Owl Farm

Providing knowledge

St Peter's School/Lincoln University
Demonstration Dairy Farm

ST PETER'S · CAMBRIDGE
NEW ZEALAND

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA · NEW ZEALAND
New Zealand's specialist land-based university

Farm Focus Day

Wednesday, 14 September 2016

St Peter's School / Owl Farm Hazard Notifications

Children are the responsibility of their parent or guardian

Normal hazards associated with a dairy farm

Other vehicle traffic on farm roads and races

Races may be slippery

HAZARD SUMMARY

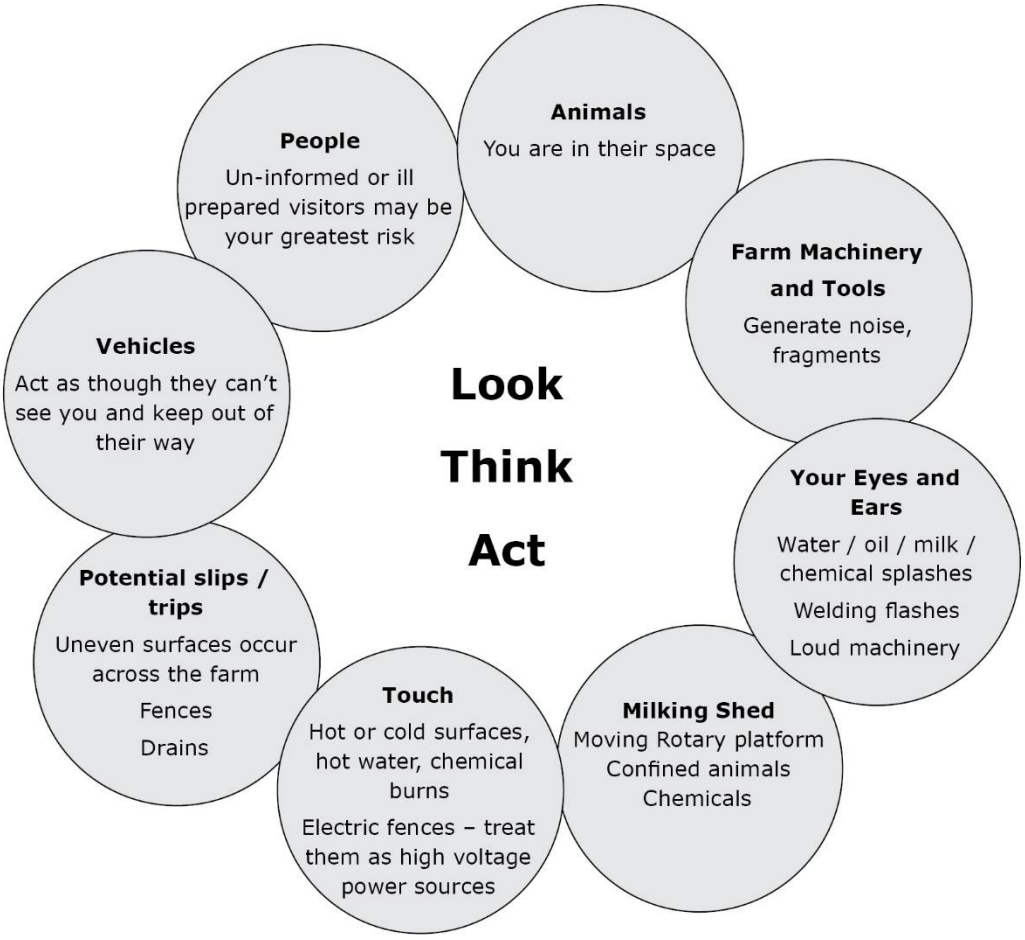
Welcome to Owl Farm

Owl Farm is a fully operational commercial dairy farm with a number of potential hazards to both visitors and staff.

Many of these potential hazards cannot be eliminated while providing access to visitors therefore all staff and visitors MUST watch for potential hazards and act with caution.

Hazard Summary

The following diagram provides a reminder of the types of hazards present.



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.

In being on Owl Farm you are acknowledging your receipt of this hazard summary. By doing so you also agree to be personally responsible for monitoring any potential hazards and agree to act conscientiously to protect yourself and any others who are also on-farm.

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Owl Farm

Legend

- Paddock
- Farm and school extent
- Parcels (as at 02/04/2016)

Contains data sourced from Land Information New Zealand under CC-By

0 100 200 m

1:2,500 @A0

N

Projection: NZGD 2000 New Zealand Transverse Mercator

Project No: 3-38970.00 Date: 28/04/2016

Author: Renee.Schicker@Opus.co.nz

N
WAIKATO RIVER
0 50 100 200 300 400 500
Meters
Owl Farm
DISCLAIMER: This product has been created with the highest degree of quality and care possible. However, Unchained Technologies, nor any of its contractors or suppliers can be held responsible for any damages whatsoever due to errors or omissions in this product, nor from its applied use. Property boundaries – sourced from LINZ – are indicative but not authoritative.

OWL FARM - ST PETER'S SCHOOL / LINCOLN UNIVERSITY DAIRY FARM STRATEGY

1. Vision

a. Dairy Farm

- To apply proven research, utilising good on farm practice and scientific monitoring for the farm to become an exemplar in dairy production, financial, environmental and people performance, while maintaining the highest standards of health and safety.

b. Students

- To encourage more young people into the dairy industry.

2. Strategic Objectives

a. Dairy Farm

- Providing leadership to dairy farmers and the wider community by demonstrating progressive practices that can be achieved on farm.
- Optimise profit through identifying the appropriate dairy production system for Owl Farm.
- Achieving a farm sustainable environmental footprint based on industry good management practice.
- To attract, train and retain quality employees.

b. Students

- To provide educational opportunities and exposure to the dairy industry which demonstrates career opportunities to students.

3. Farm Development Stages

a. Stage 1 Objective (2015/16 – 2017/18)

Establish credibility by addressing current issues and performance, whilst setting up the farm for future development. During this stage, the farm will operate a pasture based system, with tactical supplementation strategies, based largely on existing infrastructure, to optimise profit while developing a resilient farm system.

b. Stage 2 Objective (2018/19 – onwards)

Testing and investigating in conjunction with partners, innovative strategies to lead sustainable profit. The farm system will be developed over years 1-3 and reflect demonstration requirements of industry that are relevant and appropriate at that time point.

4. Stage 1 Operational Objectives

a. Dairy Farm Performance

Owl Farms high level operational objectives relating to the farms performance throughout the duration of stage 1 (2015/16 – 2017/18) are outlined below. A full breakdown of specific key performance indicators within each of the following objectives can be found within the separate Stage 1 – Dairy Farm Performance Plan in which the farms annual performance can be measured and reviewed.

i. Planning, monitoring and reporting

- To ensure all farm management and commercial planning is supported by a sound business case, solid rationale and effective modelling
- Set appropriate goals that reflect the strategy, objectives and development plans for Owl Farm, with time bound action plans and key performance indicators.
- To ensure accurate and transparent reporting of success or failures of objectives is undertaken in line with agreed timeframes.
- To ensure performance is reviewed in line with objective timeframes set out within Stage 1 Plan.

ii. Financial

- To optimise profit returned through balanced financial management within the farms existing management system
- Invest appropriately in capital development to enable improved productivity.

iii. Environmental

- To implement sound science supported environmental management systems to achieve sustainable growth and profit while protecting the wider environment.
- To ensure compliance with all regulatory and industry requirements

- To engage with stakeholders to lead towards sustainable farming objectives while influencing future direction.
- To show leadership in establishment of biodiversity management practices relevant to the Waikato.

iv. People

- To implement best practice in people management.
- To develop and implement best practice effective health and safety systems and build a culture that ensures staff, contractors and any other visitors are protected as much as practicably possible while on farm.

v. Herd Performance

- To capitalise on genetic metric of herd with regard to per cow production
- To achieve or exceed industry targets for mating performance
- To meet or exceed all recognised industry standards regarding body weights and condition within a profitable system
- Use data to measure effectiveness of actions and make information readily available
- Effective health control is optimised through preventative treatments and any immediate health issues are treated as a priority
- To adopt practices in line with the animal welfare code

vi. Soil

- To have soil fertility levels (and fertiliser application) sufficiently high to optimise pasture and/or crop production
- To review and enhance Nutrient use efficiency over time
- To actively strive to avoid physical damage to the soil from pugging or mechanical means

vii. Pasture, crops and feeds

- To optimise pasture and crops grown and harvested so that cows consume as much metabolisable energy as practical from grazed pastures, home grown crops and supplements.
- To integrate strategic use of appropriate supplementary feed when there is a genuine feed deficit and where there's a clear financial return.

viii. Community engagement

- To establish Owl Farm so as to develop and demonstrate good practice in pasture based dairy farming systems and to transfer good practices to dairy farmers.
- To develop and implement a communications plan to engage the wider community around what we are doing and why.
- Contribute to building positive perceptions around dairying.

b. Stage 1 – Students

i. Educational

- Facilitate student farm visit's to provide genuine exposure to farm and associated activities.
- Facilitate partner presentations within the educational curriculum.
- Provide data for student analysis that may benefit their area of school learning.
- Support the re-establishment of TeenAG programme within the school.

ii. Career opportunities

- Demonstrate career opportunities which exist within dairying and the primary industries through providing exposure with partners and associated companies businesses.

iii. Community engagement

- Provide farm as a resource to other school groups (primary/secondary) to support positive exposure to the dairy industry.
- Facilitate and complete a farm open day for all secondary schools.

5. Stage 2 – Operational Targets

a. Dairy Farm Performance

Stage two will continue to evolve over the space of the next 3-6 years.

OWL FARM SNAPSHOT

Area

- Milking: 150 effective hectares
- Free hold land: 132 hectares
- Lease land: 18 hectares

Stock

- 430 – 460 cows milked
- BW 110/43
- PW 133/50
- Ancestry 99%
- There is historically 6 weeks of AB followed by 4 weeks with bulls for a total mating period of 10 weeks.

Soils

- The farm is long and narrow with 3.4km's boarding the Waikato River.

Soil Type:	*Location:*
Otorohanga deep clay	SH1, river and centre north
Pukehina deep sand	North of farm
Kainui deep slit clay	Behind the Kahikatea Stand
Turangi deep sand	Deer block
Rotokauri deep clay loam	School grounds
Kaipaki deep peat	Gully below the Avantidrome

Topography

- Vary dramatically from heavy clays to light sands. The topography is flat contour over three terraces.

Cowshed

- 36 bale rotary shed with cup removers, built in 1970 with an updated Waikato plant.
- Cows are run in two herds due to capacity of yard being only 400.

Staff

- Farm Manager, Assistant Farm Manager and Dairy Assistant (3FTE).

Effluent

- Direct application through sump and pump to travelling irrigator when conditions suit to 44ha.
- Effluent holding pond used when conditions don't suit application.

Nitrogen

- 150kgN/ha is generally the maximum applied in any year
- Soil testing is undertaken in April annually to provide the fertiliser recommendations for coming season.

Cropping / pasture

- 10% pasture renovation strategy achieved through summer cropping.
- Either turnips or chicory dependent on predicted summer conditions.
- Weekly pasture metering undertaken as well as annual pasture condition scoring, allows us to identify paddocks most in need of renovation.

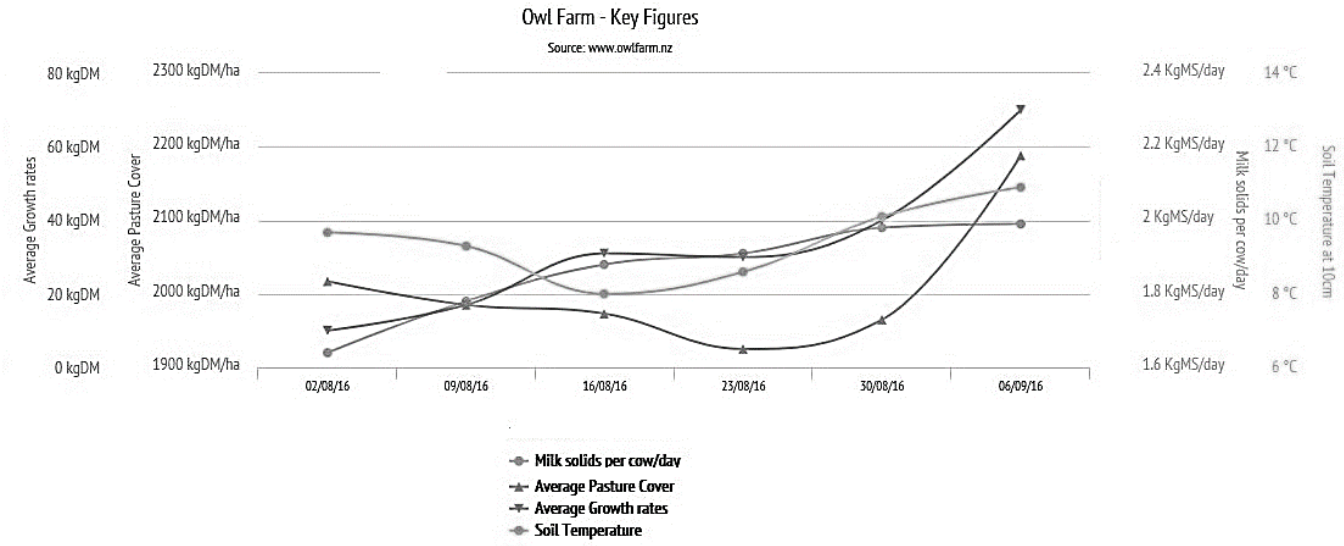
Supplement

- A mixture of grass silage, PKE and maize is used annually.

OWL FARM SEASON TO DATE

NB: All information below can be found on our new and interactive website **www.owlfarm.nz**

General



- Calving has gone reasonably well with 95% of the cows now milking. We have 100 replacement heifers which will remain on farm until 1 December.
- Unfortunately we lost 5ha of lease land at the start of the season which has reduced our effective milking area from 155ha to 150ha.
- We started the new season with 454 cows on farm. Following the loss of 5ha, we have culled an additional 22 cows and have lost a further 2 from eczema who didn't come through the winter as well as hoped. Some of those that were culled were empty, likely having slipped over autumn/winter as they were originally scanned in calf. The balance were cows that were still visibly struggling from eczema and wouldn't have coped with the demands of lactation.
- Going from 454 cows to 430 cows, we have managed to maintain our stocking rate. This does however mean that our original production targets are no longer relevant.
- The new targets are as follows:

Peak cows milked (modelled)	445 cows	428 cows
Production target (kgMS)	185,500kgMS	178,500kgMS
Per cow production (kgMS/cow)	417kgMS/cow	417kgMS/cow
Per hectare production (kgMS/ha)	1197kgMS/ha	1197kgMS

- In general it had been a slow start to the new season with weather and slower calving rate than expected being the blight on production during July. We have made up on lost ground during August and have started September in the same vein. Although we are slightly behind where we had planned to be in terms of milk production, pasture covers and growth rates, we are in a much better position across the board than the same time last year.
- Of particular note is the condition of the heifers and how have coped with the transition into the milking herd. Last season 50% of this group didn't cycle, they were underweight and weren't producing to their potential. Fortunately we have corrected these issues.

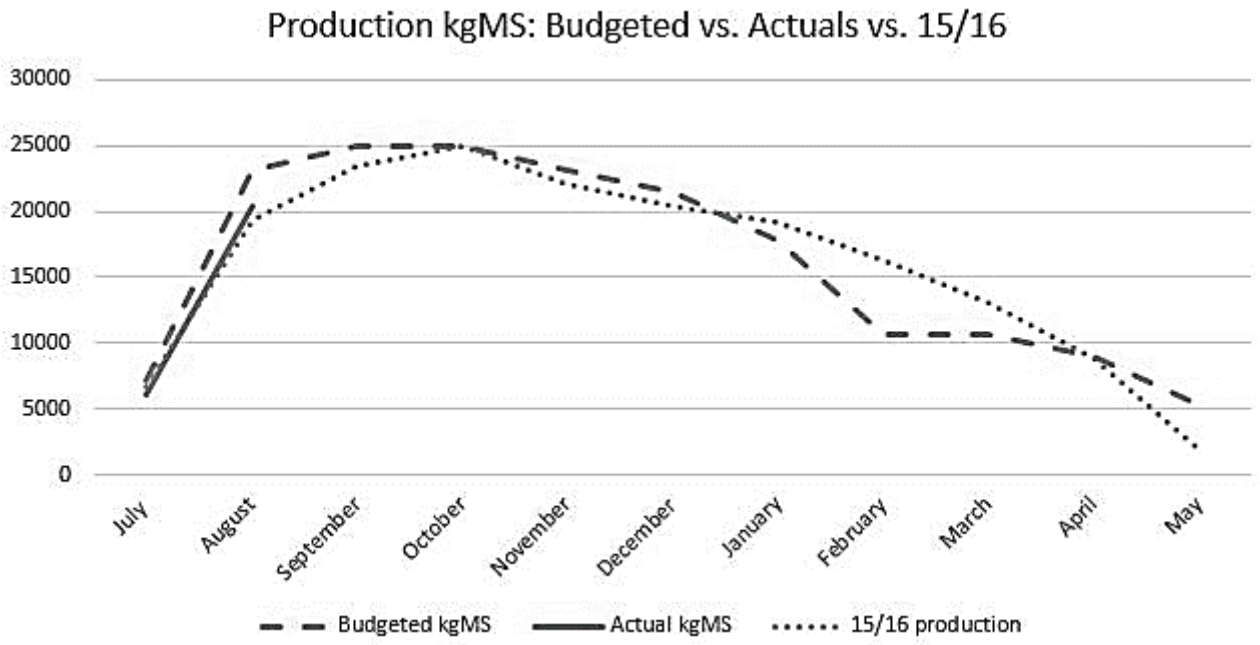
NOTES

Milk Production

- The initial production targets set at the beginning of the dairy season was 185,500kgMS. This would have been a 5% improvement on the 176,000kgMS we ended up with last season.
- With the loss of 5ha and subsequent reduction in stock numbers to 430, our new target is 178,500kgMS which is comparable at a 5% improvement on last year when comparing per cow and per hectare production.
- Applying the percentage of milk produced per month from the original 185,500kgMS target, we have been able to determine what the production curve should look like when operating the same farm system and feed budget just with less land under the revised 178,500kgMS target.

Production (kgMS): Budgeted vs. Actual vs. 15/16

Month	Budgeted kgMS	Actual kgMS	15/16 production
June			
July	7140	6095	6756
August	23205	20440	19277
September	24990		23422
October	24990		24899
November	23205		22137
December	21420		20397
January	17850		19201
February	10710		16258
March	10710		13066
April	8925		8766
May	5355		2019
Total	178500	26535	176198



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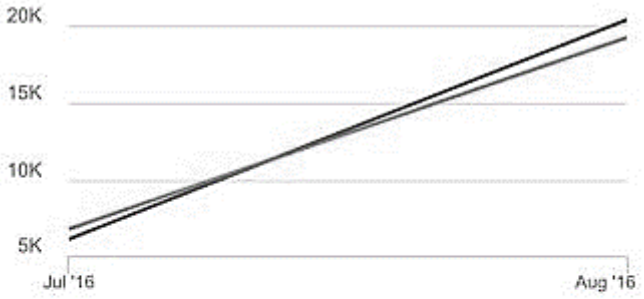
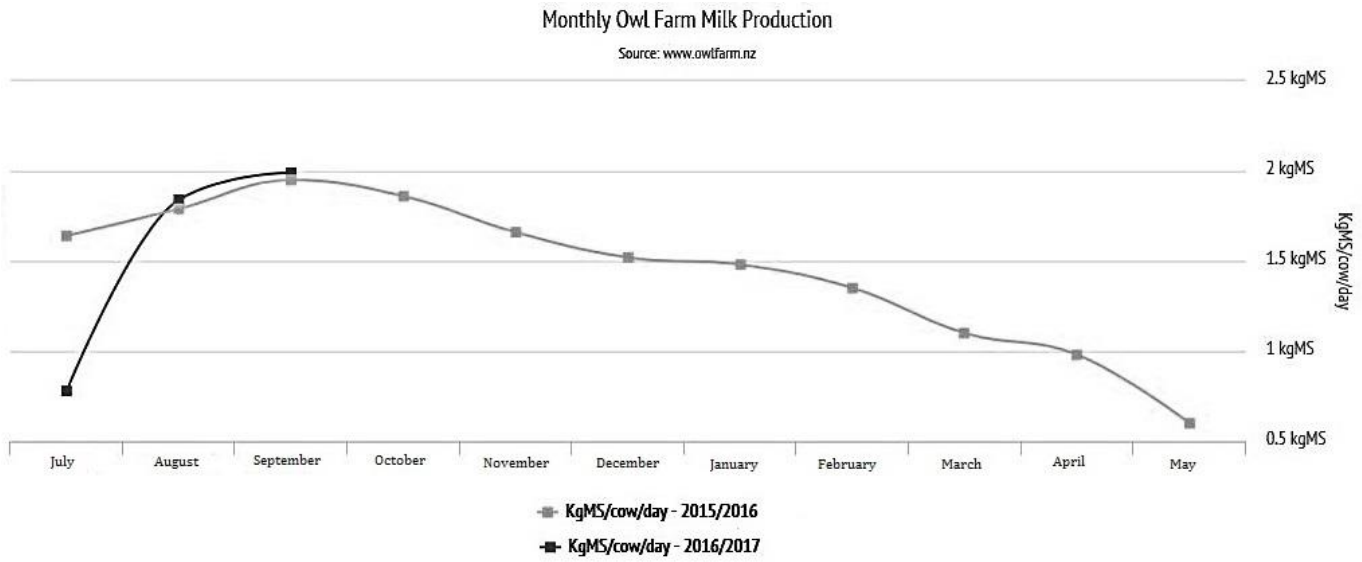


	This Season		Last Season
STD	26,535	↑ 2%	26,032
Aug	20,440	↑ 6%	19,277
Jul	6,095	↓ 10%	6,756

- The above table and graphs visually depict the season we've had so far. We started slowly and fell behind through July, slowly clawed our way back through August to be ahead season to date, however still remain marginally behind where we wanted to be at this point in the season from our initial modelling.
    - July illustrates the struggles we encountered from the continual rain that was experienced throughout the country. This demonstrates the vulnerability of our existing system to the elements as we struggled with feed utilisation and also appropriate feed sources to meet the conditions. We finished July 10% behind the previous seasons. Calving was a week later and a lot slower than last season meaning we didn't end up sending milk until the middle of July which was a week later than last season, this slowed us down from the outset.
    - August illustrates what's possible when the tap turns off and the sun comes out. Both the utilisation and energy of the feed improved dramatically throughout the month which corresponded in a boost in production. Having started the month 10% behind, we finished 6% ahead of August last year to put us 2% ahead overall.
- Although we may be slightly behind our modelled targets for the season, it is promising to see how well the cows are currently milking compared to this time last season. In August last year the cows were doing an average of 1.79kgMS, August this season the actual per cow is just below last season's peak of 2kgMS. On a weekly basis the cows have already out performed peak production last year so we are excited to see what September and October bring as we get closer to balance day and peak milk.



