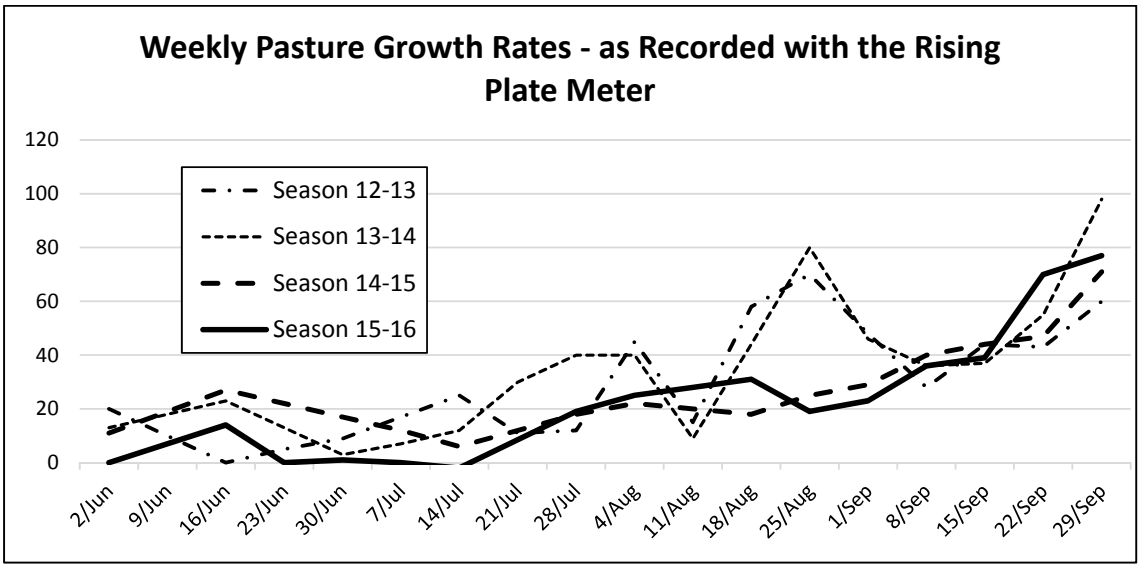


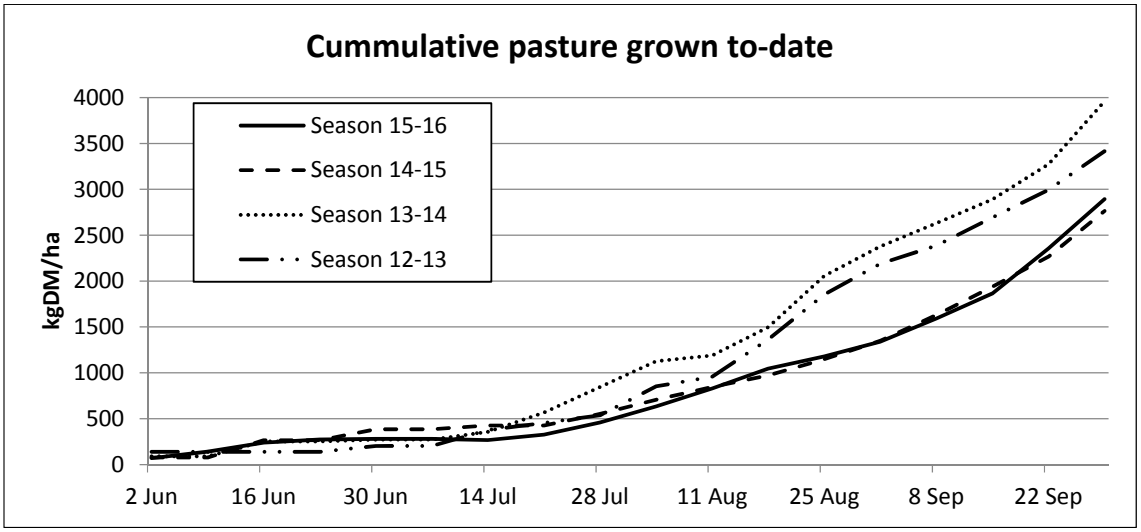
In terms of rainfall, the figure above shows a wetter winter compared to last year with more consistent rainfall through the latter parts of the winter and early spring. This is also seen in the Aquaflex readings below, which show that from the start of September, the profile has remained near field capacity for much of the month.

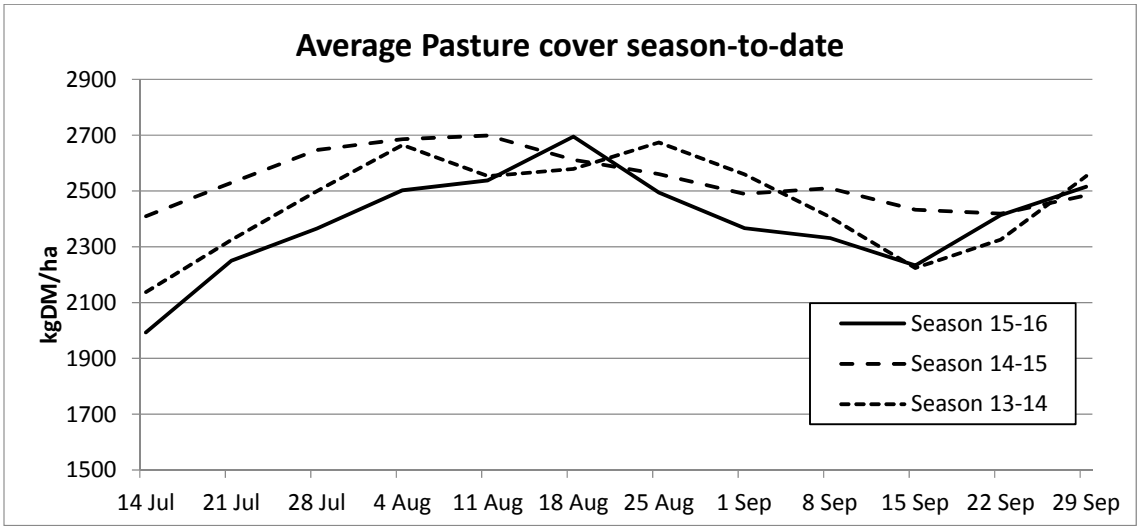
This has made grazing management a bit challenging in both blocks, with some paddocks requiring rolling after the cows grazed them.



The cooler temperatures and wetter conditions reduced pasture growth rates; this was particularly evident in the older pastures – compared to the newer cultivars – and hybrid ryegrasses. Cumulative pasture grown from June to the end of September is similar to last year but approximately 500kgDM/ha less than 2012 and 1000 kgDM/ha less than winter 2013.

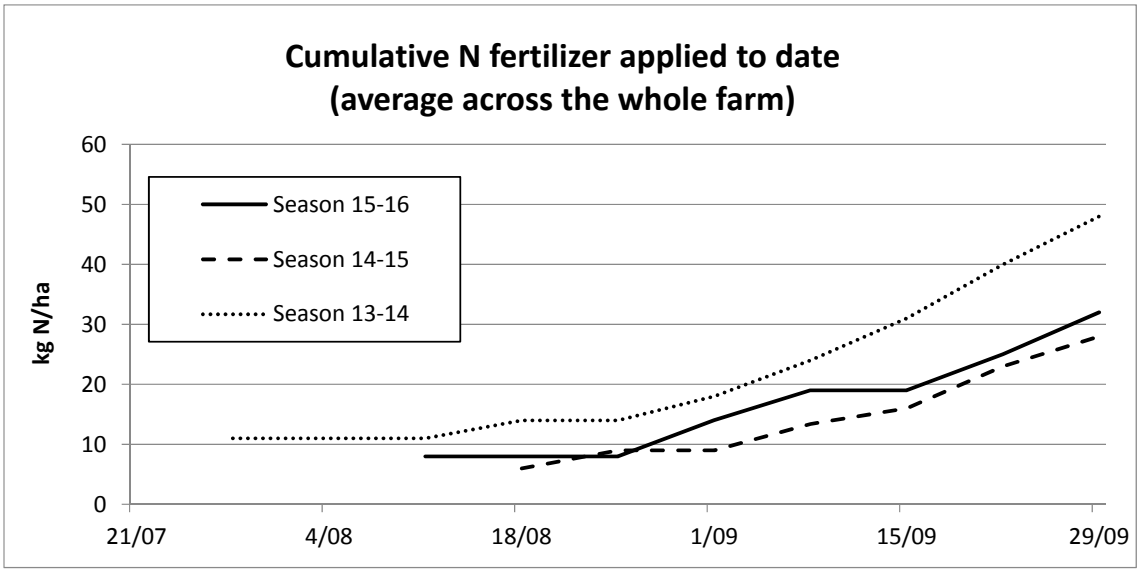






In response to the low winter growth rates, a decision was made in late July to apply a limited amount of nitrogen fertiliser to paddocks mostly likely to give positive responses. On 5th August, seven paddocks (35% of the farm) received 81 kg/ ha Ammonium Sulphate (providing 25 kgN/ha and 11.7 kgS/ha). The paddocks selection was based on:

a. Newer pasture (mostly Shogun / hybrid perennial ryegrass expected to give better cool season growth responses than older perennial ryegrass pastures);
b. Positive growth rates observed over the past 2 weeks – ie actively growing;
c. Primarily less than 2400kgDM/ha – and therefore 4-6 weeks till due for grazing;
d. Predominantly drier / free draining soils on the North End of the farm – that are less prone to saturation if a consistent period of wet weather occurs;
e. Paddocks at the bottom of the wedge were not to receive N at this point, but could receive their first application in 2-3 weeks if they meet the above criteria at that time (and APC is still significantly below target).



Spring Grass Management

The winter weather conditions resulted in the farm being consistently below Average Pasture Cover target from the start of winter (early June) through to the start of spring (August 4th). This meant that LUDF, started the SRP (Spring Rotation Planner) with around 150 kgDM/ha less APC (at 4th August).

Importantly, the SRP is a live document, not a rigid structure, allowing LUDF to respond to the lower APC without compromising subsequent pasture regrowth or milk production. Graphs below show planned / target vs actual data for a range of metrics within the SRP. Having the SRP enabled LUDF to respond to the conditions as they occurred – anticipating future changes based on where the farm was currently at compared to its target.

For example, the planned end of the first round was around the 21st September, whereas cover was pushed forward from late August such that the SRP did not finish till the end of September.

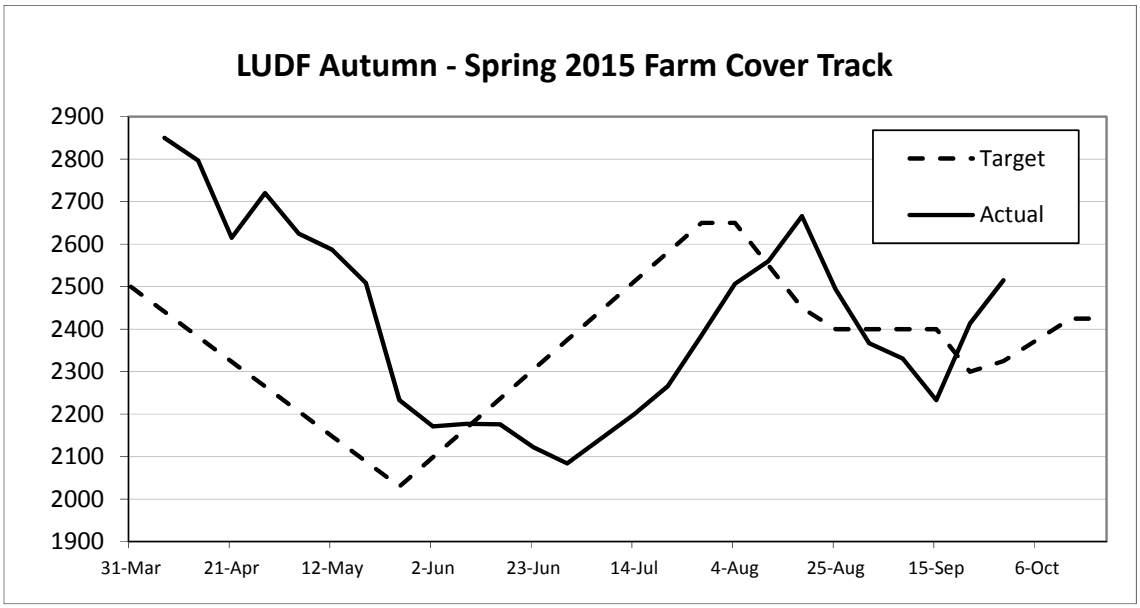
More supplement was fed this year than last year, however still less than budgeted in the SRP. Supplement was introduced in the system earlier and fed to a higher level than last season.

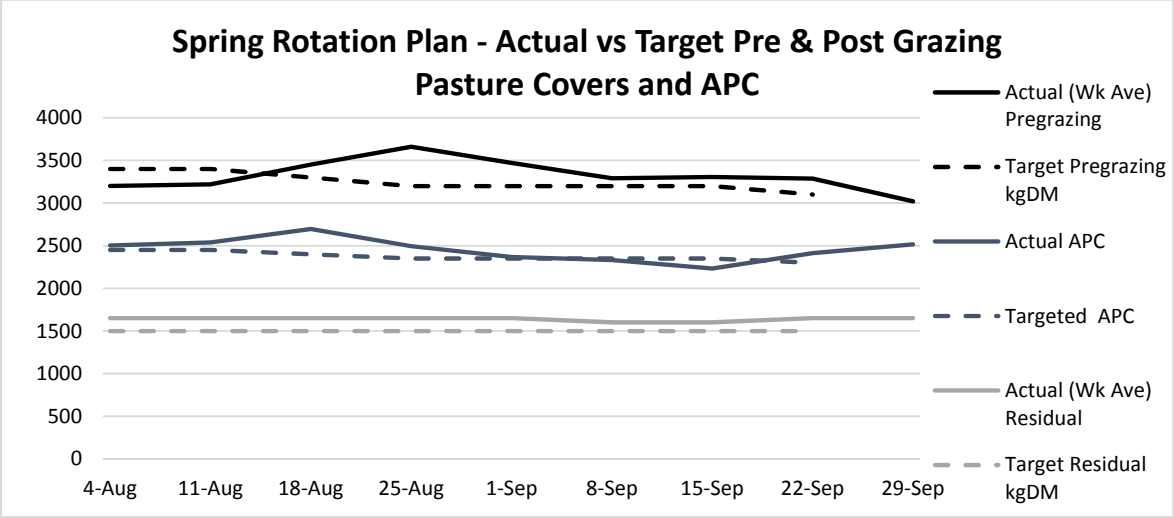
Importantly, although winter growth rates were low, and feed appeared in short supply, cows were largely offered some grass silage, and, within the bounds of the spring rotation planner, as much grass as they could eat while also leaving low and consistent grazing residuals. This is evident in the second grazing round (now underway) where the herd is again achieving low and consistent residuals, maintaining substantial milk production and generally holding liveweight / condition score.

