



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, 16 September 2015

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

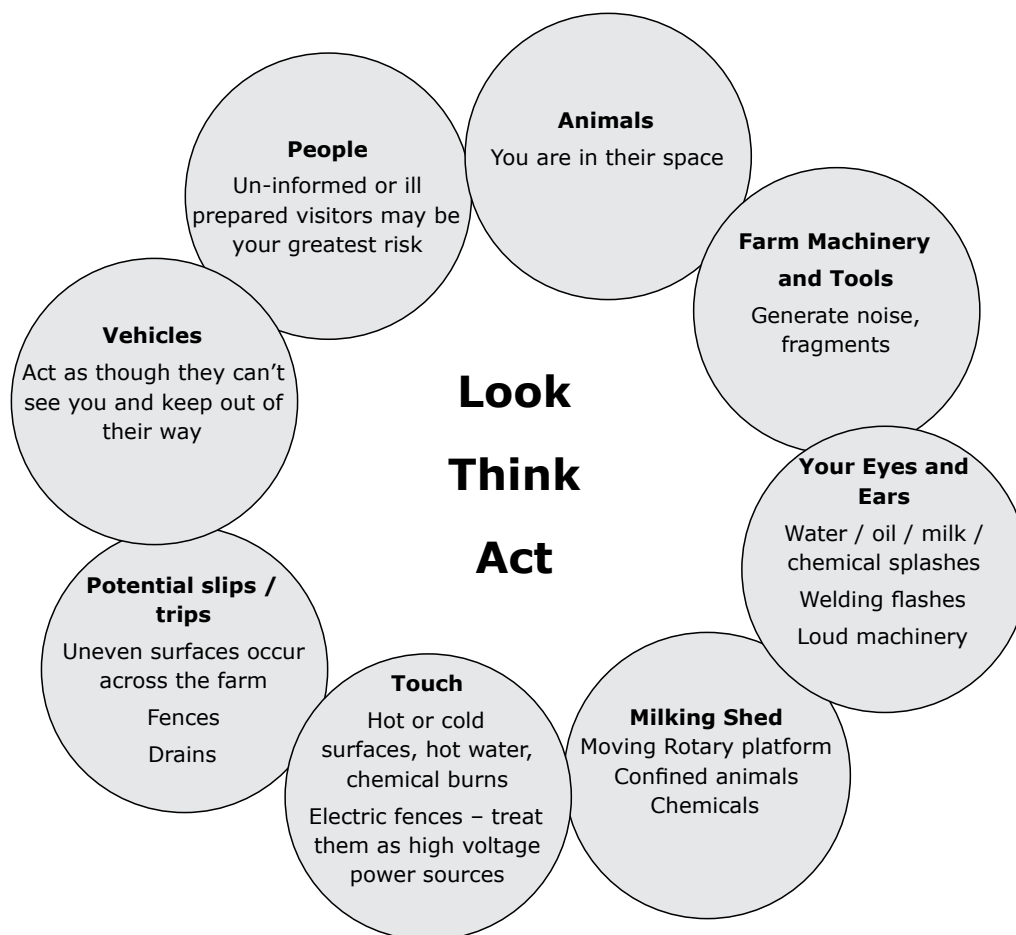
Welcome to Owl Farm

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.

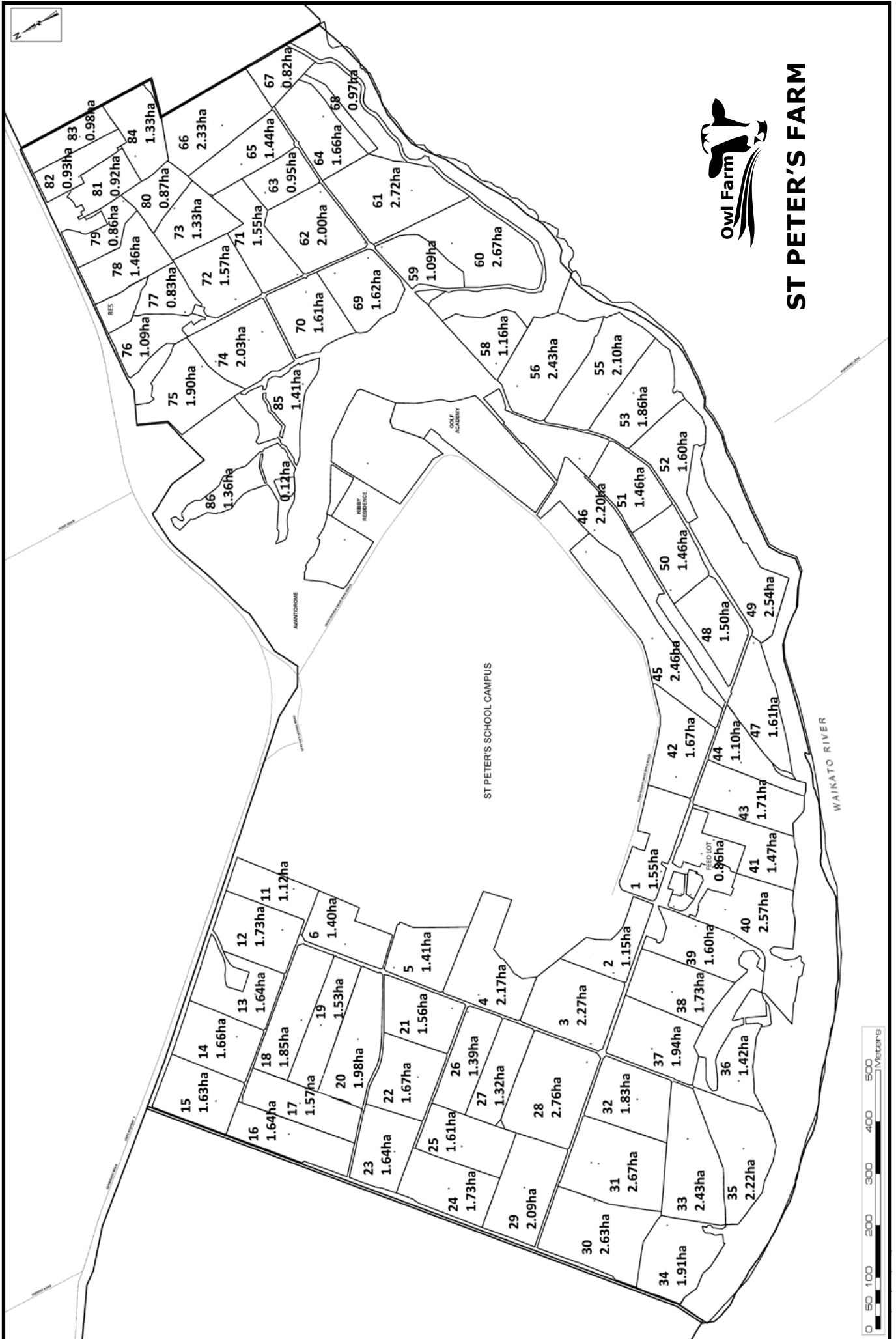
If you are uncertain how you should act or proceed stop and contact the farm manager, other farm staff or your host.

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

St Peter's School / Lincoln University Demonstration Dairy Farm

Goal

To apply proven research, utilising good on farm practice and scientific monitoring for the farm to become an exemplar in dairy production, economic performance and environmental footprint.

Strategic Objectives

To work in collaboration with the wider dairy industry and community to maximise sustainable profit embracing the whole farm system by

- Increasing productivity
- Achieving an acceptable farm environmental footprint
- Meeting or exceeding animal welfare targets
- Providing leadership to dairy farmers by demonstrating practices that can be achieved by progressive farmers
- Demonstrating career opportunities to students
- Provide educational opportunities for students

Farm Development

The development of farming systems and demonstration activities on the farm will proceed in two stages

Stage 1

To establish credibility by addressing current issues and performance, whilst setting up the farm for future development (Years 1-3; 2014/15-2016/17).

Specific Objectives During Stage 1:

- To establish Owl Farm to develop and demonstrate good practice in pasture based dairy farming systems and to transfer them to dairy farms
- To generate profit through tight control management with appropriate re-investment
- To appoint a Farm Demonstration Manager
- To delineate areas of farmland assigned to milking platform, dairy support and wintering
- To include the farm's full environmental footprint, land requirement and resource efficiency in system decision making and reporting
- To use good environmental management systems in the development and implementation of farm practices that achieve sustainable growth and profit and protect the wider environment
- To engage with Waikato Regional Council and Waikato River Authority staff to accelerate progress towards their goals relating to the environment and Waikato River
- To develop a communications plan (including photos of the journey to establish and develop Owl Farm)
- To implement optimal use of all nutrients on farm including effluent, fertilizer, and nutrients imported from supplements
- To implement nutrient recycling so that there is no significant contamination of water and that the farm meets all resource consents
- To show leadership in establishment of biodiversity management practices relevant to the Waikato
- To implement a staff training matrix
- To implement a Health & Safety plan
- To implement a time and motion study for staff with associated rosters
- To optimise pasture growth and pasture management so that cows consume as much metabolizable energy as practical from grazed pastures and supplements
- To achieve industry targets for mating performance with a 10 week mating period, including a 6 week in-calf rate of 78% and 10 week in-calf rate of greater than 90% (empty rate < 10%)
- To assist St Peter's School and Lincoln University to attract top quality domestic and international students into their organisation and into the New Zealand Primary Sector.

Stage 2

To develop, in conjunction with partners, higher risk strategies to lead sustainable profit (Years 4-6; 2017/18-2020-2021).

The farm system will be developed over years 1-3 and reflect the demonstration requirements of the industry that are relevant and appropriate at that time.

Specific objectives during stage 2

- To push the boundaries of sustainable profit through increasing productivity without increasing the farm's environment footprint.



OWL FARM SNAPSHOT

Year One and Two Objectives:

- To maximise our current system and dramatically improve both our economic and environmental sustainability
- To get accurate baseline data so that we can benchmark the property for future management and comparison

Area:

Milking 160 hectares effective
Free hold land 137 hectares
Lease land 32 hectares

- The area that has been available has varied from year to year depending mainly on availability of lease land from the McGrath block. Ultimately, the area will be set in concrete so that we have a fixed base and this will be the freehold area owned by St Peter's

Soils:

- Vary dramatically from heavy clays to light sands. The topography is flat contour over three terraces
- The farm is long and narrow with 3.4 kilometres bordering the Waikato River

<i>Soil type:</i>	<i>Location:</i>
Otorohanga deep clay	SH1, river and centre north
Pukehina deep sand	North of farm
Kainui deep silt clay	Behind Kahikatea Stand
Turangi deep sand	Deer block
Rotokauri deep clay loam	School grounds
Kaipaki deep peat	Gully below the Avantidrome

Fertility:

pH average 6.0
Phosphate 53
Potassium 9
Sulphur 15
Magnesium 122

Nitrogen:

- 150kgN/ha is being budgeted for the coming season
- Soil testing in September will still determine what final amount is applied

Production:

	2011/12	2012/13	2013/14	2014/15
Production kgMS	181,625	153,049	158,207	201,000
Cows Milked	465	453	446	453
Calves reared	174	171	158	150
Heifers grazed	100	102	112	104
Production/ha	1,094	945	993	1,256

Stock:

BW 147/48

PW 196/69

- Historically there has been a lot of AB mating using DNA semen and mating all the Yearlings to AB with herd now in the top 3% in NZ
- The objective has been to rear as many heifer replacement animals as possible and sell surplus (usually February)
- There have been six weeks AB followed by a further ten weeks use of the bulls

Calving Date: 01 July 2016

Cowshed:

- 36 bale rotary shed with cup removers, built in 1970 and the plant is Waikato
- Need to run two herds as yard has only capacity to hold 400 cows

Effluent:

- Effluent holding pond used when conditions don't suit application
- Otherwise effluent applied directly when suitable over 36 hectares using a cobra travelling rain-gun

Staff:

Farm Manager, Assistant Farm Manager and Farm Assistant (3 FTE)

Cropping:

- 14 ha of chicory and potentially 5ha of maize to come onto the milking platform
- This will work in with a planned pasture regeneration plan given little cultivation has occurred on farm over the past 10 years

Supplement:

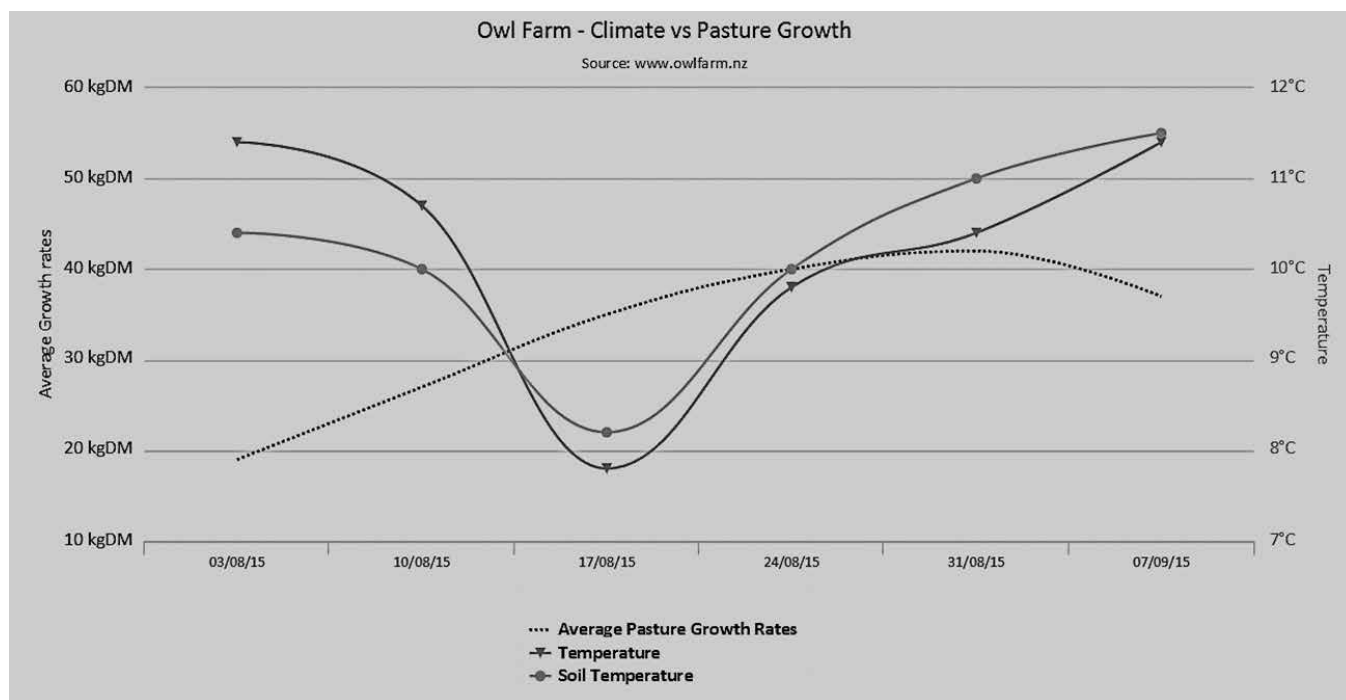
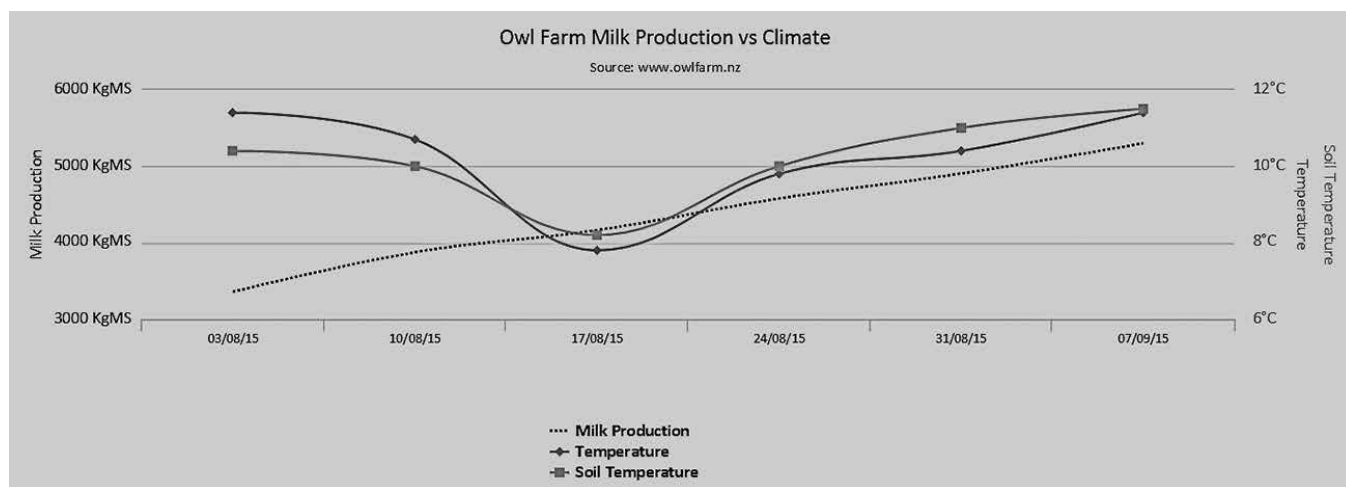
- The farm has made between 100 and 200 tonnes of grass silage per year in the past
- With regular pasture metering and the ability to be able to identify surplus in advance we think it will be somewhere between 150-200 tonnes this coming season (weather and season dependent)
- 170 tonnes of maize silage was fed late in the season and still feeding over winter
- 120 tonnes of Maize expected again this season
- 300 tonnes of PKE has been contracted for the 2015/16 season