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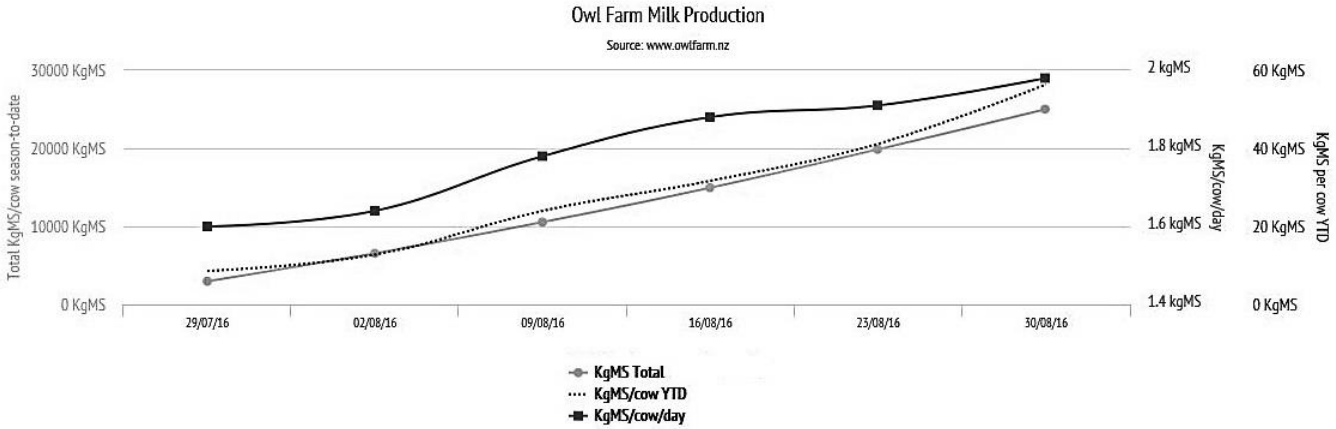
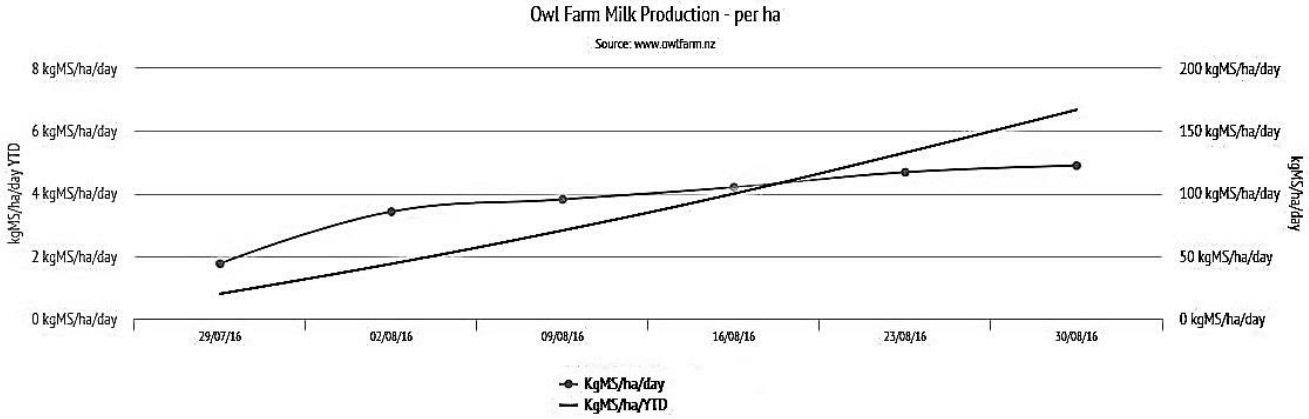
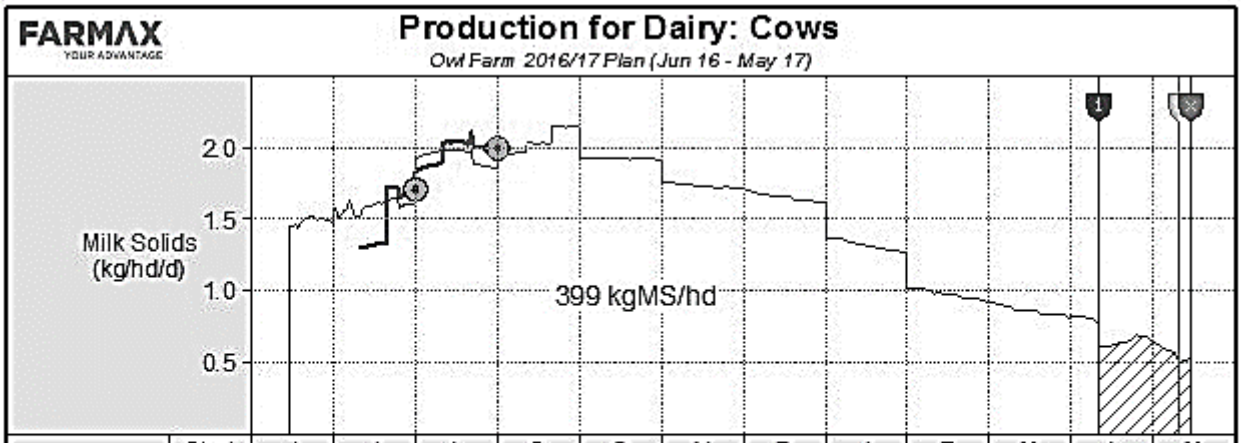






	Start	J	J	A	S	O	N	D	J	F	M	A	M
Model MS (kg/hd/d)		1.49	1.61	1.94	2.05	1.92	1.73	1.64	1.31	0.96	0.85	0.70	0.55
Actual MS (kg/hd/d)			1.57	1.97									
Actual/Forecast BCS	4.6	4.8	4.3	4.0	4.1	4.1	4.1	4.2	4.3	4.3	4.4	4.5	
Model Lwt (kg)		465	440	436	438	439	441	444	448	455	461	471	

NOTES

- Having recently completed our first herd test (1 of 4 planned), we are reasonably happy with the results and how we are tracking.

Overview

	Key Averages	2015 - 2016	2016 - 2017
Somatic cell count	103,000		
Milksolids (kg)	1.98		
Production worth	134 / 59		
Breeding worth	110 / 44		
Ancestry	99 %		

AE information above is based on a 2000 born cow. The base cow will change to a 2005 born cow in 2016. Keep this in mind when comparing indices between seasons.

Test day production averages for 04/09/2016

Age group	No. of animals	Milk (l)	Fat (%)	Fat (kg)	Protein (%)	Protein (kg)	Milksolids (kg)	SCC (000)
2 Years	91	19.60	4.89	0.96	3.74	0.73	1.70	56
3 Years	71	23.30	4.85	1.13	3.79	0.88	2.01	85
4-8 Years	184	24.70	4.79	1.18	3.70	0.91	2.09	127
9+ Years	34	23.40	5.36	1.25	3.55	0.83	2.09	136
Animals Excluded	17	12.10	4.68	0.57	3.98	0.48	1.05	128
Whole Herd	380	23.10	4.88	1.13	3.71	0.86	1.98	103

- What is particularly pleasing is the performance of the 2 and 3 year olds. This season our 2 year olds are doing an average of 1.7kgMS compared to 1.22kgMS at the same time last year. Similarly the 3 years olds were doing 1.67kgMS last year compared to 2.01kgMS this season. This reflects the efforts and investments which have been made in managing this group.

Regional herd test average comparison

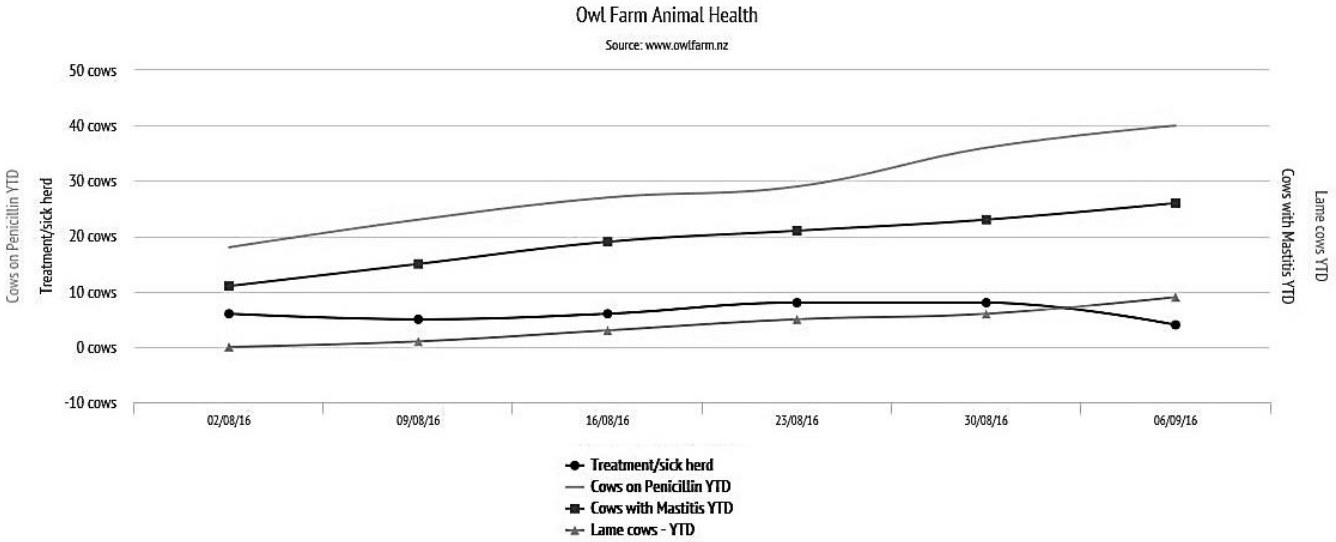
(All herds tested in same area in the last 14 days ending 04/09/2016)

Region name	No. of herds	Herd size	Milk (l)	Fat (%)	Fat (kg)	Protein (%)	Protein (kg)	Milksolids (kg)
South Auckland	152	270	21.50	4.56	0.98	3.69	0.79	1.77
For this herd		380	23.10	4.88	1.13	3.71	0.86	1.98

NOTES

Animal Health

- Milk fever was much more prevalent this season than last, which would have reflected both the conditions during July but also the ongoing effects of sub clinical eczema experienced at the back end of last year. Springers were receiving 80-100g MagOxide and 80-100g Gypsum, Colostrums received 60g Mag Oxide and 250g Lime Flour, milkers received 40g Mag Oxide and 250g Lime flour (through until 2/9/16)
- We have had higher rates of mastitis this season having identified and treated 26 cases compared to only 4 cases by this stage in season last year. This is a reflection of our dry cow policy, in the past all cows were treated with dry cow therapy and teat seal, in an effort to reduce costs at the back end of last season cows were selectively targeted for dry cow and teat seal based on age and udder conformation. This combined with the much wetter conditions observed during July would have definitely contributed to the higher levels of mastitis identified.
- The good news story is lameness, this hasn't been as prevalent this season as last. Although we have identified 6 cows STD compared to 14 last season all of these have been largely precautionary and using The Wrangler we have been able to treat them quickly and safely and have them return to the milking herd much faster than last season. None of these have gone on penicillin.
- As earlier alluded to, we have had to cull an additional 22 cows which were either empty or hadn't recovered as hoped from eczema.



- The herd has continued to be condition scored monthly thanks to Wade Bell from DairyNZ. The number below tells a good story reflective of hitting key targets at key times. Prior to calving the average BCS was 4.78 on target with industry guidelines, mid-way through calving average BCS was 4.25, this loss in condition in line with early lactation, currently they are sitting at 4.02BCS which is on target for start of mating. The current position will most likely be where the cow's bottom out as feed offered is due to increase as we near balance day.

June

REPORTS DairyNZ

AVERAGE SCORE 4.78

SCORE	PERCENT
2.5	-
3	-
3.5	-
4	8.5%
4.5	38.3%
5	44.7%
5.5	6.4%
6	2.1%
> 6.5 +	-

July

REPORTS DairyNZ

AVERAGE SCORE 4.25

SCORE	PERCENT
2.5	-
3	1.9%
3.5	1.9%
4	50.9%
4.5	34.0%
5	11.3%
5.5	-
6	-
> 6.5 +	-

August

REPORTS DairyNZ

AVERAGE SCORE 4.02

SCORE	PERCENT
2.5	-
3	4.2%
3.5	20.3%
4	49.2%
4.5	19.5%
5	6.8%
5.5	-
6	-

NOTES

- Mating will commence on 26th September this year and we will be using the LIC Why Wait PG program, but also targeting non cyclers early providing best return on investment rather than waiting until week three to start a CIDR program.
- This is to try and further tighten our calving up next spring so as to increase days in milk and also increase days pre mating for cows to ready themselves for the next season.
- This will incur some feed costs next calving but the modelling that has been done shows that with the correct amount and type of feed we will be better off, especially if we have a similar weather pattern as this year.

FARMAX

Compare Forecast Profit and Loss

Jun 16 - May 17

			Why Wait	BAU	Why Wait - Wintering Off
Revenue	Stock	Net Milk Sales - this season	985,847	976,829	986,885
		Net Milk Sales - last season	0	0	0
		Net Milk Sales - dividend	0	0	0
		Net Livestock Sales	54,448	54,320	51,804
		Contract Grazing	0	0	0
		Change in Livestock Value	-7,310	-7,310	-7,310
		Total	**1,032,985**	**1,023,840**	**1,031,379**
	Crop & Feed	Capital Value Change	-8,127	-8,127	-7,182
		Total	-8,127	-8,127	-7,182
	Total Revenue		**1,024,858**	**1,015,713**	**1,024,197**
Expenses	Wages	Wages	176,200	176,200	176,200
	Stock	Animal Health	30,000	30,000	30,000
		Breeding	30,000	30,000	30,000
		Farm Dairy	10,000	10,000	10,000
		Electricity	15,000	15,000	15,000
	Feed/Crop	Pasture Conserved	15,000	15,000	15,000
		Feed Crop	24,750	24,750	24,750
		Bought Feed	109,088	110,644	100,020
		Calf Feed	3,000	3,000	3,000
	Grazing	Grazing	61,409	61,409	75,357
	Other Farm Working	Fertiliser (Excl. N)	25,000	25,000	25,000
		Nitrogen	40,000	40,000	40,000
		Regrassing	25,000	25,000	25,000
		Weed & Pest Control	5,000	5,000	5,000
		Vehicle Expenses	20,000	20,000	20,000
		Fuel	15,000	15,000	15,000
		R&M Land/Buildings	15,000	15,000	15,000
		R&M Plant/Equipment	10,000	10,000	10,000
		Freight & Cartage	18,500	18,500	18,500
		Other Expenses	27,200	27,200	27,200
	Overheads	Administration Expenses	2,500	2,500	2,500
		Insurance	21,000	21,000	21,000
		ACC Levies	5,000	5,000	5,000
		Rates	21,500	21,500	21,500
	Total Farm Working Expenses		**725,147**	**726,703**	**730,027**
	Depreciation		52,979	52,979	52,979
	Total Farm Expenses		**778,125**	**779,682**	**783,006**
Economic Farm Surplus (EFS)			**246,732**	**236,031**	**241,191**
Other Expenses		Rent/Lease	30,000	30,000	30,000
		Interest	200,000	200,000	200,000
Farm Profit before Tax			**16,732**	**6,031**	**11,191**
Farm Profit per ha before Tax			**111**	**40**	**75**

EFS is a measure of farm business profitability independent of ownership or funding, used to compare performance between farms.
EFS should include an adjustment for unpaid family labour and management. This can be added to the expense database as management wage.

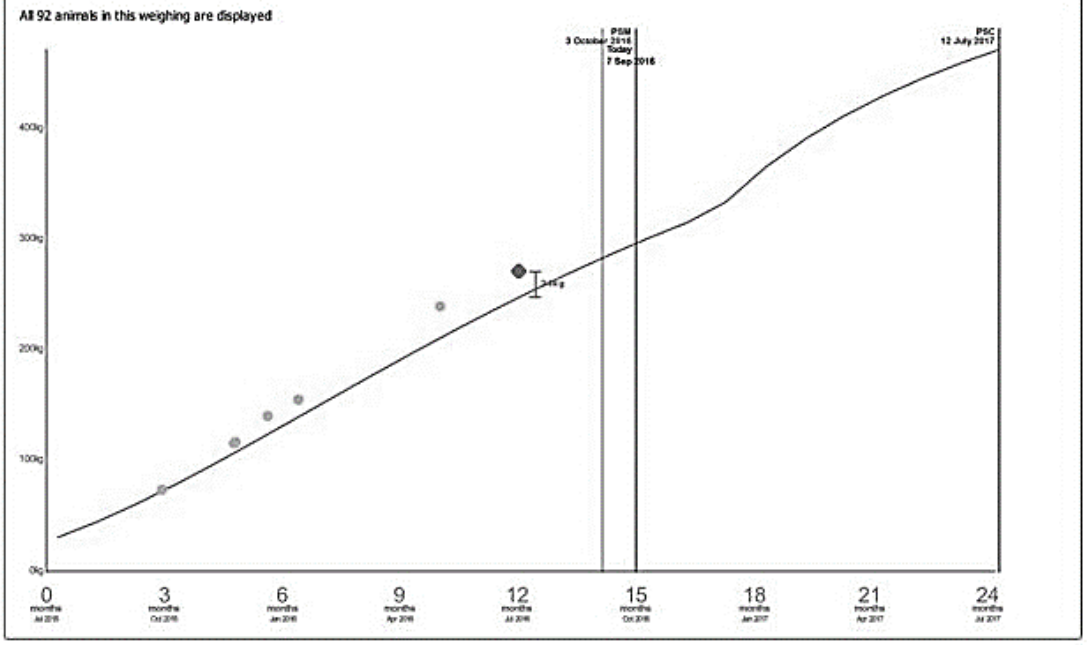
NOTES

Owl Farm

- Our heifers continue to justify the investment made in off farm grazing. They continue to exceed their weight targets.

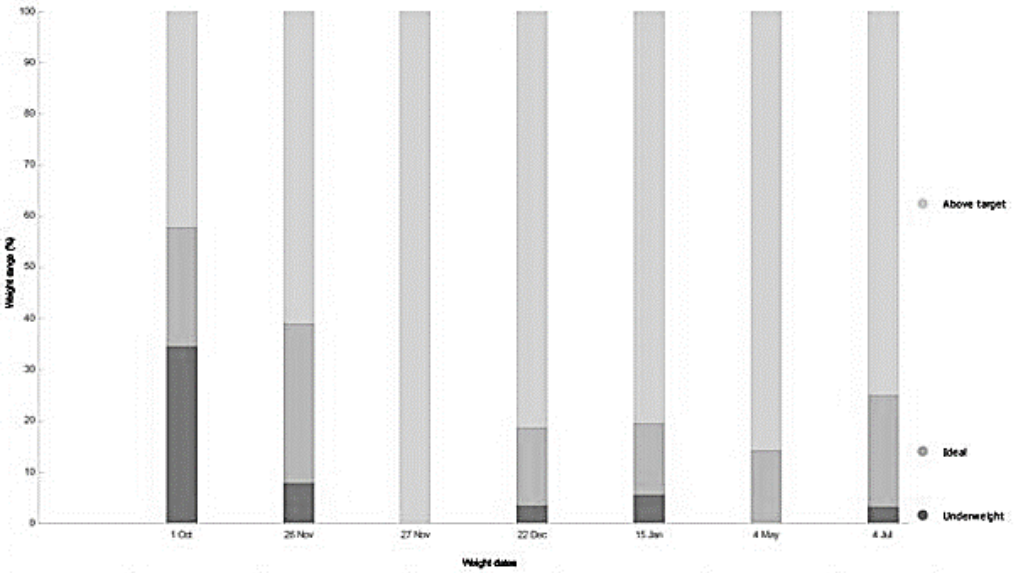
2015 Spring Born 15 Born Heifer Jul 16 4/07/2016 HPTT

Young stock trend



2015 Spring Born 15 Born Heifer Jul 16 4/07/2016 HPTT

Weight ranges

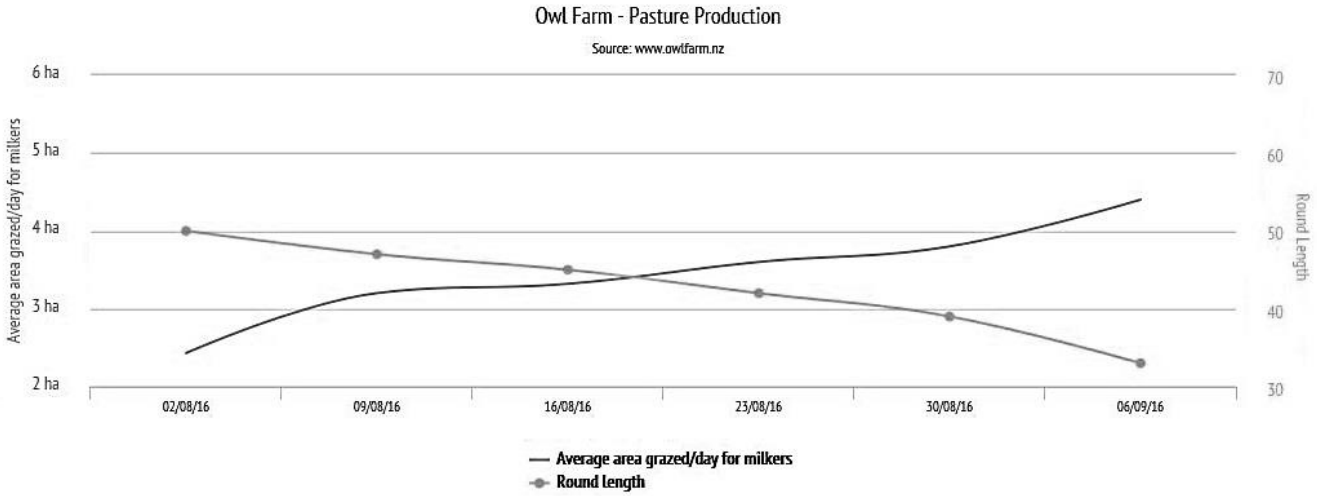


Range	October 2015		November 2015		November 2015		December 2015		January 2016		May 2016		July 2016	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Above target	38	42.2	55	61.1	1	100	74	81.3	74	80.4	78	85.7	69	75
Ideal	21	23.3	28	31.1	0	0	14	15.4	13	14.1	13	14.3	20	21.7
Underweight	31	34.4	7	7.8	0	0	3	3.3	5	5.4	0	0	3	3.3
Total Animals	90		90		1		91		92		91		92	

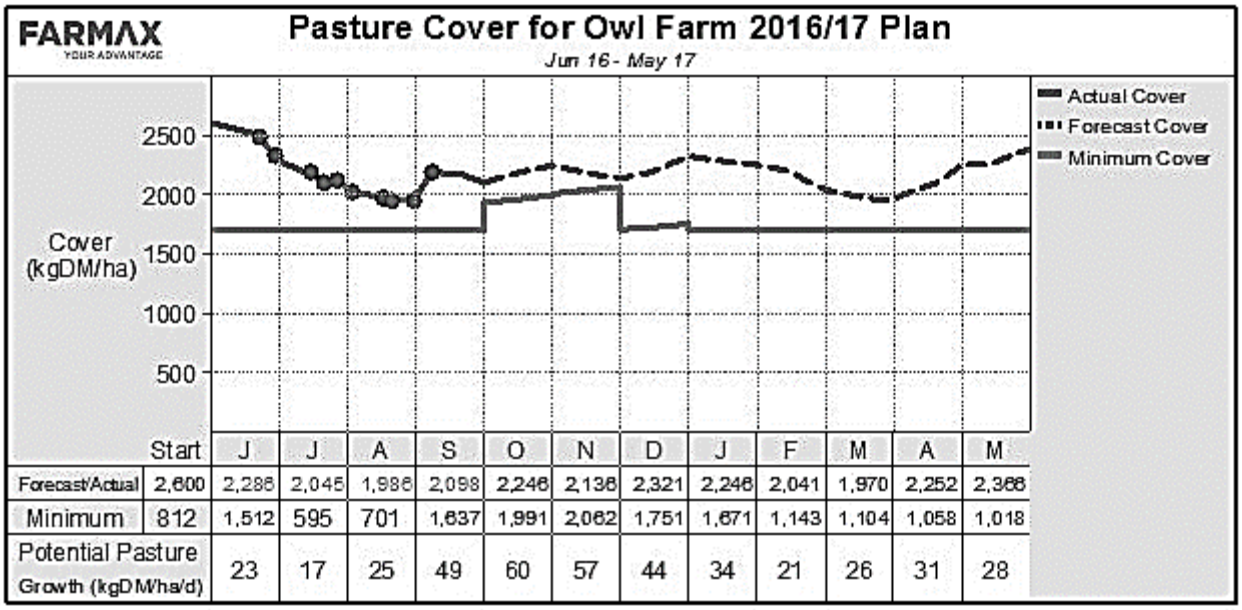
NOTES

Pasture Production

- It has been an interesting season with regards to pasture growth. We managed to come into the new season with much greater pasture covers than the previous year with 2600kgDM/ha average cover compared to 2200kgDM/ha. This was largely down to not being able to graze some annuals and new grass due to high nitrate levels.
- Following the spring rotation planner has been the focus through July and August. There were times in August when it was tempting to open the round up, however with balance day not budgeted until 15th of September we resisted the urge. We have gone from 1.86ha per day mid-way through July to currently grazing 4.7ha on a 31 day round. We will be aiming for a 24 day round or 6.2ha/day over the coming weeks.