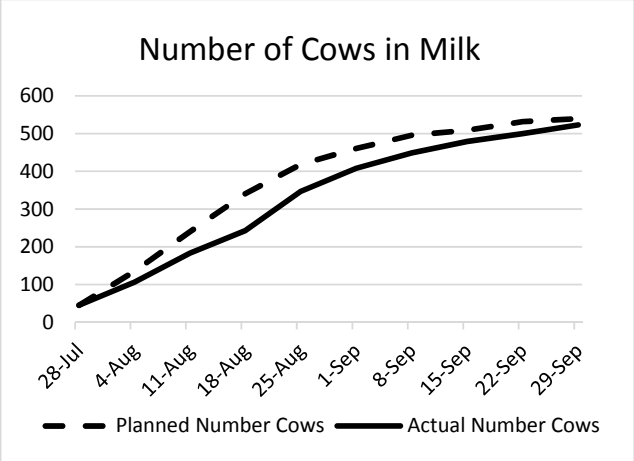
Two management aspects were significant in achieving this:

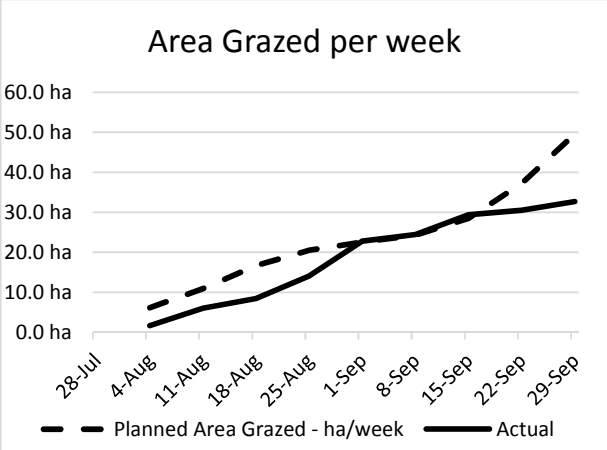
1. The farm held to the targeted area grazed per cow per day, thus holding the round length stable,
2. Higher amounts of supplement were fed early, (at the start of the SRP when there were less animals in total to be fed).

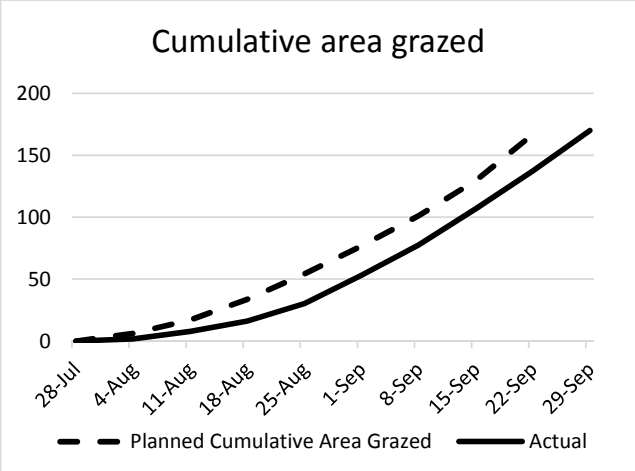
This allowed Average Pasture Covers to climb and the ungrazed area to benefit from additional days till grazing.

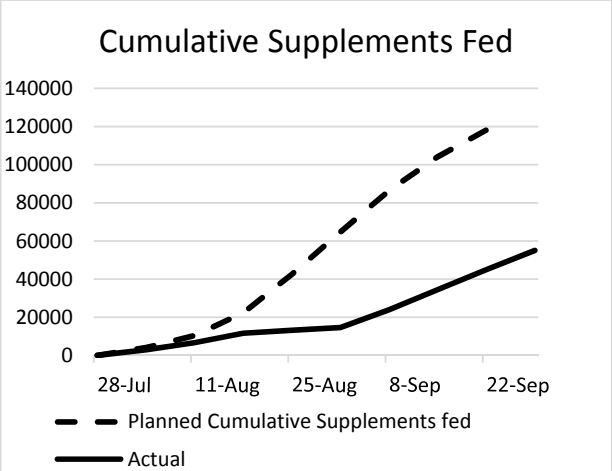




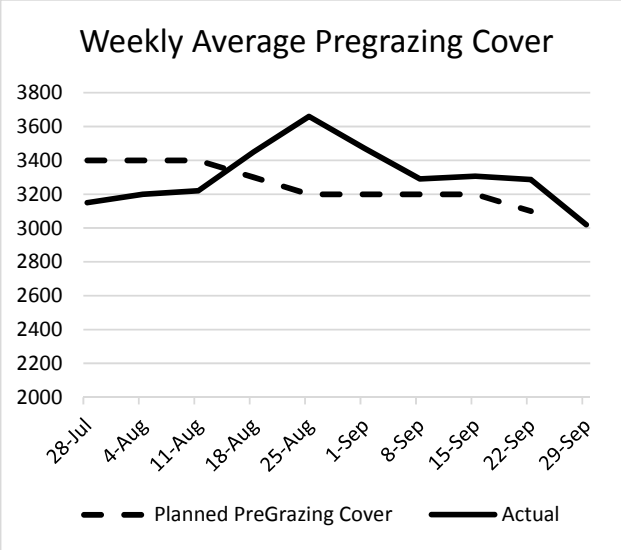


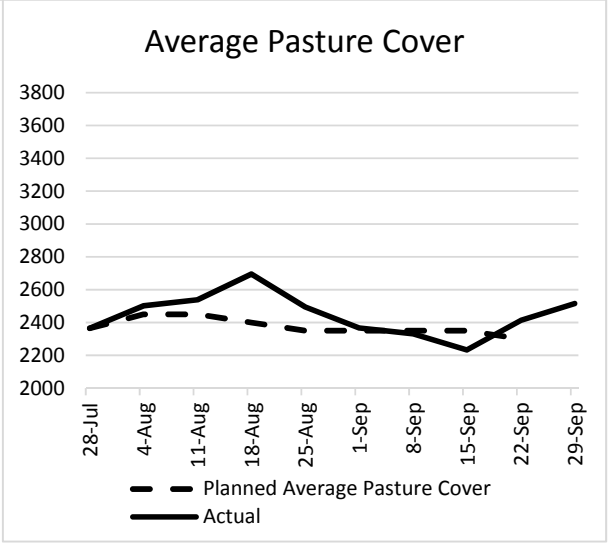


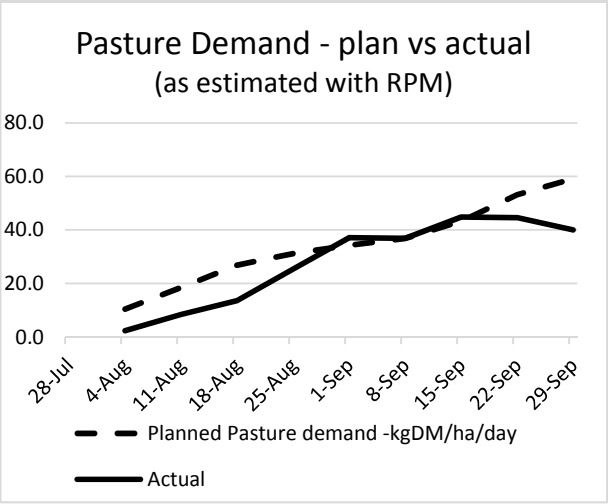


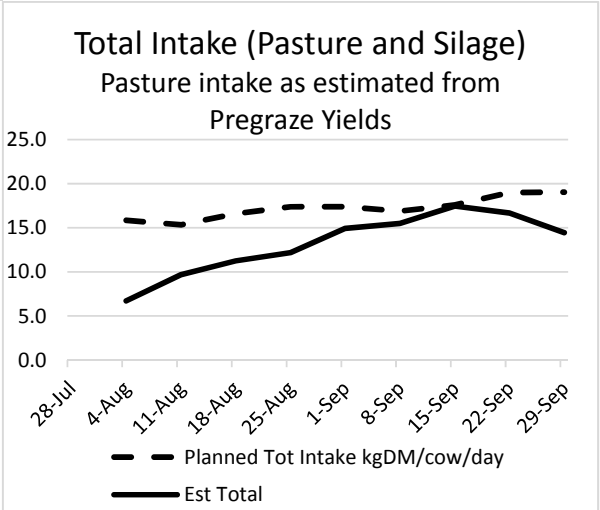


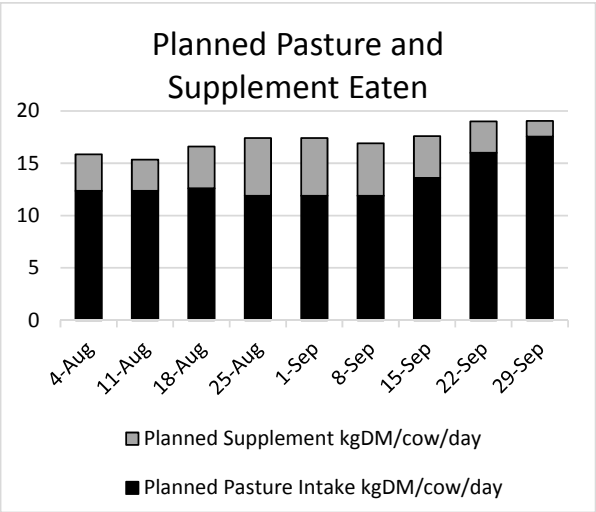
Note: Intake data above is calculated from the weekly farm walk and pasture assessment using the Rising Plate Meter. Pregraze yield – less post graze residual x area per cow = assumed intake of pasture. (See Below)

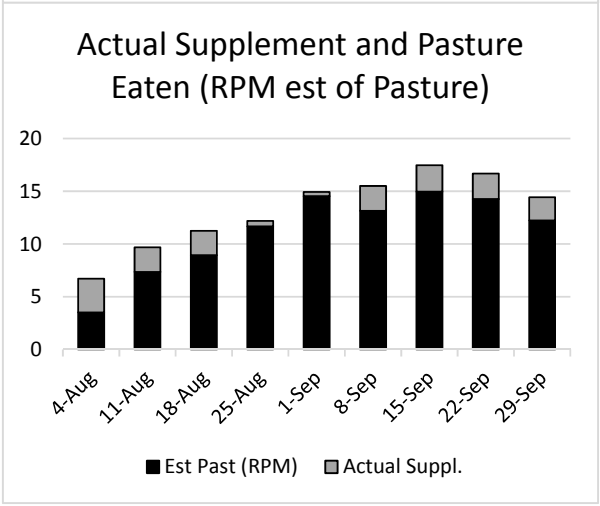






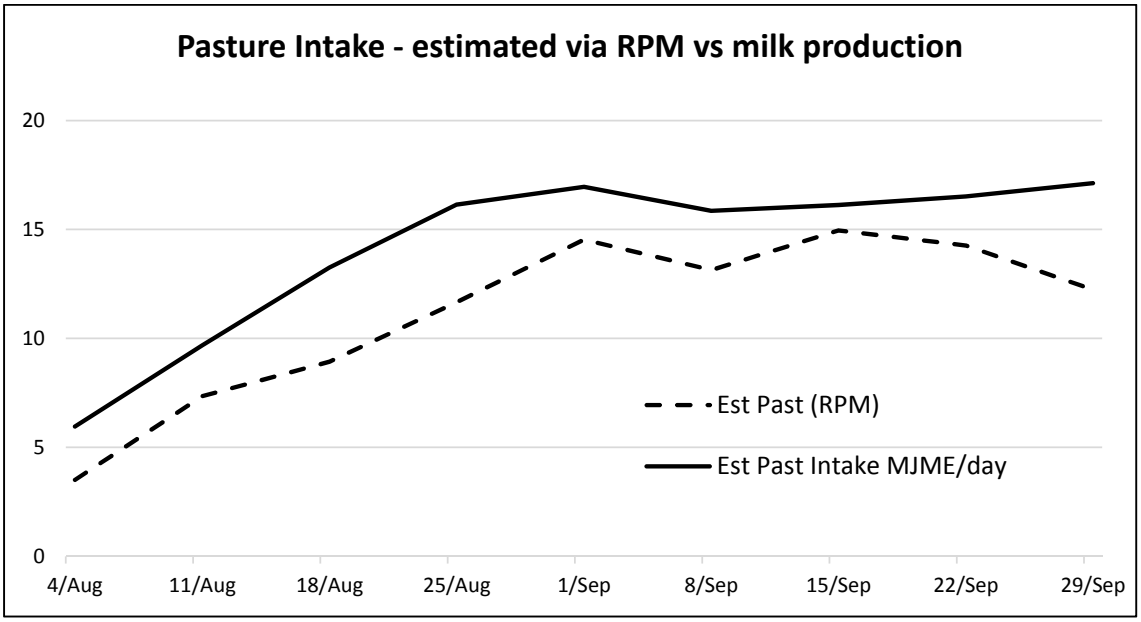


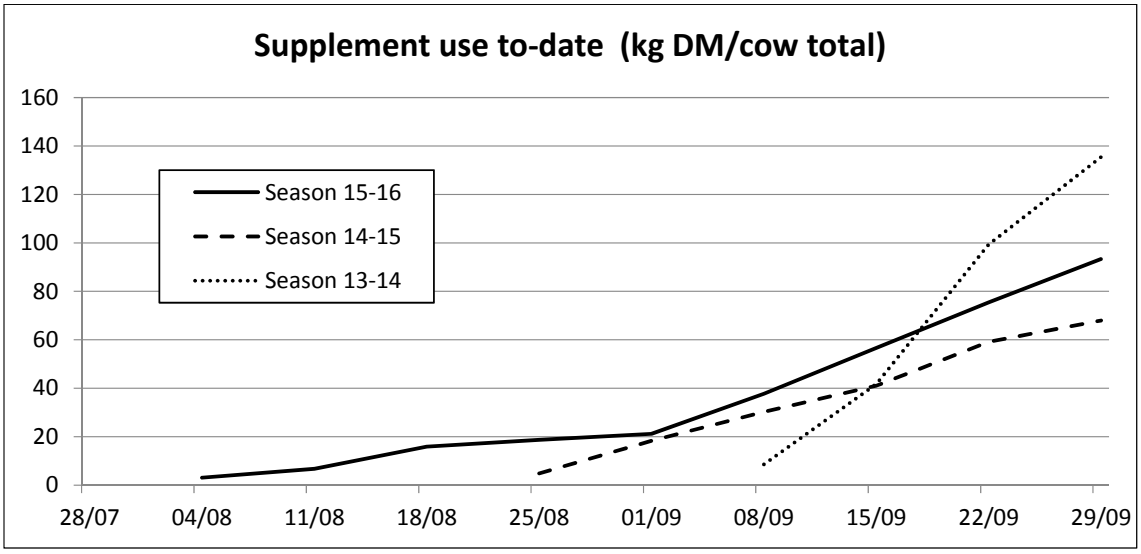




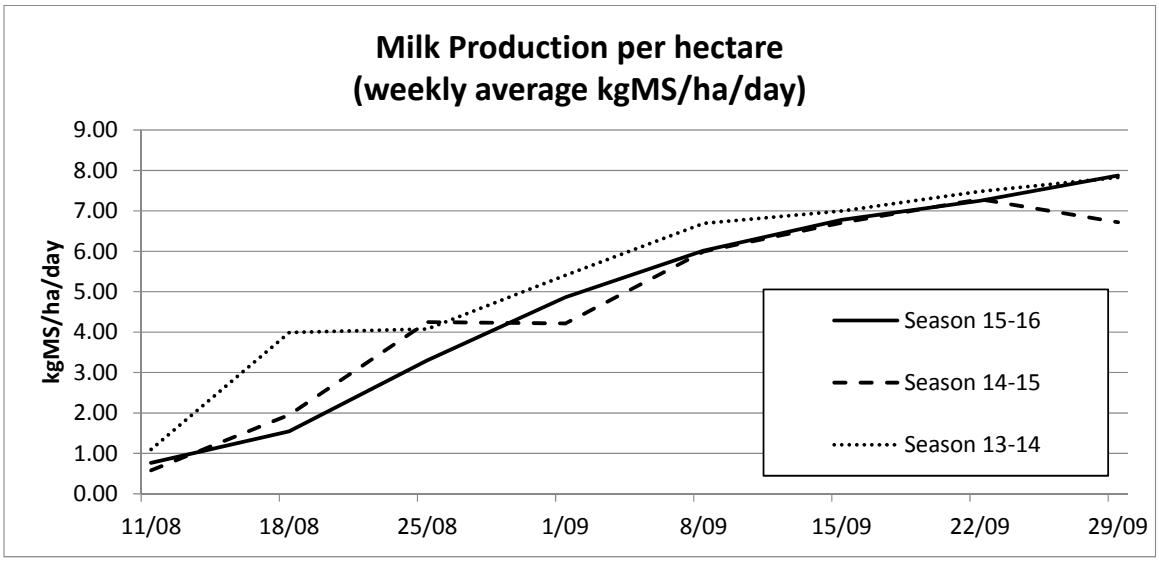
Estimating Pasture Eaten:

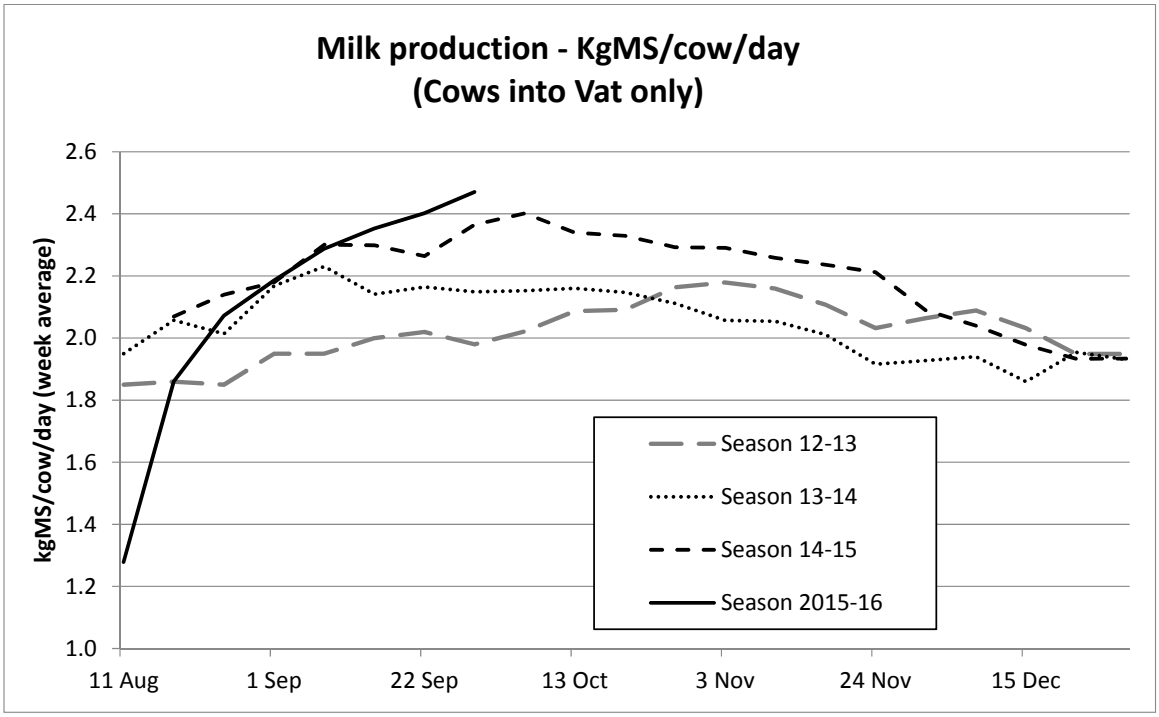
Paddocks grazed at the end of September were the last of the first grazing round, and took longer to graze than the pregraze yield suggested (the herd found more pasture than the plate meter, hence cows stayed longer in a paddock). This suggests the drop in pasture yield shown in the last 2 weeks of September is a function of the pregraze yield assessment, not a reduction in intake. Pasture intake, as back calculated from milk production less supplements eaten is shown below by comparison.





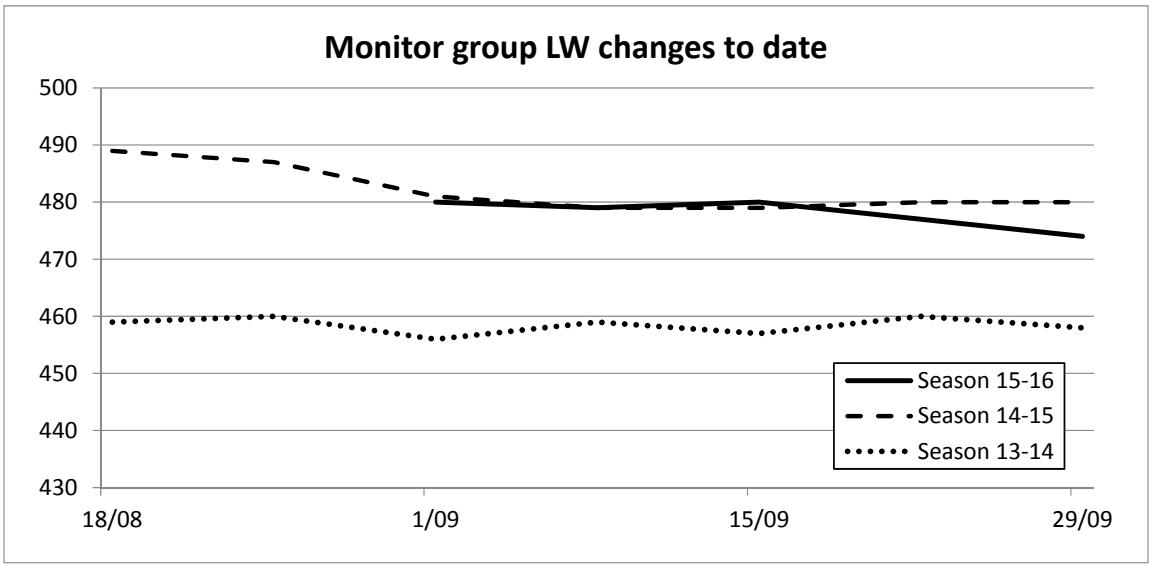
Milk Production - performance to-date





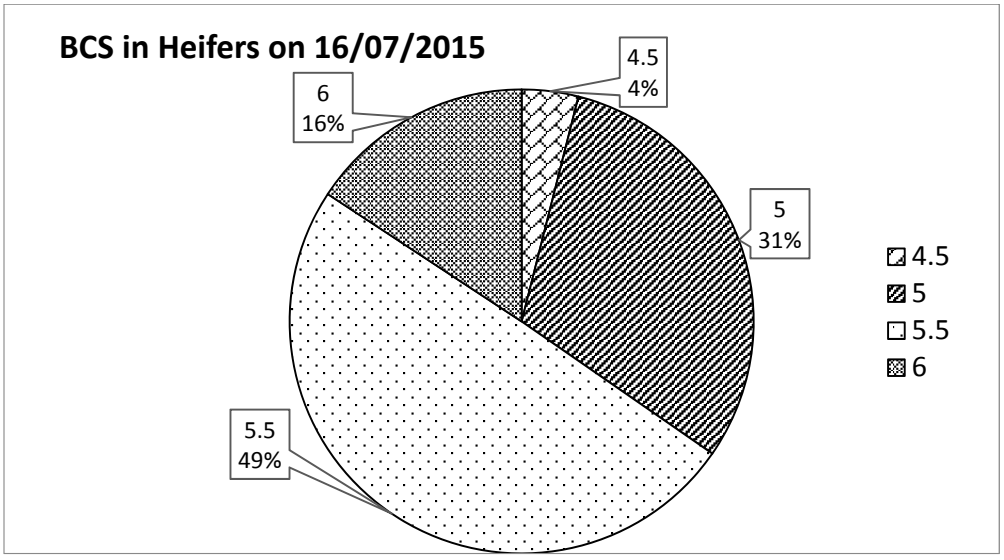
Milk Production has been consistently increasing this season, with no signs of any drop. This level of production, relatively static liveweight, and minimal number of cows with low condition scores (see below) is a combination of the condition score at calving (target BCS 5 for all MA cows and 5.5 for first and second calvers) and the volume of high quality feed offered and eaten since calving. (see above for proportion of grass vs silage, and below for pasture quality data).

To date, the calving CS and feed offered since calving have appeared to provide the herd with the required buffer or resilience to milk very well from the available pasture. A small decrease in liveweight has been observed in the monitor group in the last 2-3 weeks. The monitor group is approximately 280 early calving cows that are grouped to allow consistent reporting of changes in liveweight, without the additional noise created by adding later calving cows into the whole herd average.

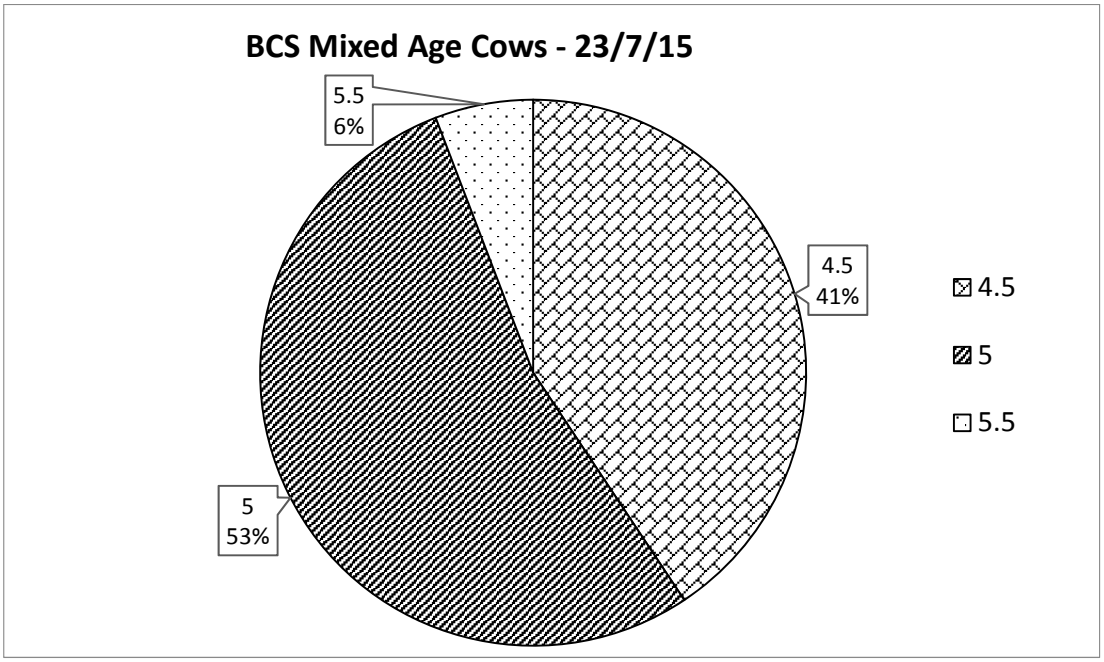


Precalving Body Condition Score:

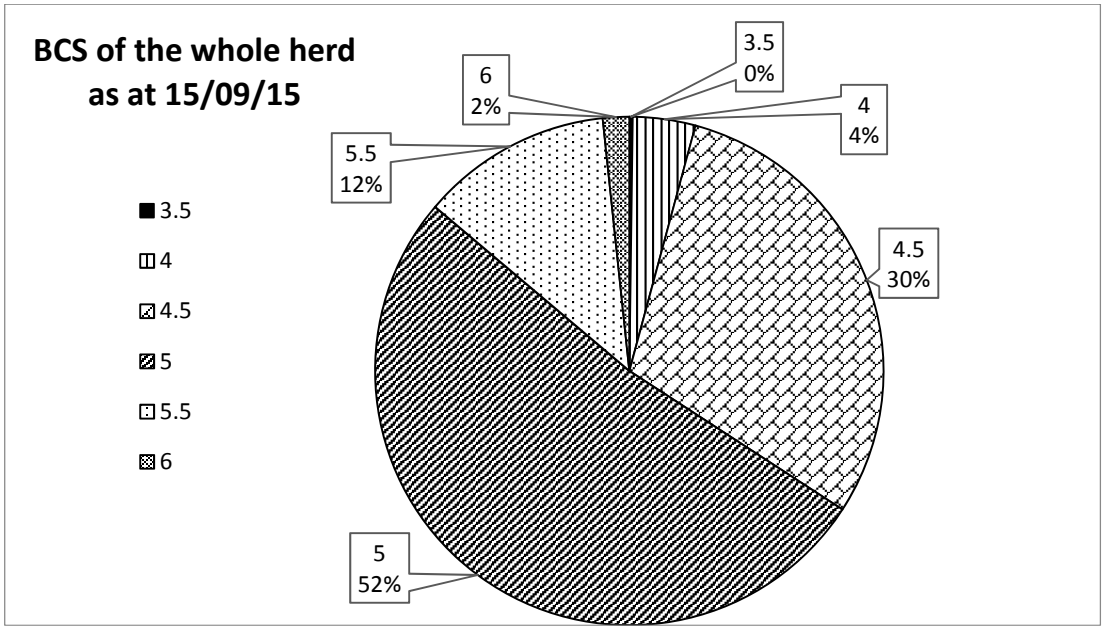
The average BCS of the heifers pre calving was 5.4, with only 5 heifers (4%) less than 5BCS. 16% were BCS 6.



The 241 early calving mixed age cows were individually condition scored on 23/7/15 and had an average 4.8. The high number of cows with a CS of 4.5 was surprising as the herd has been wintered well. It is important to remember the scores are allocated on ½ CS basis and rounded down, so cows not at 5.0 are scored as 4.5.