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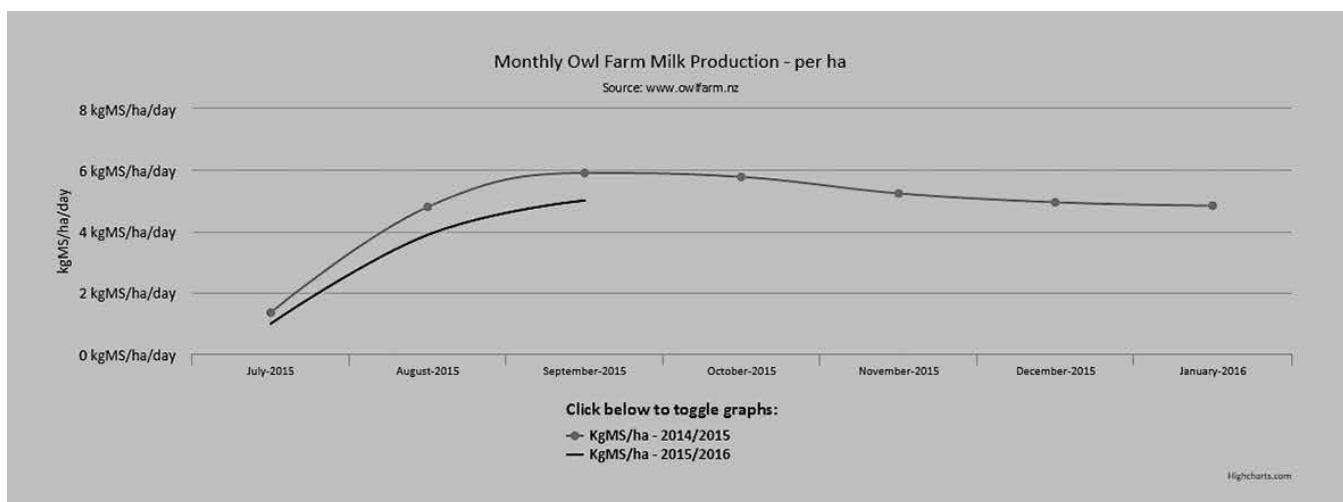
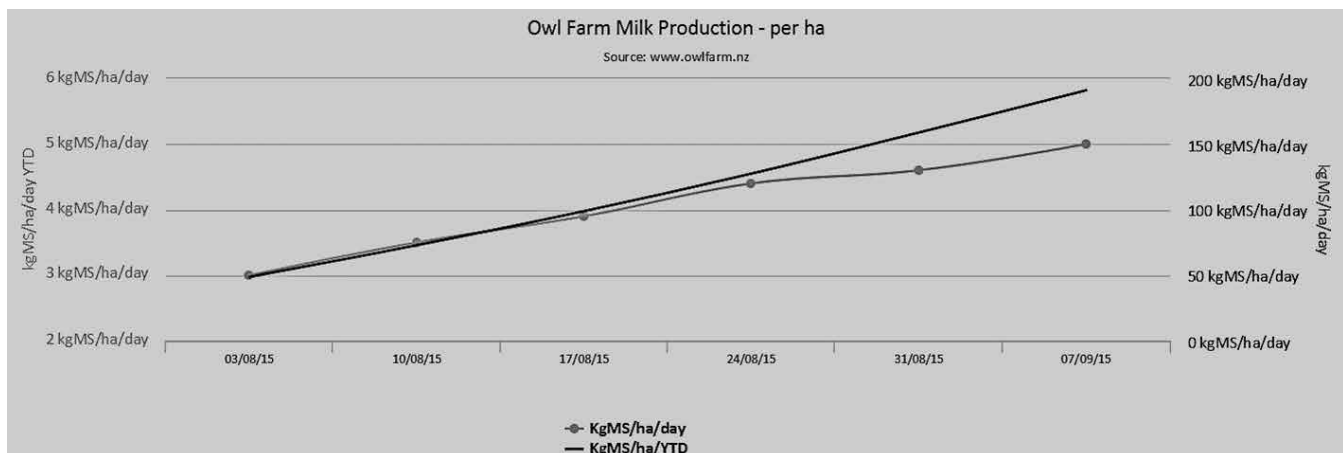
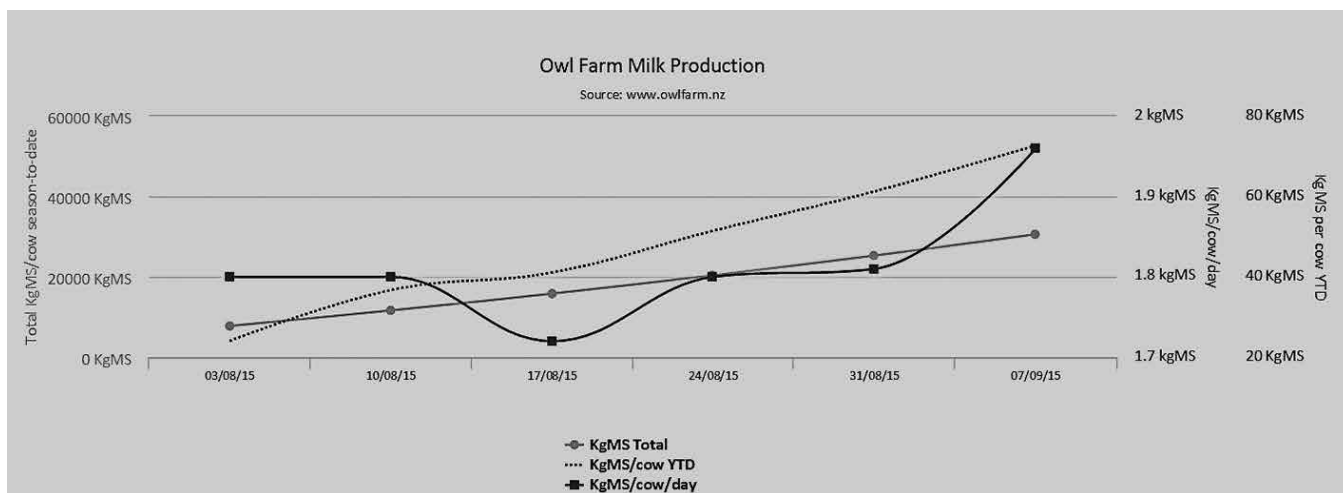
OWL FARM REPORT – SEASON TO DATE

Milk Production

- 95% of cows have calved - 70% within the first week of calving
- Calving date was brought back from 7 July in previous years to 1 July this season
- This decision was based on having identified good growth rates over winter in previous seasons and wanting to capture that feed quality early on while increasing days in milk
- The weather this season has meant that milk production is less than anticipated:
 - July: 85.9% higher than 2014 – due largely to the earlier calving date
 - August: 13.4% down due to weather and slow growth rates
 - September (current): 14.4% down
 - Season to date: 3% down
- The farm is currently primed to cash in on favourable growing conditions and warmer weather,
- Average milk production per cow (kgMS/cow/day) has been slowly tracking up towards 2kgMS/cow/day
- Currently sitting at 1.96kgMS/cow/day and 5kgMS/ha/day.
- Although behind we remain confident we can re-capture lost production over the coming months through maintaining current pasture grazing management



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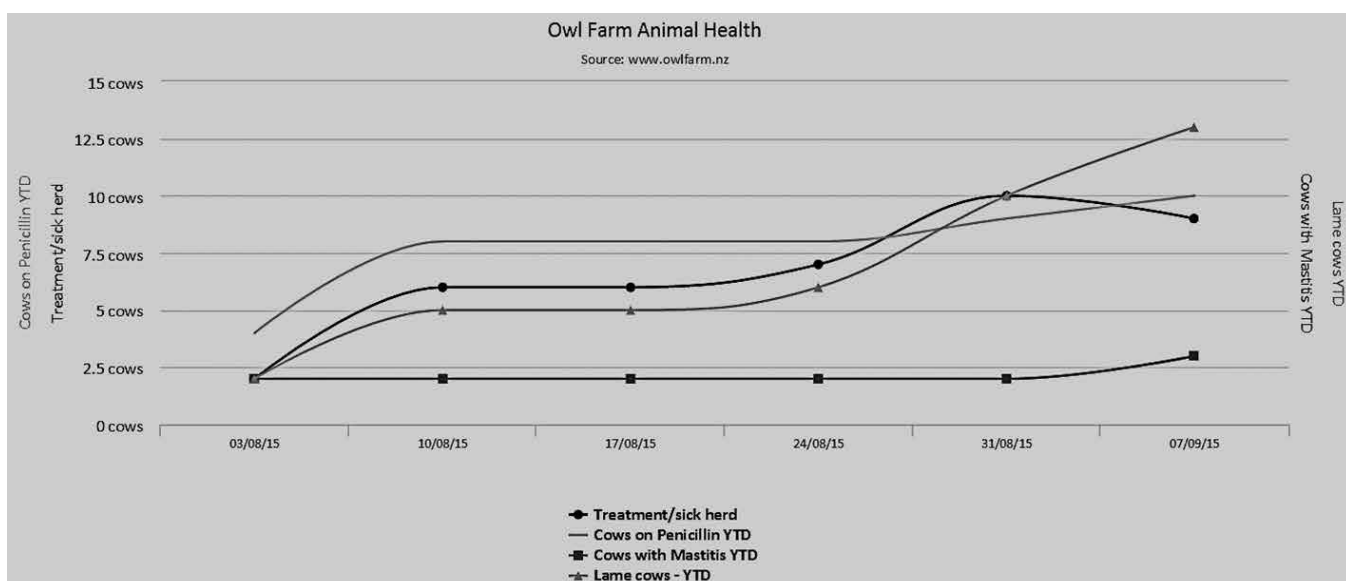


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MILK PRODUCTION CONSIDERATIONS	Week Ending						
	03/08/15	10/08/15	17/08/15	24/08/15	31/08/15	07/09/15	Variance
Cows in milk (wintered 471)	323	367	385	396	407	421	+ 14
Springer herd/dry cows	147	103	80	69	58	39	- 19
Number of cows in big herd	168	211	226	244	243	249	+ 6
Number of cows in small herd	145	139	142	142	147	154	+ 7
Number of cows in colostrum herd	10	17	17	3	7	9	+2
Number of cows in the treatment/sick herd	2	6	6	7	10	9	+1
KgMS/cow/day							
(cows in the vat only)	1.8	1.8	1.72	1.8	1.81	1.96	+ 0.15
KgMS/cow YTD	24.1	31.7	41.1	51.5	61.3	72.7	+ 11.4
Milk production for week ending (kgMS)	3358.8	3874.9	4165	4578.3	4905.1	5299.7	+ 394.6
Total milk production - YTD (kgMS)	7785	11659.9	15824.9	20403.2	25308.3	30608	+ 5299.7
Milk production per ha (kgMS/ha/day)	3	3.5	3.9	4.4	4.6	5	+ 0.4
Total milk production per ha - YTD (kgMS/ha/YTD)	48.7	72.9	98.9	127.5	158.2	191.3	+ 33.1
Protein/Fat ratio	0.8	0.78	0.71	0.78	0.79	0.75	- 0.04
Bulk Milk SCC (SCC x 1000) (target <150)	114	121	116	123	125	120	- 5

Animal Health

- Working to an animal health plan developed by Cambridge Vets
- Very few calving related complications, only one vet assisted calving required, limited milk fever cases identified
- Undertook pasture and liver sample to identify nutrient/mineral deficiencies within the herd
- We identified selenium as an issue across the entire herd while copper was additionally low in the heifers
- The entire herd received a selenium pour-on and the heifers received a 30gm copper bolus which is long acting and works quickly
- The dosatron is currently providing the herd with 60gms of magnesium sulphate and 1ml per 5 cows of selenium
- We calved down the cows at an average body condition score of 4.8 and the heifers at 5.1. This has gradually reduced to 4.6 and 4.5 respectively – due largely to feeding levels over the past couple of months
- Majority of herd has been metri-checked and 29 have been treated over 3 sessions
- The cows and heifers are starting to cycle well after a slow start
- Have hang over effects of eczema in some of the older cows from last season
- The heifers have come back from to the farm with ringworm which is starting to improve from a visual perspective