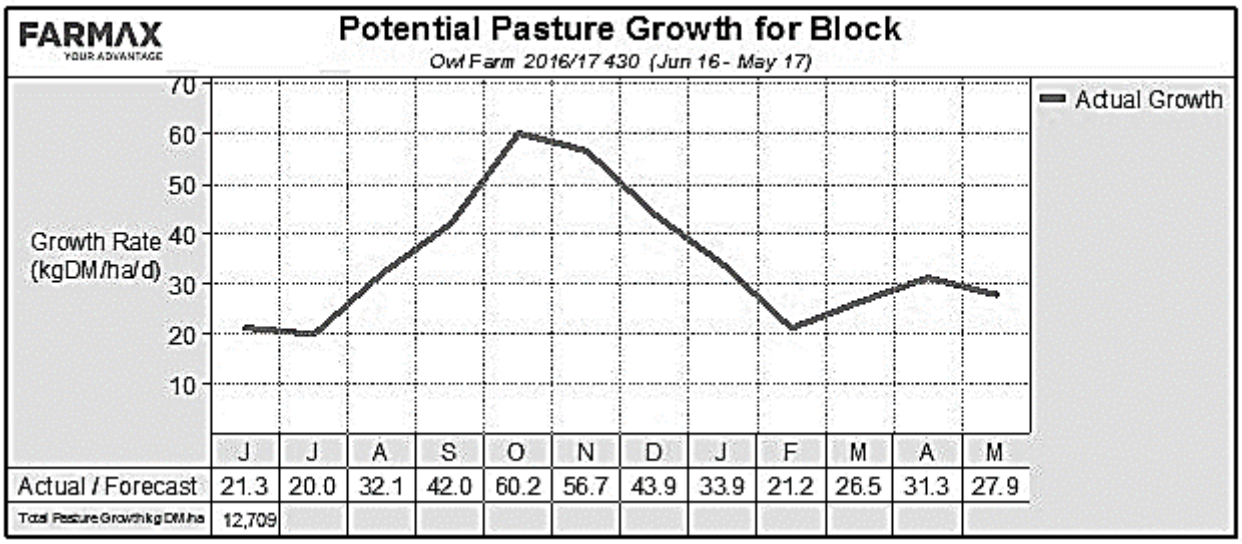
- The below image illustrates the pasture curve for the 16/17 season. The solid line represents actual average pasture covers as measured season to date whereas the dashed line represents the modelled covers for the remainder of the season based on the feed budget and predictive pasture growth rates. The dots represent the pasture metering events which have been uploaded. We bottomed out at an average of 1925kgDM/ha. We could have pushed a little harder and into the 1800s but this would have cost us later on with speed of recovery in the second grazing round, this is why we decided to purchase some baleage to ease the pressure on residuals and covers.



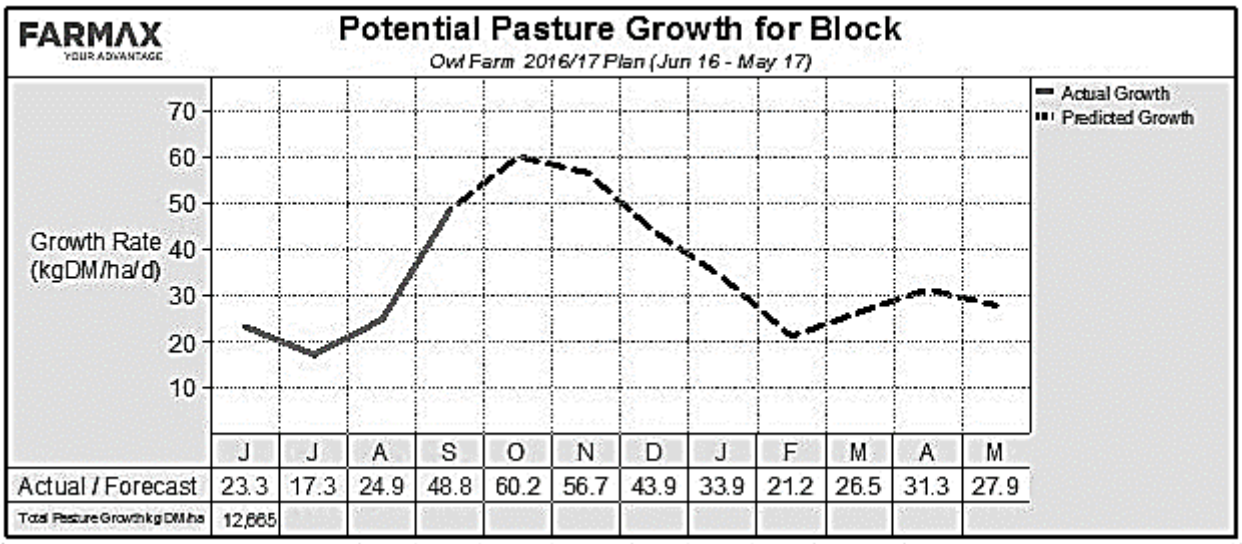
	Start	J	J	A	S	O	N	D	J	F	M	A	M
Forecast/Actual	2,600	2,286	2,045	1,986	2,098	2,246	2,136	2,321	2,246	2,041	1,970	2,252	2,368
Minimum	812	1,512	595	701	1,637	1,991	2,062	1,751	1,671	1,143	1,104	1,058	1,018
Potential Pasture Growth (kgDM/ha/d)		23	17	25	49	60	57	44	34	21	26	31	28

NOTES

- Below is our modelled average pasture growth rates which have been built into Farmax based on actuals from the previous season. The graph immediately below is what was budgeted at the beginning of the season when building the feed budget and estimating the amount of pasture we had available to feed.

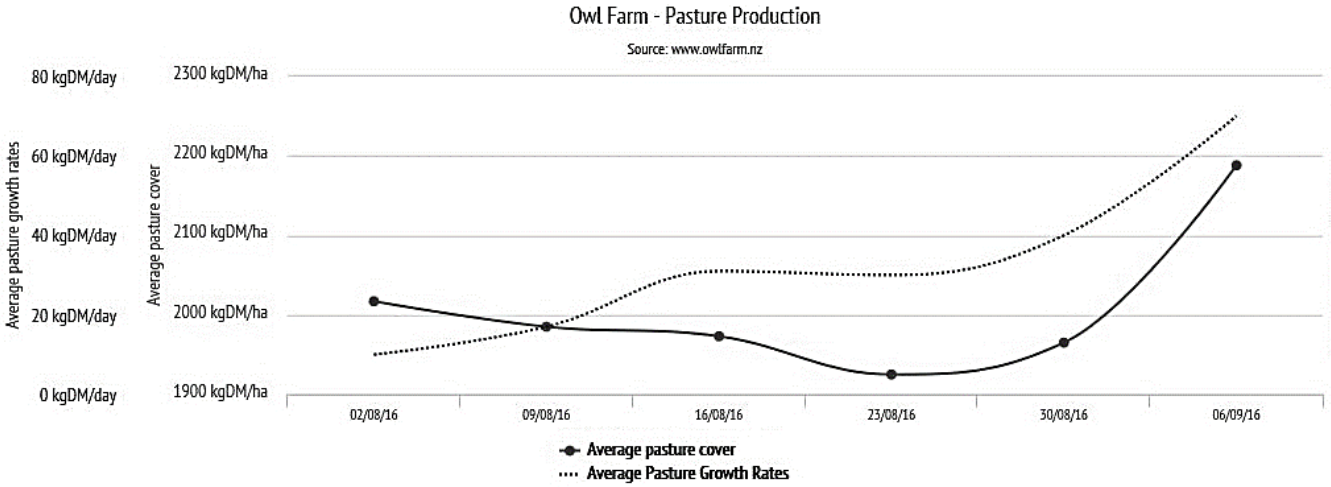


- The graph below shows what the actuals have been season to date as the actual pasture metering events have been uploaded.
    - June's actuals were slightly better than budgeted at 23.3kgDM/ha/day compared to 21.3kgDM/ha/day.
    - July's actuals were much less at 17.3kgDM/ha/day compared to a budgeted 20kgDM/ha/day. This is a reflection of the poor growing conditions and pasture damage caused through continuous rainfall during July.
    - Surprisingly although August was a warm month and utilisation was much higher than July actual growth rates were still lower than budgeted at 25kgDM/ha/day compared to a budgeted 32kgDM/ha/day. This is likely to be down the soil saturation level limiting plant growth.

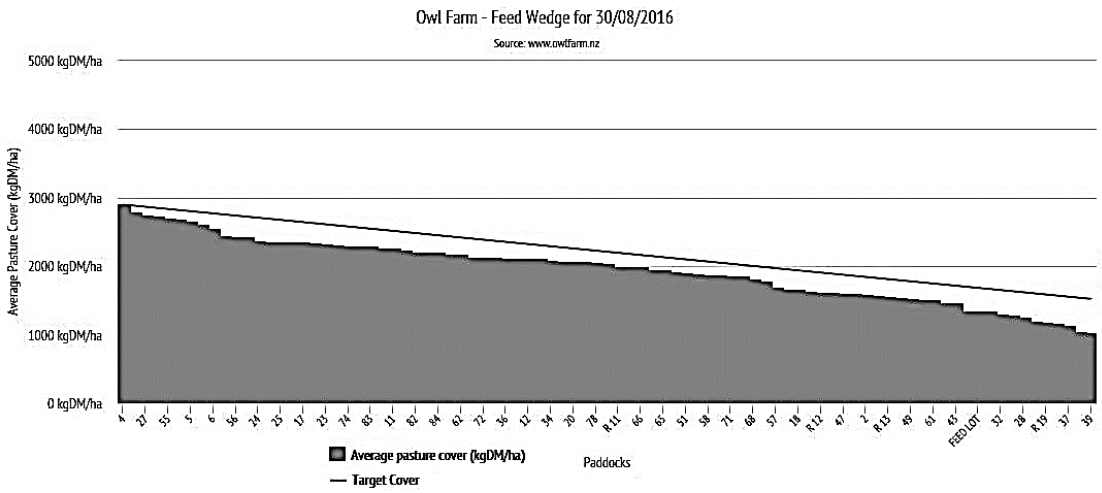


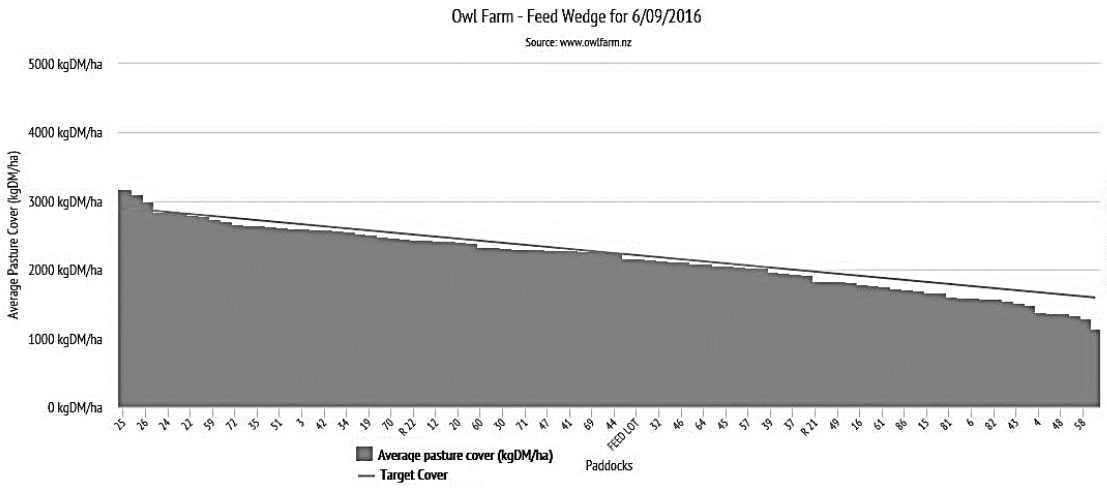
NOTES

- Although early in September things are definitely starting to move, the below graph below demonstrates that average pasture covers have increased from an average of 1965kgDM/ha last week to 2188kgDM/ha this week with growth rates averaging 70kgDM/ha/day.



- Below shows the pasture wedge from the two previous weeks and demonstrates how quickly things can change from managing a grass shortage to a grass surplus. Nitrogen and Pro-Gibb over the course of the last two weeks has significantly boosted this growth.





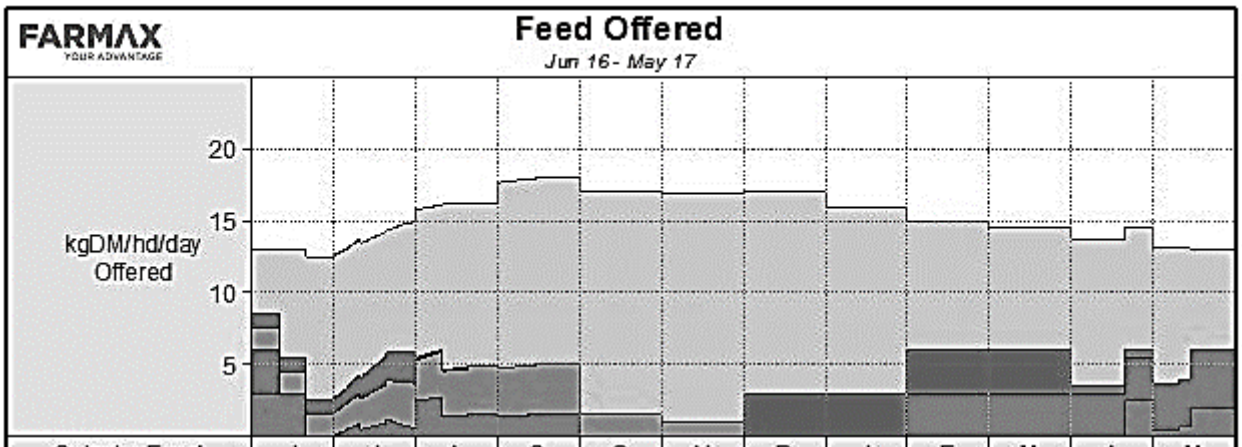
NOTES

- Although growth rates were down early in the season, the ME of the pasture has been significantly above what was budgeted. The modelled production was much less than the actual production based on the feed being offered through the feed budget. This prompted us to investigate where the additional energy was coming from.
- There are several areas which could influence the additional energy being identified:
    - Improved utilisation – significant improvements have been identified going from 75-85% in July to 90-95% in August.
    - More weight loss than we were accounting for and they were essentially milking more of their back.
    - Offering more pasture than what was measured in terms of higher dry matter percentages.
    - Higher energy levels present within the grass.
- To objectively determine where the extra milk was coming from we have undertaken some pasture sampling of various paddocks including new grass, undersown grass, annual and perennial pastures. Within our Farmax model we had budgeted 12.1MJME/kgDM for August's pasture. Our recently returned pasture samples show our lowest (perennial) at 12.5MJME/kgDM and the highest (both the annual and undersown pastures) at 12.7MJME/kgDM.
- This additional energy represents the extra milk we are seeing and further supports the extra investment made in pasture renovation. We will continue with a pasture sampling regime to build a better picture of feed quality at critical times throughout the season. We will sample annually in August, October, February and May.

Supplementary Feed Use

- As expected supplementary feed inputs have been high through the early part of the season.
- Below are our modelled and actual feed budgets developed through Farmax:
    - 1: Reflects the feed budget set at the beginning of the season using the modelled calving spread, estimated pasture growth rates, production targets etc.
    - 2: Reflects the actual feed which has gone into the system June – August while the remainder of the year still reflects the modelled inputs.

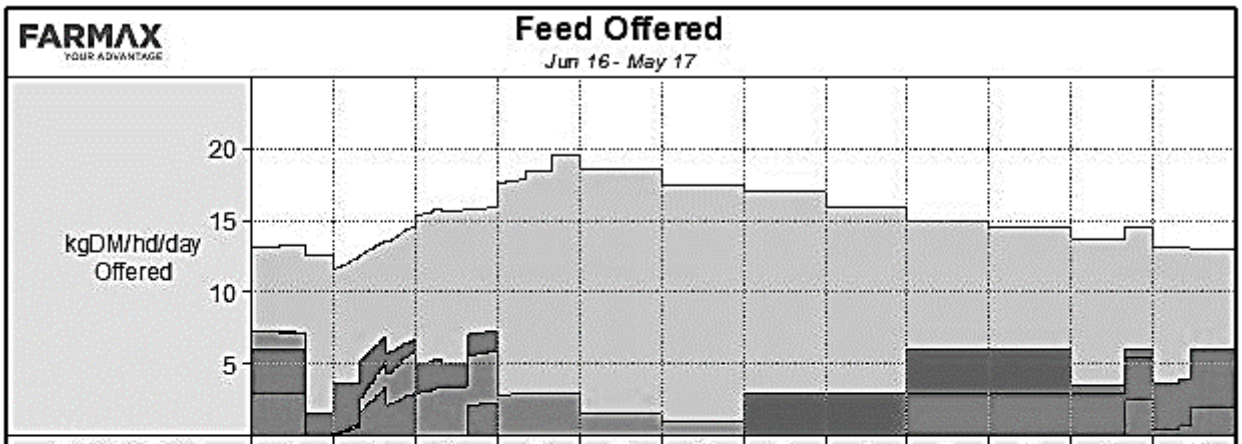
1. Feed Budget: Modelled at the beginning of the year



Select a Feed	J	J	A	S	O	N	D	J	F	M	A	M
Pasture	7.3	8.7	11.0	13.0	15.5	15.9	14.0	12.9	8.9	8.5	9.6	8.1
Chicory							3.0	3.0	3.0	3.0	0.5	
Pasture Silage	1.0	1.6	0.1									
Palm Kernel	1.5	2.4	3.2	3.4	1.5	1.0						
Bought maize silage	1.0								3.0	3.0	3.0	3.6
Annual Ryegrass	2.0	1.2	1.9	1.5							0.8	1.3
Total (Utilised)	10.5	11.5	13.9	16.1	16.8	16.8	16.7	15.6	14.0	13.6	13.1	11.3

NOTES

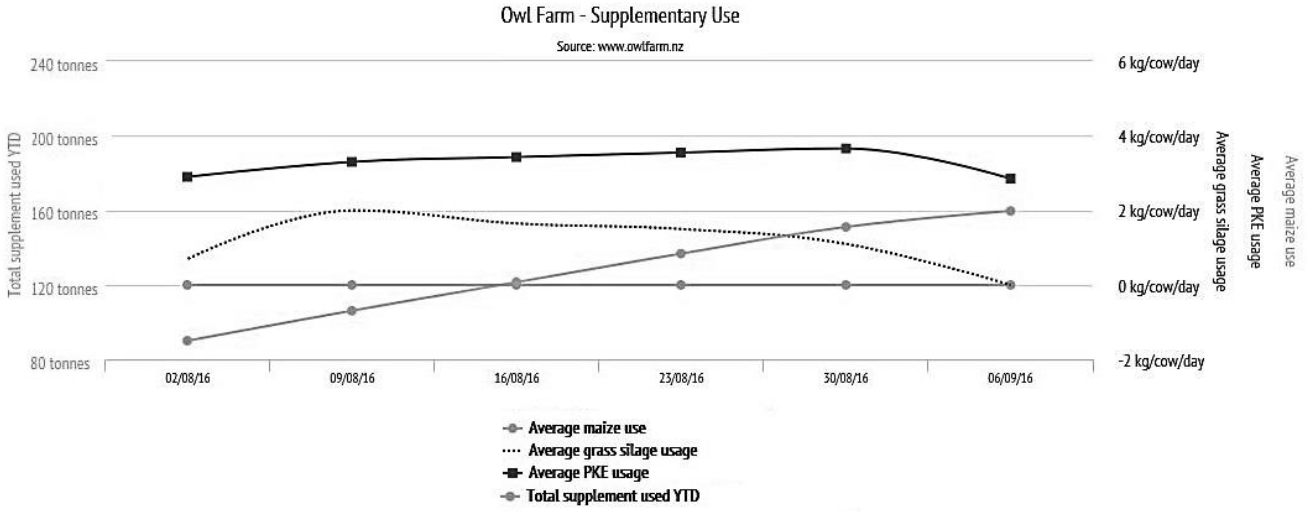
2. Feed Budget: June – August Actuals



Select a Feed	J	J	A	S	O	N	D	J	F	M	A	M
Pasture	7.7	8.1	9.9	15.6	17.0	16.5	14.0	12.9	8.9	8.5	9.6	8.1
Chicory							3.0	3.0	3.0	3.0	0.5	
Pasture Silage	0.5	2.1	1.7									
Palm Kernel	0.8	1.1	3.4	3.0	1.5	1.0						
Bought maize silage	2.0								3.0	3.0	3.0	3.6
Annual Ryegrass	2.0	1.7	0.7								0.8	1.3
Total (Utilised)	11.0	10.6	14.6	17.5	17.5	16.6	16.2	15.1	13.7	13.3	12.7	11.3

- Conditions through June meant pasture growth rates were slightly better than budgeted and allowed us to offer slightly more pasture and less supplement. Although we feed much less PKE and pasture silage than anticipated, we did feed more maize which reflects the favourable ground conditions through June.
- During July the continuous wet weather made us rethink our plans, we feed much less PKE (1.1kgDM/cow/day) than anticipated (2.4kgDM/cow/day) which was largely done to protect pasture damage through cows congregating around PKE trailers on saturated soils. This prompted us to feed slightly more pasture silage than we had budgeted as we wanted feed offered to resemble something of an appropriate amount. Sticking to the spring rotation planner meant pasture offered was less than anticipated as the cows were restricted to a certain area and growth rates were down and utilisation was far lower than budgeted at closer 75-80%.
- A much needed month's break in the rain allowed us to significantly improve feed utilisation throughout August, however the position July left us in and still sticking to the spring rotation planner meant the cows were being offered less pasture than budgeted. With conditions more favourable we filled the deficit with PKE and purchased a further 20tDM of pasture silage to ensure we could get intakes up.
- At feeding levels of 4kg of PKE per cow per day during August, we are critically aware that this contravenes the guidelines set by Fonterra and are working through strategies as a farm management committee to ensure we have appropriate contingency feed on hand and ways to feed it more effectively next season to avoid feeding at these levels. Fortunately these feeding levels were short-lived as we have now come back to the 3kg guideline as further pasture is available to feed.
- Having the appropriate feed sources on hand during winter and spring has been a significant limitation of ours which impacted intakes during July which is reflected in our milk production. Fortunately August brought much more favourable weather conditions which allowed us to regain lost ground in being able to provide enough feed albeit largely supplementary. This demonstrates the vulnerable nature of the system we are currently operating.
- Supplements budgeted 155tDM vs. supplements feed 170tDM – not bad when you consider the conditions experienced early in the season.