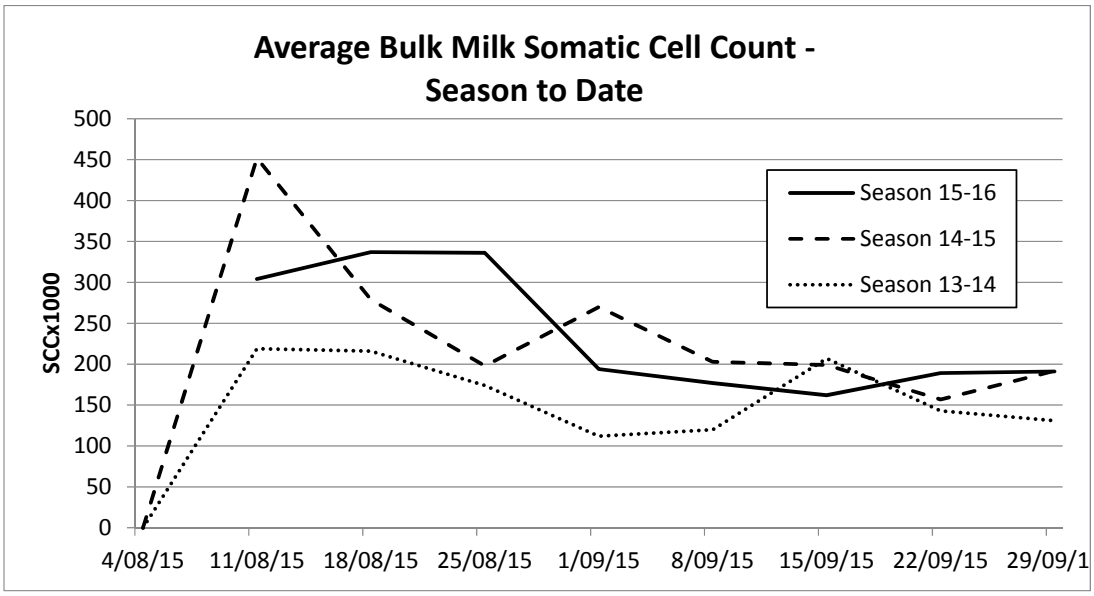


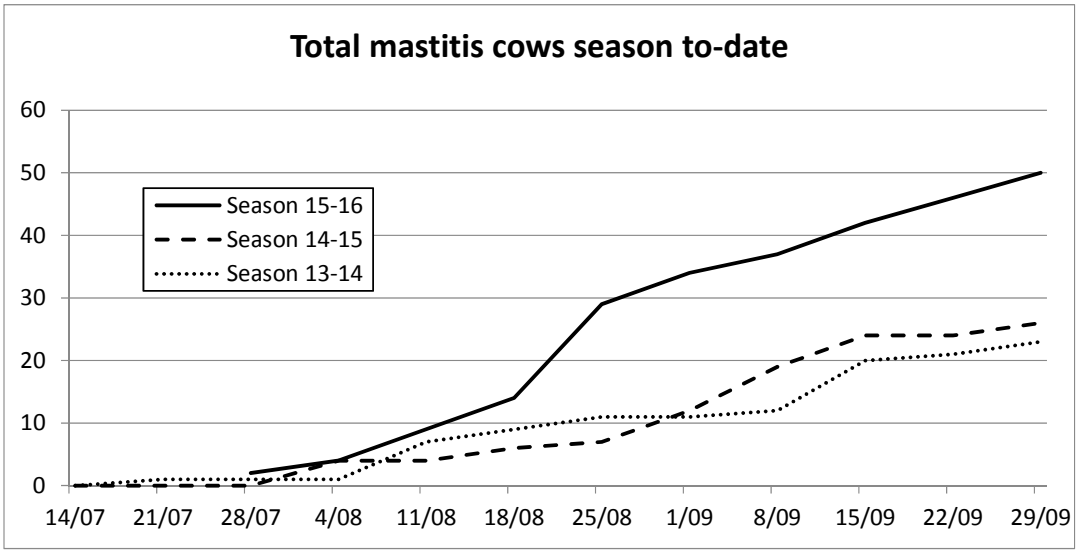
Individual condition scoring occurred for 477 calved cows in mid-September. The average CS for the whole herd of 4.9. Within this, 2 animals were 3.5, one of these cows has subsequently been identified and culled with Johnes (in spite of last seasons culling of high shedding Johnes cows), and a further 19 cows were CS 4.

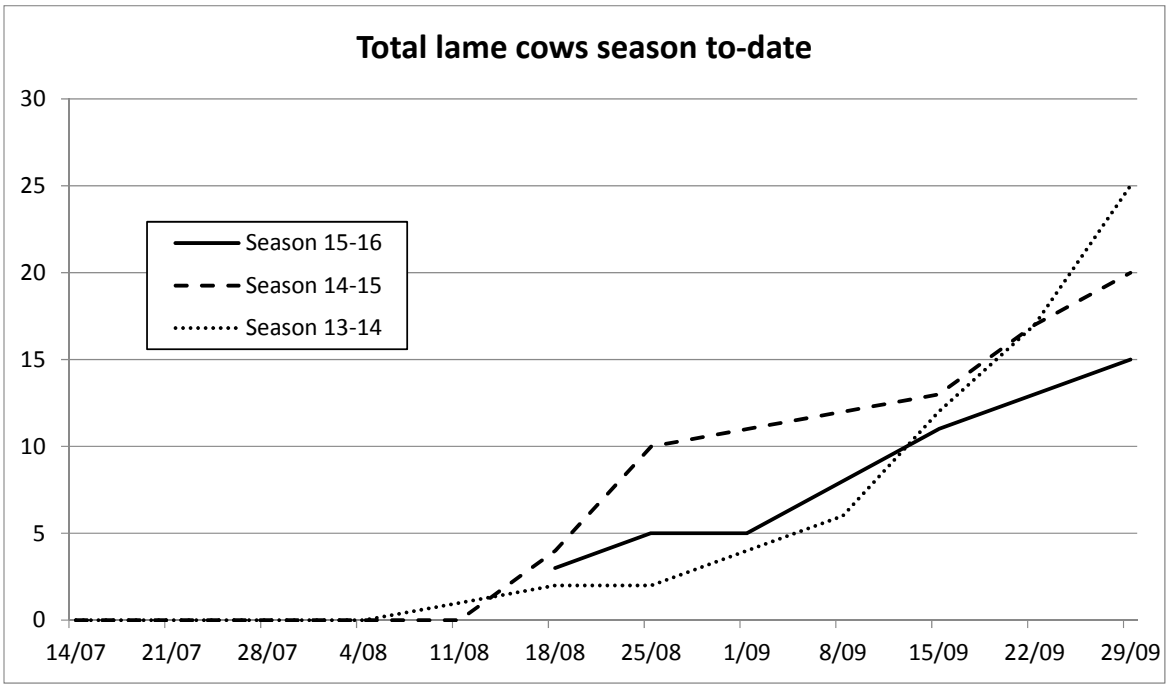


Herd health

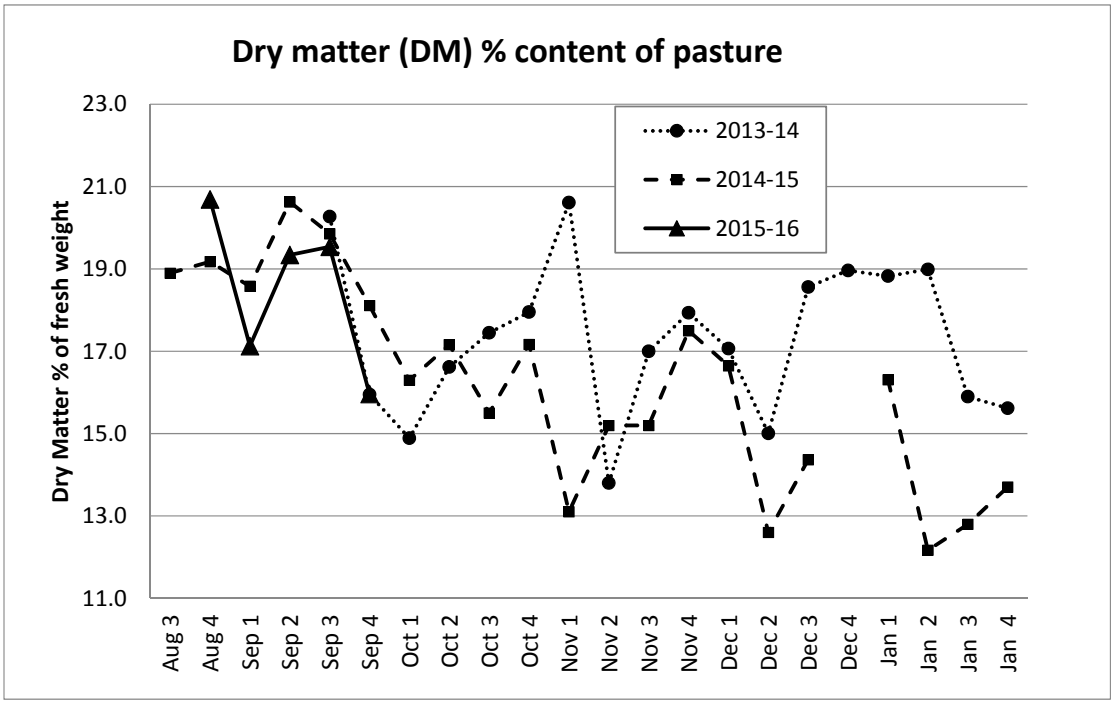
As per the graph below, the start of the season was challenging regarding the BMSCC and the number of cows with mastitis. The wetter weather could have had an influence on this outcome. On the other hand, the season so far has been better in terms of lameness.

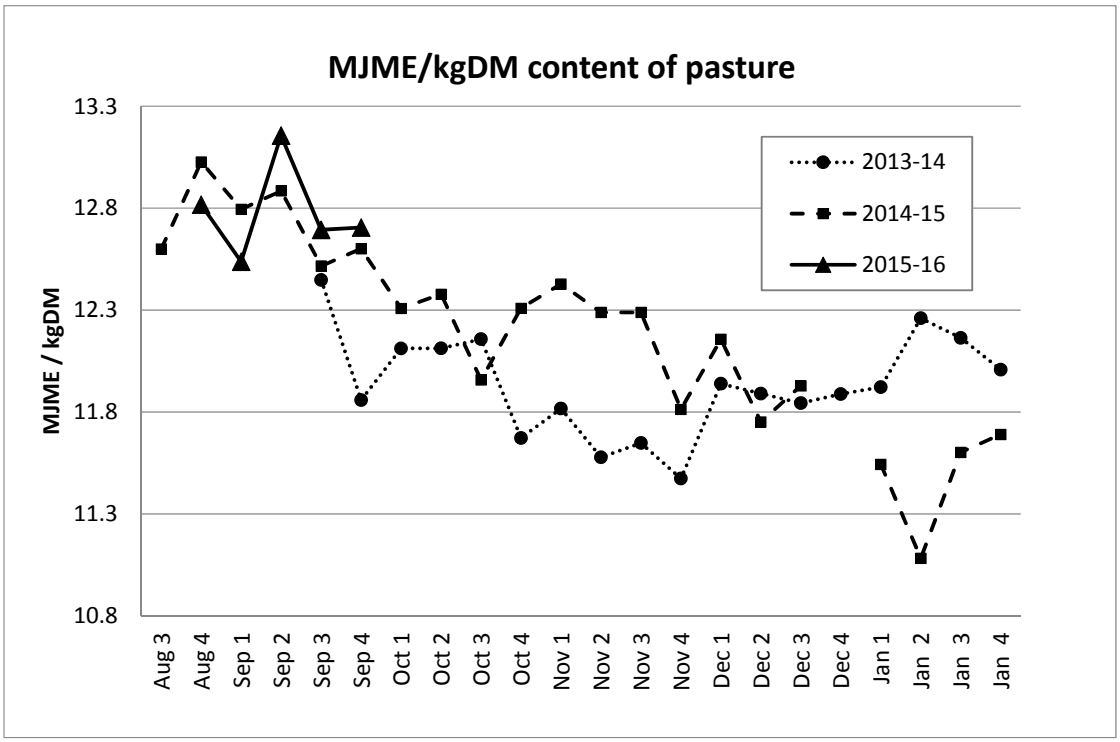


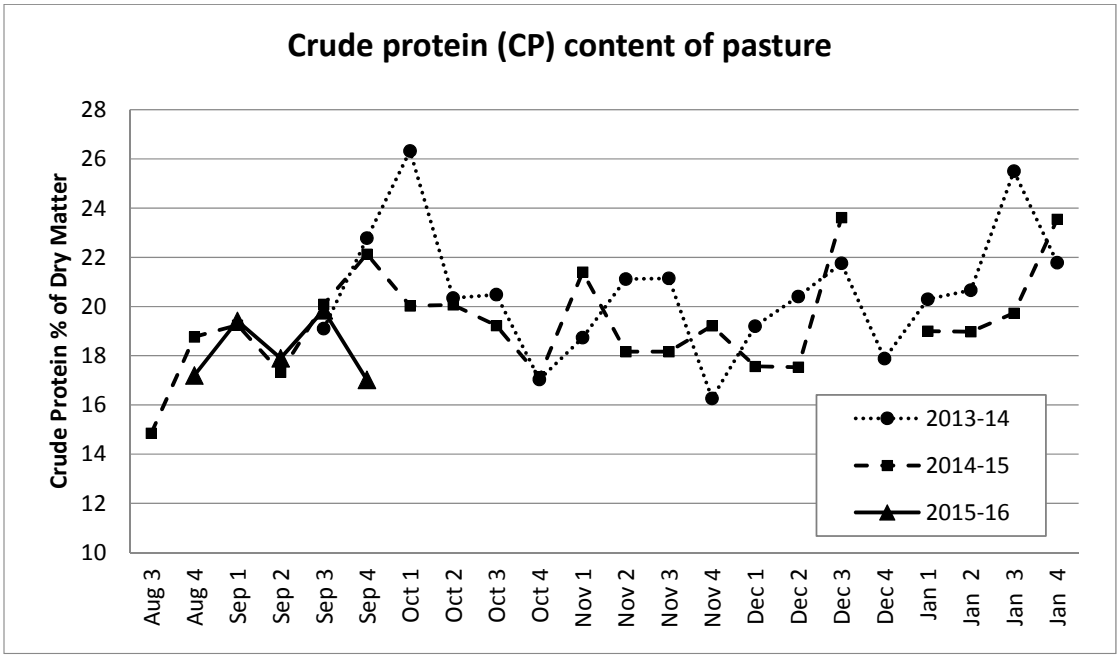


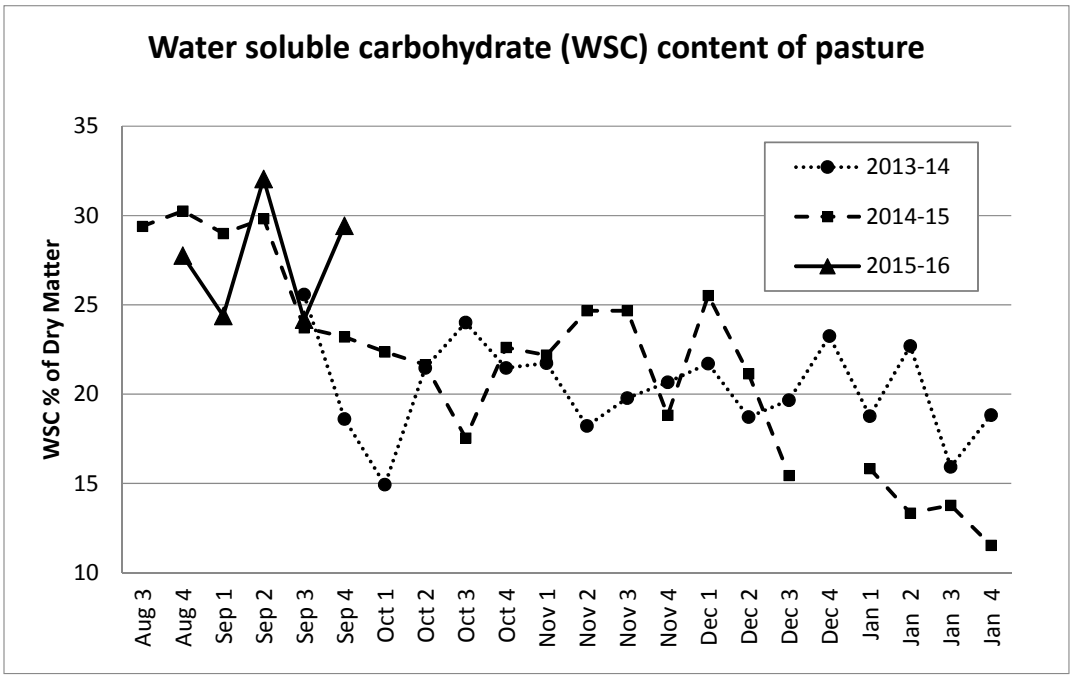


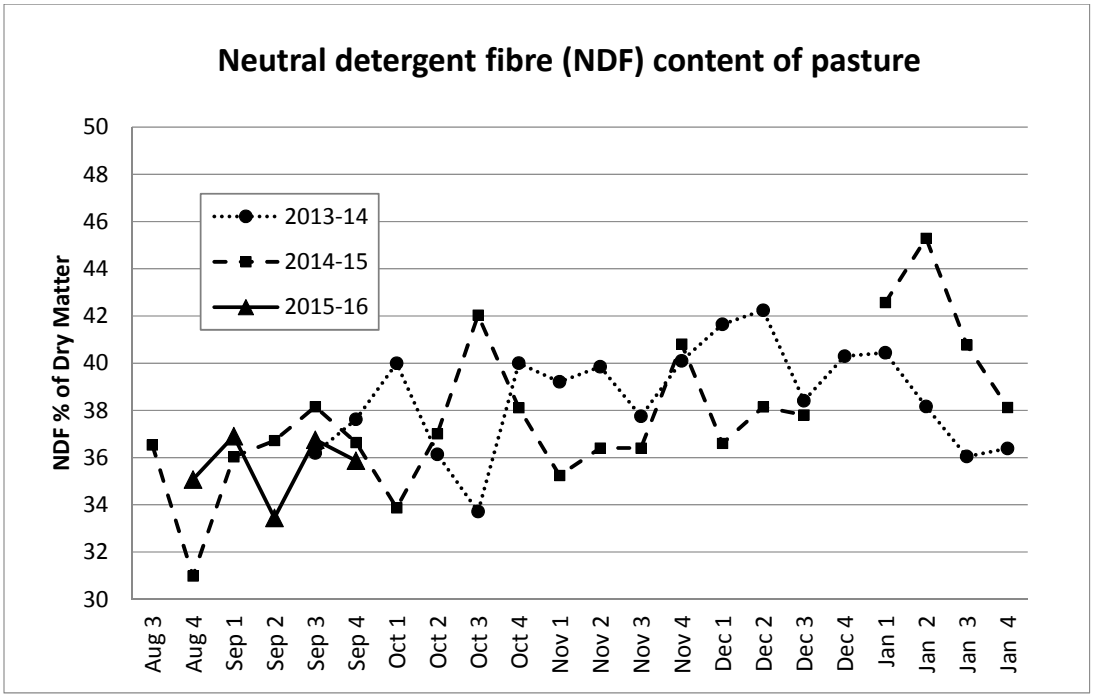
Pasture Quality:











LUDF – Financial Analysis:

Actual 14/15 Expenses / 2015-16 Initial Budget and Revised Forecast

The initial budget – established late autumn 2015 - anticipated expenses of $1,129,000, milk production of 280,000 kgMS and FWE of $4.03/kgMS. This was in essence replicating the farm system of 2014/15, with a planned reduction in regrassing from 15% of the farm to 10% of the farm. The reduction in area regrassed was expected to reduce the pressure on total feed supply (particularly in late Summer /early autumn) enabling the farm to milk cull cows for longer and thus increase total milk production.

The increase in farm working expenses from $3.87/kgMS in 2014/15 to $4.03 budgeted for 2015/16 reflected a potential increase of $51,000 expenditure. The two major areas driving this were budgeting to fully staff the farm for 12 months (compared to 2014/15 where one staff member resigned in April and was not replaced till the end of June) and the increased cost of winter feed following last summer's drought. Other costs had varied up and down relative to the 2014/15 actuals.

Further decreases in forecast milk income through the 2015 winter required another review of expenses for the 2015/16 season. Whilst needing to maintain the longterm productivity of the farm, and avoid deferring costs that would be greater in the future (such as necessary R&M), FWE of $4.00 were not sustainable with a forecast milk price of $3.85/kgMS.

A line by line review of expenses resulted in a reduction of 20 cents per kgMS, primarily achieved by reducing maintenance fertiliser to half normal levels and stopping all regrassing – other than repairing any pasture damaged through early spring grazing. The detailed review also highlighted some minor but cumulative errors in the budget spreadsheet – which added some costs that had not been flowing through to the total expenses. Fertiliser expenses were cut to half pending soil test results from each paddock to determine how much may be needed.

The farms use of milk powder for calf rearing was to be replaced with whole milk, however the subsequent reduction in calf milk powder price reversed this decision based on the following analysis:

Calf Milk Powder	**Whole Milk**
$44/20kg bag 700 grams/calf/day **$1.53 /calf/day**	$3.85/kgMS (forecast at time of purchasing milk powder) 4 litres whole milk /calf /day aat 9.6% MS 0.384 kgMS / calf /day **$1.48 /calf/day** ($3.98/kgMS required to match calf milk powder price)

The analysis above is a little simplistic as doesn't compare both feeds on grams protein provided. It did however focus the business on every item of expenditure, the options to reduce expenses, and the possible offset in production if less milk is produced or less is sold.

Suppliers of calf milk replacer (CMR) also claim

1. it provides consistency of protein and fat levels
2. fat levels in whole milk can be high on a DM basis (around 30%) which can leave calves feeling more 'full' and thus not eating as much meal for rumen development.
3. research has shown that whole milk is often deficient in certain minerals and vitamins (as a result of negative energy balance of the dam), in particular vitamin E.
4. whole milk has a higher PH generally than CMRs which can increase the rate of multiplication of bacteria

As the forecast milk price has now increased above the breakeven price above, the decision to sell all milk and buy calf milk powder has been financially advantageous.

Farm Inputs – details behind the budget and forecasted expenses:

Expense	Forecast	Details
Administration	$24,700	General expenses for farm administration, based on expected accountancy, stationary, phone, consultancy input etc for a standalone dairy farm.
Animal Health	$52,972	All vet bills, minerals, Lepto and BVD vaccines, treatment of mastitis and lameness, bloat, teat spray, dry cow therapy, teat sealing, calf debudding etc.
Breeding Expenses	$43,292	1.35 straws per cow – based on 90% Submission rate, 55% conception rate – resulting 277 cows 1st 3 weeks, 140 cows 2nd 3 weeks – 417 cows in calf after 6 weeks, 759 straws. Also includes Calf DNA tests, bull checks, preg tests, herd testing and MINDA / Protrack maintenance. AND AB for heifers ($2500) – now unlikely due to lack suitable yard facilities at graziers.
Electricity-farm	$25,000	Previously budgeted $37,000, last years actual $25,000. Invested in silowraps and upgraded milk cooling equipment in 2014/15 season.
Employment	$260,400	3.7 full time staff, with housing allowances. Includes ACC, training, milk quality bonuses, protective equipment, and recruitment. Note discount for managers input into demonstration (non farm management for comparable farms)
Grass silage purchased	$65,520	Cost of purchased feed, harvested, transported and stored at LUDF. Harvesting costs are impacted by harvesting high quality / lower yield crops and storing in bales to minimise wastage at feedout time. 300 kgDM/cow imported feed (for lactation)
Silage making & delivery	$10,336	On farm silage harvesting costs. Reduction in area regrassed is anticipated to increase area available to harvest for silage and aid autumn milk production.

Replacement grazing & meal	$134,033	Includes milk powder and meal for calves, grazing off calves and yearlings – returning to platform as incalf heifers at end June.
Winter grazing - Herd incl freight	$204,577	Off farm wintering of herd through June, July, August and September where necessary with dry cows. Includes grazing costs from use of the East Block.
Giberillin	$13,120	Budget anticipated up to 2 applications GA across whole platform, mostly late August and September with possible application in autumn. In practice have only applied 8ha this spring.
Nitrogen	$43,678	150kgN/ha across Milking platform, initially as Ammonium Sulphate then Urea. Includes application cost.
Fertiliser & Lime	$10,368	Revised down from maintenance on whole farm to application of 500kg Superphosphate across 54 ha – seven paddocks with lowest Olsen P (range from 25-34). No lime – pH of lowest paddock 5.8, 3 paddocks 5.9, rest 6.0 – 6.3).
Irrigation - All Costs	$70,600	Budget for approximately 80-90 days of irrigator use (electricity cost) and associated RM (including pivot ruts).
Rates & Insurance	$21,020	Benchmarked cost for comparable standalone dairy farm
Regrassing	$17,520	Budget of 22 ha seed and drilling as required to repair pugging damage from early spring grazing. Only used 2 ha to date, N9 will be drilled following next grazing (total under 10 ha). One paddock (8ha) of grass to grass added back with revised forecast payout.
Repairs & Maintenance	$48,500	General R/M maintenance requirement for farm (excluding irrigation RM (above)). Desire to maintain RM where appropriate rather than incur higher future RM costs.
Shed Expenses excld power	$9,850	Rubberware, shed cleaning chemicals etc.
Vehicle Expenses	$31,336	Fuel / oil, maintenance, registration, RUC etc.
Weed & Pest	$500	Small allowance for maintaining weed control on farm.

Overall:

LUDF farm profit remains very dependent on high production to offset costs and dilute farm working expenses per kgMS. Decreasing the area regrassed has the potential to push more feed into the autumn from pasture silage harvested on the platform.

LUDF Budget for 2015/16 (with 2014/5 Actuals) and updated forecast to end September

Year ending May 31, 2016	160.0ha	**Forecast 2015/16 season (as at end September)**			**Budget - June 2015**	**Act. 14-15**	**Variance to Initial Budget**	**Notes**
Milk production	Milksolids	1,785/ha		*285,666*	280,147 kgms	278,654	5520	1
Cows	Peak No / Prodtn	560cows	3.50/ha	*510/cow*	500kgMS/cow	1,742/ha	10	
Staff - 3.70 FTE's		77,207 kgms /FTE		151 cows/FTE				
Income			*$/kgMS*					
Milksolids - $4.60/kgms		86%	*4.60*	$1,314,066	$1,288,675	$1,281,808	$25,390	2
Dividend $0.29/share		5%	*0.29*	$83,557	$81,943	$81,506	$1614	
Surplus dairy stock		3%	*0.18*	$50,750	$50,750	$161,368	$0	
Other stock sales		6%	*0.31*	$87,759	$87,760		-$1	
DairyNZ levy		-1%	*-0.04*	-$10,284	-$10,085	-$10,032	-$199	
		100%	***5.50***	**$1,570,841**	**$1,543,166**	$1,558,539	$27,674	
Stock Purchases			*0.08*	$23,200	$23,200	$46,280	$0	
Gross Farm Revenue		**9,392/ha**	**5.26**	**$1,502,648**	**$1,475,843**	**$1,468,371**	$26,805	
Expenses		**$/cow**	***$/kgMS***	**Total $**	**Total $**	**Total $**	**Total $**	
Administration		44	**0.09**	$24,700	$24,700	$23,672	$0	
Animal Health		95	**0.19**	$52,972	$54,200	$57,168	-$1,228	3
Breeding Exps		77	**0.15**	$43,292	$39,215	$51,081	$4,077	4
Electricity-farm		45	**0.09**	$25,000	$37,200	$24,722	-$12,200	5
Employment		465	**0.91**	$260,400	$260,400	$229,782	$0	
Purch Grass sil 300kgDM/cow		117	**0.23**	$65,520	$70,502	$64,832	-$4,982	6
Silage making & delivery		18	**0.04**	$10,336	$9,728	$2,622	$608	
Replacement grazing & meal		239	**0.47**	$134,033	$139,766	$155,976	-$5,733	7
Winter grazing - Herd & freight		365	**0.72**	$204,577	$200,772	$177,192	$3,805	8
Giberillin		23	**0.05**	$13,120	$13,120	$6,365	$0	
Nitrogen		78	**0.15**	$43,678	$32,754	$37,922	$10,924	9
Fertiliser & Lime		19	**0.04**	$10,368	$33,317	$31,100	-$22,949	10
Freight & Cartage		0	**0.00**	$0	$0	$7,318	$0	
Irrigation - All Costs		126	**0.25**	$70,600	$70,600	$72,072	$0	
Rates & Insurance		38	**0.07**	$21,020	$21,020	$21,020	$0	
Regrassing		23	**0.05**	$12,960	$25,535	$24,083	-$12,575	11
Repairs & Maintenance		87	**0.17**	$48,500	$54,500	$55,214	-$6,000	12
Shed Expenses excld power		18	**0.03**	$9,850	$9,850	$7,180	$0	
Vehicle Expenses		56	**0.11**	$31,336	$31,336	$27,046	$0	
Weed & Pest		0.89	**0.00**	$500	$500	$1,350	$0	
Cash Farm Working Expenses				**$1,082,763**	**$1,129,015**	**$1,077,717**	-$46,252	13
FWE /kgMS			**$3.79**		**$4.03**	**$3.87**	-$0.24	
Depreciation est			***$0.41***	$116,000	$116,000	$116,000	$0.00	
Total Operating Expenses			***$4.21***	$1,198,763	$1,245,015	$1,193,717	-$46,252	13
Dairy Operating Profit			**$1.06**	**$303,885**	**$230,829**	**$274,654**	$73,057	14
DOP per effective hectare				**$1,899/ha**	**$1,443/ha**	**$1,717/ha**	$457/ha	
Cash Operating Surplus				**$419,885**	**$346,829**	**$390,654**	$73,057	
Cash Operating Surplus /ha				**$2,624/ha**	**$2,168/ha**	**$2,442/ha**	$457/ha	

See notes on following page

Variances and changes between the budget, revised forecast and last years expenses:

Notes:

1. Increased milk production based on less regrassing – resulting in more feed available through the spring /summer period – potentially available to hold cull cows on farm further into the autumn.
2. Milk income has been standardised at the current forecast milk price to aid comparison of last year, the initial budget and the current forecast. The increase in milk income reflects the increase in production noted above.
3. Small decrease in animal health compared to last year and the initial budget, primarily the effect of rearing minimal excess youngstock
4. Breeding expenses were impacted last year by a replacement computer for Protrack. Small increase in budgeted expenses in the current revision, as the calf DNA cost had not previously been reported in the total breeding expenses (error in formula)
5. Electricity usage revised back to match last years – reflecting investment last year in silowraps and more efficient milk cooling.
6. Budgeted purchase price for imported silage has decreased in anticipation of less demand for purchased feed from the dairy industry, coupled with some possible increase in supply given the increased irrigation under CPW and possible effect of less winter crop / less dairy youngstock out grazing.
7. Similar to 3 above, rearing / grazing approximately 125 youngstock rather than 150 and selling the surplus over the coming 24mth period. Reduces grazing expenses, selection options and livestock income.
8. Increased winter grazing costs have been incurred this season due to the cold winter and minimal on farm winter growth – that resulted in all rather than most cows off farm – and off for longer.
9. Increase in forecast total expense for Nitrogen as spreading costs had not been included previously. Small adjustment down on N price.
10. Decrease in maintenance fertiliser to only those paddocks with Olsen P of 34 or less
11. Decrease in planned area regrassed from two paddocks to one, and decrease from 22 to 10 ha overdrilling to repair any damage caused by early spring grazing. The 10 ha will include drilling paddock N9 with additional Bealey / Trojan as this has thinned out as the chickory population has declined.
12. Reduction in R/M – Repairs to Pivot Ruts were included in both Irrigation costs and R/M. Now included only in Irrigation (all costs).
13. Overall reduction in farm working expenses of $46,000 from initial budget to revised forecast. Equivalent to a reduction of 24 cents/kgMS
14. Combined effect of a 2% increase in production, and a decrease in farm working expenses results in an increase in operating profit of nearly $74,000 or $460/ha.