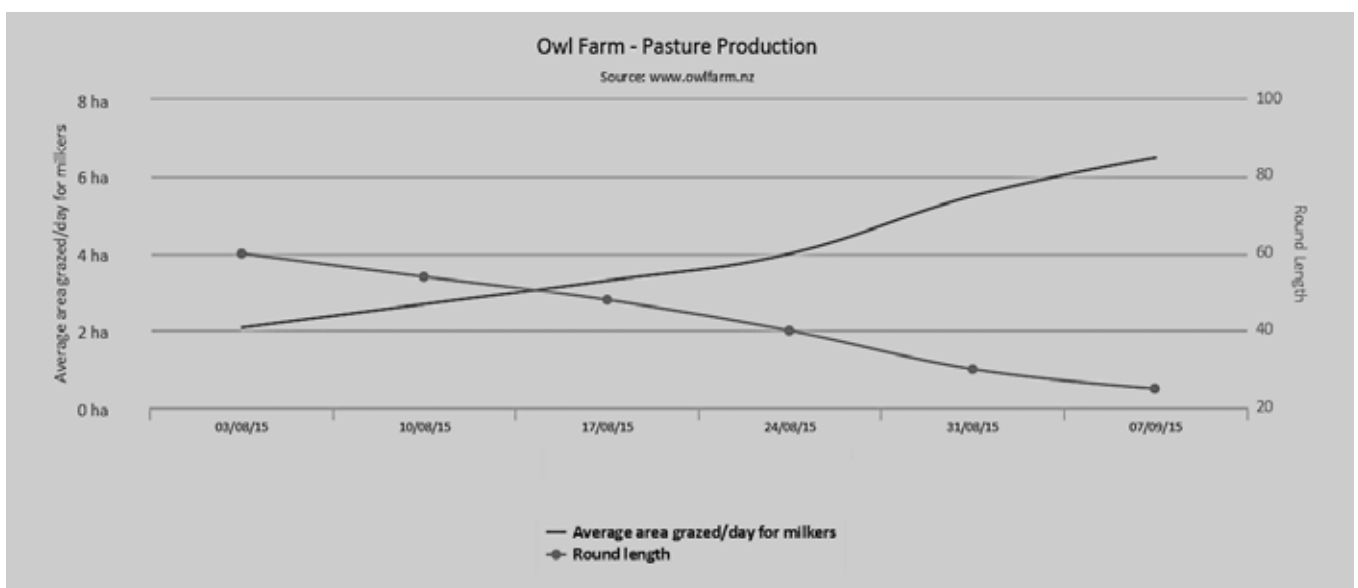
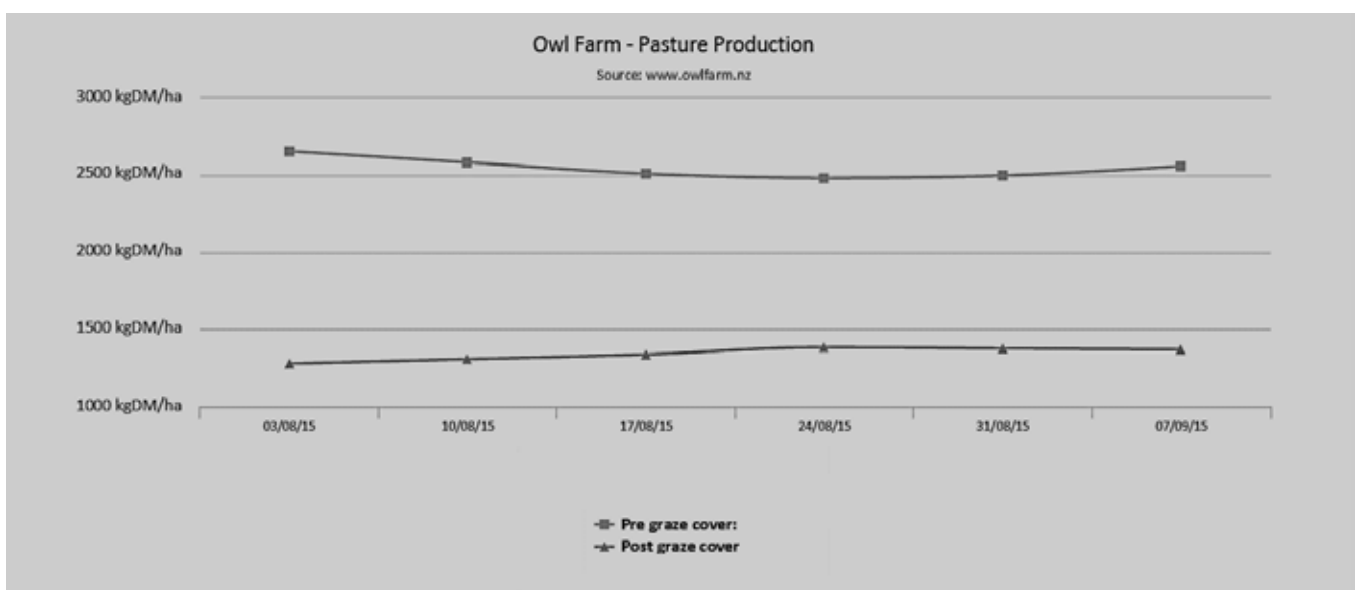
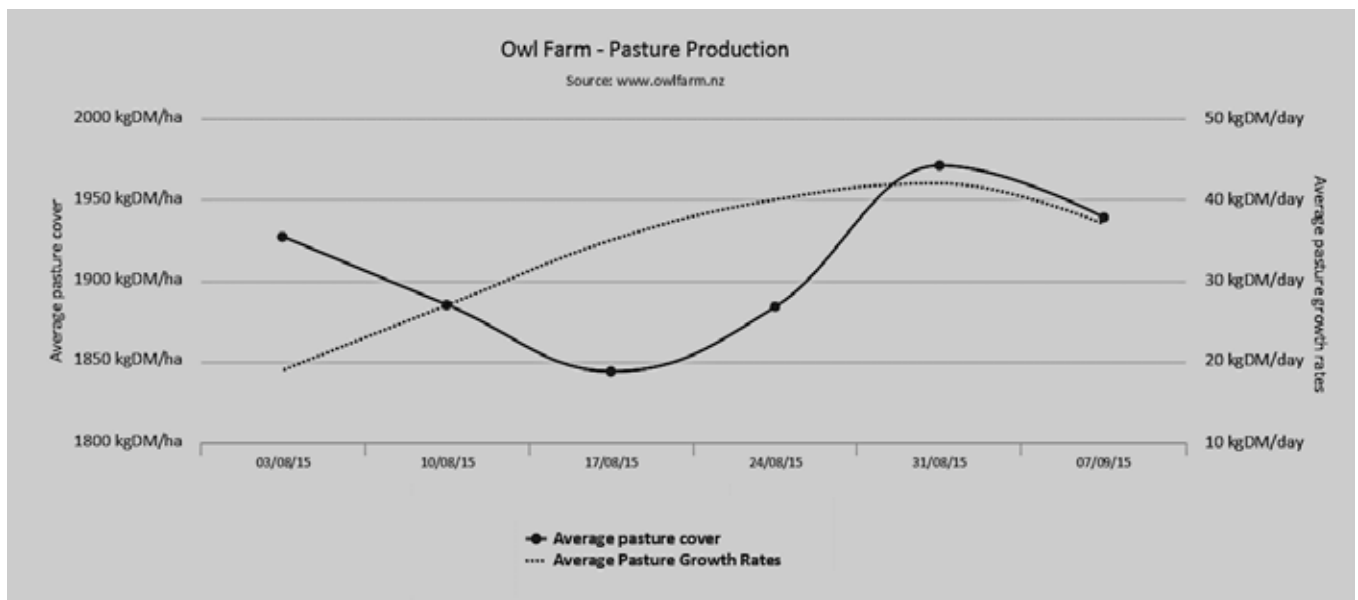
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ANIMAL HEALTH CONSIDERATIONS	Week Ending						
	03/08/15	10/08/15	17/08/15	24/08/15	31/08/15	07/09/15	Variance
BCS (average whole herd)	4.5	4.5	4.5	4.5	4.5	4.5	-
BCS (average heifers)	4.7	4.7	4.7	4.5	4.5	4.5	-
Live weight average (kg)	n/a	n/a	n/a	n/a	n/a	n/a	-
Treatment/sick herd	2	6	6	7	10	9	-1
Lame cows - new cases	0	3	0	1	4	3	+1
Lame cows - YTD	2	5	5	6	10	13	+ 3
Sick cows – new cases					2	0	-
Sick cows - YTD					2	2	-
Mastitis - new cases	0	0	0	0	0	1	+1
Mastitis - YTD	2	2	2	2	2	3	+1
Number of cows on penicillin	1	4	0	0	1	1	+1
Number of cows on penicillin YTD	4	8	8	8	9	10	+ 1
Culls - new cases	0	0	5	0	0	5	+5
Culls - YTD	0	0	5	5	5	10	+5
Deaths - new cases	0	0	0	0	0	0	-
Deaths - YTD	1	1	1	1	1	1	-
In calf results (6 weeks)	n/a	n/a	n/a	n/a	n/a	n/a	-
Number of cows cycling	n/a	n/a	n/a	n/a	n/a	n/a	-

Pasture Production

- Started the season on a 90-day round with an average pasture cover of 2142kgDM/ha
- Covers progressively dropped through the unusually cold and wet July and August
- Average covers got as low as 1844kgDM/ha with average growth rates as low as 19kgDM/ha
- Balance Day has previously been in the last week of August, we still aren't there yet
- As air and soil temperatures begin to improve so do the average pasture growth rates: as high as 42kgDM/ha in recent weeks
- Feed wedge remains flat and farm is primed to take off
- Plan to identify surplus early and shut up as silage
- Have religiously kept to our spring rotation planner even though at times we held the stock reasonably tight
- Currently on a 25 day round feeding 6.5-7ha per day,
- As a result PKE usage is reducing to the point we will be entirely pasture within the next week
- A pasture condition scoring exercise was recently undertaken whereby we identified the pasture composition of all paddocks on farm. The pasture condition scoring exercise aims to rank every paddock from best (score 5) to worst (score 1) based on the density of rye grass and clover, presence of weeds and openness of sward
- Out of 78 paddocks we identified 45% as a 4 or better
- Nothing was scored a 1
- 55% of paddocks were scored 2 or 3
- We have two approaches planned for our condition 2 and 3 paddocks:
 - Chicory will be established on score 2 or 3 paddocks that are close to the dairy shed and on heavier soil types (14 ha)
 - Non chicory areas will be weed sprayed this spring, then under-sown with a short rotation ryegrass in autumn 2016 as a short term option to improve pasture density and performance

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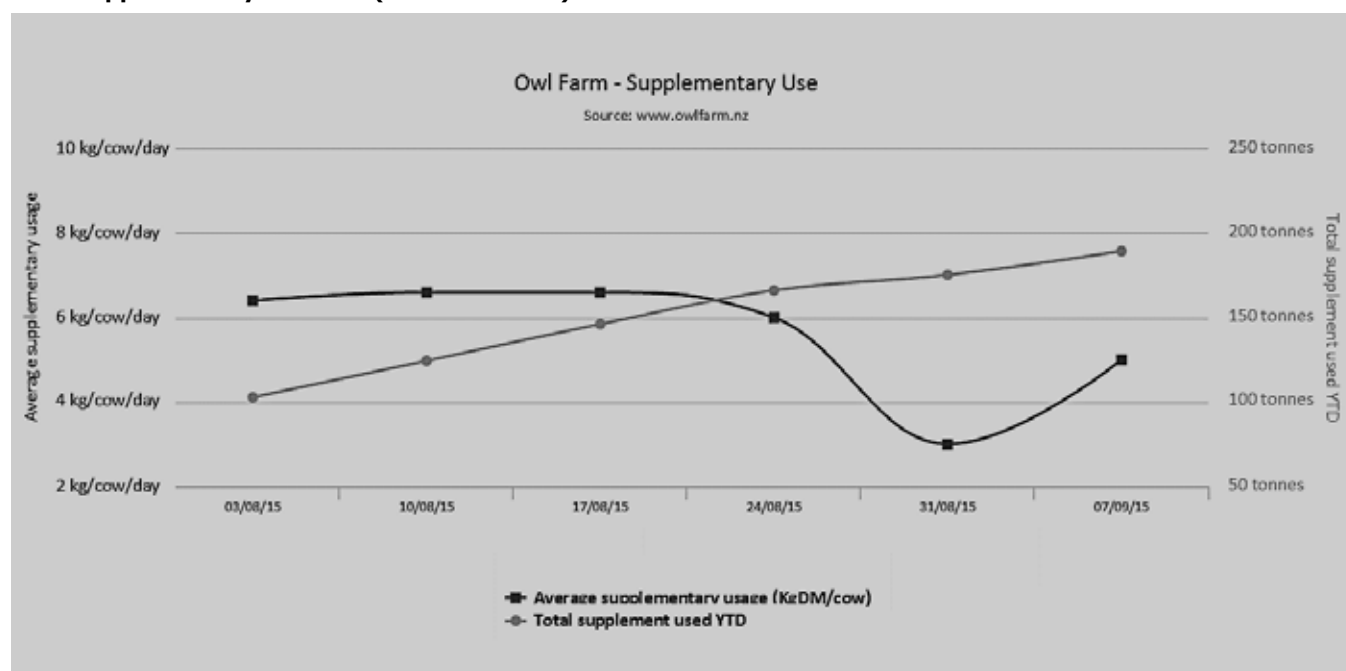
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PASTURE PRODUCTION CONSIDERATIONS	Week Ending						
	03/08/15	10/08/15	17/08/15	24/08/15	31/08/15	07/09/15	Variance
Average pasture cover (kgDM/ha)	1927	N/A	1844	1884	1971	1939	+ 87
Average pasture growth rates (kgDM/day)	19	N/A	35	40	42	37	+ 2
Pre graze cover (average for the week) (kgDM/ha)	2654	N/A	2508	2479	2496	2557	+ 17
Post graze cover (average for the week) (kgDM/ha)	1277	N/A	1337	1384	1376	1370	- 8
Lowest post graze residual (kgDM/ha)	868	N/A	1281	1273	1250	1232	- 410
Highest pre graze cover (kgDM/ha)	2858	N/A	2701	2601	2609	2718	+ 8
Average area grazed/day for milkers (ha)	2.08	N/A	3.3	4	5.5	6.5	+1.5
Round length	60	N/A	48	40	30	25	- 10
Total biomass measured for farm (kgDM)	277023	N/A	248122	314953	318192	313013	+3239

Supplementary Feed Use

- We fed 30 tonnes of maize and 5 tonnes of grass silage in June and early July
- We started feeding PKE from the middle of July and have fed just over 6kgDM/cow/day for much of August to offset the low growth rates, this is tapering off to the point that we are fully pasture based
- Currently we are 170 tonnes through our 300 tonne contract