NOTES

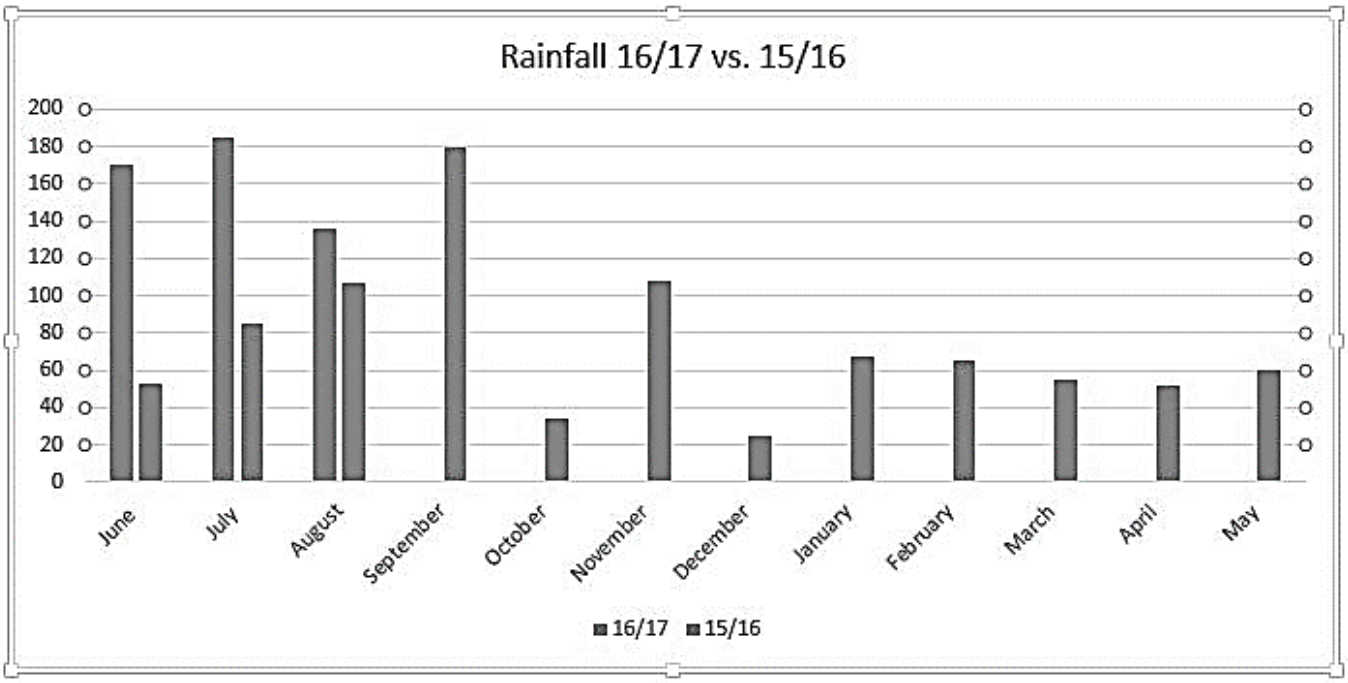


Nitrogen

- Nitrogen use has been reasonably high over the past couple of months. The majority of the farm has had a 100kg/ha application of PhaSedN (30kgN/ha) in July which along with the nitrogen also provided a sulphur boast.
- During August we followed this up with 100kg Ammo 30N (30kgN/ha) as we wanted to lift the feed wedge.
- Coming into September we going to be applying 65kg/ha of SustaiN (30kgN/ha) to ensure we can feed the pasture when it's growing at its fastest.
- Following that we will put another 30kgN on in December and a further 30kgN on in April/May which will bring the annual amount applied up to 150kgN/ha.

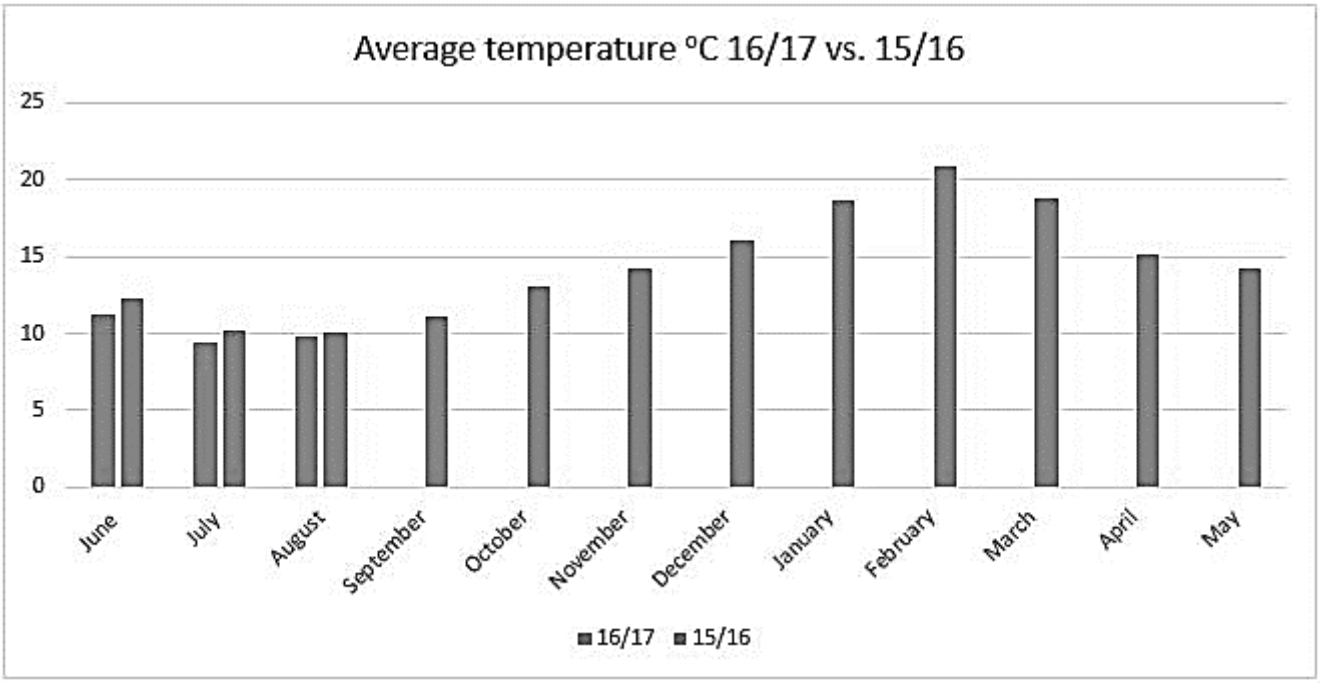
Climate

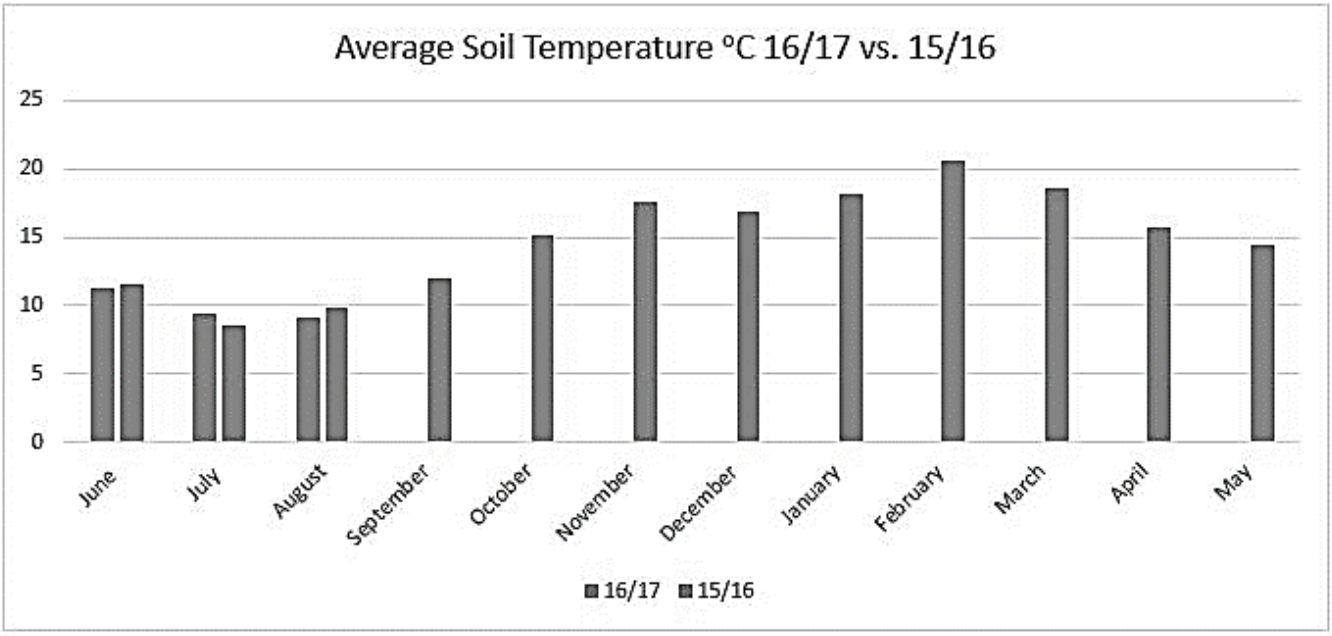
- Rainfall has largely been the talking point so far this season. Season to date this year we have received 492mm of rain compared to 303mm at the same time last season. The bulk of this occurred in June and July where we received 355.8 compared to 138.2mm during the same period last year. At 492mm we have already had 55% of the last year's total rainfall.



NOTES

- Although it may have felt like a milder winter surprisingly the average temperature so far season to date has been 10.1oC whereas last year it was 10.8oC. Although a lot of frosts were experienced last year, most of the time the day turned out to be fine.





- We can't provide a soil moisture % graph as we changed soil moisture probes between seasons and the figures are not comparable.

NOTES

PASTURE CONDITION SCORING RESULTS

Charlotte Westwood *BVSc, MACVSc, PhD Veterinary Nutritionist,* ***Emma Bell*** *B. Ag Sci, Agronomist,* ***Kyle Gardyne*** *B. Ag Sci, Agronomist* ***PGG Wrightson Seeds***

Pasture Condition Scoring Results

OBJECTIVE OF PASTURE CONDITION SCORING

"Scoring to identify your *poorest performing* pastures"

- Pasture condition scoring = a process similar to condition scoring cows.
- By ranking your paddocks from best score to poorest, poorest performing paddocks are identified and earmarked for cropping and / or regrassing.
- Refer to Pasture Renewal Charitable Trust for more information www.pasturerenewal.org.nz/resources/pasture-condition-scoring-guide/

OWL FARM PASTURE CONDITION SCORING – What we do

- Pasture Condition Scoring is carried out twice yearly at Owl Farm.
- Owl Farm pasture condition score information is now available from scoring done in August 2015, February 2016 and August 2016.
- Scoring aims to not only identify poor performing paddocks, but also to track paddock performance as part of a review of investment by Owl Farm in pasture renovation.

With a complete year-on-year comparison now (August 2015 vs August 2016), we can understand the effect of the investments made over the last 12 months to renovate pastures.

LEFT-RIGHT: The Pasture Condition Scoring Team in February 2016, then August 2016 in the same paddock (now Winter Star II tetraploid annual ryegrass)

NOTES

SCORING PROTOCOL FOLLOWED FOR PASTURE CONDITION SCORING: OWL FARM

- The Owl Farm pasture scoring team following protocol identified and endorsed by the Pasture Renewal Charitable Trust and DairyNZ (see below).
- By scoring paddocks on a 1-5 scale, the process is repeatable and comparable within and between years.

PASTURE CONDITION SCORE (1-5)

Pasture Condition Scoring involves scoring each paddock using the Pasture Renewal Trust Criteria:

1 – Entire Paddock is severely damaged

2 – Parts of the paddock have severe damage

3 — Majority of paddock has low level of damage, weeds, and less vigorous grasses

4 – Parts of paddock show signs of low level damage, less vigorous grasses & some weeds

5 – Whole paddock has dense sward of desired grasses and clovers

1 = POOR

5 = BEST

OVERALL SUMMARY – BENEFITS OF INVESTMENT IN AUTUMN 2016 PASTURE RENOVATION AT OWL FARM

- ✓ Investment in pasture renovation in autumn 2016 has resulted in a substantial lift in pasture condition score at Owl Farm this August, compared with August 2015.
- ✓ Approximately 90% of all paddocks either sown into new perennial pasture, or under-sown, have increased to a condition score of 4 or 5.
- ✓ Pasture Condition is an indication of good weed control, desirable plant population and optimum fertility, and those that were involved in the same exercise last year have noted how much these aspects have improved.
- ✓ Our focus moving forward will be to continue to use data collection to help make informed decisions regarding pasture and cropping so we can ensure the best possible return on investment.
- Blocks 1 & 2 have received little improvements since last year, and this is reflected in the current results which still remains in the 2 & 3 category.

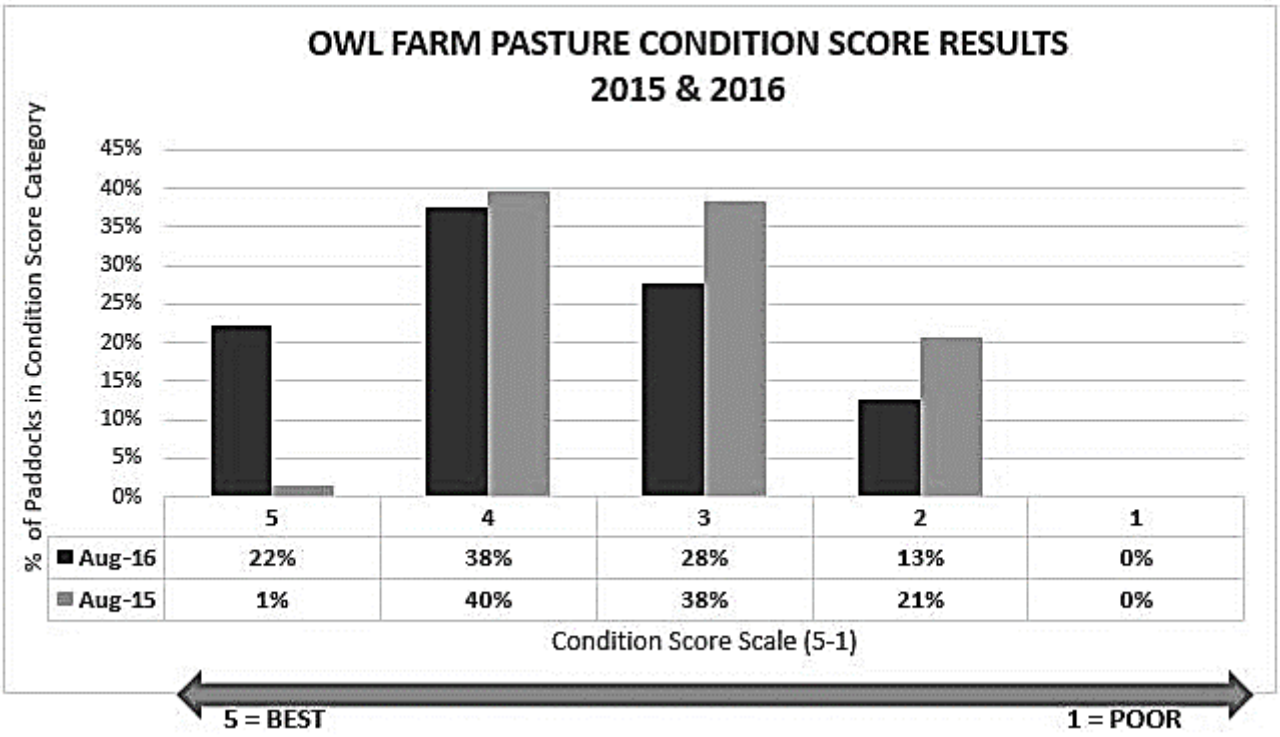
CHANGE IN PASTURE CONDITION SCORE OVER LAST 12 MONTHS: *OUTCOMES IN A NUTSHELL*

We have seen a <u>significant improvement</u> in pasture condition score which is a direct result of the investment made in pasture renovation in the last 12 months.

- ✓ **22%** of paddocks on farm are now a condition score of **5**, compared with only **1%** in August 2015.
- ✓ **60%** of the farm is now a condition score of **4** or more, compared with only **41%** last year.
- ✓ **90%** of all paddocks either sown into new perennial pasture, or under-sown, have increased to a condition score of **4** or **5**.
- 41% of paddocks on farm still remain in the 2 & 3 category, though these paddocks have not had any improvements since last year and hence have not changed in condition.

NOTES

FIGURE 1.0. Percentage of Owl Farm paddocks pasture conditioned score at 1 -5 on the Pasture Renewal Charitable Trust guidelines



	5	4	3	2	1
Aug-16	22%	38%	28%	13%	0%
Aug-15	1%	40%	38%	21%	0%

NOTE: Results are expressed as percentage of paddocks on farm in each condition score category

DID RESULTS REFLECT INVESTMENT IN PASTURES?

- Based on the shift in proportion of paddocks scoring better following pasture remediation work, Owl Farm concludes that so far, investment in pasture renovation has been very worthwhile.
- Condition scoring of paddocks will continue twice yearly to:
  - Track ongoing benefits of renovation work, as well as
  - Continue to categorise paddocks for future undersowing or summer cropping, as appropriate.

We will continue to present ongoing results from condition scoring at future Owl Farm focus days – watch this space.

PASTURE CONDITION SCORING AND PASTURE RENOVATION – THE DETAIL. WHAT DID WE DO?

- Following condition scoring of all pastures in August 2015, lowest ranking paddocks, as well as those destined for summer cropping in October 2016 were allocated to range of pasture renovation and/or weed management options.
- Owl Farms aim was to improve overall pasture performance in those paddocks.

In autumn 2016, investment in pasture renovation included:

- 12ha new perennial ryegrass/white clovers following chicory paddocks.
- 12ha Winter Star II annual ryegrass.
- 12ha under-sowing with Lush AR37 Italian ryegrass.
- 18ha under-sowing with Prospect AR37 perennial ryegrass.
- 30ha pasture weed spraying in all under-sown paddocks.

NOTES

Details around each of these renovation strategies are given below:

- **12ha PERENNIAL RYEGRASS/ WHITE CLOVERS**

All chicory paddocks from the 2015/16 season except paddock 45 and an ex maize paddock were returned to perennial ryegrass/white clovers in autumn 2016. Paddock 45 (2.5 ha) was instead sown down to Winter Star II tetraploid annual ryegrass and will be chicory cropped again in October 2016 due to substantial weed and summer grass infestation.

Table 1.0 Effect on new perennial AR37 ryegrass / white clover regrassing following chicory or maize crops crop on pasture condition score

Treatment	Pdk	Aug-16	Feb-16	Aug-15
New Grass	5	5	Chicory	2
New Grass	15	5	Chicory	2
New Grass	55	5	Chicory	3
New Grass	56	5	Chicory	3
New Grass	6	5	Chicory	4
New Grass	R13	5	Maize	-
New Grass	R12	5	Maize	-
New Grass	11	4	Chicory	2

Following investment in regrassing with perennial ryegrass/white clover for the majority of these ex chicory paddocks and ex maize paddock in autumn 2016, all paddocks have shown a substantial improvement in pasture condition from scores recorded in August 2015 in terms of ryegrass density, fertility and weed presence. Only one paddock (52) is at a condition score of 3 due to inadvertent treading damage.

- **30ha UNDER-SOWING**

A further substantial area of the farm remained poor in terms of pasture condition, as identified both at the August 2015 condition scoring, but also based on subjective assessment in autumn 2016 following the 2015/2016 summer.

Our proposed rate of pasture renewal (10% of the farm annually) was relatively slow with regard to remedying these poor performing paddocks in a timely manner. Whilst not as ideal as a complete regrassing program, under-sowing was proposed as an effective alternative to improve the rate of pasture improvement for Owl Farm.