Expenses to date:

Year ending May 31		2015/16 Budget	Actual to end Sept	Budget to End Sept	Variance (Act-bud)	Forecast Year End	Notes
Milk production (kgMS)		280,147	46,293	46,000	293	280,440	
Staff - 3.7	160ha	1751 /ha				1751 /ha	
Peak Cow Nos and Prod.		560					
Income	Milksolid Payout $/kgMS	$4.60					
	Dividend /share	$0.29/share					
	Milksolid Revenue	$1,288,676	$212,948	$211,600	1,348	1,290,024	
	Dividend	$81,943	$13,541	$13,455	86	82,029	
	Surplus dairy stock	$138,510	$16,855	$8,660	8,195	146,705	1
DairyNZ Levy		-$10,085	-$1,667	-$1,656	-11		
Stock Purchases		-23,200		-26,960	26,960	3,760	1
Gross Farm Revenue		**$1,475,844**	**$241,677**	**$205,099**	$36,578	1,512,422	
Expenses							
Cow Costs	Animal Health	$54,200	$22,455	$23,586	-$1,131	53,069	
	Breeding Expenses	$39,215	$7,579	$9,299	-$1,720	37,495	
	Replacement grazing & meal	$139,766	$34,929	$55,209	-$20,280	119,486	
	Winter grazing - Herd incl. freight	$200,772	$186,521	$188,462	-$1,941	198,831	
Feed	Grass silage purchased	$70,502	$160		$160	70,662	
	Silage making & delivery	$9,728			$0	9,728	
	Eco-n & Giberillin	$13,120		$9,120	-$9,120	4,000	**2**
	Nitrogen	$32,754	$8,547	$10,809	-$2,262	30,492	
	Fertiliser & Lime	$33,317	$3,586	$21,120	-$17,534	15,783	**3**
	Irrigation - All Costs	$70,600	$1,155	$8,518	-$7,363	63,237	**4**
	Re-grassing	$25,535	$309	$8,360	-$8,051	17,484	**5**
Staff	Employment	$260,400	$69,186	$82,575	-$13,389	247,011	**6**
Land	Electricity-farm	$37,200	$5,286	$9,200	-$3,914	33,286	**7**
	Administration	$24,700	$6,730	$7,268	-$538	24,162	
	Rates & Insurance	$21,020			$0	21,020	
	Repairs & Maintenance	$54,500	$13,371	$12,842	$529	55,029	
	Shed Expenses excl. power	$9,850	$4,055	$3,524	$531	10,381	
	Vehicle Expenses	$31,336	$8,893	$10,667	-$1,774	29,562	
	Weed & Pest	$500	$391	$500	-$109	391	
Cash Farm Working Expenses		**$1,129,015**	**$373,153**	**$461,059**	-$87,906	1,041,109	**8**
FWE/kgMS		**$4.03**				4.0	
Depreciation est.		$116,000			$0	116,000	
Total Operating Expenses		$1,245,015	$373,153	$461,059	-$87,906	1,157,109	
Dairy Operating Profit		$230,829	-$131,476	-$255,960	$124,484	$355,313	
DOP/ha		**$1,443**				**$2,221**	
Cash Operating Surplus		$346,829				$471,313	
Cash Operating Surplus per ha		**$2,168**				**$2,946**	

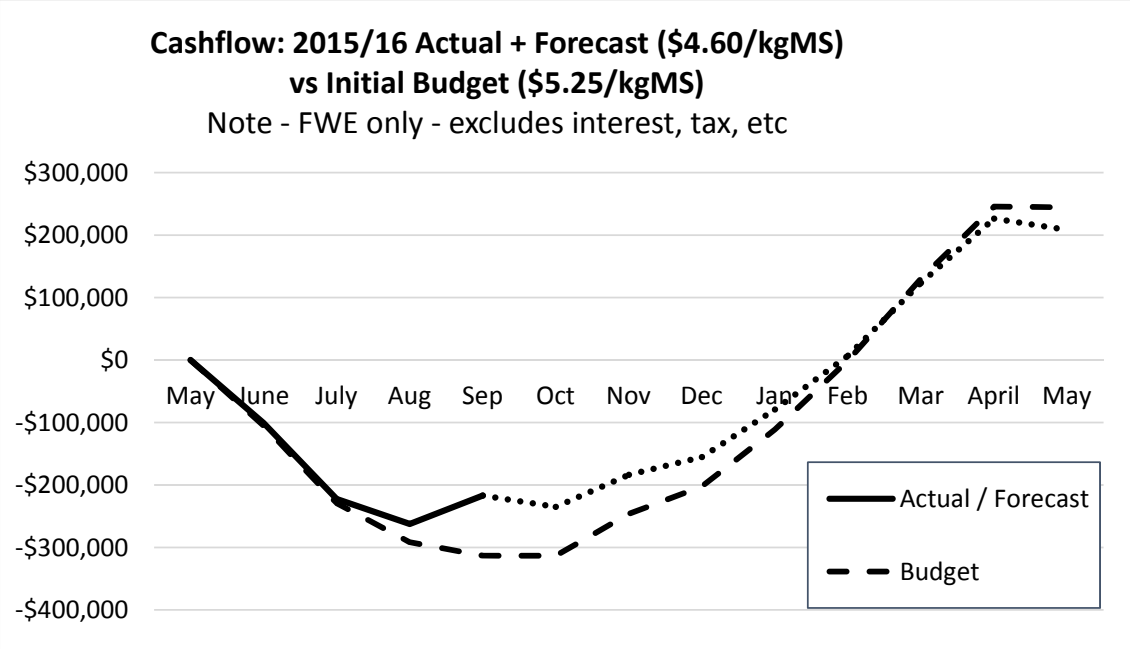
Variances in Expenses to date (compared to budget)

As above, the budget is as agreed prior to the beginning of the season. Since then changes to the budget have been made, as outlined above. Throughout the season all comparisons of expenses will be to initial budget, to compare progress over time. The exception is revenue in the above table, which has been updated to the current forecast milk payout.

A monthly cashflow budget vs actual to date and forecast for the remaining season follows. The budgeted cashflow is as above, with overdraft interest added. Note budgeted revenue is based on $5.25 milk income (as forecast at the beginning of the season). Actual revenue is adjusted to the current forecast of $4.60. Forecast revenue and expenses is actual to date, plus remaining months budgeted expenses, or revenue based on current milk price.

Major Variances above:

1. Slight differences in timing of some stock sales and purchases.
2. As above, very little GA was applied this season.
3. Savings from not applying maintenance Phosphate fertiliser.
4. September rain has prevented any need for irrigation to date.
5. Minimal regrassing required to patch damaged pastures from early spring grazing.
6. Delayed start to the employment of a new farm assistant has reduced staff expenses.
7. Saving on budget – see revised forecast note above.
8. Significant saving to date against budget – some will be timing differences, most is anticipated to become annual savings.



Re-jigging the system to maintain viability

Options to maintain viability

1. Wintering on
2. Young stock on farm
3. Reduced / no regrassing
4. Minimising Phosphate fertiliser
5. Staffing changes
6. Calf milk powder
7. Less calves reared
8. Variations to breeding programme

LUDF has considered a number of possible changes to its system to maintain viability, with lower milk process, while not moving from its wider objective of maximising sustainable profit within its historical environmental footprint (as above).

The areas identified above all have potential impacts on current and future productivity (and profitability), as well as short term revenue and expenses.

Wintering and grazing off, staffing and are covered below, while changes to regrassing, phosphate fertiliser, calf milk powder and the number of young stock reared are noted above in the revised forecast, with some additional details also below.

Impact Wintering On and / or Rearing Young Stock on the milking platform.

LUDF is part way through farm system and financial modelling with Farmax to identify both the possible outcome of these changes and the sensitivity to this type of system change. Additional notes from DairyNZ's modelling team in regard to these aspects are below. It is useful to note this type of system change requires consideration of many factors including:

a. Financial impact / sensitivity to costs / revenue
b. Impact on farm staff – seasonality of workload and total hours worked
c. Changes in tractor use / RM / depreciation
d. Impacts on Nutrient losses – both on the milking platform and in the total catchment
e. Long term vs short term intentions / abilities
f. Complexity of multiple classes stock and forage
g. Relationships with external providers feed and contractors to achieve outcomes.

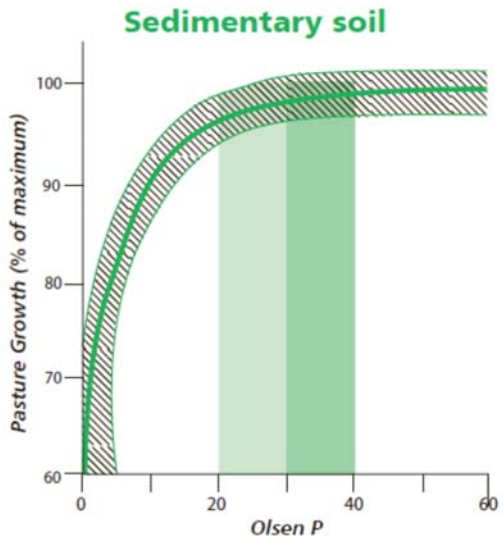
Reduced / No Regrassing

Aggressive regrassing at LUDF (10-15% per year in a grass to grass system) has been a valuable means of establishing higher yielding, higher quality (and easier managed) pastures at LUDF. Experience in the 2014/15 season with the lower input system identified 15% regrassing put unnecessary strain on the farms feed supply. It was the intention to reduce this to 10% this season, had milk income been higher. LUDF could have deferred all regrassing this season, but in light of the 24 September forecast milk price, has opted to maintain one paddock (5%) to be regrassed this year.

When considering regrassing decisions, the farms newer pastures were much more actively growing in the colder weather experienced this spring. This feed from newer pastures is highly valuable in LUDF's pasture system.

Minimising Phosphate Fertiliser

The following graph from the New Zealand Fertiliser Manufacturers' Research Association indicates target Olsen P levels for normal and high milk production per hectare. It indicates the level of Olsen P likely to maximise pasture production and has been the basis of LUDF increasing Olsen P levels to a target of 35-40 over recent years.



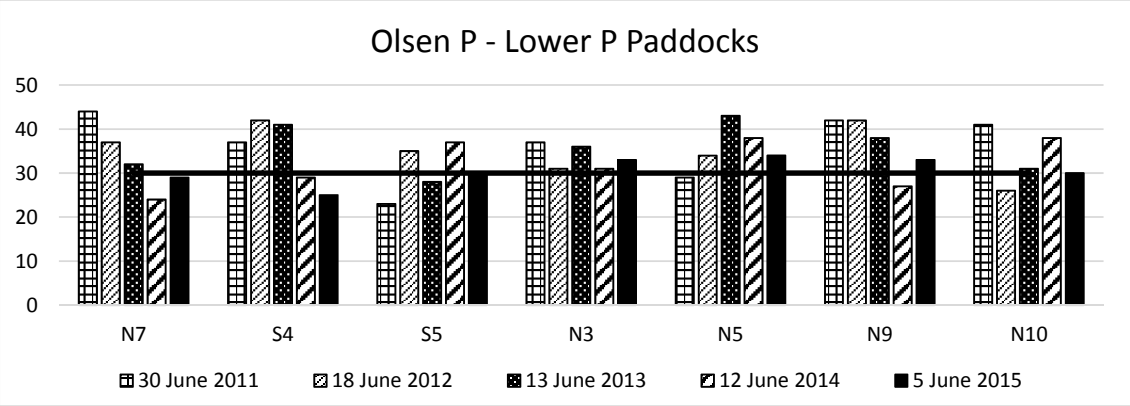
The relationship between relative pasture production and Olsen P for sedimentary soils. The shaded boxes represent target ranges for soil Olsen P for standard (lighter shade) and high (darker shade) milksolid production. High milksolid production is defined as where current milksolid production/ha is in the top 25% of the supply area or it is intended to increase to this level.

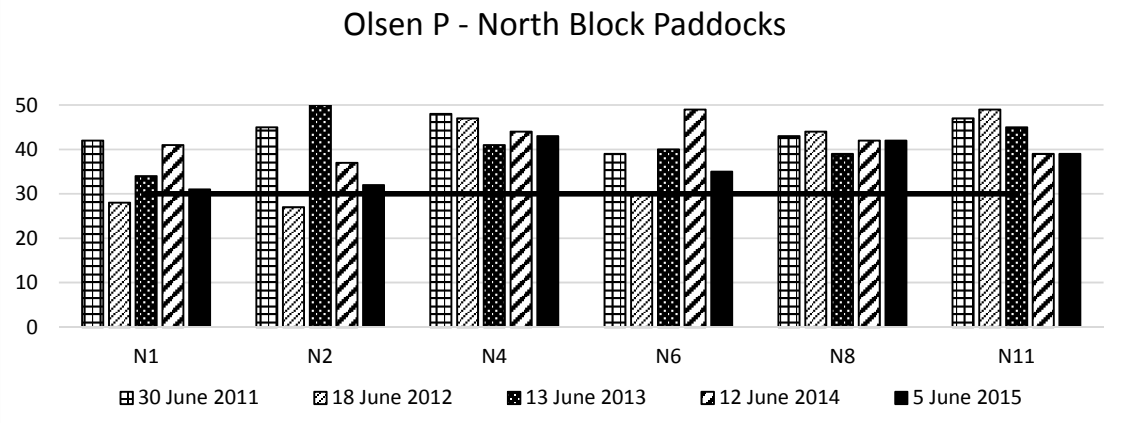
LUDF has individually soil tested each paddock each winter, since 2011. This data has been used to refine fertiliser applications per paddock, primarily enabling fertiliser to be applied at less than maintenance, at maintenance or above maintenance levels depending on the individual soil test and trend in soil test values over time.

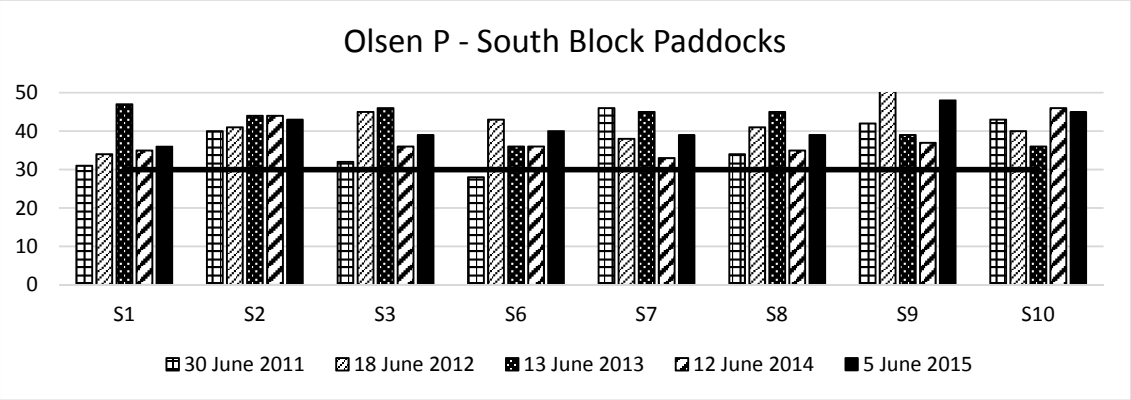
Given the low payout forecast for 2015/16, LUDF is using this individual paddock data to further refine maintenance applications of superphosphate.

1. For the spring period, most maintenance fertiliser applications has been deferred till the autumn when the revised payout forecast and fertiliser pricing at the time will determine application rates
2. Additional Sulphur is being applied through Ammo31 in September and early October to replace the Sulphur normally applied as superphosphate in the spring.
3. Three paddocks (N7, S4 and S5) have Olsen P levels at the last soil test of 30 or below. These paddocks, plus N3, N5, N9 and N10 (which have Olsen P levels or 30-34) will be targeted for maintenance fertiliser this spring.

The individual paddock soil tests are graphed below, the first graph is the seven paddocks identified above for Phosphate fertiliser this spring. The remaining graphs are all other paddocks on the North or South blocks.