Total supplementary feed use (season to date) is 190 tonnes



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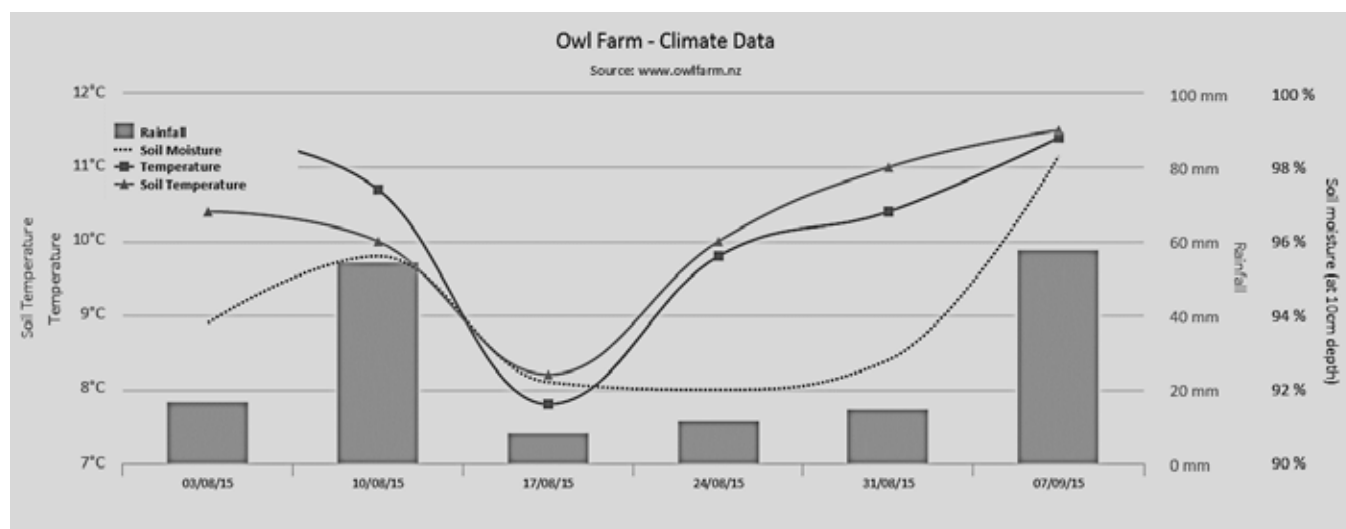
SUPPLEMENTARY FEED USE CONSIDERATIONS	Week Ending						
	03/08/15	10/08/15	17/08/15	24/08/15	31/08/15	07/09/15	Variance
Average PKE usage (kg/cow/day)	6.4	6.6	6.6	6	3	5	+2
PKE usage YTD (tonnes)	70.7	92.3	114	134	143.2	157.2	+ 14
Average maize use (kg/cow/day)	0	0	0	0	0	0	-
Maize usage YTD (tonnes)	30.94	30.94	30.94	30.94	30.94	30.94	-
Average grass silage usage (kg/cow/day)	0	0	0	0	0	0	-
Grass silage usage YTD (tonnes)	4.8	4.8	4.8	4.8	4.8	4.8	-
Grass silage harvested from milking platform (tonnes/DM)	0	0	0	0	0	0	-
Total supplement feed for week per cow (kgDM)	44.7	46	46.7	42.5	20	35	+15
Total supplement used YTD (tonnes)	102.72	124.32	146.02	166.02	175.22	189.22	+14

Nitrogen and fertiliser

- Completed an entire round of the farm in August with Sustain at 70kg/ha (33kgN/ha) to try and build the feed wedge up in front of us
- Currently budgeted for 150kgN/ha for farm over the season (excluding effluent block) – 150kgN/ha is a limit not a target
- Completed a round of Gibberellic Acid over winter but would like to do much more next year
- Have completed our spring soil tests and capital fertiliser plan will be reviewed based on what information that provides

Climate

- An onsite weather station records rainfall, air and soil temperature, soil moisture and wind direction, this data is available for all to see on both our website and the Honda shop's website
- The cold and wet in both July and August has meant our growth rates and pasture covers are significantly down on where we would have expected them to be
- Soil temperatures are on the rise which corresponds to increasing pasture growth rates
- With it warming up we are also starting to see more cows cycling which is promising
- As a whole the Waikato is probably a month behind where we have been the last couple of years but we have time on our side and trust that we will claw back lost production as climate improves over the coming months



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CLIMATE CONSIDERATIONS	Week Ending						
	03/08/15	10/08/15	17/08/15	24/08/15	31/08/15	07/09/15	Variance
Temperature (avg. oC)	11.4	10.7	7.8	9.8	10.4	11.4	+ 1
Rainfall (mm)	17	54.6	8.6	12	15	57.8	+42.8
Season to date rainfall (mm)	155.2	209.8	218.4	230.4	245.4	303.2	+57.8
Soil temperature							
(avg. oC @ 10cm depth)	10.4	10	8.2	10	11	11.5	+ 0.5
Soil moisture							
(% @ 10cm depth)	93.8	95.6	92.2	92	92.8	98.3	+5.5

All of this information can be found on our website www.owlfarm.nz

NOTES



FARMING STRATEGIES FOR OWL FARM TO BEST MANAGE LOW MILK PRICE

Farmax Dairy Pro was utilised to run a number of scenarios to maximise the operating profit for Owl Farm under the current forecast milk price.

The base file had been prepared prior to the \$3.85 milk price and is used as the reference point. The base system is already efficient with a sound comparative stocking rate and good per cow performance forecast. This meant structural changes such as a drop in stocking rate weren't modelled.

The farm is committed to a 300t PKE contract for the season so this wasn't reduced. Maize bought in from the lease block is forecast to be 125tDM

Owl Farm is operating reasonable efficiently already with good per cow performance and farm working expenses budgeted at \$3.89/kgMS.

All models were run to finish with similar pasture cover and cow condition at 31 May 2016. Small variations in carried forward supplement are recognised in the financial reports.

Four scenarios have been run.

Scenario 1: Early Culling

Cull 27 cows end of November with another 40 on 10th of February after pregnancy testing and then the final 17 culled in April. Effect is to reduce total feed going into maintenance and preserving cow condition on the rest of herd.

Scenario 2: Dry 100 Heifers and Light Cows off at 01.02.16

They remain on the farm but cow condition is preserved meaning less feed is required for gaining condition at the end of the season.

Scenario 3: Oad for Whole Herd 30.09.15

Objective is to preserve cow condition. This scenario ended up with significantly better condition cows and were milked to 31st of May. Also carried 60t Maize silage forward into next season. Staff numbers were maintained.

Scenario 4: Calves Kept at Home

Instead of going off grazing at 01.12.15, 92 calves were kept at home. Calf grazing is \$9.00/hd/week.

NOTES

Base File

Figures 1 and 2 detail the feed plan and the production curve for the cows in the base file. It is based on 300t PKE and 125t maize silage bought in from the lease land area. Approximately 18 ha of pasture silage is also forecast depending on pasture growth rates.

Figure 1: Base file feed plan

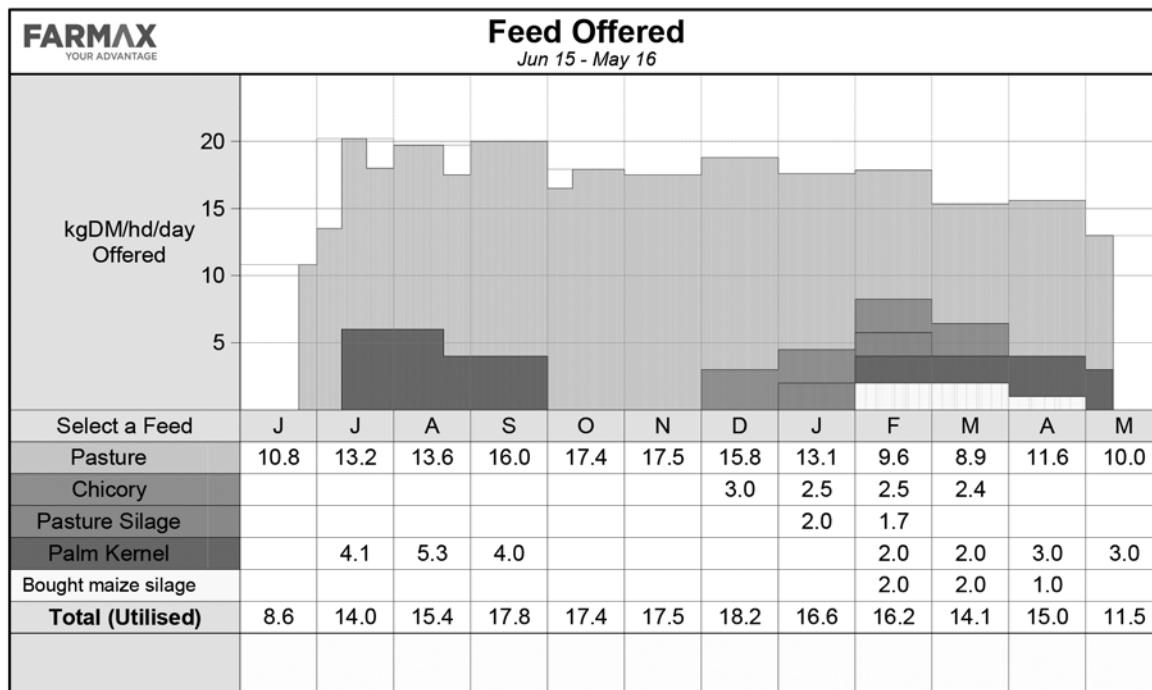
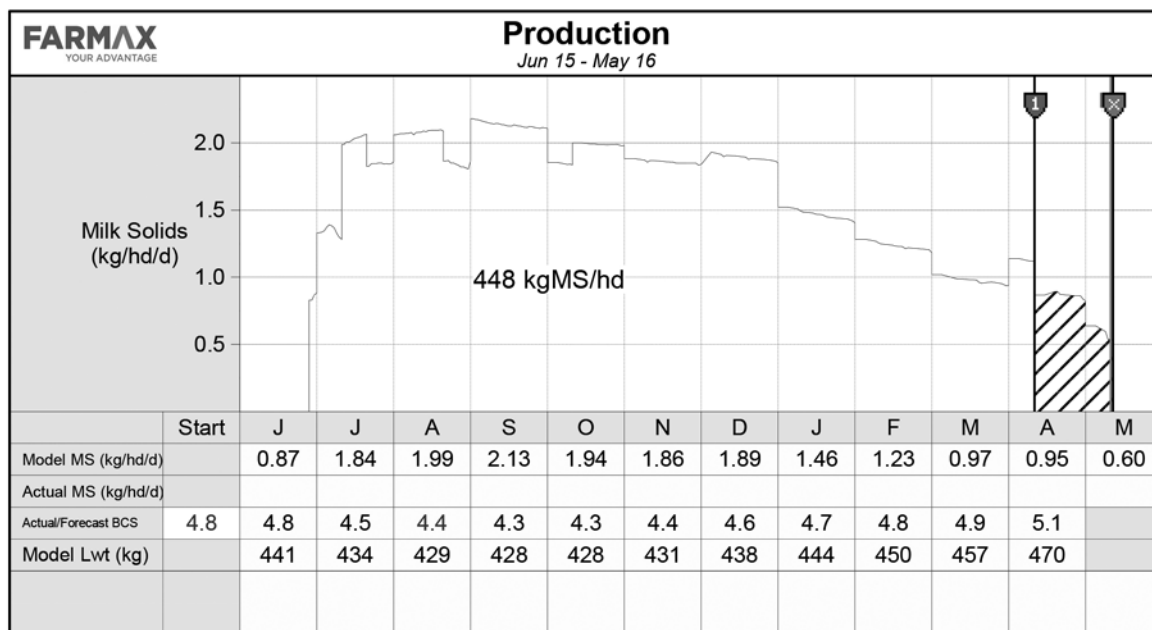


Figure 2: Base file milk curve



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Figures 3 and 4 : Comparison of base file and early culling

FARMAX <small>YOUR ADVANTAGE</small> Compare Physical Summary <small>Jun 15 - May 16</small>					
Category	Description	Plan 15/16	Early culling	Difference	Units
Farm	Effective Area	160	160	0	ha
	Stocking Rate	2.9	2.9	0.0	cows/ha
	Comparative Stocking Rate	72.0	69.2	-2.8	kg Lwt/t DM offered
	Potential Pasture Growth	15.3	15.3	0.0	t DM/ha
	Nitrogen Use	114	114	0	kg N/ha
	Feed Conversion Efficiency (offered)	13.3	12.9	-0.4	kg DM offered/kg MS
Herd	Cow Numbers (1st July)	470	470	0	cows
	Peak Cows Milked	461	461	0	cows
	Days in Milk	215	211	-4	days
	Avg. BCS at calving	4.9	4.9	0.0	BCS
	Liveweight	1,232	1,158	-74	kg/ha
Production (to Factory)	Milk Solids total	205,926	207,294	1,368	kg
	Milk Solids per ha	1,287	1,296	9	kg/ha
	Milk Solids per cow	447	450	3	kg/cow
	Peak Milk Solids production	2.12	2.04	-0.08	kg/cow/day
	Milk Solids as % of live weight	104.5	111.8	7.4	%
Feeding	Pasture Offered per cow *	4.5	4.4	-0.1	t DM/cow
	Supplements Offered per cow *	1.4	1.3	0.0	t DM/cow
	Off-farm Grazing Offered per cow *	0.1	0.1	0.0	t DM/cow
	Total Feed Offered per cow *	5.9	5.8	-0.1	t DM/cow
Diagnostics	Pasture Offered per ha	12.9	12.7	-0.3	t DM/ha
	Supplements Offered per ha	4.2	4.1	-0.1	t DM/ha
	Off-farm Grazing Offered per ha	1.7	1.7	0.0	t DM/ha
	Total Feed Offered per ha	18.8	18.4	-0.4	t DM/ha
	Supplements and Grazing / Feed Offered *	25.0	24.9	0.0	%
	Bought Feed / Feed Offered *	15.8	16.4	0.6	%
(*) feed offered to females > 20 months old / peak cows milked					

FARMAX <small>YOUR ADVANTAGE</small> Compare Forecast Profit and Loss <small>Jun 15 - May 16</small>					
			Plan 15/16	Early culling	Difference
Revenue	Stock	Net Milk Sales - this season	785,813	791,035	5,222
		Net Milk Sales - last season	0	0	0
		Net Milk Sales - dividend	0	0	0
		Net Livestock Sales	53,075	50,156	-2,919
		Contract Grazing	0	0	0
		Change in Livestock Value	65,179	65,179	0
		Total	904,066	906,370	2,304
	Crop & Feed	Capital Value Change	-3,959	1,824	5,783
		Total	-3,959	1,824	5,783
	Total Revenue		900,108	908,194	8,087
Expenses	Wages	Wages	188,168	188,168	0
		Animal Health	36,560	34,400	-2,160
	Stock	Breeding	25,455	23,951	-1,504
		Farm Dairy	9,140	8,600	-540
		Electricity	15,995	15,050	-945
		Total	65,179	65,179	0
	Feed/Crop	Pasture Conserved	8,078	13,500	5,422
		Feed Crop	9,600	9,600	0
		Bought Feed	108,603	106,873	-1,730
		Calf Feed	3,000	3,000	0
	Grazing	Grazing	80,613	80,613	0
		Run-Off Lease	4,320	4,320	0
		Owned Run-Off Adj.	5,920	5,920	0
		Total	80,613	80,613	0
	Other Farm Working	Fertiliser (Excl. N)	30,000	30,000	0
		Nitrogen	26,695	26,695	0
		Irrigation	640	640	0
		Regrassing	7,200	0	-7,200
		Weed & Pest Control	15,000	15,000	0
		Vehicle Expenses	24,000	24,000	0
		Fuel	12,000	12,000	0
		R&M Land/Buildings	40,000	40,000	0
		R&M Plant/Equipment	10,000	10,000	0
		Freight & Cartage	16,000	16,000	0
		Other Expenses	45,000	45,000	0
	Overheads	Administration Expenses	2,500	2,500	0
		Insurance	21,000	21,000	0
		ACC Levies	4,960	4,960	0
		Rates	16,480	16,480	0
	Total Farm Working Expenses		766,926	758,270	-8,657
	Depreciation		46,560	46,560	0
	Total Farm Expenses		813,486	804,830	-8,657
Economic Farm Surplus (EFS)			86,621	103,365	16,743
Farm Profit before Tax			86,621	103,365	16,743
Farm Profit per ha before Tax			541	646	105
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.					