Under-sowing options included Italian AR37 Ryegrass & Perennial AR37 Ryegrass

- **Italian ryegrass** with AR37 **(Lush AR37)** = short term boost in production (12-24 months). We anticipate at this stage that these paddocks will be cropped and regrassed back into perennial pasture.
- **Perennial ryegrass** with AR37 (Prospect AR37 and no white clovers) = longer term, paddocks that are lower priority for crop and need to improve productivity yet won't be earmarked for regrassing in the immediate to medium term future.
- A previous report (which can be found on the Owl Farm website) demonstrated the economic benefit of under sowing, using the economic feed values from Dairy NZ for the upper North Island at different times of the season.
- Economic benefits aside, Pasture Condition Scoring this August has highlighted a significant improvement as a result of undersowing with either Italian AR37 or perennial AR37 ryegrass. Table 2.0 demonstrates the benefit of under-sowing in autumn with Italian Ryegrass & Perennial Ryegrass on condition score when comparing undersown paddocks condition scored in both August 2015 and August 2016. All undersown paddocks were also sprayed for weeds.

NOTES

Table 2.0 Effect of under-sowing on Pasture Condition Score of a range of Owl Farm paddocks

Treatment	Pdk	Aug-16	Feb-16	Aug-15
Italian	2	5	3	2
Italian	58	5	Chicory	2
Italian	3	5	2	4
Perennial	1	5	3	3
Perennial	42	5	Chicory	3
Perennial	25	5	1	4
Perennial	4	5	2	4
Perennial	27	5	3	4
Perennial	26	5	2	
Italian	34	4	2	2
Italian	82	4	3	3
Italian	79	4	3	3
Italian	81	4	3	4
Italian	83	4		4
Perennial	24	4	2	4
Italian	33	4	2	3
Italian	36	4	2	3
Italian	44	4	3	3
Italian	35	3	2	3
Italian	47	3	3	4

OTHER opportunities to assess the benefits of pasture renovation at Owl Farm – PASTURE QUALITY

- Pasture renovation brings many potential benefits to Owl Farm not only through the production of more home grown dry matter but also potentially better quality pastures.
- With many thanks to **Hill Laboratories**, we've been able to undertake some detailed pasture sampling on new grass paddocks collected at the end of August 2016.
- Owl Farm are keen to investigate potential benefits of new pastures as more of the milking platform is gradually improved through a process of cropping, full pasture renovation and in some cases, undersowing.
- The first stage of looking at pasture quality was the collection of pasture samples from four paddocks on the platform.
    - **Paddock 48**; Established with new perennial AR37 ryegrass and white clovers following a chicory crop in autumn 2015.
    - **Paddock 56**; Established with new perennial AR37 ryegrass and white clovers following a chicory crop in autumn 2016.
    - **Paddock 44**; Undersown with Lush AR37 tetraploid Italian ryegrass (no clovers) after being identified as a moderate performing paddock at the August 2015 and February 2016 pasture condition score process.
    - **Paddock 45**; Chicory cropped in summer 2015/2016, sown to Winter Star II tetraploid perennial ryegrass in autumn 2016 due to weed and summer grass infestation. Will be resown to chicory in October 2016.

NOTES

Table 3.0 Pasture quality for grab samples collected in late August 2016 from a range of newly renovated pastures

Hill Laboratories
BETTER TESTING BETTER RESULTS

Paddock	Description	DM%	CP	ADF	NDF	Ash	OM	SS	Starch	CF	DOMD	MJME
48	New PRG/WC 2015	14.8	26.7	21.1	37.8	10.3	89.7	13.1	<0.5	3.5	77.9	12.5
56	New PRG/WC 2016	15.2	32.8	23.4	40.3	12.0	88.0	9.2	<0.5	3.9	78.5	12.6
44	Undersown PRG 2016	17.6	28.9	19.2	36.9	10.4	89.6	14.2	<0.5	3.8	79.4	12.7
45	Tetraploid Annual 2016	11.3	27.0	23.3	39.5	11.7	88.3	12.0	<0.5	3.9	79.1	12.7

Comments around pasture quality results

Dry matter % (DM%) – All samples were relatively low but not unusually so for new winter new. Winter Star II tetraploid perennial pasture contained very low DM% at only 11.3%. Tetraploids typically have slightly lower DM% than diploids however this difference is more marked than normal. This might have implications for assessment of pasture cover in paddock 45 as C-dax or rising plate meter may overestimate DM on offer.

Crude protein (CP%) – All samples have high levels, well above the requirements by dry cows over winter (12-14% for mixed age and R2 heifers, respectively) and peak lactation dairy cows (18-20% CP).

Acid detergent fibre (ADF) – lower levels are better because low ADF means higher potential digestibility (and therefore energy) in a sample. All samples are within a typical expected range for mid-winter pastures.

Neutral detergent fibre (NDF) – like ADF, lower levels of NDF are better because NDF is linked with potential dry matter intake by cows. All levels are within a typically expected range for winter pastures. Interestingly the tetraploid annual ryegrass is slightly higher than the diploids, unusual as typically tetraploid ryegrasses contain slightly lower NDF than diploid ryegrasses. This might simply be a function of sampling variability in the paddocks.

Ash – Ash is a measure of the inorganic component of the pasture sample, and is typically explained by most of the minerals such as calcium, potassium, sodium, magnesium, phosphorus etc.

Organic matter (OM%) – this is simply the total DM of the pasture sample less the ash in the sample.

Soluble sugars (SS%) – this is the water soluble carbohydrates (sugars) in the pasture sample. Higher results are better as soluble sugars are completely and quickly digested in the rumen of the cow, equating to more energy being available to the cow. All samples contain moderate levels. Sampling variation is likely to explain differences between paddocks. Typically if anything tetraploid annual ryegrasses contain slightly more SS than diploid perennial pastures, however this isn't the case in this single sampling.

Starch – all levels are very low, as is typical for ryegrass dominant winter pastures. Ryegrasses store energy as sugars, not starch (unlike clovers) therefore starch levels are almost always very low, especially in winter when few clovers are seen.

Crude Fat (CF%) – all levels are similar and typical for winter pastures. Fat levels in pasture are a useful energy source for the cow, however we don't want very high levels (more than 5-7% of dry matter) or fibre digestibility may be reduced. Sometimes high fat pasture can show up as oily dung pats when light rain falls on the pats and leaves an oily sheen on top.

Digestibility of Organic Matter in Dry Matter (DOMD %). This is the potential digestibility of the organic matter (excluding ash, which isn't digestible anyway). Higher values are better. DOMD is very closely associated with MJME – high DOMD = high MJME.

Megajoules of Metabolisable Energy (MJME). Simply this is the energy density of feed. The higher the better and certainly all samples have tested well for mid-winter ryegrasses.

NOTES

CONCLUSION – FIRST ROUND OF SAMPLING OF OWL FARM NEW PASTURES

- All samples showed good quality for winter pasture samples
- Given the samples weren't collected in a scientific manner, rather pluck samples harvested to post-grazing height, they're an indication only of the quality we might expect from new pastures from now on (note: older unimproved pastures weren't collected)
- Mid-winter and early spring pastures tend to all be of good quality when pastures are ryegrass dominant (assuming not weed infested)
- Of greater interest is pasture quality from late spring onwards when differences with newer vs. old pastures will become more apparent. Effects of tetraploidy, ryegrass heading date and selection of new ryegrasses for reduced aftermath heading can alter pasture quality and offer benefits to cows.
- At Owl Farm we'll be continuing to watch pasture quality changes with interest into the coming spring – and sharing these results with you on line and at future Owl Farm focus days.

NOTES

REVIEW OF SUMMER CROPPING EXPERIENCES FROM 2015 SOWN CHICORY

How did Owl Farm Chicory perform last summer?

Summer Summary 2015/16 - Facts and figures

- **12** ha chicory (**8%** of 150 effective ha at Owl Farm) spring sown 2015
- **7** paddocks
- Sprayout permanent pasture, direct drilled October 2015
- **8kg** Puna II or Choice chicory/ha sowing rate
- Averaged **9,000**kgDM/ha yield over 12 ha
- First grazing second week of December 2015
- **2.28**kgDM consumed/cow/grazing
- Between **4 and 5** grazings/paddock over summer period
- **7.4** cents/kgDM grown excluding opportunity cost of pasture foregone
- **22.6** cents/kgDM grown including opportunity cost of pasture foregone

Owl Farm Chicory – background

- Chicory was identified in winter 2015 as high quality summer forage to improve quantity and quality of summer home grown forage.
- All Owl Farm paddocks were pasture condition scored in August 2015. Poor performing perennial pasture paddocks were identified as summer crop paddocks.

Paddock Number	Paddock Area (ha)
15	1.6
11	1.1
6	1.4
5	1.4
45	2.5
52	1.6
56	2.4
7 Paddocks	**12.0 (ha)**

12ha of chicory (8% of total effective ha) aimed to:

- Be grazed on 21 day rotation.
- Provide 450 cows with 2.5kgDM chicory / cow/ day based on this rotation and growth rates by chicory of 85kgDM/ha/day.

NOTES

Calculating area of summer crop

Table 5.0 Area of chicory required for a range of proposed feeding rates (chicory offered per cow per day)

Typical industry calculations for area required for chicory at different requirements (kgDM of chicory per cow per day) compared with actual for Owl Farm during 2015/2016 with 428 cows on farm early in December 2015.

Chicory offered kgDM/cow/day	Area to sow in chicory (ha) per 100 cows	Daily area of chicory offered Per 100 cows (ha)	Per cow (m^2)
2	2.33	0.11	11.1
3	3.50	0.17	16.7
4	4.67	0.22	22.2
5	5.83	0.28	27.8
6	7.00	0.33	33.3
Owl Farm actual for spring sown chicory 2015 for 428 cows			
Est. chicory eaten (kgDM/cow/day)	*Area **actually** sown*	*Per 100 cows (ha)*	*Per cow (m^2)*
2.28	***2.8***	***0.126***	***12.6***

NOTE: These recommended chicory areas per 100 cows assume:

- **Chicory at 1,800 kgDM available DM/ha** (e.g. grazing from 3300kgDM/ha (30cm pre-graze) to 1500kgDM/ha (no lower than 5-7cm post-graze residual)
- **21 day round x average of 85kgDM/ha/day growth rates** (21 x 85kgDM/day = 1,785kgDM/ha accumulated over 21 days)

12 ha (8% of the farm) of chicory was a *less* than ideal proportion of the farm sown to chicory

Why is less than 10% of farm sown to chicory not really ideal?

Ideally a greater area would have resulted in:

- Chicory delivering a higher proportion of the cows total summer diet = better milksolids and/or cow condition score response.
- Cows consuming more chicory as a proportion of the diet – to better justify the energetic cost of walking to the paddock to consume the chicory.
- A higher proportion of the farm being cropped each year as part of a re-grassing program.

What commitment to chicory is Owl farm making for the coming year?

AREA of chicory = 15 ha (10% of the farm)

For the coming year, 10% of effective ha will be sown to chicory (15 ha). Owl Farm has greater confidence with taking a higher proportion of the milking platform out of the farm to establish chicory in spring 2016. Pasture renovation in autumn 2016 has greatly improve pasture performance across the farm (see more in pasture condition scoring summary).

With newly renovated paddocks performing more strongly (more kgDM/ha pasture production) spring 2016, Owl Farm has greater confidence to commit 15ha (10%) of the farm to be taken out of the grazing round in October 2016 for chicory establishment.

NOTES

Outcomes from 2015 / 2016 Chicory

Physical performance

- Chicory grazed from second week of December 2015 onwards, with last grazing at the end of March 2016.
- Based on back calculations from kgMS produced by cows, kgDM of pasture (and, when relevant), supplementary feeds consumed by cows, chicory was calculated to deliver on average 2.28kgDM consumed/cow/day.
- Estimated chicory DM yields ranged from 8,000kgDM/ha to 10,500kgDM/ha.
    - Chicory DM yield was at the lower range of expected yields, for a number of reasons.
- Other summer crop options including Barkant tankard turnip and Titan or Goliath rape were discussed by the Owl Farm Management Committee. With the use of WinterStarII annual ryegrass to improve the weed and summer grass burden in chicory paddocks, the committee has concluded to use chicory for a further year under 'best practice' management to compare with the previous years performance. Summer brassicas may well still feature at Owl Farm in years to come.

Financial performance

If you've summer cropped at your place, it's important to do an end of summer review of how your crop has performed and what the crop has cost you.

By knowing the costs involved to grow chicory, we can work out the value of chicory to Owl Farm.

Table 6.0. Cost analysis of Chicory at Owl Farm 2015/2016 – Planned vs actual costs

				Cost/ha		
	Product	Rate	Per Hectare	PLANNED	ACTUAL	YOURS
SPRAYOUT						
	Weedmaster TS540	4	L/ha	$56	$56	
	Pulse Penetrant	100	ml/100Lwater	$2	$2	
	Dew 600	400	ml/ha	$8	$8	
	AgChem Application			$38	$10	
FERTILISER						
	Lime including spreading	1	T/ha	$130	$0	
	DAP	200	kg/ha	$157	$0	
	Sustain N - Pre Graze	65	kg/ha	-	$42	
	Fertiliser spreading application			$70	$15	
PLANTING						
	S/S Chicory Seed	8	kg/ha	$184	$184	
	Slug Bait	10	kg/ha	$86	$86	
	Direct Drill			$190	$140	
POST-EMERGE						
	Insecticide (if cutworm present)	0.5	L/ha	$24	-	
	Ag Chem application			$38	-	
	Spraying Oil	500	ml/100L	$6	$6	
	Broadleaf weed spray	65	g/ha	$31	$31	
	Grass weed spray	0.2	L/ha	$46	$18	
	AgChem Application			$38	$10	
FERTILISER						
	Spreading Costs x1				$15	
	Sustain N x 1 application	65	kg/ha	$94	$42	
TOTAL COST				$1,098	$666	

NOTES

- For an estimated average of 9,000kgDM/ha, we can turn this into cents per kgDM of chicory (Table 6).
- Divide costs per ha ($666/ha) by the average DM yield/ha (9,000kgDM/ha) = $0.074 or around **7.4 c/kgDM chicory grown**

TABLE 7.0. Sensitivity analysis (c/kgDM of crop grown) excluding value of area of summer pasture foregone

		c/kgDM
Chicory Crop Yield (kgDM/ha)	7,000	9.5
	8,000	8.3
	9,000	**7.4**
	10,000	6.6
	11,000	6.1
	12,000	5.6
	13,000	5.1

Limitations of valuing chicory crop based on variable costs required to grow the crop

- If Owl Farm had chosen to not grow a chicory crop, the underperforming chicory paddocks will still have yielded some pasture between the months of October and April.
- When we crop a paddock, this pasture can no longer contribute to feed supply for the farm as it has been replaced by crop. There is an opportunity cost of pasture foregone – that has not been grown.
- We need to value this pasture foregone, when calculating the value of chicory on a cents per kgDM basis.
- Table 7 show the average monthly pasture production by all Owl Farm paddocks between October 2015 and April 2016.
- The poorest performing chicory paddocks produced during 2015 on average, 26% less dry matter when ranked in Minda Land and Feed pasture. Owl Farm has placed a value on this pasture foregone and included it in the 'cost' or value of chicory produced in those paddocks.

TABLE 8.0 Estimated amount and value of pasture grown mid-October to late March on average across all paddocks, Owl Farm – Based on ACTUAL pasture growth rates 2015/2016 average pasture growth rates for Owl Farm.

	ACTUAL 2015/2016 Farm pasture growth rates (kgDM/ha/day) [1]	Days out of pasture	Farm Pasture grown (kgDM/ha) [2]	Economic Value ($/kgDM) [3]	Value of Pasture ($/ha) [4]
October	67	15	1,005	0.17	170.85
November	49	30	1,470	0.17	249.90
December	44	31	1,364	0.37	504.68
January	34	31	1,054	0.37	389.98
February	27	29	783	0.37	289.71
March	27	25	675	0.37	249.75
Total			6,351 kgDM/ha		$1,855/ha

NOTES

TABLE 9.0 Estimated amount and value of pasture grown for run-out underperforming summer crop paddocks from mid-October to late March – Based on ACTUAL Owl Farm average pasture growth rates for 2015-2016.

	Owl Farm Average	*Poor performing Paddocks (-26%)*[5]
Average Pasture Grown (kgDM/ha)	6,351	*4,699*
Value of pasture ($/ha)	$1,855	*$1,373*

TABLE 10.0 Sensitivity Analysis (c/kgDM of crop grown) including value of area of poorer performing summer pasture foregone to grow crop ($1,373/ha).

		c/kgDM	
		Excluding value of pasture foregone	Including value of pasture foregone
Crop Yield (kgDM/ha)	7,000	9.5	29.1
	8,000	8.3	25.4
	9,000	**7.4**	**22.6**
	10,000	6.6	20.3
	11,000	6.1	18.5
	12,000	5.6	17.0
	13,000	5.1	16.7

ASSUMPTIONS:

1. Actual Pasture Growth Rates for Owl Farm, as assessed on weekly basis by Owl Farm team.
2. Estimated total amount of pasture grown during the time crop area is sprayed out for chicory then returned to pasture (15th October to 25th March).
3. DairyNZ Economic Values for perennial ryegrass seasonal dry matter production traits used in the 2015/16 Forage Value Index http://www.dairynz.co.nz/media/3361791/forage-value-index-handbook-2015-16.pdf.
4. Value of feed ($/ha) calculated by multiplying the EV x Pasture grown per hectare per month.
5. According to the pasture assessment data from MINDA Land & Feed, the poorest performing paddocks at Owl Farm were 26% below average.

HOW WE PLAN TO IMPROVE OWL FARM 2016 CHICORY CROPPING ON THE 2015 PERFORMANCE?

Weeds were a major issue in our chicory paddocks last season and in some paddocks this compromised potential yield significantly.

In order to reduce the risk of this happening again, we have used a Winter Star II Tetraploid Annual Ryegrass as a lead in crop in order to have another go at breaking the weed cycle.

NOTES

Benefits of using Winter Star II Annual Ryegrass

- ✓ Opportunity to have "another go" at weed and summer grass control using glyphosate twice, particularly good for problem weeds such as couch, it is necessary to have an autumn kill with some hard to eradicate weeds.
- ✓ Chance to address any soil nutrient deficits well in advance of a crop.
- ✓ Opportunity to increase winter dry matter production in poor performing paddocks.
    - In Owl Farm's case, this included a number of paddocks that scored 1 & 2 in the Pasture Condition Scoring exercise.

System benefit of cropping and pasture renewal

We are striving for 10% of the farm per year to undergo pasture renewal at Owl Farm in order to optimise the amount of feed grown on farm, and decrease reliance on imported feeds.

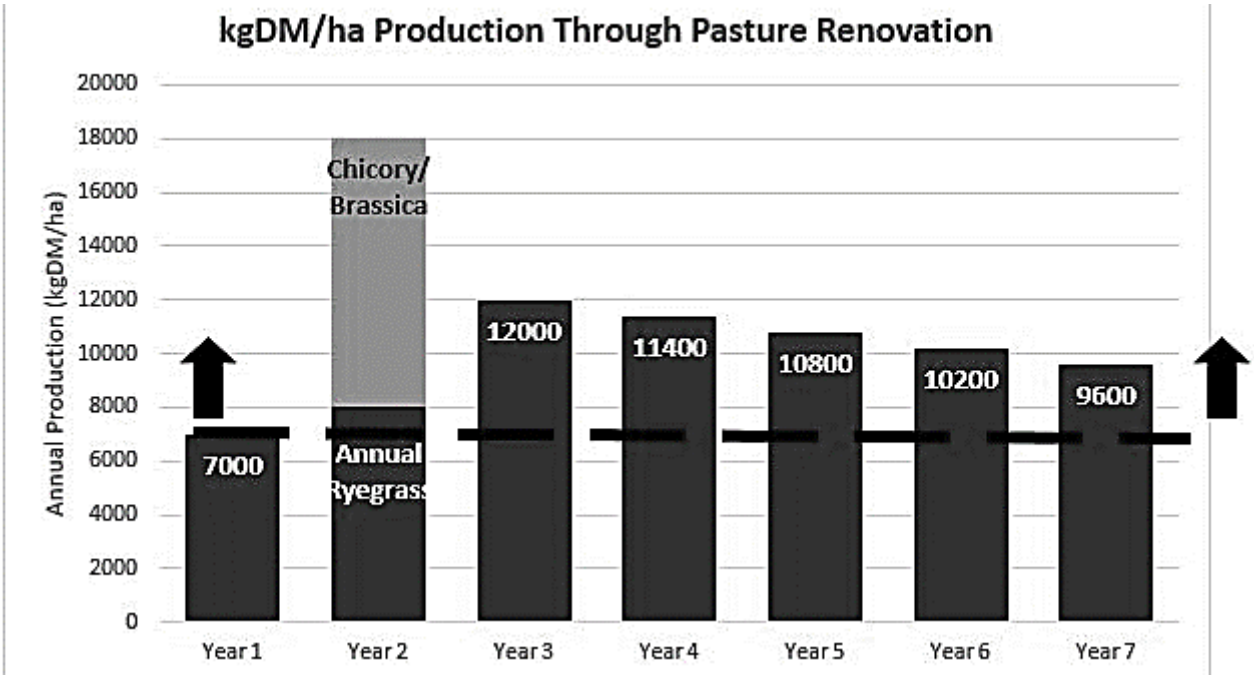
The below graph demonstrates what place cropping and pasture renewal play in terms of dry matter production over a 7 year period. Our poorest performing paddocks are growing 26% less than the average paddock on Owl Farm, which is 7,000kgDM/ha/year. Owl Farm's pasture renovation programme demonstrates an extra **19,000kgDM/ha** grown over a 5-year period – that's got to be a good thing!

A major KPI for Owl farm is pasture renewal, and it has been highlighted numerous time that increasing both the quantity and quality of feed grown on farm is a key factor in the development of this farm. A fundamental step in this process is the use of forage crops, to:

- Provide high quality forage over a period where grass is relatively low in quality
- Break weed & pasture pest cycles (namely Black Beetle, a major pest at Owl Farm)
- A means to establish new high quality perennial pasture with AR37 endophyte protection

Ongoing pasture improvements following a crop will provide ongoing value for a farming business that can be factored into the value of the crop itself. Figure 2 shows the potential value of an improved perennial pasture following a crop. Assumptions include that other agronomic variables (pH, Olsen P and other soil nutrients are not limiting, nor are drainage, control of weed species and/or drought).

FIGURE 2.0 Ongoing potential dry matter yield advantages associated with pasture renovation following summer cropping at Owl Farm (based on expected permanent pasture performance data from Pasture Renewal Charitable Trust financial model)



Cumulative additional yield from new permanent pasture including and from year 3 onwards, an ex-chicory (or brassica) paddock could yield an additional 19,000kgDM over the subsequent 5 years (average of 3,800kgDM/year).