Staffing

LUDF, like a number of other farms has taken a strategic and long term view of its staffing needs. The farm has 4 full time staff, comprising the farm manager, second in charge and two farm assistants. The managers time is discounted a little to accommodate the additional time and responsibilities associated with the farms demonstration role.

LUDF choses to focus on milk production per hour worked as its metric rather than number of cows per person, as this more accurately directs attention to the important components of the farms performance.

Included within the staffing on farm is all calf rearing, on farm and industry training, accommodation allowances and very limited use of casuals. The staff work an 8 on 2 off, 8 on 3 off roster.

Calf Milk Powder and Number of Calves Reared

See above

Variations to the Breeding Programme

LUDF has chosen not to compromise the long term productivity of the herd by short term breeding decisions, however has considered where savings can be made. Any cows not likely to be on farm next year, or not desirable as dams of replacements are likely to receive Hereford straws when AI mated.

Heifers will be naturally mated, in part because of the relatively low number of replacement heifers kept when the farm has AI mated heifers in the past, but also because the facilities at their current grazier aren't suitable for AI mating. This contributes a saving of approximately $2500.

The use of bulls after 6 weeks AI mating has been robustly debated, with economic analysis suggesting there is unlikely to be much saving or gain from either the use of Bulls or AI mating for

the last 4 weeks. There are a number of advantages and disadvantages with bulls vs all AI mating that warrant consideration of this aspect, that could drive a financial advantage depending on the farm.

LIC have a useful spreadsheet for calculating the likely financial impact of bulls vs AI mating after the initial AI period.

Input from DairyNZ regarding system changes (please contact your local DairyNZ Consulting Officer for more information on these impacts for your farm)

System adjustment to integrate fodder beet into the milking platform – Canterbury

There has been pressure for change on dairies across NZ. The sources of pressure include low milk prices, and the increasing cost of grazing off over winter as a proportion of farm expenses for South Island farms, and new considerations around how to make the best possible use of fodder beet. This has led to a number of questions being asked of DairyNZ. These questions have come through to the modelling group to supply the "answers". Rather than supply the "answers", a framework for assessing the options has been proposed (see appendix 1), based on either marginal budgeting where possible, or farm modelling (eg with Farmax) where required.

A common question has been does it make sense to winter on? This is a strategic or system change, and has implications over several years. If we assume that the change is in order to increase profit, while remaining resilient in the face of a range of milk prices, we need to consider what improvement is there to profit per hectare at both the current (low) milk price and a longer term average milk price.

Key Points

- **The difference between current pasture eaten and crop eaten per ha drives profitability. Yields and utilisation are king.**
  Eg if you currently grow 18T (consume 85%, i.e. eat 15 T) and achieve fodder beet yields of 25T DM/ha (consume 90%, i.e. eat 22.5T) then the difference in yield of 7.5TDM/ha eaten is a significant increase in total home grown feed. If the fodder beet yields only 20T D M/ha (consume 80%, i.e. eat 16T DM) then you are only achieving a 1T difference, much less likely to be worthwhile.
- **Skill and/or experience in growing and feeding crops is needed.**
- **There is additional complexity with more groups of animals to manage.**
- **There is additional labour required for feeding out crops (staff implications).**
- **Changes will occur to the nutrient loss for the milking platform, and the catchment where grazing has previously occurred.**

Principles of Decision making

1. Why am I changing?

2. What are my options?

Include possibilities for improving business as usual

3. What are the individual changes that occur?

Increased revenue, decreased revenue / Increased costs, decreased costs

4. What are the extra risks?

Price risk, yield risk, climate risk

5. Can I plan and implement this change?

Do I or my team have skills and/or experience with this change?

Do I have the cashflow to fund it? Do we have time to implement it?

Can we access contractors if required? What other considerations need to be taken into account?

Scenarios Considered

What are the options? A particular option may appear to be better than the current situation, but is it the best available option? Here we specify a range of options that could be considered in the context of outsourcing less feed in conjunction with making use of fodder beet on the milking platform.

Current Situation

All grass on the milking platform. Wintering off for dry cows, replacement young stock off farm from December (as R1's) till calving.

Alternative Options

1. Transition on the platform/shoulder feeding of Beet: This has a small amount of beet fed to milkers or dries on the milking platform before moving to the wintering block.
2. Winter on: All cows and R2's are wintered on the milking platform utilising beet and topped up with grass silage. Same milking herd numbers as base.
3. Winter on: All cows and R2's are wintered on the milking platform utilising beet and topped up with grass silage. Milking herd reduced from base numbers in proportion to area required for wintering and change in feed supply for milking cows.
4. Young stock on: Young stock kept on the platform, beet used where possible, milking cow numbers reduced to accommodate additional feed demand from youngstock.
5. Self-contained for all stock: Young stock kept on the milking platform and all cows wintered on the farm, with beet where appropriate.
6. Reduced stocking rate, reduced supplementary feed, but still winter and graze off, however with a lower number of total stock off farm.

Why does bringing beet onto the platform seem like a good idea? If a Canterbury farm grows sufficient grass to eat 15tDM/ha, but beet can yield 25tDM/ha, then with 90% utilisation, it is possible that 22.5tDM/ha beet is eaten. This beet is a 7.5 tDM per ha increase in homegrown feed eaten for each hectare switched from grass to beet. Assuming a marginal cost of $2400 per ha of fodder beet grown[1], the cost of the additional feed is $320 per tDM ($2400/7.5t). The high quality (12.8 MJ ME/kg DM) means it is price competitive with other high quality sources of feed.

In other words, if 10% of the platform was in Beet, at the assumed yield and utilisation, homegrown feed eaten would increase by 0.75 tDM/ha (averaged over the platform) or an increase of 5%[2]. Taking into account that the quality of Beet (12.8 MJ ME) is slightly higher than the annual average for ryegrass, there is a further advantage.

The main disadvantage of this feed is that it arrives at a relatively narrow window of a few months compared to ryegrass, fitting mainly with wintering of dries and shoulder feeding of milkers. There are nutritional limits to beet as a percentage of feed eaten, and the need to supply fibre and protein (eg pasture or pasture silage), means the diet is not as cheap as it could otherwise be.

Sensitivities

Yields

What if the fodder beet yield and utilisation are overestimated? Lowering yield from 25 to 20, and utilisation from 90% to 80%, implies only 16t would be eaten (ie 20t*80%). This means there may only be a small benefit in homegrown feed. For example, with 10% beet, the benefit in feed would be less than 1% averaged over the platform. This highlights the importance of beet yield and utilisation relative to the pasture grown on the farm to determine what benefit may be achieved. If the farm has below average pasture growth, it would be appropriate to carefully assess the opportunities to get average or higher beet yields.

Cow numbers

What if the cow numbers are kept constant when wintering on is introduced (eg Option 2)? There is less grass available for the milkers, and so either milk production falls, or more feed (eg pasture silage) is required to feed them to keep milk production the same. If more feed is bought in, there is a significant extra risk exposure to feed prices if they increase (with either drought or general increases in demand).

What if the cow numbers are reduced when wintering on is introduced (eg Option 3)? If 10% was calculated as being appropriate for planting to beet for wintering, then stock numbers could be reduced by 10%. In this case the level of purchased feed may be similar (as a percentage of feed

[1] $2400 is an estimate of the ***marginal*** (or additional) cost of growing fodder beet on the platform where previously there was grass. Therefore it excludes irrigation (to the extent the pasture was already going to be irrigated), and the cost of fertiliser for the beet area should have the cost of fertiliser that would have been applied to the grass area subtracted. It is assumed that regrassing after the beet is a part of the planned regrassing process, and so the cost of regrassing doesn't need to be included in the marginal cost of growing beet. See breakdown of costs in Appendix 1.

[2] The percentage increase in homegrown feed with 10% in beet equals [(90%*15+10%*22.5)/15]-1 = [15.75/15]-1 = 5%

eaten), so there is no extra purchased feed risk. However, there will be sensitivity to milk prices. For example, a farm stocked at 3.5 cows, 400 kg MS/cow would initially produce 1,400 kg MS/ha, and at a 10% reduction in cow numbers (with constant production per cow), 140kg MS/ha would be lost. If there was a $1 increase in the milk price, the possible benefits of the wintering on scenario would reduce by $140 (1400kg MS/ha *10%*$1/kg MS).

Grazing costs

What if the wintering cost for sending to a grazier was $25/week instead of $30/week? At $30 per week, for 10 weeks of wintering, at a base stocking rate of 3.5 cow/ha, the grazing cost is $1,050/ha. With the reduction, the grazing cost falls to $875, a reduction of $175 per hectare. This reduces the relative benefit of moving to wintering on by $175 per hectare.

Irrigation

What if irrigation reliability is low on the milking platform? This may put a greater yield risk on the beet, and the cost of purchasing feed under drought or dry conditions would compound, leading to a much reduced benefit of wintering on.

Beet establishment costs

What if the cost of beet establishment was 10% higher (eg $300 per hectare sown)? With only 10% of the area sown, the cost averaged over the farm is $30 per ha (300*10%). What if the seedlings were blown away or otherwise severely damaged? Resowing could cost $500/ha of beet, or $50/ha averaged across the farm. There could be a yield penalty as well, depending on the timing.

Extra staff time

What extra time could wintering require if current staff were not available to do it? One estimate from Southland Demo Farm was 2 people for 5 hours per day for 800 cows (split into several groups). Over the wintering period of 10 weeks, this would add to $14,000 (2 people *5 hours * $20/hr *7days*10 weeks). At a reduced stocking rate of 3.15 cows/milking platform ha, this would be $55/milking ha ($14,000/800 cows*3.15). Additional vehicle expenses and R&M would also apply. If current staff do this work, could fatigue carry into the next calving season?

What benefit could be gained by not having to cart stock to and from wintering? At $20 per animal for the return trip for milkers (less culls), this would be $53/ha (3.5*[1-25% replacement rate]*$20).

Additional considerations

What other considerations should be assessed before making a change?

- Do I want to discontinue a good relationship with a grazier? Is there an alternative that benefits both parties? Eg transition on the milking platform, ready for a large percentage of beet in the diet at grazing?
- Where will I source supplement to feed with the beet?
- Is my soil type, pH and fertility appropriate for Beet? Is there a risk of severe pugging that would lower utilisation and reduce yields of pasture when regrassed? Will I have to regrass parts of the farm that I wouldn't be able to grow beet on, and what does this do to the feed supply?
- Will a significantly different system (e.g. with wintering on) fit within the applicable regional council policies?
- Transition cost (fund change with sale of stock, but can only do once)
- What complexity do the "juggling" of extra cropping and classes of stock add to the farm that could lead to other balls being dropped (e.g. lower production or reproduction)?
- What are the risks to animal health if I don't have the skills, experience or advice to safely transition and feed the animals on beet?
- Is there a benefit to controlling the wintering process in terms of better results?
- How do I "transition" to wintering from my current state, when I have to pay for wintering and establishing fodder beet in the first year, but benefits don't arrive till the second year? If stocking rate is adjusted downwards as part of the strategy, the sale of excess stock may assist with cashflow over this period.

References

A range of information and resources are available from DairyNZ, including:

FeedRight Information Sheet: Incorporating fodder beet into your farm system

Farm Fact 1-73: Fodder beet – feeding to dairy cows

These can be found by navigating from the homepage menu on the left, choosing **Feed**, then **Crops**, then **Fodder Beet** or going direct to:

http://www.dairynz.co.nz/feed/crops/fodder-beet/

Appendix 1: Marginal cost of growing beet

All Beet costs, less those already incurred for growing grass, equals the marginal cost of growing beet.

Beet Item	Cost ($/ha)		Cost ($/ha)
Cultivation	390		
Seed	430		
Base fertiliser	470	Less pasture fertiliser	250
Fertiliser application	80		
Planting	160		
Weed and pest chem	840		
Irrigation	300	Less pasture irrigation	300
Chemical application	160		
150 kg urea N/ha	130		
Total variable cost	**$2960**	**Marginal cost over pasture**	**$2410**

- Estimate only, individual needs will vary.
- Depending on how the beet is used, there may be additional costs for integrating beet into the system. For example additional silage may need to be fed with Beet as part of the system costs.

Appendix 2: Sensitivity – Net Fodderbeet available at different crop yields and utilisation:

	Yield of Fodderbeet				
Utilisation	**18**	**20**	**22**	**25**	**27**
90%	16.2	18.0	19.8	22.5	24.3
85%	15.3	17.0	18.7	21.3	23.0
80%	14.4	16.0	17.6	20.0	21.6
75%	13.5	15.0	16.5	18.8	20.3

Lincoln University Dairy Farm - Farm Walk notes

Tuesday 5 October 2015

LUDF – focus for 2015/16 Season: Nil-Infrastructure, low input, low N-loss, maximise profit.
Farm system comprises 3.5 cows/ha (peak milked), 150kgN/ha, 300kgDM/cow imported supplement, plus winter most cows off farm. FWE of less than $1.08 million and target production of 500kgMS/cow.

Critical issues for the short term

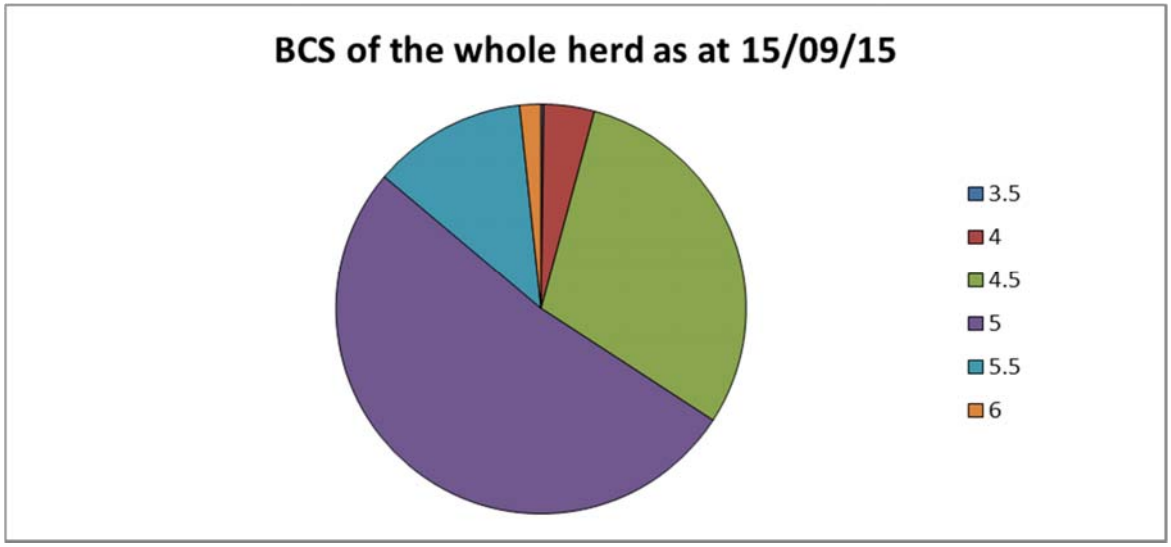
1. **Monitor average pasture cover on the milking platform**
2. **Monitor grass quality coming through the following rounds to ensure good quality and quantity intakes over mating.**
3. **Calving, cow health (mastitis) and calf management**
4. **Use back fences with all herds to minimise pasture damage and aid regrowth**
5. **Supplement cows with Magnesium**

Key Numbers - week ending Monday 5th October 2015 (this is a 6-day week set of results)

Ave Past Cover	2601kgDM/ha	Past Growth Rate	70 kgDM/ha/day
Round length	29 days	Ave Supplement used	0 kgDM/cow/day
No Cows on farm	560 (539 milking into the vat)	Ave Soil Temp (week)	10.4 degrees
Ave Milk Production	2.45 kgMS/cow	SCC	158,000

Herd Management

2. There are currently 550 calved cows (539 milkers, 7 colostrum cows and 4 red mob cows) on farm. The last remaining 10 cows to calve are now on the platform.
3. This week we had 3 new cases of mastitis and one lame.
4. The herd was split on 23 August into a small herd of heifers and low BCS cows (126 cows) with the rest as the main herd. The small herd is being preferentially fed, generally getting the first part of each paddock and not being pushed as much to achieve target grazing residuals. This is to minimise BCS loss.
5. Cows in milk were BCS on 15th September 2015. The average BCS for the herd is 4.9. See graph below for the split:



6. Magnesium is being supplemented to the calved and non-calved animals on the milking platform as Mag Oxide and Mag Chloride in the stock water.
7. All heifer replacement calves are now outside (grazing on the East Block)
8. Preparation for mating:
    a. On 10th September, all cows calved at least 10 days were Metrichecked. 24 cows were treated (5% of cows presented to metricheck).
    b. Blood samples were taken from a sample of calved cows to check mineral levels, all results came back as adequate no extra minerals required.
    c. Bulls were visually checked including measuring scrotum size and will receive Copper, Selenium. Blood test were done to check their BVD status - all results came back as BVD negative.
    d. There's a lot of heat activity in the big herd at the moment. The herd was tail painted on Monday 21st September (5 weeks before PSM).
    e. To date, 235 cows have been identified as having a heat - 42% of 560 cows
    f. The herd has been BVD vaccinated.
    g. On Thursday 17th September, R2yr heifers received Selenium injection and Copper bullet plus BVD vaccination and pour on drench.