Figures 5 and 6 : Comparison of base file and drying off 100 heifers 01.02.16

FARMAX <small>YOUR ADVANTAGE</small> Compare Physical Summary <small>Jun 15 - May 16</small>					
Category	Description	Plan 15/16	Heifers Dry 1 Feb	Difference	Units
Farm	Effective Area	160	160	0	ha
	Stocking Rate	2.9	2.9	0.0	cows/ha
	Comparative Stocking Rate	72.0	73.4	1.5	kg Lwt/t DM offered
	Potential Pasture Growth	15.3	15.3	0.0	t DM/ha
	Nitrogen Use	114	114	0	kg N/ha
	Feed Conversion Efficiency (offered)	13.3	12.9	-0.4	kg DM offered/kg MS
Herd	Cow Numbers (1st July)	470	470	0	cows
	Peak Cows Milked	461	461	0	cows
	Days in Milk	215	199	-15	days
	Avg. BCS at calving	4.9	4.9	0.0	BCS
	Liveweight	1,232	1,234	2	kg/ha
Production (to Factory)	Milk Solids total	205,926	208,532	2,606	kg
	Milk Solids per ha	1,287	1,303	16	kg/ha
	Milk Solids per cow	447	452	6	kg/cow
	Peak Milk Solids production	2.12	2.13	0.01	kg/cow/day
	Milk Solids as % of live weight	104.5	105.6	1.1	%
Feeding	Pasture Offered per cow *	4.5	4.5	0.0	t DM/cow
	Supplements Offered per cow *	1.4	1.2	-0.1	t DM/cow
	Off-farm Grazing Offered per cow *	0.1	0.1	0.0	t DM/cow
	Total Feed Offered per cow *	5.9	5.8	-0.1	t DM/cow
Diagnostics	Pasture Offered per ha	12.9	13.0	0.1	t DM/ha
	Supplements Offered per ha	4.2	3.8	-0.4	t DM/ha
	Off-farm Grazing Offered per ha	1.7	1.7	0.0	t DM/ha
	Total Feed Offered per ha	18.8	18.5	-0.3	t DM/ha
	Supplements and Grazing / Feed Offered *	25.0	23.2	-1.8	%
	Bought Feed / Feed Offered *	15.8	14.2	-1.6	%
(*) feed offered to females > 20 months old / peak cows milked					

FARMAX YOUR ADVANTAGE		Compare Forecast Profit and Loss Jun 15 - May 16			
			Plan 15/16	Heifers Dry 1 Feb	Difference
Revenue	Stock	Net Milk Sales - this season	785,813	795,759	9,946
		Net Milk Sales - last season	0	0	0
		Net Milk Sales - dividend	0	0	0
		Net Livestock Sales	53,075	53,852	777
		Contract Grazing	0	0	0
		Change in Livestock Value	65,179	65,179	0
		Total	904,066	914,790	10,723
	Crop & Feed	Capital Value Change	-3,959	732	4,690
		Total	-3,959	732	4,690
Total Revenue		900,108	915,521	15,414	
Expenses	Wages	Wages	188,168	188,168	0
	Stock	Animal Health	36,560	36,560	0
		Breeding	25,455	25,455	0
		Farm Dairy	9,140	9,140	0
		Electricity	15,995	15,995	0
	Feed/Crop	Pasture Conserved	8,078	8,078	0
		Feed Crop	9,600	9,600	0
		Bought Feed	108,603	98,173	-10,429
		Calf Feed	3,000	3,000	0
	Grazing	Grazing	80,613	80,613	0
		Run-Off Lease	4,320	4,320	0
		Owned Run-Off Adj.	5,920	5,920	0
	Other Farm Working	Fertiliser (Excl. N)	30,000	30,000	0
		Nitrogen	26,695	26,695	0
		Irrigation	640	640	0
		Regrassing	7,200	7,200	0
		Weed & Pest Control	15,000	15,000	0
		Vehicle Expenses	24,000	24,000	0
		Fuel	12,000	12,000	0
		R&M Land/Buildings	40,000	40,000	0
		R&M Plant/Equipment	10,000	10,000	0
Freight & Cartage		16,000	16,000	0	
Overheads	Other Expenses	45,000	45,000	0	
	Administration Expenses	2,500	2,500	0	
	Insurance	21,000	21,000	0	
	ACC Levies	4,960	4,960	0	
		Rates	16,480	16,480	0
Total Farm Working Expenses		766,926	756,497	-10,429	
Depreciation		46,560	46,560	0	
Total Farm Expenses		813,486	803,057	-10,429	
Economic Farm Surplus (EFS)			86,621	112,464	25,843
Farm Profit before Tax			86,621	112,464	25,843
Farm Profit per ha before Tax			541	703	162
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.					



Figures 7 and 8 : Comparison of base file and putting herd on OAD 30.09.15

FARMAX YOUR ADVANTAGE		Compare Physical Summary Jun 15 - May 16			
Category	Description	Plan 15/16	OAD	Difference	Units
Farm	Effective Area	160	160	0	ha
	Stocking Rate	2.9	2.9	0.0	cows/ha
	Comparative Stocking Rate	72.0	77.7	5.7	kg Lwt/t DM offered
	Potential Pasture Growth	15.3	15.3	0.0	t DM/ha
	Nitrogen Use	114	114	0	kg N/ha
	Feed Conversion Efficiency (offered)	13.3	13.7	0.4	kg DM offered/kg MS
Herd	Cow Numbers (1st July)	470	470	0	cows
	Peak Cows Milked	461	461	0	cows
	Days in Milk	215	224	9	days
	Avg. BCS at calving	4.9	4.9	0.0	BCS
	Liveweight	1,232	1,291	59	kg/ha
Production (to Factory)	Milk Solids total	205,926	194,231	-11,695	kg
	Milk Solids per ha	1,287	1,214	-73	kg/ha
	Milk Solids per cow	447	421	-25	kg/cow
	Peak Milk Solids production	2.12	2.13	0.00	kg/cow/day
	Milk Solids as % of live weight	104.5	94.0	-10.4	%
Feeding	Pasture Offered per cow *	4.5	4.5	0.0	t DM/cow
	Supplements Offered per cow *	1.4	1.2	-0.2	t DM/cow
	Off-farm Grazing Offered per cow *	0.1	0.1	0.0	t DM/cow
	Total Feed Offered per cow *	5.9	5.8	-0.2	t DM/cow
Diagnostics	Pasture Offered per ha	12.9	13.1	0.1	t DM/ha
	Supplements Offered per ha	4.2	3.5	-0.6	t DM/ha
	Off-farm Grazing Offered per ha	1.7	1.7	0.0	t DM/ha
	Total Feed Offered per ha	18.8	18.3	-0.5	t DM/ha
	Supplements and Grazing / Feed Offered *	25.0	22.0	-3.0	%
	Bought Feed / Feed Offered *	15.8	14.8	-1.1	%
(*) feed offered to females > 20 months old / peak cows milked					

FARMAX YOUR ADVANTAGE		Compare Forecast Profit and Loss Jun 15 - May 16			
			Plan 15/16	OAD	Difference
Revenue	Stock	Net Milk Sales - this season	785,813	741,184	-44,629
		Net Milk Sales - last season	0	0	0
		Net Milk Sales - dividend	0	0	0
		Net Livestock Sales	53,075	52,962	-113
		Contract Grazing	0	0	0
		Change in Livestock Value	65,179	65,179	0
		Total	904,066	859,325	-44,741
	Crop & Feed	Capital Value Change	-3,959	14,956	18,915
		Total	-3,959	14,956	18,915
	Total Revenue		900,108	874,281	-25,826
Expenses	Wages	Wages	188,168	188,168	0
	Stock	Animal Health	36,560	36,560	0
		Breeding	25,455	25,455	0
		Farm Dairy	9,140	9,140	0
		Electricity	15,995	15,995	0
	Feed/Crop	Pasture Conserved	8,078	8,078	0
		Feed Crop	9,600	9,600	0
		Bought Feed	108,603	107,538	-1,065
		Calf Feed	3,000	3,000	0
	Grazing	Grazing	80,613	80,613	0
		Run-Off Lease	4,320	4,320	0
		Owned Run-Off Adj.	5,920	5,920	0
	Other Farm Working	Fertiliser (Excl. N)	30,000	30,000	0
		Nitrogen	26,695	26,695	0
		Irrigation	640	640	0
		Regrassing	7,200	7,200	0
		Weed & Pest Control	15,000	15,000	0
		Vehicle Expenses	24,000	24,000	0
		Fuel	12,000	12,000	0
		R&M Land/Buildings	40,000	40,000	0
		R&M Plant/Equipment	10,000	10,000	0
		Freight & Cartage	16,000	16,000	0
	Other Expenses	45,000	45,000	0	
	Overheads	Administration Expenses	2,500	2,500	0
		Insurance	21,000	21,000	0
		ACC Levies	4,960	4,960	0
		Rates	16,480	16,480	0
	Total Farm Working Expenses		766,926	765,861	-1,065
	Depreciation		46,560	46,560	0
	Total Farm Expenses		813,486	812,421	-1,065
Economic Farm Surplus (EFS)		86,621	61,860	-24,761	
Farm Profit before Tax		86,621	61,860	-24,761	
Farm Profit per ha before Tax		541	387	-155	
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.					



Fig 9 and 10: Comparison of base file to keeping calves at home

FARMAX <small>YOUR ADVANTAGE</small> Compare Physical Summary <small>Jun 15 - May 16</small>					
Category	Description	Plan 15/16	Young Stock Home	Difference	Units
Farm	Effective Area	160	160	0	ha
	Stocking Rate	2.9	2.9	0.0	cows/ha
	Comparative Stocking Rate	72.0	73.2	1.3	kg Lwt/ha DM offered
	Potential Pasture Growth	15.3	15.3	0.0	t DM/ha
	Nitrogen Use	114	114	0	kg N/ha
	Feed Conversion Efficiency (offered)	13.3	13.4	0.1	kg DM offered/kg MS
Herd	Cow Numbers (1st July)	470	470	0	cows
	Peak Cows Milked	461	461	0	cows
	Days in Milk	215	211	-3	days
	Avg. BCS at calving	4.9	4.9	0.0	BCS
	Liveweight	1,232	1,232	0	kg/ha
Production (to Factory)	Milk Solids total	205,926	200,161	-5,765	kg
	Milk Solids per ha	1,287	1,251	-36	kg/ha
	Milk Solids per cow	447	434	-13	kg/cow
	Peak Milk Solids production	2.12	2.12	0.00	kg/cow/day
	Milk Solids as % of live weight	104.5	101.5	-2.9	%
Feeding	Pasture Offered per cow *	4.5	4.4	-0.1	t DM/cow
	Supplements Offered per cow *	1.4	1.3	0.0	t DM/cow
	Off-farm Grazing Offered per cow *	0.1	0.1	0.0	t DM/cow
	Total Feed Offered per cow *	5.9	5.8	-0.1	t DM/cow
Diagnostics	Pasture Offered per ha	12.9	13.0	0.1	t DM/ha
	Supplements Offered per ha	4.2	4.1	-0.1	t DM/ha
	Off-farm Grazing Offered per ha	1.7	1.4	-0.3	t DM/ha
	Total Feed Offered per ha	18.8	18.5	-0.3	t DM/ha
	Supplements and Grazing / Feed Offered *	25.0	24.8	-0.1	%
	Bought Feed / Feed Offered *	15.8	16.5	0.7	%

(*) feed offered to females > 20 months old / peak cows milked

FARMAX YOUR ADVANTAGE		Compare Forecast Profit and Loss Jun 15 - May 16				
			Plan 15/16	Young Stock Home	Difference	
Revenue	Stock	Net Milk Sales - this season	785,813	763,815	-21,998	
		Net Milk Sales - last season	0	0	0	
		Net Milk Sales - dividend	0	0	0	
		Net Livestock Sales	53,075	52,764	-310	
		Contract Grazing	0	0	0	
		Change in Livestock Value	65,179	65,179	0	
		Total	904,066	881,758	-22,308	
	Crop & Feed	Capital Value Change	-3,959	-6,861	-2,902	
		Total	-3,959	-6,861	-2,902	
Total Revenue			900,108	874,897	-25,211	
Expenses	Wages	Wages	188,168	188,168	0	
	Stock	Animal Health	36,560	36,560	0	
		Breeding	25,455	25,455	0	
		Farm Dairy	9,140	9,140	0	
		Electricity	15,995	15,995	0	
	Feed/Crop	Pasture Conserved	8,078	8,078	0	
		Feed Crop	9,600	9,600	0	
		Bought Feed	108,603	108,046	-556	
		Calf Feed	3,000	3,000	0	
	Grazing	Grazing	80,613	60,120	-20,493	
		Run-Off Lease	4,320	4,320	0	
		Owned Run-Off Adj.	5,920	5,920	0	
	Other Farm Working	Fertiliser (Excl. N)	30,000	30,000	0	
		Nitrogen	26,695	26,695	0	
		Irrigation	640	640	0	
		Regrassing	7,200	7,200	0	
		Weed & Pest Control	15,000	15,000	0	
		Vehicle Expenses	24,000	24,000	0	
		Fuel	12,000	12,000	0	
		R&M Land/Buildings	40,000	40,000	0	
		R&M Plant/Equipment	10,000	10,000	0	
		Freight & Cartage	16,000	16,000	0	
		Other Expenses	45,000	45,000	0	
	Overheads	Administration Expenses	2,500	2,500	0	
		Insurance	21,000	21,000	0	
		ACC Levies	4,960	4,960	0	
		Rates	16,480	16,480	0	
	Total Farm Working Expenses			766,926	745,877	-21,049
	Depreciation			46,560	46,560	0
	Total Farm Expenses			813,486	792,437	-21,049
	Economic Farm Surplus (EFS)			86,621	82,459	-4,162
Farm Profit before Tax			86,621	82,459	-4,162	
Farm Profit per ha before Tax			541	515	-26	
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.						

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.



Summary

In the Owl Farm situation, given the specific circumstances of feed commitments etc. the preferred option is to dry approximately 100 of the heifers/light cows off at 1st of February. On the basis these cows are eating 7 kgDM during February/March they start to regain a small amount of condition and it allows us to have the whole herd at CS 5.0 by 31 May.

Supplements are being used more efficiently to produce milk in the remaining cows and there is a modest increase in pasture that can be offered to the milkers.

Because we are preserving cow condition rather than milking it off the cows, and then having to dry off and restore it with supplementary feed, total production is slightly improved.

The early culling based on early pregnancy test is the next most profitable option for the farm. Again it has the effect of preserving cow condition and means more pasture and supplement is available for production.

OAD milking in this situation where the farm is committed to maintaining staffing and where feed is contracted, was the less profitable for the farm than the base model. There is likely to be some carryover effect that has not been factored in as this did result in better condition cows heading into the 16/17 season with a higher carryover inventory of maize.

Keeping the calves at home also reduced profitability even when the calf grazing price is \$9.00/hd per week. The challenge with this scenario is the increasing calf demand as summer dry begins to bite. The assumption has been made the growth rate of the calves would not be compromised.