NOTES

BEST PRACTICE GUIDE - Chicory

Chicory is a tap rooted perennial herb with good drought tolerance and produces a high yield of high quality feed (12.8 MJME/kg DM and 18-30 % CP) boosting summer and autumn milk production. Chicory is a flexible forage option which can be grown well as summer crop, perennial crop (2 years under good management), or be used as a component of a pasture sward.

Planning The decision to plant a summer crop is usually based on the need for bulk, high quality "low cost" feed when pasture supply is limiting. The process of deciding how much crop is needed should begin in the autumn. That way poor performing paddocks can be selected, sprayed out and planned into a high producing winter annual ryegrass (For example Winter Star II). This allows problem weed and pest cycles to be broken and as a result a better quality crop may be grown. Also autumn soil testing allows time to correct deficiencies that may be present. Chicory supplies feed over a number of grazing's through summer and autumn. To feed 5 kg DM/cow/day through summer approximately 4.5 – 5 ha of chicory will be needed per 100 cows.

Spray-out Spray-out annual ryegrass in spring with Glyphosate and an insecticide at the correct label rates. (Talk to your local rep for further details)

Fertiliser Fertiliser requirements should be based on a soil test taken in the autumn. High yielding Chicory crops have a large nutrient requirement. The application of P in a base dressing and down the spout at planting will provide good response particularly on low P soils. Growing Chicory on effluent ground may allow significant reduction in fertiliser inputs, but this should be on the basis of soil testing & knowledge of crop requirements.

Seedbed Chicory is best established after cultivation and conventional drilling as desired plant populations are more likely to be achieved and there is less pressure from pests. Alternatively, chicory can be established using no-tillage techniques when paddock conditions are suitable for germination and early growth. However, this must be done well, particularly in situations where soils are cold and wet or where weeds and pests are prevalent. A double spray-out may be required, and always use insecticide at spray-out and slug bait at planting in no-till situations. Regardless of sowing method, achieve a fine, firm and weed free seed bed. Rolling following cultivation and again following planting may be necessary to achieve adequate consolidation.

Planting Sow Superstrike coated seed at between 8-10kg/ha or at 0.5-2kg/ha in mixes, at a depth of 10 cm when soil temperatures are 12°C and rising. Chicory should not be grazed until it has developed 6-7 true leaves as we a trying develop a good tap root to maximize re-growth from future grazing's (The 'tops' of chicory grow faster than the tap root develops). Depending on growth rates this could be 50-80 days after sowing.

Monitor Monitor crops every 2-3 days during establishment. Most crops failures occur during this time so early detection and control of weeds and pests is key to protecting the crop during this vulnerable stage.

Protection A post emergence application of grass weed and/or broadleaf herbicide is generally required at 3 – 4 weeks. Sclerotinia can be a devastating disease; perennial cultivars have higher tolerance compared with annual varieties. Perennial chicory offers the most flexible option when considering a summer or multiyear crop.

Fertiliser A side-dressing of N is recommended at 4-6 weeks. The rate will depend on the soil supply and crop demand. Ask your local rep for more details.

Management Aim to feed 1/3 of the cow's diet for a sustained period of time, allowing the rumen to adjust. Pre- grazing height should ideally be 25-35 cm and post grazing residual of 5-10cm (no lower than 5cm or 1500 KgDM) Back fencing may be required as dairy cows will readily graze to lower than 5cm.

BEST PRACTICE GUIDE – Barkant Turnips

Barkant® turnips produce high yielding summer forage for lactating dairy cows supplying energy (13MJ/kg DM) and protein (16-18%) to boost summer milk production at a cost of less than 15c/kg DM. Like any crop, sound planning and attention to detail is the key to successful cropping with Barkant turnips.

Planning

Barkant turnips will be ready for grazing 60-90 days after planting. Ensure this is appropriate for the planned planting date and when the summer forage is required. If feed is required earlier, alternatives include Puna II chicory (56 - 80 days) or Pasja leafy turnip (42-70 days). For later options, consider Green Globe turnip (90-120 days) or Goliath forage rape (90-110 days).

Preparation ideally starts in autumn with a spray-out of run out pasture and sowing of Winter Star II annual ryegrass. Soil testing at this point allows time to correct deficiencies that may be present. The optimum pH is in the range 5.8-6.2 and this can take six months to correct with lime.

Spray-out

Spray-out in spring with glyphosate and an insecticide at the correct label rates. Insecticide options include Lorsban® (7 day withholding period) and Dew 600® if a nil withholding period is required.

Fertiliser

Fertiliser requirements should be based on a soil test. High yielding brassica crops have a large nutrient requirement. The application of Phosphorous (P) in a base dressing and down the spout at planting will provide good response particularly on low P soils. Growing brassicas on effluent ground may allow for a significant reduction in fertiliser inputs, but this should be on the basis of soil testing and knowledge of crop requirements.

Seedbed

Brassicas are best established after cultivation and conventional drilling as desired plant populations are more likely to be achieved and there is less pressure from pests. Alternatively, the crop can be established using no-tillage techniques when paddock conditions are suitable for germination and early growth. However, this must be done well, particularly in situations where soils are cold and wet or where weeds and pests are prevalent. A double spray-out may be required, and always use insecticide at spray-out and slug bait at planting in no-till situations. Regardless of sowing method, achieve a fine, firm and weed free seed bed. Rolling following cultivation and again following planting may be necessary to achieve adequate consolidation. To determine if the paddock is adequately consolidated, walk the field; your boot prints should only leave a slight indent in the soil surface.

Planting

Sow Superstrike coated Barkant turnips at 3kg/ha, at a depth of 10 cm when soil temperatures are 10°C and rising.

Monitor

Monitor brassica crops every 2-3days during establishment. Most crop failures occur during this time so early detection and control of weeds and pests is key to protecting the crop during this vulnerable stage.

Protection

A post emergence application of broadleaf and/or grass weed herbicide is generally required at 3-4 weeks. In most crops there will be pests such as leaf miner and springtails present at this stage, sometimes in huge numbers, so including an insecticide in this application is important. Where leaf miner and other insect pests are prevalent through the season, a second and sometimes third follow-up spray in required.

Fertiliser

A side-dressing of N is recommended at 4-6 weeks. The rate will depend on the soil supply and crop demand. Ask your local rep for more details.

NOTES

Best Practice Turnips - Cost Analysis - Direct Drill				
	Product	**Rate**	**Per Hectare**	**Cost/ha**
SPRAYOUT				
	Weedmaster TS540	4	L/ha	$56
	Pulse Penetrant	100	ml/100Lwater	$2
	Dew 600	400	ml/ha	$8
	AgChem Application			$38
FERTILISER		-	-	-
	Lime including spreading	1	T/ha	$130
	DAP	200	kg/ha	$157
	Fertiliser spreading application			$70
PLANTING				
	Barkant Turnips	8	kg/ha	$74
	SlugOut Slug Bait	10	kg/ha	$86
	Direct Drill			$150
POST-EMERGE				
	Sheriff 100 (if cutworm present)	0.2	L/ha	$9
	AgChem Application (if cutworm present)			$38
	Bonza Spraying Oil	500	ml/100L	$6
	Prestige	350	ml/ha	$42
	Sequence	0.5	L/ha	$46
	Sparta *(First Insceticide)*	150	ml/ha	$43
	AgChem Application	-	-	$38
	Sparta *(Second Insceticide)*	150	ml/ha	$43
	AgChem Application	150	ml/ha	$38
FERTILISER				
	Fertiliser spreading application			$70
	Sustain N	150	kg/ha	$77
TOTAL COST				**$1,223**

NOTES

APPENDIX – Analysis Report

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

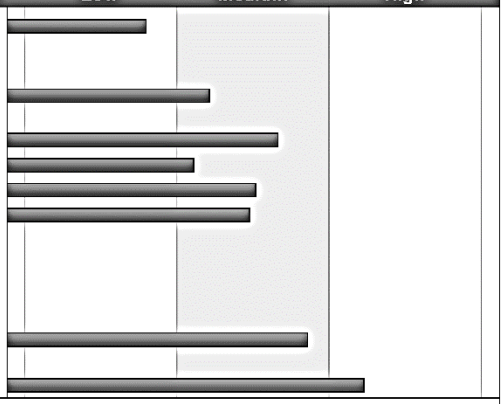
Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	St Peters School	**Lab No:**	1636756 shpv1
Address:	Private Bag 884 Cambridge 3450	**Date Received:**	25-Aug-2016
		Date Reported:	30-Aug-2016
		Quote No:	80107
		Order No:	
		Client Reference:	Feed testing
		Add. Client Ref:	Owl Farm
Phone:	07 827 9899	**Submitted By:**	Doug Dibley

Sample Name: Pd 48 Perenial **Lab Number:** 1636756.1
Sample Type: Mixed Pasture, Dairy (P301)

Analysis		Level Found	Medium Range
Nitrogen	%	4.1	4.5 - 5.0
Nitrogen	%DM	4.3	
Dry Matter	%	14.8	12.0 - 25.0
Crude Protein	%DM	26.7	20.0 - 30.0
Acid Detergent Fibre	%DM	21.1	20.0 - 30.0
Neutral Detergent Fibre	%DM	37.8	30.0 - 45.0
Ash	%DM	10.3	7.0 - 14.0
Organic Matter	%DM	89.7	
Soluble Sugars	%DM	13.1	
Starch	%DM	< 0.5	
Crude Fat	%DM	3.5	
Digestibility of Organic Matter in Dry Matter (DOMD)	%	77.9	65.0 - 80.0
Metabolisable Energy	MJ/kgDM	12.5	9.0 - 12.0
Non Structural Carbohydrate	%DM	21.7	
OMD in-vivo	%DM	86.9	



The above nutrient graph compares the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use of this information.
IANZ Accreditation does not apply to comments and interpretations, i.e. the 'Range Levels' and subsequent graphs.

NOTES

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

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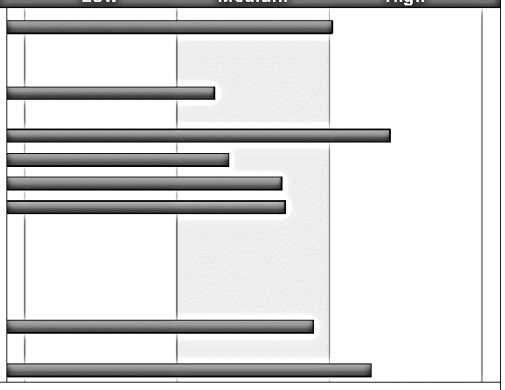
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	St Peters School	**Lab No:**	1636756 shpv1
Address:	Private Bag 884 Cambridge 3450	**Date Received:**	25-Aug-2016
		Date Reported:	30-Aug-2016
		Quote No:	80107
		Order No:	
		Client Reference:	Feed testing
		Add. Client Ref:	Owl Farm
Phone:	07 827 9899	**Submitted By:**	Doug Dibley

Sample Name: Pd 56 New Grass **Lab Number:** 1636756.2
Sample Type: Mixed Pasture, Dairy (P301)

Analysis		Level Found	Medium Range
Nitrogen	%	5.0	4.5 - 5.0
Nitrogen	%DM	5.2	
Dry Matter	%	15.2	12.0 - 25.0
Crude Protein	%DM	32.8	20.0 - 30.0
Acid Detergent Fibre	%DM	23.4	20.0 - 30.0
Neutral Detergent Fibre	%DM	40.3	30.0 - 45.0
Ash	%DM	12.0	7.0 - 14.0
Organic Matter	%DM	88.0	
Soluble Sugars	%DM	9.2	
Starch	%DM	< 0.5	
Crude Fat	%DM	3.9	
Digestibility of Organic Matter in Dry Matter (DOMD)	%	78.5	65.0 - 80.0
Metabolisable Energy	MJ/kgDM	12.6	9.0 - 12.0
Non Structural Carbohydrate	%DM	11.0	
OMD in-vivo	%DM	89.1	



The above nutrient graph compares the levels found with reference interpretation levels. NOTE: It is important that the correct sample type be assigned, and that the recommended sampling procedure has been followed. R J Hill Laboratories Limited does not accept any responsibility for the resulting use of this information. IANZ Accreditation does not apply to comments and interpretations, i.e. the 'Range Levels' and subsequent graphs.

NOTES

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

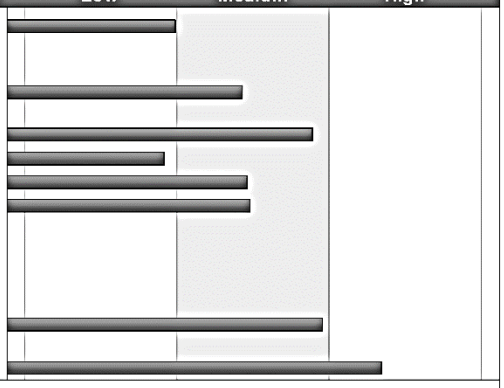
Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	St Peters School	**Lab No:**	1636756 shpv1
Address:	Private Bag 884 Cambridge 3450	**Date Received:**	25-Aug-2016
		Date Reported:	30-Aug-2016
		Quote No:	80107
		Order No:	
		Client Reference:	Feed testing
		Add. Client Ref:	Owl Farm
Phone:	07 827 9899	**Submitted By:**	Doug Dibley

Sample Name: Pd 44 Under Sown **Lab Number:** 1636756.3
Sample Type: Mixed Pasture, Dairy (P301)

Analysis		Level Found	Medium Range
Nitrogen	%	4.5	4.5 - 5.0
Nitrogen	%DM	4.6	
Dry Matter	%	17.6	12.0 - 25.0
Crude Protein	%DM	28.9	20.0 - 30.0
Acid Detergent Fibre	%DM	19.2	20.0 - 30.0
Neutral Detergent Fibre	%DM	36.9	30.0 - 45.0
Ash	%DM	10.4	7.0 - 14.0
Organic Matter	%DM	89.6	
Soluble Sugars	%DM	14.2	
Starch	%DM	< 0.5	
Crude Fat	%DM	3.8	
Digestibility of Organic Matter in Dry Matter (DOMD)	%	79.4	65.0 - 80.0
Metabolisable Energy	MJ/kgDM	12.7	9.0 - 12.0
Non Structural Carbohydrate	%DM	20.0	
OMD in-vivo	%DM	88.6	



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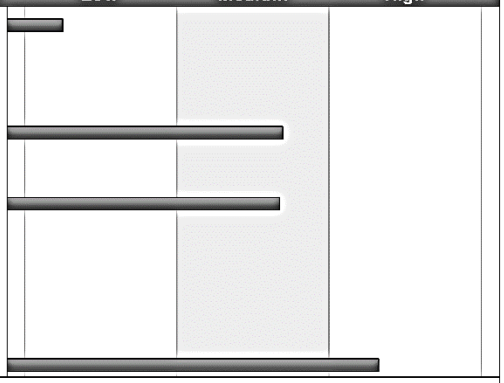
Address:	Private Bag 884 Cambridge 3450	**Date Received:**	25-Aug-2016	
		Date Reported:	30-Aug-2016	
		Quote No:	80107	
		Order No:		
		Client Reference:	Feed testing	
		Add. Client Ref:	Owl Farm	
Phone:	07 827 9899	**Submitted By:**	Doug Dibley	

Sample Name: Pd 45 Annual **Lab Number:** 1636756.4
Sample Type: LEAF Ryegrass (P117)

Analysis		Level Found	Medium Range
Nitrogen	%	4.1	4.5 - 5.0
Nitrogen	%DM	4.3	
Dry Matter	%	11.3	
Crude Protein	%DM	27.0	20.0 - 30.0
Acid Detergent Fibre	%DM	23.3	
Neutral Detergent Fibre	%DM	39.5	
Ash	%DM	11.7	7.0 - 14.0
Organic Matter	%DM	88.3	
Soluble Sugars	%DM	12.0	
Starch	%DM	< 0.5	
Crude Fat	%DM	3.9	
Digestibility of Organic Matter in Dry Matter (DOMD)	%	79.1	
Metabolisable Energy	MJ/kgDM	12.7	9.0 - 12.0
Non Structural Carbohydrate	%DM	17.9	
OMD in-vivo	%DM	89.6	



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NOTES

Comparing potential benefits and challenges of Palm Kernel Expeller Extract (PKE) and Summer Brassicas for summer milksolids production.

Summer planning is just around the corner. With planning comes many options, opportunity and contemplating regarding the best feed options for your business.

As with any farm business options, often the best way to drive a decision is to acknowledge the good and not so good outcomes as a result of your decision.

Deciding between investing in PKE or summer brassicas is no different. First and foremost planning requires careful calculation of each feed on a cents per kgDM grown (or presented to the cow e.g. PKE in a feed trailer), cents per kgDM consumed / eaten after allowing for wastage then cents per MJME eaten (cents per kgDM consumed divided by the MJME/kgDM of each feed).

Often one option or the other will be quickly obvious when this process is done.

Over and above the cents per kgDM and cents per MJME process, there are many other objective and subjective aspects of different feeds that require further thought. Some examples of comparison between PKE and summer brassicas are shown in Figures 3 and 4.

FIGURE 3.0. Favourable attributes of either summer brassica or PKE.

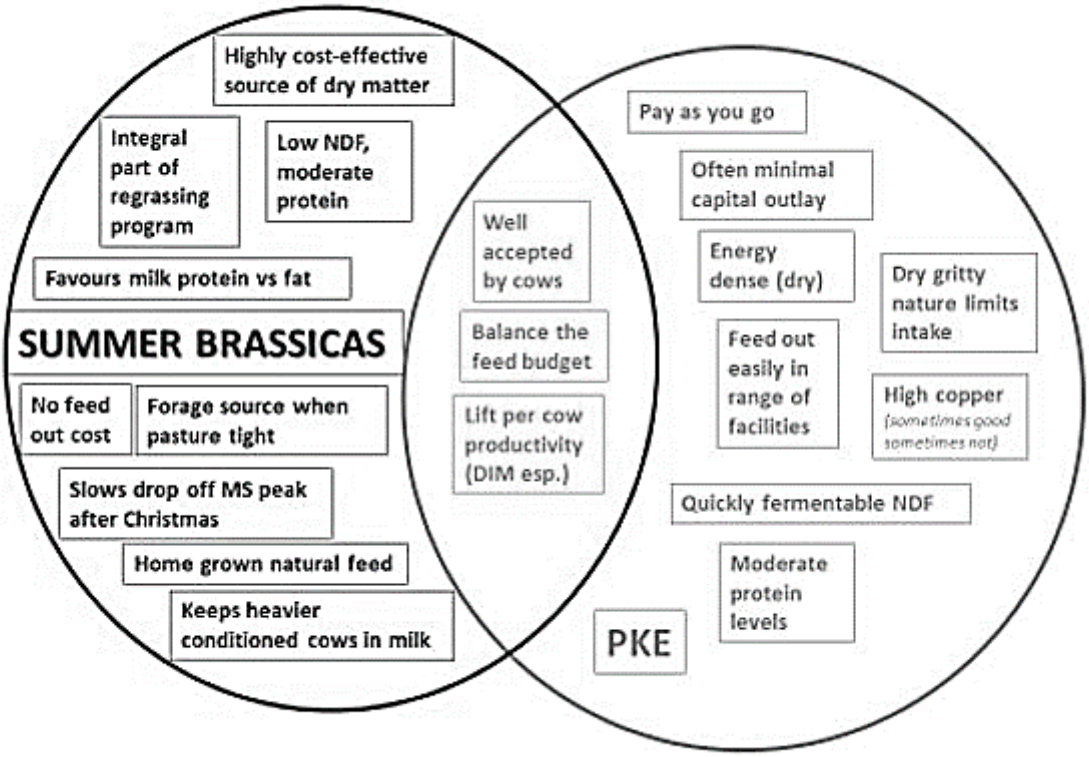

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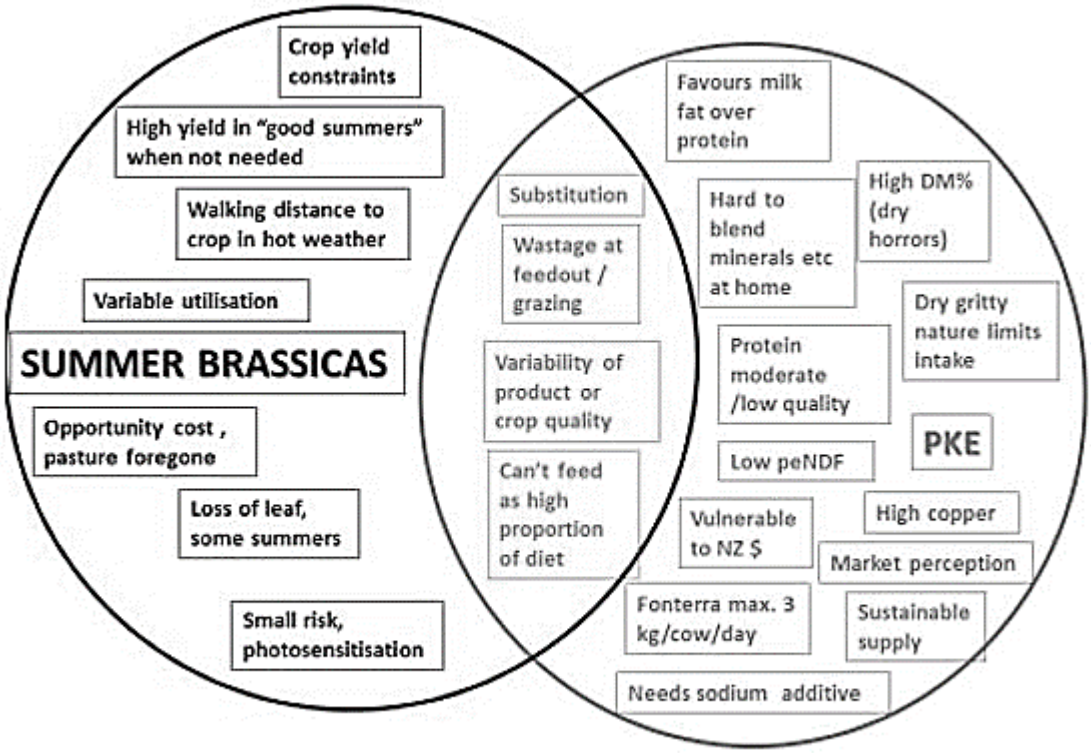
FIGURE 4.0. Potentially challenging attributes of either summer brassica or PKE.



NOTES

How the policies and rules are shaping up

Summary of draft proposed plan change at 14 July 2016 (updated 26 July 2016)

Healthy Rivers PLAN FOR CHANGE | Wai Ora HE RAUTAKI WHAKAPAIPAI

Maniapoto Māori Trust Board
Raukawa Charitable Trust
Te Arawa River Iwi Trust
Tūwharetoa Māori Trust Board
Waikato Raupatu River Trust
Waikato Regional Council

The following summary is based on the draft proposed plan change following the Collaborative Stakeholder Group (CSG) workshop on 6 and 7 July 2016. The draft proposed plan change includes new objectives, policies and methods. It has yet to go through project partner decision making processes, so does not constitute Waikato Regional Council policy.