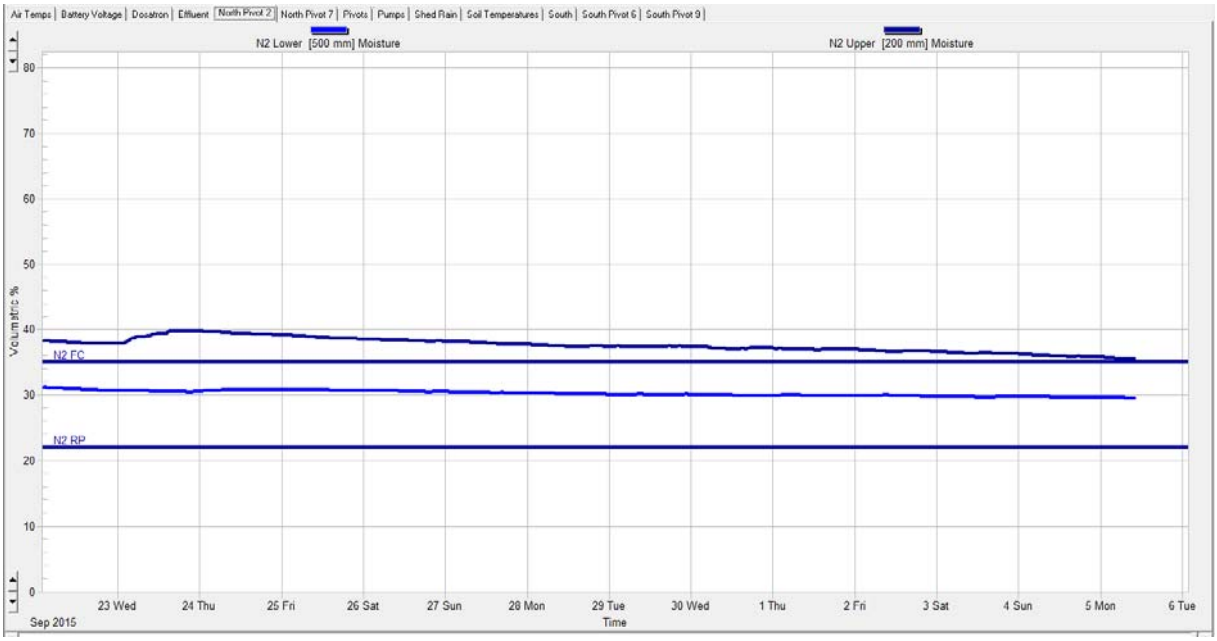
Growing Conditions

9. The average 9 am soil temperature for the week was 10.4 degrees (1.6 degrees higher than last week). Note the farm is now experiencing warmer days but has had some cooler nights (no frost) and a couple of very windy days.

Figure 1: Soil temperature history for the last 2 weeks

10. There has been no rain this week and the last couple of windy days have contributed to the continuous drop of moisture levels in the soil.
11. The irrigation systems are all in place and ready to start working when required.

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



Nitrogen and Gibberellic Acid

12. 39.2 ha have received AMMO 31 at a rate of 81 kg/ha this week (25 kgN/ha). This is the beginning of a second round of N for the farm this year. We continue to use AMMO to provide additional Sulphur, given the farm is unlikely to apply much superphosphate this season. Normally LUDF reverts to urea for the second round of N and begins applying maintenance superphosphate, but due to the forecast payout will only target Phosphate to paddocks with low Olsen P values.
13. No Gibberellic Acid has been applied this week and we will not be applying any more this spring.

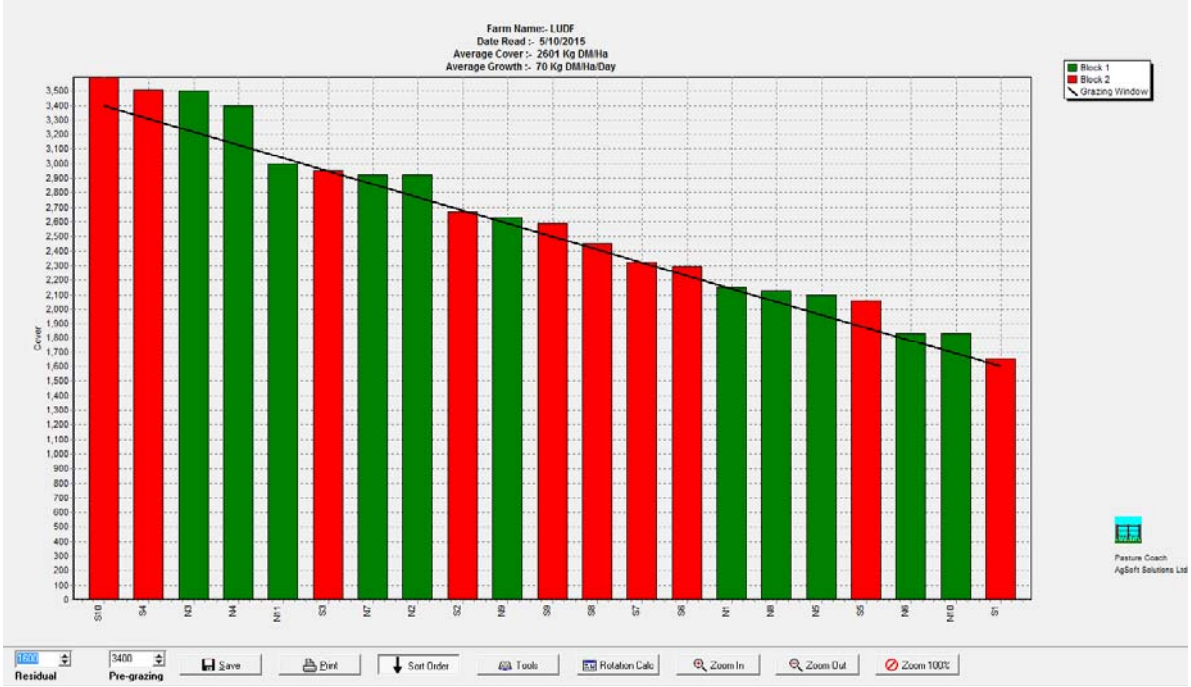
Pasture and Feed Management

14. The milkers and dry cows have been fed only grass.
15. The winter active hybrid tetraploid (Shogun) paddocks are continuing to perform strongly under the current conditions.
16. Average demand for the past week - from pasture - across the milking platform is estimated to be approximately 65-70 kgDM/ha/day, based on an average of 550 calved cows on the platform over the last week, offered 19-20 kgDM of pasture/cow/day and no silage.
17. APC has increased by 86 kgDM/ha (from 2515 kgDM/ha last week to 2601 kgDM/ha this week), which is more than the difference between demand and estimated growth rate.
18. Total feed demand will increase a little more as the remaining 10 cows calve and their intakes increase from a dry cow to in milk cows.
19. Post grazing residuals in the paddocks have on average been even and consistent. Where cows have on occasion struggled to clean up some parts of some paddocks, these areas may be targeted for pre-graze mowing in the second grazing round.
20. Our demand line in the feed wedge is calculated using a target rotation length of 25 days, intake of 20kgDM/cow/day, 560 cows (for the week ahead) and residual of 1600kgDM/ha. Target pregrazing cover is therefore:

    (Stocking rate x ***Intake from pasture*** x Rotation) + Optimum residual = Pre-grazing Cover.

    (560 cows / 160 ha x 20 kgDM/cow/day x 25 days) + 1600 = 3400kgDM/ha.
21. The Intake is determined by milk production, the recorded slight decrease in liveweight, maintenance requirements and distance walked. (See DairyNZ facts and figures for these details). At LUDF this calculates to approx. 260MJME. Recent feed testing suggests pasture is 12.5MJME, therefore 260MJME requires 20.8 kgDM/cow/day.

Figure 3: This week's feed wedge:



22. The feed wedge estimates a surplus of 15 tDM/ha at present. The surplus has increased from last week's 8 tDM/ha. We can see a small surplus starting to build and we will monitor this closely to ensure pastures do not loose quality over the next round or the grazing rotation extends beyond our target.
23. The cover on the top paddock on the high end of the wedge is around the 3550 kgDM/ha. This is higher than the target pregraze cover in the wedge – the herd will confirm whether they find as much cover as the rising plate estimate.

Feeding Management for the coming week

24. Given all of the above, the key decisions for the week ahead:
    a. All cows will now be fed on the platform, including the 10 cows still to calve.
    b. We will continue on a 25 day round which is 6.4 ha per day
    c. We will continue to monitor cow behaviour, post-grazing covers and weather conditions, and adjust the feeding regime as required.
    d. Pasture walks are continuing on a weekly basis for the rest of the season.

LUDF Weekly report	8-Sep-15	15-Sep-15	22-Sep-15	29-Sep-15	6-Oct-15
Farm grazing ha (available to milkers)	160	160	160	160	160
Dry Cows on farm / East blk /Jackies/other	0/95/0/0	0/69	0/46/0/0	0/24/0/0	0/0/0/0
Culls (Includes culls put down & empties)	0	1	1	1	0
Culls total to date	6	7	8	9	9
Deaths (Includes cows put down)	0	0	0	0	1
Deaths total to date	5	5	5	5	6
Calved Cows available (Peak Number 560)	472	498	521	540	550
Treatment / Sick mob total	3	7	4	5	4
Mastitis clinical treatment	3	5	4	4	3
Mastitis clinical YTD (tgt below 64 yr end)	37	42	46	50	53
Bulk milk SCC (tgt Avg below 150)	177	162	189	191	158
Lame new cases	3	3	2	2	0
Lame ytd	8	11	11	15	15
Lame days YTD (Tgt below 1000 yr end)	12	30	30	30	30
Other/Colostrum	0	0	0	0	0
Milking twice a day into vat	440	470	494	523	539
Milking once a day into vat	6	6	0	0	0
Small herd	120	126	128	141	141
Main Herd	320	344	366	382	398
MS/cow/day (Actual kg / Cows into vat only)	2.29	2.35	2.40	2.47	2.45
MS/cow to date (total kgs / Peak Cows	34	48	62	78	94
MS/ha/day (total kgs / ha used)	6.02	6.78	7.25	7.88	8.07
Herd Average Cond'n Score	0.00	0.00	4.90	0.00	0.00
Monitor group LW kg WOW early MA calvers	479	480	477	474	0
Soil Temp Avg Aquaflex	6.8	6.8	8.6	8.8	10.4
Growth Rate (kgDM/ha/day)	36	39	70	77	70
Plate meter height - ave half-cms	13.1	12.4	13.7	14.4	15.1
Ave Pasture Cover (x140 + 500)	2331	2233	2413	2515	2610
Surplus/[defict] on feed wedge- tonnes	0	0	0	0	0
Pre Grazing cover (ave for week)	3290	3306	3287	3020	3300
Post Grazing cover (ave for week)	1600	1600	1650	1650	1650
Highest pregrazing cover	3450	3379	3433	3500	3590
Area grazed / day (ave for week)	3.49	4.19	3.50	5.52	5.61
Grazing Interval	46	38	46	29	29
Milkers Offered/grazed kg DM pasture	15.0	0.0	0.0	0.0	0.0
Estimated intake pasture MJME	188	0	0	0	0
Milkers offered kg DM Grass silage	2.9	0	0	0	0
Silage MJME/cow offered	11	0	0	0	0
Estimated intake Silage MJME	32	0	0	0	0
Estimated total intake MJME	220	0	0	0	0
Target MJME Offered/eaten (includes 6% waste)	246	0	0	0	0
Pasture ME (pre grazing sample)	12.5	13.1	12.6	12.7	0.0
Pasture % Protein	19.4	17.9	19.8	17.0	0.0
Pasture % DM - Concern below 16%	17.1	19.3	19.5	16.0	0.0
Pasture % NDF Concern < 33	36.9	33.5	36.8	35.9	0.0
Mowed pre or post grazing YTD	0.0	0.0	0.0	0.0	0.0
Total area mowed YTD	0.0	0.0	0.0	0.0	0.0

Supplements fed to date kg per cow (560 peak)	37.7	56.6	75.4	93.3	93.3
Supplements Made Kg DM / ha cumulative	0	0	0	0	0
Units N applied/ha and % of farm	25units/ 19.2%	0	25units/ 30.6%	25units/ 30.6%	25units/24.5%
Kgs N to Date (whole farm)	19	19	25	32	39
Rainfall (mm)	2.8	15	29	8.6	0
Aquaflex topsoil rel. to fill point target 60 - 80%	70-90	80-90	90-100	90-100	70-100

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.

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.

LIC®

Focus Day Feedback – October 2015

1. What is your on farm role (please circle)?

- Farm Owner
- Farm Consultant
- Sharemilker
- Rural Professional
- Farm Manager
- Farm Staff
- Other - please specify _____

2. When was the last LUDF Focus Day you attended (please circle)?

- This is my first
- 2015 - I'm a regular attendee
- I attend when I can but not regularly
- Not for a year or so

3. Did you find the topics covered today useful?

	Very useful	Somewhat useful	Interesting but not useful	Not useful	Waste of time
Sustainable Dairying – Workplace Action Plan					
LUDF Seasonal Update					
Pasture management to harvest more					
LUDF Revised Financials / Options to maintain viability					

4. Any other comments or suggestions for future Focus Days?

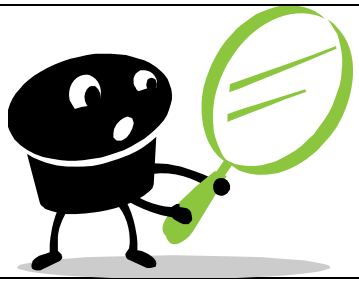
5. Name: (optional)

Welcome to Lincoln University Dairy Farm (LUDF).

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

Hazard Summary: Look, think, act.

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

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

ARE YOU TRAINED FOR WHAT YOU ARE ABOUT TO DO? If not, STOP.

If you are uncertain how you should act or proceed, stop and contact the farm manager, other farm staff or your host.

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