These scenarios and the results published are specific to Owl Farm and the conditions it is operating under.

It is quite probable the relative financial performance of the scenarios modelled would change given different parameters including feed contracts, expected per cow performance, cost of feeds and current on farm conditions.

Consider your particular situation and work with your advisor to determine the most appropriate path forward for your farm this season.

NOTES

FARMAX YOUR ADVANTAGE			Compare Forecast Profit and Loss Jun 15 - May 16				
			Plan 15/16	Early culling	Heifers Dry 1 Feb	OAD (DM 18 Aug 15)	Young Stock Home
Revenue	Stock	Net Milk Sales - this season	785,813	791,035	795,759	741,184	763,815
		Net Milk Sales - last season	0	0	0	0	0
		Net Milk Sales - dividend	0	0	0	0	0
		Net Livestock Sales	53,075	50,156	53,852	52,962	52,764
		Contract Grazing	0	0	0	0	0
		Change in Livestock Value	65,179	65,179	65,179	65,179	65,179
		Total	904,066	906,370	914,790	859,325	881,758
	Crop & Feed	Capital Value Change	-3,959	1,824	732	14,956	-6,861
		Total	-3,959	1,824	732	14,956	-6,861
Total Revenue			900,108	908,194	915,521	874,281	874,897
Expenses	Wages	Wages	188,168	188,168	188,168	188,168	188,168
	Stock	Animal Health	36,560	34,400	36,560	36,560	36,560
		Breeding	25,455	23,951	25,455	25,455	25,455
		Farm Dairy	9,140	8,600	9,140	9,140	9,140
		Electricity	15,995	15,050	15,995	15,995	15,995
	Feed/Crop	Pasture Conserved	8,078	13,500	8,078	8,078	8,078
		Feed Crop	9,600	9,600	9,600	9,600	9,600
		Bought Feed	108,603	106,873	98,173	107,538	108,046
		Calf Feed	3,000	3,000	3,000	3,000	3,000
	Grazing	Grazing	80,613	80,613	80,613	80,613	60,120
		Run-Off Lease	4,320	4,320	4,320	4,320	4,320
		Owned Run-Off Adj.	5,920	5,920	5,920	5,920	5,920
	Other Farm Working	Fertiliser (Excl. N)	30,000	30,000	30,000	30,000	30,000
		Nitrogen	26,695	26,695	26,695	26,695	26,695
		Irrigation	640	640	640	640	640
		Regrassing	7,200	0	7,200	7,200	7,200
		Weed & Pest Control	15,000	15,000	15,000	15,000	15,000
		Vehicle Expenses	24,000	24,000	24,000	24,000	24,000
		Fuel	12,000	12,000	12,000	12,000	12,000
		R&M Land/Buildings	40,000	40,000	40,000	40,000	40,000
		R&M Plant/Equipment	10,000	10,000	10,000	10,000	10,000
		Freight & Cartage	16,000	16,000	16,000	16,000	16,000
		Other Expenses	45,000	45,000	45,000	45,000	45,000
	Overheads	Administration Expenses	2,500	2,500	2,500	2,500	2,500
		Insurance	21,000	21,000	21,000	21,000	21,000
		ACC Levies	4,960	4,960	4,960	4,960	4,960
		Rates	16,480	16,480	16,480	16,480	16,480
Total Farm Working Expenses			766,926	758,270	756,497	765,861	745,877
Depreciation			46,560	46,560	46,560	46,560	46,560
Total Farm Expenses			813,486	804,830	803,057	812,421	792,437
Economic Farm Surplus (EFS)			86,621	103,365	112,464	61,860	82,459
Farm Profit before Tax			86,621	103,365	112,464	61,860	82,459
Farm Profit per ha before Tax			541	646	703	387	515
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.							

SPRING GRAZING MANAGEMENT: OBTAINING THE FINANCIAL BENEFITS

- Farmers who assess pasture cover make more informed grazing management decisions
- This could increase operating profit by between \$199/ha and \$333/ha in the Waikato compared with farmers with little knowledge of pasture cover

Spring grazing management is vital to the success of the whole season. If the correct rotation length (i.e. daily area allocated) is set and target residuals reached, pastures will be set to grow the maximum amount of high quality feed throughout spring and for the rest of the season.

Assessment of pasture cover allows farmers to make more informed grazing management decisions and reap financial benefits. A farm-scale computer simulation recently estimated the effect of making regular estimates of pasture cover on farm profitability (see Figure 1 and Table 1 below and article in the September 2015 Technical Series for further details).

Results indicated that regular assessment of pasture cover resulting in good or optimal feed management increased operating profit by between \$199/ha and \$333/ha at a milk price of \$3.65 compared with no assessment of pasture cover resulting in poor feed management.

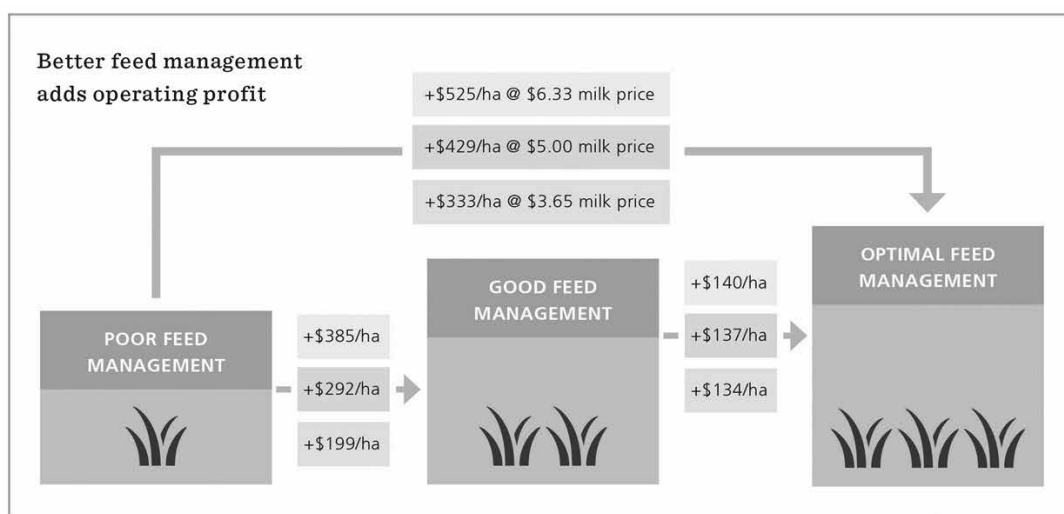


Figure 1.

As knowledge of pasture cover increases and feed management improves, more operating profit per hectare is achieved.

Table 1. Modelled scenarios and results for three feed management approaches on a typical Waikato farm.

	Poor	Good	Optimal
Pasture assessment	No assessment of pasture cover, grazes paddocks based on time since previous grazing	Assesses cover with 85% accuracy, some error in paddock selection	Assesses cover with 100% accuracy
Feed allocation	Poor	Some error in pasture and supplement allocation	Well managed, supplements only used when residuals <1500 kg DM/ha
Surplus	Taken when daily residual >2000 kg DM/ha, paddocks >4000 kg DM/ha harvested	Taken when daily residual >1700 kg DM/ha, paddocks >4000 kg DM/ha harvested	Taken when daily residual >1700 kg DM/ha, paddocks >3500 kg DM/ha harvested
Annual pasture yield (t DM/ha)	17.3	17.8	18.7
Milksolids production (kg/ha)	1210	1281	1283

Reasons for the increases in operating profit with improved feed management in the modelled scenarios were:

- Greater pasture yield (average pasture cover kept in the rapidly growing phase, post-grazing residuals maintained between 1500-1600 kg DM/ha, covers at the top end of the pasture wedge weren't allowed to get too high)
- Less frequent and less severe under-feeding of lactating cows
- Lower supplement costs

NOTES

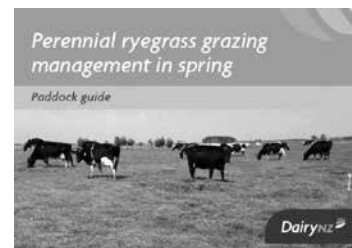
DairyNZ have produced a new resource that provides information enabling you to improve your farm operating profit through effective grazing management decisions such as:

- When is the optimum time to graze?
- What is my target pre-grazing yield?
- What is my target residual?

What is the optimum time to graze?

The optimum time to graze is between the 2- and 3-leaf stages of regrowth.

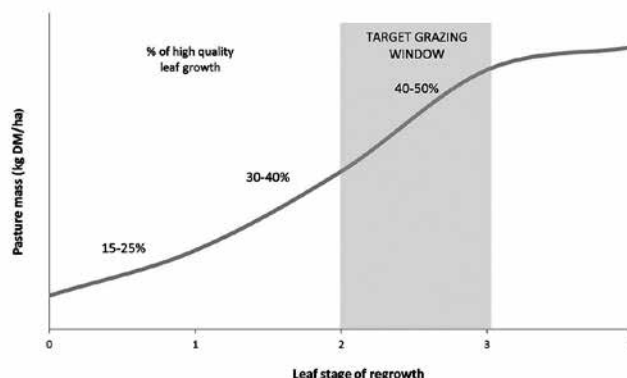
- Grazing before the 2-leaf stage reduces pasture production and, if done over multiple rotations, reduces pasture persistence.
- Beyond the 3-leaf stage, older leaves die, which results in wastage and pasture quality may decline as dead material builds up.



Why?

After grazing, regrowth follows a 's-shaped' curve (Figure 2). Total pasture mass builds up slowly to begin with, accelerates and then levels off towards ceiling yield where new leaf growth is balanced by leaf death.

The first full leaf grown after grazing is relatively small as the plant has little energy for growing this leaf. Once grown the



first leaf adds energy to the plant so there is more energy for the next leaf (so it will be larger) and this pattern continues until the plant has regained its full energy status. This is why the first leaf only contributes 15-25% towards the total amount grown to the 3-leaf stage, while the second and third leaves contribute 30-40% and 40-50%.

Figure 2. The increase in pasture mass as it regrows following grazing.

How many days does it take to reach the 2- and 3-leaf stages?

The rate that leaves regrow depends on temperature and moisture. If the weather is cooler and/or drier, pastures will take longer to reach the 2- and 3-leaf stages. Estimates of how long it might take to reach the 2- and 3-leaf stages in the Waikato are provided in the table below but it is important to check the leaf stage of your pastures pre-grazing as conditions on farm may vary, see grazing management guide.

Time to reach the:	September	October	November
2-leaf stage	24 – 28 days	20 – 26 days	20 – 24 days
3-leaf stage	36 – 42 days	30 – 39 days	30 – 36 days

Canopy closure

If pastures are at or nearing canopy closure, they need to be grazed or conserved regardless of leaf stage. Canopy closure reduces the density of your pasture, reduces clover content and increases stem production.

If pastures are consistently at canopy closure before the 2-leaf stage, review the nitrogen fertiliser policy (nitrogen grows bigger leaves) or post-grazing residuals (high residuals result in canopy closure earlier in the regrowth cycle).

NOTES

What is my target pre-grazing yield?

Target pre-grazing yield is calculated as:

Stocking rate x pasture requirement x rotation length + residual

e.g. (2.9 cows/ha x 18 kg DM/cow/day x 25 days) + 1500 kg DM/ha = 2805 kg DM/ha

It is important to correctly assess and manage pre-grazing yields. This enables:

- Good allocation of pasture to the herd
- Management of yields within the desired range (2800-3200 kg DM/ha)
- Good animal performance (by focusing on leaf content and pasture quality)
- Target post-grazing residuals and high cow intakes to be achieved.

What is my target post-grazing residual?

Target a consistent, even post-grazing residual of 1500-1600 kg DM/ha or 7-8 clicks using a rising plate meter during spring and early summer (calving to Christmas).

- Lower residuals reduce regrowth
- Higher residuals reduce pasture quality at subsequent grazings and increase pasture wastage.

For more information see these resources:

- Perennial ryegrass grazing management in spring guide
- Feeding cows in spring booklet
- Technical Series September 2015 article: Financial benefits of better feed allocation
- Technical Series August 2014 Grazing management – The root to success
- Technical Series September 2011 article: Grazing management guidelines for optimal pasture growth and quality

NOTES

TO SUMMER CROP, OR NOT?

Charlotte Westwood BVSc, MACVSc, PhD Veterinary Nutritionist, Emma Bell B. Ag Sci (Hons) Agronomist, PGG Wrightson Seeds

Reasons not to Crop (possible challenges)

- Upfront costs of paddock preparation and crop establishment (working capital constraints)
Comments: Discuss concerns with your accountant and bank manager. Ask your farm consultant to model a range of outcomes from cropping based on a sensitivity analysis approach (using estimated costs to establish a crop and a range of expected dry matter yield figures).

For example, it is not uncommon to yield summer brassicas at less than 12 c / kgDM. In contrast,

PKE can cost more than 22 c / kgDM, and delivers feed of a lesser quality and doesn't lead onto benefits such as regreasing behind a summer forage crop.