Objectives

Key outcomes that the plan is seeking to achieve

1. Long term restoration and protection of water quality for each subcatchment and Freshwater Management Unit
2. Social, economic and cultural wellbeing is maintained in the long term
3. Short term improvements in water quality in the first stage of restoration and protection of water quality for each subcatchment and Freshwater Management Unit
4. People and community resilience
5. Mana Tangata – protecting and restoring tangata whenua values
6. Whangamarino Wetland

Policies

Proposed directions being set by the plan

1. Manage diffuse discharges of nitrogen, phosphorus, sediment and microbial pathogens
2. Tailored approach to reducing diffuse discharges from farming activities
3. Tailored approach to reducing diffuse discharges from commercial vegetable production systems
4. Enabling activities with lower discharges to continue or to be established while signalling further change may be required in the future
5. Staged approach
   i.e. achieving long term water quality targets staged over 80 years to minimise social disruption and allow time for innovation and making a start now and preparing for future reductions in discharges
6. Restricting land use change
   i.e. land use change consent applications need to demonstrate clear and enduring decreases in diffuse discharges
7. Preparing for allocation in the future
   i.e. prepare for future reductions in discharges and any future property level allocation of diffuse discharges by implementing the methods in the plan change; collect information to support this; signal principles for future allocation
8. Prioritised implementation
   i.e. implement relevant polices according to priority areas: subcatchment where the gap between water targets and current water quality is greater, lakes Freshwater Management Units and Whanagamarino wetland
9. Subcatchment (including edge of field) mitigation planning, coordination and funding
10. Provide for point source discharges of regional significance
11. Application of Best Practicable Option and mitigation or offset of effects to point source discharges
12. Additional considerations for point source discharges in relation to water quality targets
13. Point sources consent duration
14. Lakes Freshwater Management Units
    i.e. restore and protect lakes via lake specific approach guided by lake catchment plans
15. Whangamarino Wetland
    i.e. protect and progress towards restoration of the wetland by reducing discharges flowing into it
16. Flexibility for development of land returned under Te Tiriti o Waitangi settlements and multiple owned Māori land
17. Considering the wider context of the Vision and Strategy

NOTES

NOTES

How the policies and rules are shaping up

Summary of draft proposed plan change at 14 July 2016 (updated 26 July 2016)

Healthy Rivers PLAN FOR CHANGE | Wai Ora HE RAUTAKI WHAKAPAIPAI

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New rules will complement existing rules

Existing rules in the Waikato Regional Plan will continue to apply, including provisions that manage earthworks and point source discharges.

Additional requirements for forestry

In addition to provisions already in the regional plan that manage forestry, there will be new requirements around written notification 20 days prior to commencing harvest operations and providing forest harvest plans to Waikato Regional Council.

Point sources policy

When applying for resource consent, point source discharges must propose to adopt the best practicable option to avoid or mitigate adverse effects. If not practicable to avoid or mitigate adverse effects, they can instead propose an offset measure.

Summary of new rules

The following is a summary of key points in the draft proposed plan change developed by the Collaborative Stakeholder Group that is due to be considered by the project partners.

Note: The rules are presented here in the order they appear in the draft proposed plan change.

Rule 1 - Small and low intensity farming activities

Permitted activity

This rule applies to farming activities on properties that are not used for commercial vegetable production and are not part of a multi-property enterprise and are registered (Schedule A) and have stock excluded (Schedule C) and are either:

- ≤ 4.1ha OR
- >4.1ha with <6 stock units/ha, no arable cropping

Another opportunity for your say later in 2016

It is anticipated that Waikato Regional Council will notify a proposed plan change later this year. The community and stakeholders have been involved in developing the policies right from the start, and this will be another opportunity for you to provide your views. When making a submission on the proposed plan change you can support or oppose various parts of it, or take a neutral stance. The information you provide will be considered when final decisions are made on the plan change.

Rule 2 - Other farming activities

Permitted activity

This rule is designed to identify properties with low risk factors which do not need a Farm Environment Plan at this stage. It applies to farming activities on properties that are not commercial vegetable production and are registered (Schedule A) and have stock excluded (Schedule C) and can meet either set of the following conditions:

- greater than 4.1ha and less than or equal to 20ha with >6 stock units/ha OR arable cropping AND not part of multi-property enterprise AND

1. Stocking rate has not increased since notification (if grazing) OR
2. Nitrogen, phosphorus, sediment and microbial pathogen losses have same or lower discharges since notification (if not grazing) AND

Continued overleaf

How the policies and rules are shaping up

Summary of draft proposed plan change at 14 July 2016 (updated 26 July 2016)

3. Water bodies are fenced so that any new fences keep cattle, horses, deer and pigs at least 3m away from water body

- >20ha with >6 stock units/ha OR arable cropping:

1. N loss doesn't exceed Nitrogen Reference Point (see Schedule B) or 15kg N/ha/year (whichever lesser) AND
2. no land >15° slope cultivated or grazed AND
3. no soil cultivation occurs within 5m of a water body AND
4. no winter forage crops grazed in situ AND
5. water bodies are fenced so that any new fences located to keep cattle, horses, deer and pigs at least 3m away from water body

Note: Properties between 4.1 and 20ha do not require a Nitrogen Reference Point modelled through OVERSEER, but must provide verification that they comply with points 1 and 2.

Rule 3 - Farming activities with a Farm Environment Plan under a certified industry scheme

Permitted activity

Properties, excluding commercial vegetable production, that do not come under rules 1 or 2, and are registered to a certified industry scheme and are registered (Schedule A) and stock excluded (Schedule C) must provide a Farm Environment Plan to Waikato Regional Council and adhere to it by:

- 1 July 2020 for priority 1 subcatchments, and properties with a Nitrogen Reference Point greater than 75th percentile nitrogen leaching value
- 1 July 2023 for priority 2 subcatchments
- 1 July 2026 for priority 3 subcatchments

Note: Industry schemes will have to be approved by Waikato Regional Council. Schedule 2 sets out the requirements for an industry scheme. Policies state that there must be a similar level of rigour in developing, monitoring and auditing of mitigation actions for both rules 3 and 4. The notes to Rule 4 also apply to Rule 3.

Rule 4 - Farming activities with a Farm Environment Plan not under a certified industry scheme

Controlled activity

For properties that do not come under Rules 1 or 2, farming (excluding commercial vegetable production) where the land use is not registered to a certified industry scheme is controlled provided:

- it has a Farm Environment Plan prepared by a certified person and provided to Waikato Regional Council as part of a consent application, designed to identify risk of contaminant loss from that property and actions to reduce those risks with timeframes specified for those actions
- Farm Environment Plans are in place by 'tranche' dates (Priority 1 and properties with a Nitrogen Reference Point greater than 75th percentile nitrogen leaching value by July 2020; Priority 2 by 2023, Priority 3 by 2026)
- cattle, horses, deer and pigs are excluded from any water bodies for stock exclusion (in line with Schedule C)
- the stock listed above are excluded within 3 years of the tranche date for Farm Environment Plans or by 2026 whichever is sooner
- the Farm Environment Plan demonstrates how the property will not exceed its Nitrogen Reference Point (see Schedule B), as measured by a 5-year rolling average via OVERSEER unless other suitable mitigations are specified
- if the property has a Nitrogen Reference Point greater than 75th percentile nitrogen leaching value, the Farm Environment Plan is prepared by 2020 and demonstrates how the property will reduce to the 75th percentile by 2026

Note: Policy 2(d) says that reductions must be proportionate to the amount of current discharge (those discharging more are expected to make greater reductions) and proportionate to the scale of water quality improvement required in the subcatchment.

Rule 5 - Existing commercial vegetable production

Controlled activity

Commercial vegetable production enterprises operating under an approved Farm Environment Plan (in place by July 2020) as part of an industry scheme are a controlled activity as long as the area of the enterprise does not exceed the maximum area occupied by that enterprise from 1 July 2006 to 1 July 2016 and the enterprise does not exceed its Nitrogen Reference Point (see Schedule B).
Note: Policies require a reduction in 10% of nitrogen discharges across the sector by 2026.

How the policies and rules are shaping up

Summary of draft proposed plan change at 14 July 2016 (updated 26 July 2016)

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Waikato Regional Council

Rule 6 – Use of land for farming activities

Restricted discretionary activity

Properties used for farming activities but not covered by preceding rules.

Rule 7 - Land use change

Non-complying activity

The following land use changes (greater than 4.1ha) are non-complying activities from date of notification and therefore require a resource consent.

Woody vegetation (excluding weed species)	→	Farming activities
Livestock grazing other than dairy farming	→	Dairy farming
Arable cropping	→	Dairy farming
Any land use	→	Commercial vegetable production (except as under Rule 5)

Note: Provision is made in Objectives and Policies for some flexibility for development of tangata whenua ancestral lands. This is to recognise that flexibility has been restricted in the past due to legal and/or historical impediments. Any land that does change use will also be subject to other rules, for example the requirement to have a Farm Environment Plan under Rule 3 or 4. A Nitrogen Reference Point for any new land use will be established as part of the consent application.

Schedule A - Registration

All rural properties >2ha must, by March 2019, provide Waikato Regional Council with information that includes:

- landowner/land user details and other basic information
- details of land use activities undertaken at date of plan change notification
- (if grazing animals) stocking rate, location of water bodies and any adjacent fences, location of livestock crossing points and type of structures.

Schedule B - Nitrogen Reference Point

All commercial vegetable production properties or enterprises must, by March 2019, provide Waikato Regional Council with a Nitrogen Reference Point (average N leaching losses from 1 July 2006 to 30 June 2016) and associated data.

Other properties >20ha must, by March 2019, provide Waikato Regional Council with a Nitrogen Reference Point (highest annual leaching loss in either the 2014/15 or 2015/16 financial year for the property) and associated data.

All Nitrogen Reference Points are calculated using OVERSEER or other approved model.

Schedule C - Stock exclusion

Properties grazing cattle, horses, deer or pigs must have fences or stockproof natural barriers to prevent them from entering water bodies. Water bodies for stock exclusion in this plan change are any:

- rivers that continually contain surface water
- drains that continually contain surface water
- wetlands, including constructed wetlands
- lakes.

Timeline of rules

Date	Requirement
Notification	Land use change (rule expires 1 July 2026)
31 March 2019	Registration Nitrogen Reference Point information submitted
1 July 2020	Priority 1, 75th percentile nitrogen leaching value dischargers and commercial vegetable production complete Farm Environment Plans
1 July 2023	Priority 2 complete Farm Environment Plans Priority 1 complete stock exclusion
1 July 2026	Priority 3 complete Farm Environment Plans Priority 2 and 3 complete stock exclusion Leaching exceeding 75th percentile nitrogen leaching value have been reduced to meet 75th percentile Land use change rule expires.

NOTES

Owl Farm

Definitions

	Meaning
75th percentile nitrogen leaching value	75th percentile value (units of kg N/ha/year) of all of the Nitrogen Reference Point values for dairy farming properties and enterprises within each Freshwater Management Unit and which are received by the Waikato Regional Council by 31 March 2019.
Commercial vegetable production	the following vegetables grown in New Zealand for commercial purposes: • artichokes, Asian vegetables, beans, beetroot, boxthorn, broccoflower, broccoli, broccolini, Brussels sprouts, burdock, cabbage, capsicums, carrots, cauliflower, celeriac, celery, chilli peppers, chokos, courgettes, cucumbers, eggplant, Florence fennel, garland chrysanthemum, garlic, gherkins, herbs, Indian vegetables, kohlrabi, kumara, leeks, lettuces, marrows, melons, okra, parsnips, peas, puha, pumpkin, purslane, radishes, rakkyo, rhubarb, salad leaves, salsify, scallopini, scorzonera, shallots, silverbeet, spinach, spring onions, sprouted beans and seeds, squash, swedes, sweetcorn, taro, turnips, ulluco, watercress, witloof, yakon, yams, and zucchinis, potatoes, tomatoes, asparagus, onions • hybrids of vegetables listed above
Dairy farming	farming of dairy cows on a milking platform for milk production
Drystock farming	pasture grazing beef cattle, dairy animals grazed off a milking platform, sheep, and deer for meat, wool, or velvet production.
Enterprise	one or more parcels of land held in single or multiple ownership to support the principle land use or land which the principle land use is reliant upon, and constitutes a single operating unit for the purposes of management. An enterprise is considered to be within a subcatchment if more than 50% of that enterprise is within the subcatchment.

NOTES

How the policies and rules are shaping up

Summary of draft proposed plan change at 14 July 2016 (updated 26 July 2016)

Activities explanations

	Requires resource consent?	Consent grant status
Permitted activity	No, but must comply with conditions.	-
Controlled activity	Yes	Must be granted. Must comply with standards and terms in plan. Can only consider specific matters over which control reserved and may only impose consent conditions relevant to those matters.
Restricted discretionary activity	Yes	May be granted. Can only consider specific matters over which discretion restricted and may only impose consent conditions relevant to those matters.
Discretionary activity	Yes	May be granted. May impose consent conditions. Full discretion.
Non-complying activity	Yes	May be granted, subject to gateway test (i.e. that the adverse effects of the activity on the environment will be minor or the application is for an activity that will not be contrary to the objectives and policies of a relevant plan or proposed plan). May impose consent conditions. Full discretion.
Prohibited activity	Cannot be applied for	-

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Waikato Regional Council

NOTES

DairyNZ Sustainable Milk Plan

Contact Person(s):	Doug Dibley - Demonstration Manager	*Farm Name:*	Owl Farm	*Plan Writer:*	Mike Bramley DairyNZ
Physical Address:	St. Peter's School, 1716 Cambridge Road, Cambridge	*Ownership type:*	Owner Operator	*Date:*	29-Jul-16
Email Address:	doug@owlfarm.nz	*Supply Number:*	72847	*Region:*	Waipa River

Farm Identifiers, Location, & Key Statistics:

Title Legal Description:	0		**(ha):**	0.00	**District/Zone:**	Waikato main stem	
Additional Title:	0		**(ha):**	0.00	**Catchment:**	Central Waikato Catchment	
Additional Title:	0		**(ha):**	0.00	**Climate Site:**	Owl farm climate station	
Total Effective Area (ha):	150.00	**Total Farm Area (ha):**	170.00		**Peak Herd Size:**	443	**Stock Rate:** 2.88

Major environmental risks identified for this farm:

These environmental risks shall be managed through practices and actions identified in this plan.

Some high risk areas on the bottom terrace where heavy soils and surface springs make winter and spring management without pugging and potential runoff difficult

The silage pit area and organic recycling area are potential risks

Nitrogen loss could be an issue depending on potential rule changes

0

Resource Consents Held:

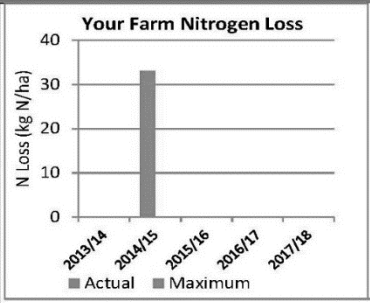
Farming land use:	
Effluent:	
Ground Water Take:	0
Surface Water Take:	0
Human Sewage:	
Other:	

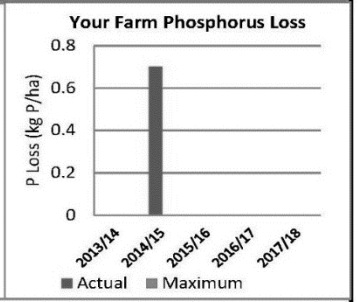
Effluent System Indicators:

Application Area (ha):	44	**Consented:**	
Kg effluent-N/ha/yr applied:	69	**Consented:**	0
Storage Volume (m³):	3,000	**Consented:**	
Storage Lining Material:	0		

Nutrient Management Indicators:

Date of last NB:	01/07/2016	
NB created by:	Fonterra, Ballance and Doug have all	
Overseer Version:	6.2	
Catchment Average N Loss:	0	
Overseer Version:	0	
Nitrogen Leached:	**Actual**	**Max**
2014/15 (kg N/ha):	33	0
2015/16 (kg N/ha):	0	0
Phosphorus	**Actual**	**Max**
2014/15 (kg P/ha):	0.7	0
2015/16 (kg P/ha):	0	0





Comments:	0

Summary of management areas within this farm:

Irrigation System Summary:

Irrigation Scheme:	0				
Total Annual Volume (m^3):	0	**Irrigation Flow (L/sec):**			0
Irrigation Type:	0	**Number:**	0	**Ha:**	0
Irrigation Type:	0	**Number:**	0	**Ha:**	0
Irrigation Type:	0	**Number:**	0	**Ha:**	0
Irrigation Type:	0	**Number:**	0	**Ha:**	0
Irrigation Water use efficiency (%):	0%	**Target (%):**	0%	**Water Takes:**	0

Other livestock classes

Livestock class:	0	**Number:**	100	**Months:**	3
Livestock class:	0	**Number:**	0	**Months:**	0
Livestock class:	0	**Number:**	0	**Months:**	0

Soil & Topography Summary:

Soil Type 1:	Otorohanga Deep Clay			**Area (ha):**	0
Soil Type 2:	Pukehina deep sand			**Area (ha):**	0
Soil Type 3:	Kainui deep silt clay			**Area (ha):**	0
Contour %:	**Flat %:**	65	**Rolling %:** 30	**Steep %:**	5

Cropping Summary:

Crop Type 1:	Chicory	**Area (ha):**	12
Crop Type 2:	0	**Area (ha):**	0
Crop Type 3:	0	**Area (ha):**	0

Water Use Summary:

Dairy Shed Type:	Rotary	**No of Cups:**	36
Total Water Use (L/day):	32200	**L/cow/day:**	73

Remaining compliant with this Sustainable Milk Plan

This Sustainable Milk Plan is part of a voluntary project and does not guarantee compliance with your Regional Council.

This plan has been developed with you the farmer to help manage environmental risks associated to this farm taking into consideration Regional Council regulations at the time.

If you the farmer need to make any amendments to this Sustainable Milk Plan please inform your consultant or DairyNZ when required.

As part of this Sustainable Milk Plan project a sample of farms may be reviewed to gauge effectiveness of the project. Farm reviews will be scheduled in advance with the farmer and are carried out by an independent body not your Regional Council.

Auditing:

Last Audit Date:	0
Auditor Name:	0
Last Audit Result:	0
Auditor Organisation:	0

This Sustainable Milk Plan is part of a voluntary project and does not require auditing for regulation but a small number of Sustainable Milk Plan's from this catchment may be reviewed to gauge effectiveness of this project.

Predicted audit frequency based on audit result (may vary):	0

Targets:

The target document used to generate this Sustainable Milk Plan was:	Version 3: 31 August 2015

These targets being addressed by this Sustainable Milk Plan have been prepared to help you the farmer, meet your Regional Council regulatory requirements and your requirements under the Sustainable Dairying Water Accord at the date the Sustainable Milk Plan is developed. It also takes into consideration requirements of your milk company environmental conditions of supply and conditions of your irrigation scheme resource consents (if applicable). The target document listed above is available through the DairyNZ website. The target documents are subject to change as regulatory conditions change. While all reasonable endeavours have been made to ensure the accuracy of the information in this document, DairyNZ Limited does not accept responsibility for any loss or damage, however caused, which you may directly or indirectly suffer in connection with your use of this document and expressly disclaims any and all liability that may arise from any such loss arising out of your use of or reliance on information contained or accessed through this Sustainable Milk Plan. You as the owner of this document are fully responsible of ensuring your Sustainable Milk Plan meets and continues to meet your regulatory requirements.

NOTES

Water & Irrigation Management

Objective: To ensure water use is managed effectively and that the actual use of water is monitored and efficient.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
Above GMP	Installed Numedic water efficient nozzle for washdown which reduce water use by about 20%	View	
GMP	Water systems well maintained with an on site electrician available when required	View	
GMP	Shed walls are kept wet for easy cleaning and cooler water is recycled to minimise water use	Sighted	
GMP	Half the stock water lines are buried to prevent damage.	Questioning	
GMP	Upgraded the washdown pump, which maintained water use, but halved the washdown time	Questioning	
GMP	Upgraded stock water retilculation lines and larger water troughs	Questioning & View	
Above GMP	Halo system monitors water use and informs decision making to improve water use efficiency	Questioning	
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
GMP	*Upgrading some stock water lines to a bigger size and upgrading some troughs to a larger size to ensure water supply equals demand*	*Doug*	*31/05/2016*	*Questioning*	*YES*	
0	0	0	00/01/1900	0		
GMP	*Train staff on water use via farm meetings, inductions and one on one interactions and develop systems to capture actions*	*Doug*	*Ongoing*	*Questioning*	*YES*	
GMP	*There are a mix of water sources from bores, surface water and town supply which will be recorded*	*Doug*	*01/12/2015*	*Questioning, document*	*YES*	
Above GMP	*A Halo Water system will be installed and will use the data to improve water use efficiency*	*Doug*	*31/10/2015*	*Visual*	*YES*	
0	0	0	00/01/1900	0		
0						
0						

NOTES

Owl Farm

Nutrient Management

Objective: To maximise nutrient use efficiency while minimising losses to water.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
GMP	Spread fertiliser using a certified contractor who provides proof of placement mapping	Questioning	
GMP	Regular soil testing, every year in May on seven blocks	Soil test result report	
Above GMP	Management trained to Advanced Sustainable Nutrient Management level	Certificate	
Above GMP	Use N Guru, which takes soil Nitrogen levels into account and matches this to nitrogen fertiliser applications using variable rates for paddocks	Questioning	
Above GMP	New fertiliser spreader allows the farm to improve efficiency by better matching applications to plant requirements. Proof of placement available through GPS system	Questioning	
GMP	Nutrient Budget blocks reflect the blocks used for soil testing to aid fertiliser decisions	Questioning	
0			
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
GMP	*Update Nutrient Budgets from Fonterra and Ballance and compare numbers Ensure blocks are set up correctly*	*Doug, Fonterra & Balance*	*01/12/2015*	*Reports*	*YES*	
Above GMP	*Develop a Nutrient Management Plan including scenarios and actions to improve nutrient use efficiency and manage losses*	*Doug, Ballance & Mike B*	*01/05/2016*	*Reports*	*YES*	
GMP	*Investigate a business case for purchasing own fertiliser spreading equipment with GPS to improve efficiency of fertiliser use*	*Doug*	*01/02/2016*	*Questioning*	*YES*	
0	0	0	00/01/1900	0		
0	0	0	00/01/1900	0		
0	0	0	00/01/1900	0		
0						
0						

NOTES

Effluent Management

Objective: To manage the risk associated with the operation of effluent systems to ensure effluent systems are compliant 365 days of a year.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
GMP	Application depth measured at 6.3mm from a Cobra rain gun, when set at the fastest speed	Questioning	
GMP	Effluent system has been evaluated by Doug (using SDA processes) and opportunities for improvements identified	Questioning	
GMP	Storage pond allows effluent to be applied only under suitable conditions and record activities in Dairy Diary	Questioning / runsheet	
GMP	Effluent pond is fenced and there are warning signs, including on the gate where the irrigator is	Visual	
GMP	Have an an effluent policy / procedure book and includes maps	Questioning and viewing the book	
GMP	The storage pond is emptied of solids x2 per year	Questioning	
GMP	A muck spreader has been purchased to better utilise effluent nutrients	Questioning	
0			
0			
0			
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
Compliance	*Repair broken nib wall in yard*	*Doug*	*01/07/2016*	*View*	*YES*	
Above GMP	Investigate safety system options (Inc. People and fail safe): e.g. Halo cut off; proof of placement, text can be used to start and stop the pump etc.	Doug	01/05/2016	Questioning		
GMP	Emergency procedures / safety systems will be updated	Doug	Ongoing	Book		
Compliance	Confirm pond leakage result via Opus consultants	Doug & Opus	01/12/2016	Report		
Above GMP	Investigate system to divert shed roof water	Doug	01/12/2016	Questioning		
GMP	Provide appropriate training to staff on effluent systems policies and procedures	Doug	Ongoing	Questioning and certificates if formal		
GMP	Update effluent policy and procedures. Including policy in relation to soil moisture	Doug	31/05/2017	Questioning / Policy		
0						

NOTES

Waterway & Biodiversity Management

Objective: To manage wetlands and water bodies so that stock are excluded as far as practicable from water, to avoid damage to the bed and margins of a water body, and to avoid the direct input of nutrients, sediment, and microbial pathogens.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
GMP	Strategically graze paddocks depending on conditions (e.g. avoid wet paddocks) ; Use temporary fences in paddocks (75, 34, 35 & 53);	Questioning	
Compliance	All accord waterways are fenced	Map	
Compliance	All defined waterways have crossings with culverts or bridges	Map	
GMP	There has been a lot of riparian planting on the farm	Map	
GMP	Weeds and pests are controlled by spot spraying and shooting	Questioning	
GMP	Have fenced wetlands on the farm. Through paddocks 36,37, 38 and 39	Map, Visualised	
0			
0			
0			
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
Above GMP	A new constructed wetland is to be developed on the farm	Doug & Opus	01/12/2016	Questioning and view		
SDWA	Develop a Riparian Management Plan using the DairyNZ tool	Doug	01/08/2016	Riparian Plan		
Above GMP	Install a water quality monitoring system for the wetland to test outputs and model impact of constructed wetland	Doug / Opus	01/12/2016	Map and plan		
GMP	*Improve the nib on culvert in the wetland where it runs through the paddock to improve Health and Safety for farm staff*	*Doug to lead*	*01/06/2016*	*Map and visual and report*	*YES*	
Above GMP	*Complete an eco blitz on the farm to survey the Biodiversity*	*Doug*	*30/05/2016*	*Questioning*	*YES*	
0	0	0	00/01/1900	0		
Above GMP	A 3 -5 year planting plan is being developed withNgati Haua Mahi Trust and an application to WRA	Doug & Trust	31/05/2017	Questioning		
0						

NOTES

Land & Soil Management

Objective: To maintain or improve the physical and biological condition of the soils in order to minimise the movement of sediment, phosphorus and other contaminants to waterways.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
Above GMP	Areas of steeper sidlings have been retired and planted	Visual and map	
GMP	Manage the risk of pugging damage with strategic grazing; providing bigger breaks and avoiding wet areas when very wet	Questioning	
Above GMP	Have a sediment bund near the road to prevent soil loss	Questioning; Visual look	
GMP	Ongoing upgrading and maintenance of main and feeder races	Questioning and view	
GMP	When planting crops, are selective over paddocks and no full cultivation and have wide buffers to any waterways	Questioning	
GMP	Have subsurface drainage to reduce paddock saturation and therefore risk of sediment runoff	Questioning	
GMP	All drains identified and mapped	Questioning / Map	
Above GMP	Contractors now have a map which shows risky areas to avoid	Map	
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
GMP	Map vulnerable soils and critical source areas for sediment loss.	Doug	01/12/2016	Map		
GMP	*Consider undersowing 40 ha of pasture due to weed issues*	*Doug*	*01/05/2016*	*Questioning*	*YES*	
Above GMP	Identify lower performing hill sides and retire from grazing and plant	Doug	Ongoing	Map, Visual		
GMP	*Identify and map drains*	*Doug*	*31/05/2016*	*Map*	*YES*	
0	0	0	00/01/1900	0		
0				0		
0						
0						

NOTES

Owl Farm

Storage Infrastructure & Waste Management

Objective: To manage areas used for bulk storage of biological and chemical resources and manage all farm waste effectively to minimise adverse environmental effects.

Level	Environmental 'Good Management Practices' currently carried out:	Evidence Required:	Note
Compliance	There is a concrete based silage stack on the farm	Visual	
GMP	Dead stock are collected by AC pet foods	Questioning	
GMP	There is a waste management site for managing rubbish	Visual	
GMP	Chemicals are stored in a locked shed	Visual	
GMP	Silage wrap is collected and removed from the farm	Questioning	
GMP	Plastic containers are now recycled	Questioning	
GMP	Contingency plans for accidental spillages are incorportaed into the farm Health and Safety plan	H & S plan	
0			

Level	Agreed actions for improvement:	By Who?	When?	Evidence Required:	Complete	Note
GMP	*Look at silage wrap recycling options*	*Doug*	*01/05/2016*	*Questioning*	*YES*	
GMP	*Investigate developing contingency plans for accidental spillages: Milk, effluent, fertiliser, Chemical and fuel*	*Doug*	*01/05/2016*	*Plan*	*YES*	
GMP	Review the risk associated with the organic waste site and options to manage better	Doug / School	01/12/2016	Questioning; Visual		
0				0		
0				0		
0				0		
0						
0						

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NOTES

FERTILISER – A CAREFUL BALANCING ACT

Ballance Agri-Nutrients

Summary

- Soil testing is now conducted in autumn to better align with fertiliser planning activities
- The variation in soil fertility has largely been reduced, although there are still a few areas that need addressing, notably for Olsen P and Quick Test K
- Many of the blocks are below the optimum soil pH range and a lime application has been recommended to correct this
- OVERSEER was used to develop actual nutrient budgets for the preceding two years, using real data and the new farm block divisions
- Actual nutrient budgets showed that nitrogen loss to water was greater (42 kg N/ha) than the previously calculated value (33 kg N/ha)
- The predictive nutrient budget showed that the farm's nitrogen loss to water would only increase marginally (44 kg N/ha) under the proposed management strategy for the year ahead
- Some of this nitrogen loss to water could be mitigated by wintering cows off farm. This would allow the effective production of feed on-farm, which an essential component of a System 2 dairy operation

The challenge

Develop a fertiliser strategy for Owl Farm that increases productivity and enhances economic performance, while also enabling the farm to achieve an acceptable environmental footprint.

The approach

Understand the current fertility status of the farm and use this information to develop an appropriate fertiliser recommendation. The tools used in this approach include:

- Detailed soil maps
- Soil testing
- Herbage testing
- Overseer
- N-Guru

In addition, the Ballance team meets with Owl Farm regularly: there are quarterly meetings to review tactics and to discuss future options, e.g. whether to move away from a System 2 operation in the long term. The pros and cons of such a shift need to be carefully considered before any decision is taken.

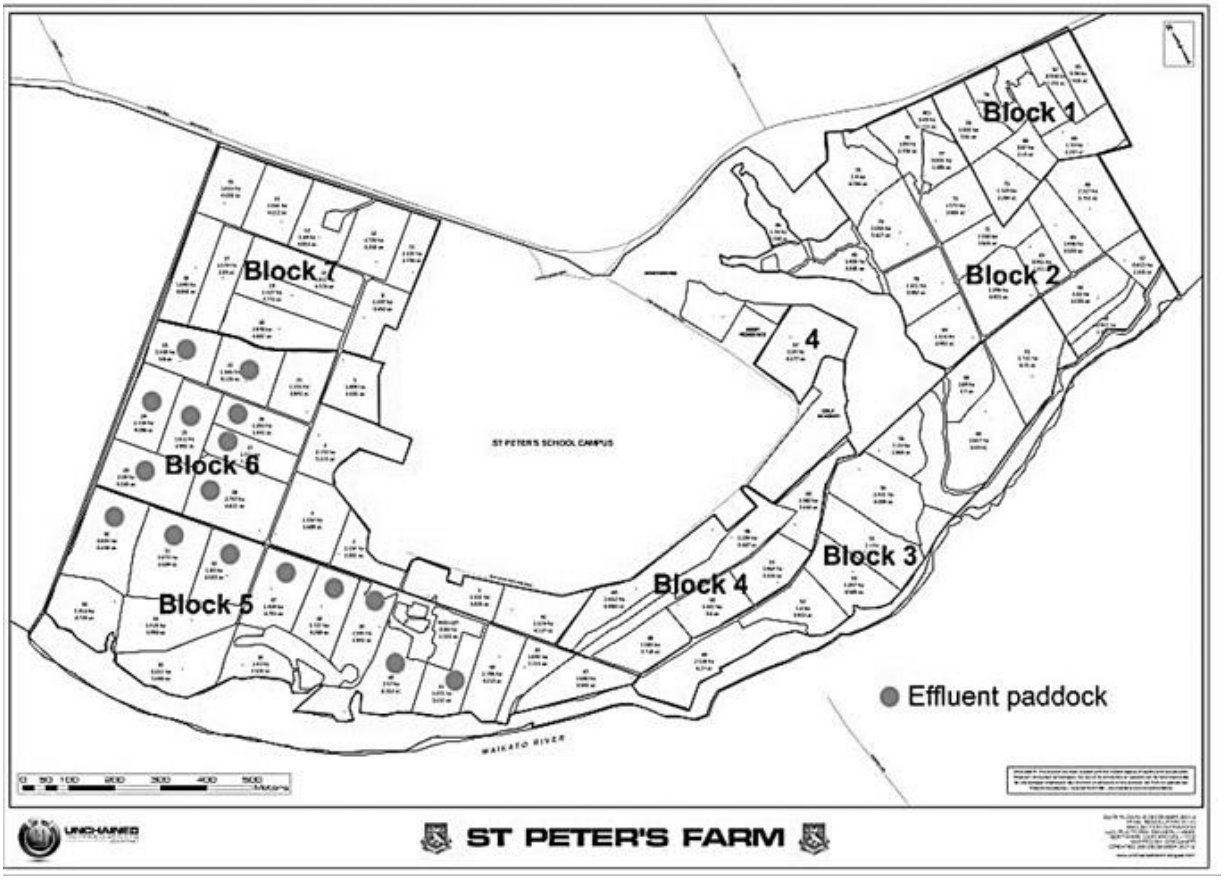
Soil testing

Historically, the farm had been divided into three blocks for soil testing:

- Effluent block
- Non-effluent block
- Maize block

NOTES

An analysis of the soil types on the farm showed that more detailed information could be obtained if the land was divided into seven blocks. These blocks are shown in the map below.



Soil testing had traditionally been carried out in September. However, this timing was not optimum, in terms of other farm activities, including planning fertiliser applications. As a result, it was decided to change the soil testing protocol, so that it would be conducted in autumn. The new soil testing regime started in March 2016.

Soil test results and fertiliser recommendations

The results of soil tests taken March 2016 are shown in the accompanying report from Hill Laboratories. This data highlights several opportunities to improve farm productivity.

NOTES

Ballance agri-nutrients

Hill Laboratories
BETTER TESTING BETTER RESULTS

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ANALYSIS REPORT

Client:	St Peters School	**Lab No:**	1554736 s2chpv2
Address:	Private Bag 884 Cambridge 3450	**Date Registered:**	19-Mar-2016
		Date Reported:	24-Mar-2016
		Quote No:	
		Order No:	
		Client Reference:	4051959
		Add. Client Ref:	Owl Farm
Phone:	07 827 9899	**Submitted By:**	M Ter-Morshuizen

Soil Analysis Results

Sample Name:	Soil Type*	pH pH Units	Olsen Phosphorus mg/L	Sulphate Sulphur mg/kg	Potassium MAF units	Calcium MAF units	Magnesium MAF units
1	Ash	5.6	35	35	22	8	24
2	Ash	5.6	51	17	8	6	31
3	Ash	5.9	62	16	14	10	26
4	Ash	5.4	55	48	9	7	16
5	Ash	5.5	41	44	16	7	26
6	Ash	5.9	35	31	15	9	30
7	Ash	5.6	36	35	11	8	20
A	Ash	5.7	24	22	9	8	15
B	Ash	5.4	45	45	13	6	16
C	Ash	5.7	35	36	4	7	10
D	Ash	5.6	30	46	5	6	14

Sample Name:	Sodium MAF units	Aluminium ($CaCl_2$ Extractable) mg/kg	Total Nitrogen* %	Total Cadmium* mg/kg	Soil Sample Depth* mm		
1	6	-	0.75	0.63	0-75	-	-
2	5	-	0.65	0.53	0-75	-	-
3	5	-	0.70	0.68	0-75	-	-
4	6	3.8	0.60	0.56	0-75	-	-
5	7	-	0.99	0.68	0-75	-	-
6	10	-	0.85	0.80	0-75	-	-
7	8	-	0.58	0.49	0-75	-	-
A	5	-	-	0.41	0-150	-	-
B	6	3.0	-	0.68	0-150	-	-
C	6	-	-	0.64	0-150	-	-
D	6	-	-	0.67	0-150	-	-

ilac-MRA IANZ ACCREDITED LABORATORY

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

NOTES

Ballance agri-nutrients

Lime

The majority of blocks have a soil pH slightly below optimum (5.7-6.0). In the soil tests, the pH of the blocks ranged from 5.4 to 5.9. As a result, an application of lime (at a rate of 2 tonne/ha) to the entire farm is recommended. This will lift soil pH by around 0.2 unit. An annual application of 0.5 tonne lime/ha is recommended to help to maintain soil pH within the optimum range.

Phosphorus

Soil test results showed that the farm was at or above the optimal Olsen P for an ash soil (20-30). Blocks 2, 3, 4 and 5 were all above Olsen P 40, and would likely be able to maintain production for a year without any additional phosphate inputs.

Blocks 1, 6 and 7 had an Olsen P of 35, 35 and 36, respectively. While this is above the traditional optimal range, it still requires phosphate fertiliser inputs to ensure production levels are maintained. The recommended action is 300 kg Superten/ha, in spring and autumn. This will provide 54 kg P/ha for the year, which is slightly below maintenance application.

Potassium

While most blocks had adequate potassium levels, two require fertiliser potassium to raise Quick Test K results. Blocks 2 and 4 had Quick Test K levels of 8 and 9 respectively. A September application of potassium (as muriate of potash) at a rate of 29 kg K/ha is recommended for these paddocks.

Chicory

The soil samples labelled A, B, C and D in the accompanying soil test results represent paddocks 12 (A), 37, 38, 39 (B), 51, 54 (C) and 66 (D). These paddocks are scheduled to be planted in chicory.

Block	Recommendation	Reason
Chicory	• DAP (166.6 kg/ha). Apply down drill	• Starter fertiliser to support crop establishment
	• SustaiN (66.6 kg/ha). Apply after first grazing	• Post-grazing nitrogen to boost crop growth
	• SustaiN (66.6 kg/ha). Apply after second grazing	• Post-grazing nitrogen to boost crop growth

Nitrogen applications

Tactical use of nitrogen fertiliser is a key tool for a farm that relies on home-grown feed. Regular use of light dressings of nitrogen encourages pasture growth, providing that no other nutrient is limiting production. In line with pasture monitoring some of these applications would not be applied to all paddocks.

For the current year, the following nitrogen programme has been recommended:

- July – PhaSedN Quick Start (100 kg/ha)
- August – Sustain Ammo 30 (100 kg/ha)
- September – SustaiN (65 kg/ha) and for selected paddocks MOP (60 kg/ha)
- December – SustaiN (65 kg/ha)
- April – SustaiN (65 kg/ha) and Ballance Selenium (1 kg/ha)

NB – Agronomically there would ideally be a further application of a similar rate of 30kg N/ha. Currently this is unlikely to happen due to the strong driver of not increasing the predicted N leaching – see below. Seasonal pasture feed wedge monitoring and whether summer becomes dry this year will also be factors considered.

Nitrogen leaching

Nitrogen leaching losses are modelled by entering a range of farm data into OVERSEER® Nutrient Budgets (OVERSEER) and generating a nutrient budget. There are two key considerations that must be kept in mind when doing this:

- The importance of entering accurate farm information
- The importance of distinguishing between the type of nutrient budget being developed.

NOTES

There are three types of OVERSEER nutrient budgets that can be created. These are i) A predictive nutrient budget, which typically looks forward using estimated data inputs for the coming year. This is the type commonly used for fertiliser recommendations; ii) A year-end nutrient budget, which looks at the past year and uses actual data from that year; iii) A scenario nutrient budget, which is a hypothetical nutrient budget that examines options for managing nutrients more effectively or assesses what would happen to nutrient losses and flows if the farm system was changed.

In constructing the nutrient budgets for the 2014/15 or 2015/16 farming year and the predictive 2016/17 year we collected all the relevant farm data from Owl Farm and entered this into OVERSEER. We then identified the soil types and obtained and entered fertiliser data. These nutrient budgets are presented below.

The 2014/15 and 2015/16 nutrient budgets are year-end nutrient budgets and are built using actual farm data. These nutrient budgets were quite similar in their inputs, and this is reflected in the outputs. Of key interest are the 'N loss to water' numbers for these budgets, which are 42 and 43 kg N/ha/year, respectively. These are greater than the 33 kg N/ha/year previously reported. The main reason that N loss is now higher is because the farm has been re-blocked into more accurate management units, which better reflect the soil orders for each block.

As the data that has been entered into OVERSEER is more accurate, the nutrient budgets that are produced are a more accurate reflection of the actual N leached from the farm. This change in output highlights the importance of collecting and entering accurate data into OVERSEER.

For the 2016/17 season the predicted N loss to water has increased to 44 kg N/ha/year (1 kg N/ha greater than the probable reference point). There a couple reasons for this. Firstly, the farm has budgeted growing additional pasture as a result of the pasture renovation strategy; this reduces the reliance on brought in feed, in particular PKE. Grass has a higher N content than PKE, so therefore more N is available for leaching, which is largely responsible for the increase. There is also a slightly higher budgeted use of N fertiliser this season to support growth and establishment of new pastures.

Overseer file name	**Owl Farm 2014-15 Year End**	**Owl Farm 2015-16 Year End**	**Owl Farm- 2016-17 Predictive - Low N**
Farm Year	2014-15	2015-16	2016-17
	Year End	Year End	Predictive
Nitrogen fertiliser applied (kg N/ha/year)	111	122	128
Imported Supplement N (kg N/ha/year)	68	67	40
N Loss to Water (kg N/ha/year)	42	43	44
N conversion efficiency (%)	30	30	31

There are a number of strategies that could be employed to help reduce the nitrogen loss to water, with the most effective for this situation likely to be wintering cows off. This approach will allow for the best use of fertiliser nitrogen on the farm, which is important if adequate feed is to be grown to support the pasture-dominant model currently in use.

Variable rate nitrogen use

Soil testing had revealed that the level of total nitrogen was variable across the test paddocks, ranging from 0.56% to 0.77%. This raised the possibility that economic and production gains could be achieved by using variable rate nitrogen fertiliser applications.

N-Guru, a software program that is designed to improve the efficiency of nitrogen use on New Zealand's pastoral farms, was used to analyse the results from Owl Farm.

Soils with higher levels of total nitrogen require lower rates of nitrogen fertiliser, while those with lower levels of total nitrogen can grow more pasture if higher rates of nitrogen fertiliser are applied. This can lead to overall production gains. For Owl Farm, using variable rate nitrogen fertiliser (0 or 30 kg N/ha, depending on the block) in October would result in a predicted yield of 37,109 kg DM pasture grown, at a response rate of 18.0 kg DM/kg N applied. This is an improvement over the yield (35,874 kg DM) and response rate (17.3 kg DM/kg N) from a fixed rate of nitrogen (30 kg N/ha).

Furthermore, by avoiding nitrogen applications where they are not required, there is likely to be an environmental benefit, through a small reduction in the potential for nitrate leaching from these areas

NOTES

Ballance team

Nutrient Specialist: Mark Ter-Morshuizen

Environmental Management Specialist: Ian Power

Science Extension Manager: Ian Tarbotton

NOTES

OWL FARM FUTURE PLAN

Environmental regulations along with more ambitious profitability goals mean we are about to start reviewing our farm system approach. This has always been the plan with stage 1 (1-3 years) being about doing what are currently doing better and building credibility while stage 2 (3-5 years) is about testing and investigating in conjunction with partners, innovative strategies to lead sustainable profits. We haven't put a huge emphasis on trying to significantly lower our current nitrogen footprint given within 18 months' time the entire farm system approach may look different, key to making this decision will be environmental outcomes. It's important to note that here and now sticking within the environmental limits is of course a priority albeit one that will most likely evolve over the next 18 months.

As a Farm Management Committee we have continued to discuss options for the following season to make our current farm system more resilient. After robust discussion we came to the conclusion that we need to identify and align with a long term strategy first and foremost rather than continue to make short term system alterations and investments. We have therefore identified a range of systems which we think reflect the variety of options we have available.

- Status quo – of which we already have a fair idea of what this looks like.
- Status quo with in-shed feed system.
- Matching stocking rate with pasture grown, lower stocking rate with no brought in feed and harvesting surplus.
- Feed pad with various stocking rates.
- Animal housing and duration controlled grazing with various stocking rates – most likely winter milking.

We plan to model these in depth to determine what the most appropriate farm system will likely be for us long term to meet our vision and strategic objectives. There will be a range of scenarios modelled within each farm system approach as we try to find the sweet spot for each, i.e. stocking rate, nitrogen inputs, feed sources, calving patterns, winter milking etc.

Modelling will reflect the farm system and feed budgets using Farmax, economic implications and environmental considerations using Overseer. A range of aspects will be considered when determining what system best fits our objectives, these will include:

- Profit
- Environmental
- Production
- Capital expenditure and return on investment
- Animal welfare
- Health and safety
- HR
- Perceptions – both internally and externally.

This will be a significant piece of work which reflects the vision and strategy of the Joint Venture Agreement and the reason our partners are on board in support of this.

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Owl Farm

Providing knowledge
St Peter's School/Lincoln University
Demonstration Dairy Farm

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New Zealand

Lincoln University
Te Whare Wānaka o Aoraki
AOTEAROA · NEW ZEALAND
New Zealand's specialist land-based university

Next Farm Focus Day

Wednesday, 16 November 2016

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