Table 1. An example of a sensitivity analysis of the costings for a summer crop (in this case, summer Barkant turnips) with an expected cost structure / ha vs. a range of expected crop yields for a dry summer

Table 1. An example of a sensitivity analysis of the costings for a summer crop (in this case, summer Barkant turnips) with an expected cost structure / ha vs. a range of expected crop yields for a dry summer

		S per hectare cost to grow crop									
		\$800	\$900	\$1,000	\$1,100	\$1,200	\$1,300	\$1,400	\$1,500	\$1,600	\$1,700
Crop yield t DM / hectare	6.0	0.133	0.150	0.167	0.183	0.200	0.217	0.233	0.250	0.267	0.283
	6.5	0.123	0.138	0.154	0.169	0.185	0.200	0.215	0.231	0.246	0.262
	7.0	0.114	0.129	0.143	0.157	0.171	0.186	0.200	0.214	0.229	0.243
	7.5	0.107	0.120	0.133	0.147	0.160	0.173	0.187	0.200	0.213	0.227
	8.0	0.100	0.113	0.125	0.138	0.150	0.163	0.175	0.188	0.200	0.213
	8.5	0.094	0.106	0.118	0.129	0.141	0.153	0.165	0.176	0.188	0.200
	9.0	0.089	0.100	0.111	0.122	0.133	0.144	0.156	0.167	0.178	0.189
	9.5	0.084	0.095	0.105	0.116	0.126	0.137	0.147	0.158	0.168	0.179
	10.0	0.080	0.090	0.100	0.110	0.120	0.130	0.140	0.150	0.160	0.170
	10.5	0.076	0.086	0.095	0.105	0.114	0.124	0.133	0.143	0.152	0.162
	11.0	0.073	0.082	0.091	0.100	0.109	0.118	0.127	0.136	0.145	0.155
	11.5	0.070	0.078	0.087	0.096	0.104	0.113	0.122	0.130	0.139	0.148
	12.0	0.067	0.075	0.083	0.092	0.100	0.108	0.117	0.125	0.133	0.142
	12.5	0.064	0.072	0.080	0.088	0.096	0.104	0.112	0.120	0.128	0.136
	13.0	0.062	0.069	0.077	0.085	0.092	0.100	0.108	0.115	0.123	0.131
	13.5	0.059	0.067	0.074	0.081	0.089	0.096	0.104	0.111	0.119	0.126
	14.0	0.057	0.064	0.071	0.079	0.086	0.093	0.100	0.107	0.114	0.121

- Concerns – poor crop yields during possible dry summer conditions. This is a very fair concern (offset with likelihood of poor pasture yields under same conditions)
- Skill set of staff – Crop establishment, monitoring, feeding off
- Perception that other feeds e.g. PKE more appropriate for situation

There are no right or wrong responses with regard to these challenges – rather an opportunity to consider the ways that summer crops can improve the profitability of your business

Reasons to Crop (Opportunities)

Feed Budget Benefits

- Summer crop supplies high quality feed when pasture supply is low. This allows the herds feed demand to be better matched with supply from a combination of summer crop and pasture
- The aim of any good cropping program is to reduce reliance on purchased supplementary feeds, particularly when supplements are in short supply, or when supplementary prices lift when demand is high

Agronomic Advantages

- Break pest cycles e.g. Clover Root Weevil, nematodes, black beetle
- Break weed cycles – perennial weed species and/or summer grass challenges (grass-specific herbicides can be used) resulting in a tidier, clean pasture following the crop

NOTES

- Improve soil conditions and better seed bed preparation (as part of establishing summer brassicas, bulb turnips particularly)
- Regrassing - Setting up paddocks following crop with agronomically superior modern pasture species to those currently present in underperforming pastures

Nutritional Benefits for the Herd

- Better quality feed than summer pasture (higher MJME and crude protein, lower NDF) slows the rate of drop off peak MS production. Good quality crops can offer more milk protein relative to milk fat, and on average milk protein is worth twice the \$ per kg than milk fat. In contrast, PKE supports the production of more milk fat and less milk protein
- Better feed conversion efficiency (gMS per kgDM eaten) from summer crops than poorer quality supplementary feed e.g. baleage
- Better cow condition over the summer, allowing cows to be better set up once the autumn rains come. Cows in better body condition are more likely to milk on well for longer, improving 'days in milk' (lactation length) of the herd

Animal Health Benefits of Summer Cropping

- **Facial eczema:** Summer crops offer low or nil spore count feed. By delivering more feed when summer pastures are slow growing, more feed offered as crop means pastures do not need to be grazed as hard, reducing intake of spores at the base of the sward
- **Internal parasites:** As for facial eczema, summer crops offer feed that carries low or nil larval challenge for young stock, especially after early autumn rains
- **Standard type endophyte in older ryegrasses:** Summer crops contain no standard ryegrass endophyte toxins (heat stress and/or ryegrass staggers challenges). Further, summer cropping allows new pastures to be established, containing new ryegrass types that contain novel endophytes that carry fewer risks of endophyte associated toxicities than standard endophyte ryegrasses

More Milk from Summer Crops

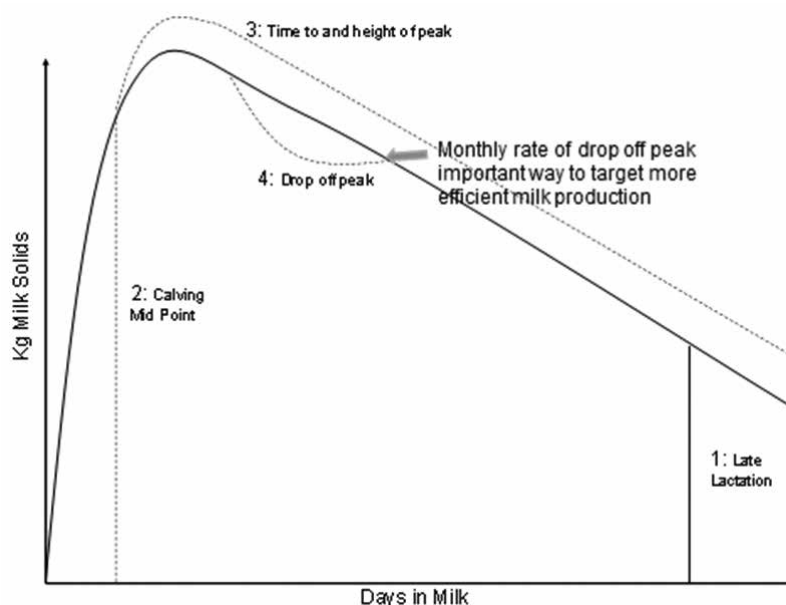
A key and valuable reason to summer crop is to deliver a cost effective source of high quality feed for the summer months.

Opportunities include:

- Slow the rate of drop off peak MS production for spring calved cows
- Retain or gain more cow body condition score to allow more days in milk during late lactation

Figure 1. Opportunities to improve milk solids (MS) production at different stages of the lactation curve. 1. Days in milk extended by milking more cows on, later, in late lactation 2. Calving date and time from planned start of calving to mid point (50% of cows calved). 3. Timing to, and height of peak MS production. 4. Rate of drop off peak MS production

- The opportunity for summer cropping is to reduce the rate of drop off peak MS production during the summer and early autumn months



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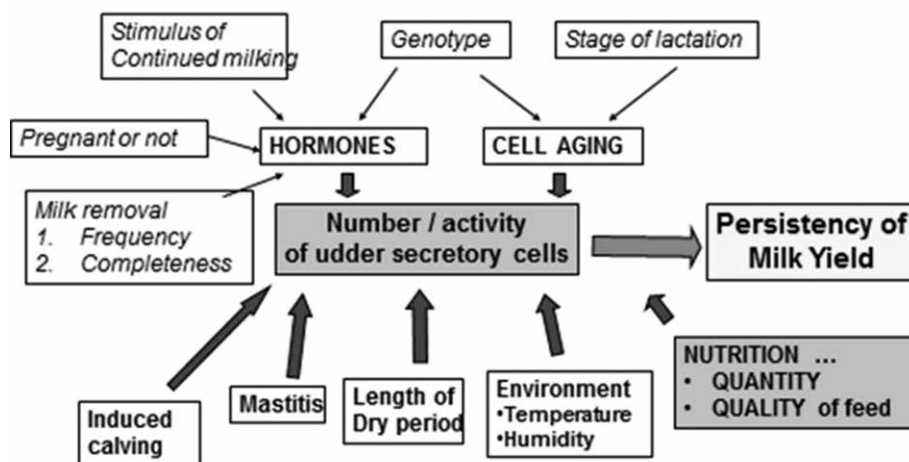
Rate of drop off peak MS production? How to calculate drop off rate, and what targets to set

- Adjust for cow numbers (kgMS/cow) to calculate the rate of drop off peak on a per cow basis (if cow numbers change considerably from peak lactation through into the summer)
- The “ideal” rate of drop off peak = less than 4% per month off peak. E.g. 2.2 kgMS at peak x 0.96 = target 2.11 one month later
- What is *realistically* achievable? (Don’t set yourself unrealistic targets!)
- Best producers can achieve 8-10% drop off peak the first month after peak MS production. Beyond that, a realistic target can be 5-6 % per month thereafter

Is it possible to have a completely “Flat” lactation curve (zero rate of drop off peak)?

- No! The cow can’t physiologically continue to milk at the same rate throughout lactation, as at peak, due to aging and loss of secretory cells – the udder cells that manufacture milk

Figure 2. Many factors prevent a cow from maintaining a flat lactation curve. Loss and aging of secretory cells in the udder contribute to the gradual drop of milk solids (MS) production as the lactation progresses



Summer Nutrition and the Rate of Drop off Peak MS Production

TWO key nutritional influences:

- QUANTITY of summer feed on offer
- QUALITY of summer feed on offer

QUANTITY of Feed: The Feed Budget

- Don’t focus on the types or quality of summer feeds until a feed budget is completed. No matter how top quality a crop or feed may be, if cows are being underfed, MS production and cow body condition score will fall behind target
- “Vitamin F” (Vitamin Feed) deficiency is the No. 1 cause of rapid rate of drop of MS production off peak

Feed Supply vs. herd Demand

- El Nino? – A conservative Feed Budget is even more important if the predicted dry summer occurs. Consider running more than one version of your Feed Budget. One with average summer pasture growth rates and one with below average growth rates
- Identify ways to balance the Feed Budget if a deficit is predicted

Reduce Feed Demand

- Early culls (low producers, poor conformation, 3 x repeat offenders for mastitis, repeat lame cows)
- Once a day milk some or all cows
- Send dry stock and / or young stock away grazing

Increase Feed Supply

- N fertiliser if soil moisture permits
- Slower round to ‘bank’ feed in front of the herd
- Summer crop, choosing a crop that best covers your deficit period. For example, if you expect January and February to be dry, but pastures usually hold on well through December, you may be better to create a feed bank of January/February feed as a summer brassica (turnip, rape) than a multi-graze option ready to graze in December

NOTES

Crops to help improve overall summer diet quality

The late spring / early summer 'crash' in pasture quality:

- This 'crash' or rapid drop in MS production typically occurs to some degree on all farms. Severity of the 'crash' is moderated by stocking rate, ryegrass heading date, presence of clovers or herbs in the sward, as well as cow body condition score and cow genetic merit. The flowering of ryegrasses is the key driver of most rapid drops in MS production in late spring. Flowering is associated with changes in the nutritional profile of the ryegrass plant as flowering commences:

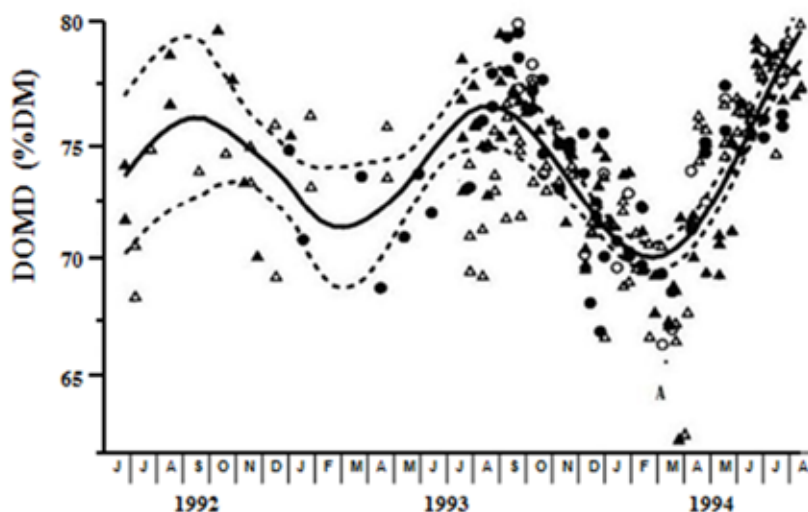
Increased

- Fibre content (Neutral detergent fibre, acid detergent fibre and lignin)

Reduced

- Tastiness (especially if standard endophyte) / 'harvestability' efficiency of stemmer ryegrass, meaning cows leave more feed behind in the paddock and consume less dry matter per bite
- NDF extent of degradation in the rumen
- Digestibility and MJME
- Rumen outflow rate
- Crude protein

Figure 3. Change in digestibility (DOMD) across seasons. Identical trends are seen with MJME/kgDM. From Moller et al. Proceedings of the NZ Grasslands Association 57: 173-177, 1996



Pasture quality and rate of drop off peak MS – Short Term ideas to reduce risk

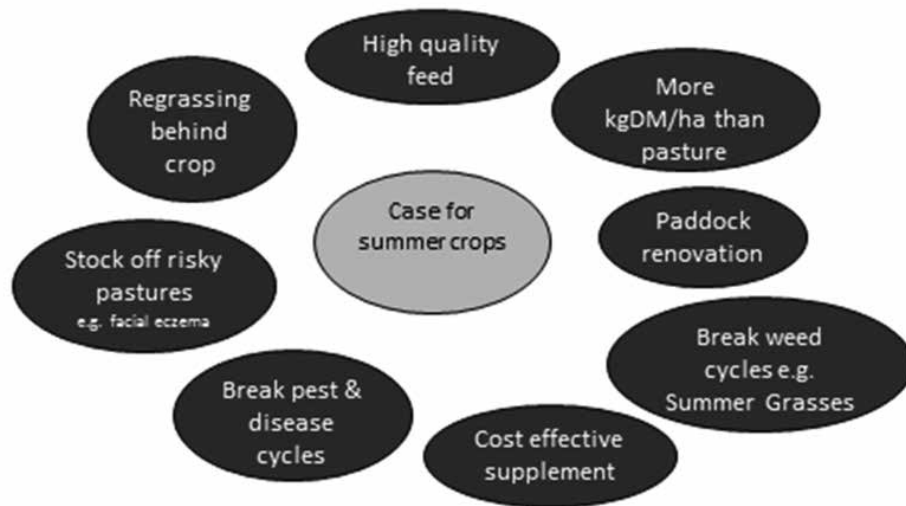
- **Stocking rate liveweight/ha.** Higher stocking rates mean pasture quality is, on average better as harder grazing pressure maintains better quality. Stocking rate can be increased by taking genuine surpluses out for silage areas or for spring cropping
- **Adjust pre and grazing pasture covers.** Higher pasture covers in late spring tend to encourage more stem, seed head and dead material in the pasture. Change pre-grazing pasture covers by dropping paddocks out for silage or for spring cropping.
- **Adjust post-grazing covers,** especially during first and second grazing rounds. High post-grazing covers mean poorer quality pasture in the 3rd and subsequent grazing round
- **Earlier topping in front of cows** (before lots of seedhead is present) otherwise consider topping behind cows (despite the mess!). Topping very poor quality pasture in front of cows may increase rate of drop off peak MS production because cows can no longer select best quality feed
- Optimise pasture nutrients (NPK) to minimise nutritional stress on plants

Summer crops to 'dilute' down intake of poor quality pastures

- Part of the daily diet (usually up to 1/3 of the diet, on a dry matter basis) as summer crop can help slow rate of drop off peak MS production. Low MJME, low protein and high fibre pastures can be complemented by higher MJME, moderate protein, low fibre crops such as chicory, brassicas or plantain

NOTES

Figure 4. The Bundle of opportunities that summer crops can offer. Summer crops are NOT just all about good quality feed, rather offer a bundle of opportunities for your business



Which Summer Crop Best Fits My System?

Risk of summer dry?

- Very free draining paddocks, prone to dryness – may not be best cropping options. Rape can be a better option for light soil paddocks these areas if must cropped
- Rape is more summer dry tolerant than Barkant turnip (better and more extensive root development)
- Chicory is tolerant of dry after first grazing (December) once a tap root is established. Chicory does best when established early into free draining soils that retain good summer water-holding capacity

When do I need the bulk of summer crop feed?

- **Feed deficit?** When is the greatest risk of summer dry and dry matter deficit for the herd? Before or after Christmas?
- **Pasture quality challenges?** When do you see the worst drop in MS production and/or cow condition score?
- **Animal health challenges?** e.g. Facial Eczema, young stock parasite challenges

Crop opportunities: Timing of feed delivery:

- **November** - The fastest time from sowing to grazing is leafy turnip e.g. Pasja II or Millet (provided soil temperatures are warm enough)
- **December** - Chicory ready early December, multigraze every 20-28 days
- **January / February?** Barkant turnips or Titan rape single graze ready early January to early February. For late February / early March, Green Globe bulb turnips or a later maturing rape e.g. Goliath will allow for feed to carry later in the summer into early autumn
- **Tonic Plantain** may persist better than chicory under harsh summer conditions (and better winter activity than chicory) – if a second year is required from the crop area

What is the paddock weed burden?

- Brassicas are often a better option if summer grasses/weeds are a challenge – with more ag chem options available to better control weeds in brassicas than in either chicory or plantain.
- OR – go through an Annual or Italian ryegrass before chicory or plantain to allow up to three complete spray out opportunities before establishment of chicory

Paddock soil pH?

- All summer crops perform best at soil pH of 5.6 or greater (Brassicas prefer 5.8 – 6.2)
- Chicory can tolerate lower pH but does best in pH of 5.5 or greater

Pest and disease risk

- Major brassica-specific pest challenges e.g. Leaf Miner, Diamond Back Moth, Mosaic Virus (Turnips)
- Chicory disease challenge - Sclerotinia
- Plantain moth is becoming more of a challenge for plantain crops

NOTES

Paddock fertility

- Chicory is better suited to higher Olsen P soils
- Lower fertility paddocks can be better suited to rape. These areas are typically less well suited to chicory, leafy turnip, or bulb turnip
- Of the bulb turnips, HT Bulb turnip and Green Globe turnip handle lower fertility better than tankard bulb turnips (Barkant)

Area of milking platform available to crop

- Run a feed budget to understand implications on spring feed supply / demand for the herd if cropping areas are taken out e.g. late September / early October. Some crops e.g. Chicory may require a larger than ideal percentage of the milking platform out of the spring peak demand for pasture. Smaller areas of potentially higher yielding crops that deliver feed over a shorter period of time e.g. summer brassicas may be a better option

What percentage of the diet needed as crop?

- We shouldn't feed more than one third of the diet as summer brassica (risk of milk taint)
- We shouldn't feed more than 25% - 35% of the diet as chicory (risk of milk taint)
- A high daily dietary inclusion of forage sorghum, or greenfeed maize won't deliver enough energy or protein for high performance lactating dairy cows

Crop Options for Summer Dairying

*Leafy turnip: e.g. **Pasja II** and **HT Leafy Turnip***

- Multigrazing option (well suited due to a low growing point)
- Very high quality (minimal stem, tiny bulb) leaf and petiole
- Fast feed, sowing to grazing (42-70 days)
- Minimal ripening requirement
- Aim for a height of less than 20 cm high (beneath top of red band). Care if large areas are sown, leafy turnip will lose palatability at higher pre-graze heights on later grazed paddocks
- Chew down no lower than 5 cm to optimise regrowth potential
- Aim for a 21-28 day rotation (Faster rotation can mean that the crop is better accepted by calves however too fast may reduce the multigraze opportunity if plants don't have sufficient time to recover between grazings)
- Cattle can be slower to start to graze leafy turnip than tastier options e.g. Titan Rape
- Always make baleage or pasture area available to turnip fed cattle, don't feed calves or heifers to eat more than 80% of diet (on a dry matter basis) as leafy turnip
- Leafy turnips are not often fed to adult cattle as shallow root structures mean plants can be pulled from ground (less options, multigraze & regrowth)
- Leafy turnips tend not to handle low fertility soils well
- Shallow root structures of leafy turnips mean this crop may not handle summer dry conditions as well as early sown rape

*Forage Rape: e.g. **Titan** (70 to 90 days grazing after sowing), **HT Rape** (90 to 110 days), **Goliath** (90 to 110 days)*

- Single or multigraze option. Can be multigrazed (young stock). Lactating dairy cows usually single graze spring sown rape crops on the dairy platform
- Better drought tolerance than Pasja II Leafy Turnip, provided rape sown earlier enough to establish roots before summer dry conditions
- Time from sowing to grazing = 70-90 days (Titan Rape), 90-110 days (Goliath Rape and HT Rape)
- Titan, Goliath are a new generation kale x rape interspecies cross and have excellent aphid tolerance
- Single or multi graze - often single graze, rape is often eaten once Barkant turnips are finished later in summer (Rape tends to hold quality better late in the summer than early maturing, tankard bulb turnips)
- Titan forage rape = the best energy content of the forage rapes
- There can be a small risk of photosensitisation (rape scald) in cows under some conditions

*Bulb Turnips: e.g. **Barkant bulb turnip**, **Green Globe bulb turnip**, **HT Bulb Turnip***

- Single graze option
- Early maturing soft tankard bulb turnips (Barkant, 60-90 days) or later maturing globe turnip (Green Globe or HT Bulb Turnips, 90 to 120 days). Green Globe great for lower fertility areas
- Barkant bulb turnip is the highest yielding of the summer bulb turnips available
- Tankard shaped bulbs (Barkant) allows cow to pull turnips from ground. This, combined with soft bulbs = good utilisation

NOTES

- Barkant tankard bulb turnips tend to have a higher leaf to bulb ratio than Green Globe
- HT Bulb Turnip and Green Globe have harder bulbs, and are better anchored than Barkant tankard bulb turnips. Hard bulbs keep better than tankard types, later into summer
- Low soil fertility conditions are handled better by HT bulb turnip and Green Globe, than Barkant turnip
- Use both early and later maturing turnip types in spring planning decisions, e.g. 2/3 of turnip area as earlier maturing Barkant bulb turnip, 1/3 of area at later maturing Green Globe turnips (or forage rape). Barkant turnips don't carry well beyond 120 days after sowing (soft bulbs are prone to rot, as well as at risk of leaf drop/loss)
- Bulb turnips deliver excellent quality summer feed particularly if leaf is retained on turnip crops through proactive pest and disease prevention strategies
- There can be a small risk of photosensitisation (rape scald) in cows under some conditions

Chicory: e.g. Puna II Chicory

- Tap-rooted, perennial herb sown as a pure sward, with red and white clovers (Rocket Fuel) or as part of perennial ryegrass, clover pasture mix
- Drought tolerance opportunity - provided chicory is sown and establishes early enough to develop a deep tap root before summer dry conditions challenge the crop
- Either short season (6 months) or through to perennial cropping option
- Prefers fertile, free-draining soils
- Key growth period is from September– May. Avoid grazing June-August and / or when soils are very wet underfoot
- Outstanding later spring/summer yield and quality (13 MJME/kgDM and crude protein 18 – 24 % CP)

First year chicory crop

- Graze for first time when 7 true leaves have emerged, and when plants don't pull
- Pre-grazing 25 – 30cm
- Post-grazing No lower than 5-7cm
- Aim is to maintain plant numbers if you intend to take a perennial chicory crop into a second year

Second year chicory crop

- Need minimum plant density of 25-30 plant/m² to take chicory into second year AND selection of a chicory cultivar with track record of perenniality (some cultivars are true annuals and unsuitable to take through to a second year)
- Avoid grazing in winter – crown damage is likely with risk of plant loss due to sclerotinia
- Crop will usually try and bolt (seed head) in second year of grazing
- Lower pre-graze heights of stems at 15-20cm are needed in the second year of grazing (lower than first year). Mechanical topping may be required to control quality

Table 2. Area required for chicory at different requirements (kgDM of chicory per cow per day)

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

NOTE: These chicory areas assume:

- **Chicory at 1800 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 = 1785kgDM/ha accumulated over 21 days)
- **Care with cow walking distances.** At low amounts of chicory offered per cow per day, consider the impact of walking time and distances for cows – often it's not worth the walk for only a small amount of crop. For cows to walk a long distance for only 2kgDM of chicory in the heat/humidity of summer months, it may be better to feed twice the amount of chicory to half the number of cows

NOTES

Tonic Plantain

- Coarse fibrous rooted, perennial herb sown as a pure sward, with clovers, or as part of perennial ryegrass, clover pasture mix
- Tonic is more of a perennial option than most chicory types, with a potential life span of 2-3 summers depending on growing conditions. Note not all plantains have the good winter activity of Tonic Plantain – choose cultivars wisely
- Drought tolerant but not as tolerant as chicory. Recovers very quickly after rains
- Either short season (6 months) or through to perennial cropping option
- When sown as pure sward or with clovers, manage as for chicory with daily allocation offered as part of a diet
- Plantain quality is on average, better than perennial ryegrass grown under the same summer conditions
- Manage on a fast round (aim = 21 days) as accumulation of older leaves and stem/seed head can cause palatability (tastiness) issues especially in lower N soils. Palatability can especially be a problem with older plantain leaves in late summer / autumn. Seed heads are usually palatable if grazed not higher than 25 cm in height

Forage Sorghum and Sorghum / Sundangrass Cross

- Single or multigraze option (usually multigraze). Range of hybrids (Sudan x Sudan; Sorghum x Sudan) hybrids available
- Not tolerant of cold conditions – sow at soil temperatures of 17°C and rising and when temperatures have stabilised
- Good bulk feed but not top quality (moderate MJME/kgDM and low protein; quality depends on grazing management decisions) = not an ideal milking feed in isolation from other high quality feed
- Water use efficient crop – the best of the summer crop options, because the plant stops growing and simply survives under very harsh conditions
- Rotationally graze & back fence to optimise multigraze opportunities
- Dry matter cover targets: Pre-graze target of 45-80 cm. Feed quality will be lower if pre-graze heights are over 100cm. Post-graze targets of no lower than 10cm are recommended for maximum regrowth opportunity
- Risk of prussic acid toxicity (cyanide toxicity) and nitrate toxicity under some growing conditions
- Supplement cows with sodium (and sometimes sulphur)

Green Feed Maize: e.g. Forage King; Pioneer

- Single graze option
- Sow at soil temperatures of 10 °C (50mm depth) and rising over 3 consecutive days
- Not as tolerant of dry and hot conditions as Forage Sorghum & sorghum hybrids
- Doesn't have to be precision planted for green feed (unlike for silage)
- Like forage sorghum - Good bulk feed but not top quality (moderate MJME/kgDM and low protein; quality depends on grazing management decisions)
- No prussic acid toxicity (cyanide toxicity) as can occur with forage sorghums – but risk of nitrate toxicity remains a possibility
- Graze at any stage but don't expect any regrowth. Later grazing = better dry matter yields per ha but the ex-maize area will be later back into grass
- Don't take for silage as Forage King contains hybrids of varying CRM and silage quality will be very variable
- Water use efficient crop, but not as good as forage sorghum / sorghum hybrids
- Supplement cows with sodium

Pearl Millet

- Summer annual grass. Single or multigraze – almost always multigraze
- More tolerant of cold conditions vs Forage sorghum / sudan grass x
- Not as drought tolerant as forage sorghum / sudan grass x but can do surprisingly well in dry conditions. Does not tolerate water logged soils
- No risk of prussic acid toxicity (cyanide toxicity) but nitrate toxicity remains a risk under some growing conditions
- Fast bulk feed from sowing to grazing (as early as 3-4 weeks under some conditions)
- Slightly better quality than Forage sorghum / sudan grass x - Not top quality, depends on grazing management
- Rotationally graze & back fence to maximise regrowth opportunity
- Target dry matter covers = pre-graze 25-40 cm, quality will be lower if pre-graze cover is higher than 50cm
- Target post-graze = at least 10-15 cm residuals

NOTES

Some Cow Considerations with Summer Forage Brassica Crops

Brassica milk taint (turnips, forage rape) – Transfer of glucosinolates into milk.

- Feed summer brassicas at no more than 1/3 diet on a dry matter basis
- Don't graze brassica crops immediately before afternoon milking
- Graze brassica crops after the morning milking, ideally after pasture/supps have been fed. This reduces the risk of hungry dominant cows consuming too many turnips at the expense of submissive cows

Photosensitisation ("Rape Scald") on summer brassica crops – Prevention

- Don't graze immature brassica crops – particularly rape crops. Observe recommended intervals from sowing to grazing for each species and each cultivar of summer brassica
- Limit intake of summer brassicas by milking cows to less than 1/3 of diet on a dry matter basis
- Put cows onto crop "full" of pasture and / or supplements (dominant cows are risk of eating too much brassica, particularly too much leaf that contains the glucosinolate compounds that can sometimes result in photosensitisation)
- Leaf contains more glucosinolates than bulb & stem. Break feed, clean up tops & bulb, tops & stem each day before moving cows onto a fresh break on a daily basis
- Soil test aim for summer brassica paddocks with sulphate-sulphur soil test results of less than 10mg/kg. If soil sulphate levels are low, resolve these once paddocks are back in pasture, not before or during the growth of a summer brassica crop
- Care with late applications of N fertiliser – these can increase levels of glucosinolates

	Bulb Turnip		Rape		Puna II Chicory		Tonic Plantain	
Characteristic	Barkant	HT	Titan	HT or Goliath	Pure stand	Legume mix (Rocket Fuel)	Pure stand	Legume mix
The Paddock								
Tolerance: Poor drainage	x	x	x	x	x	x	*	*
Optimum pH	5.8-6.2		5.8-6.2		5.6-6.2	5.8-6.2	5.6-6.2	5.8-6.2
Optimum Phosphorous (Olsen P)	15-20		15-20		20-30		20-30	
Tolerance: Summer dry	* Shallow rooting		**Deep rooting		**Chicory Tap root	**Chicory Tap root	*Tonic Plantain coarse, fibrous root	
Suitability: High weed and/or summer grass burden	***	***	***	***	*Best to go through Annual/Italian ryegrass before chicory or Tonic plantain; multiple sprays for weed control			
The Crop								
Recommended sowing rate (kg/ha)	3kg		4kg		8kg	13kg (5kg chic. 4kg white; 4kg red clover)	8-10kg	8-10kg + clovers
Perenniality	Annual crop				Cultivar dependent. Undersow with ryegrass in autumn		Tonic Plantain perennial with good winter activity	
Expected dry matter (DM) yield/ha spring sowing to March	7-16 tDM		7-18 tDM		8-16tDM	8-16tDM	8-12tDM	8-12tDM
The Agronomic Challenges								
Key insect pest risk – Waikato	Springtail, White cabbage butterfly, diamond back moth, leaf miner					Clover root weevil, clover flea	Plantain (Carpet) Moth, Porina, Grass Grub	
Key plant disease risk – Waikato	Mosaic viruses				Sclerotinia under poor drainage/wet conditions with crown damage.			
Grazing management								
Multi (M) or Single (S) graze	S	S	S or M	S or M	M	M	M	M
Sowing to grazing (days)	60-90	110	70-90	110	56-70 (7 th true leaf emerged)		56-70 (6 th true leaf emerged)	
Set Stocking?	Set Stocking not recommended for dairy stock on any of these crop types							
Grazing rotation	Not applicable; Single graze only		28 days	28 days	21-28 days	21-28 days	21-28 days (faster is better)	21-28 days
The dairy animal								
Maximum inclusion in diet (DM basis - Risk of milk taint, lactating cows)	35%				25-35%	Depends on chicory content	None	None
Expected milksolids response late lactation (gMS/kgDM fed)	40-45 gMS / kgDM crop (approximate) depend on stage of lactation, cow age & genetics, other feeds in diet						Variable	
Key health risks	Photosensitisation under some, not all conditions					Ruminal bloat		Ruminal bloat

NOTES

OWL FARM PASTURE CONDITION SCORING 2015

Emma Bell Agronomist, PGG Wrightson Seeds

Aim of Process*

*From www.pasturerenewal.org.nz The Pasture Renewal Charitable Trust is an independent entity funded by agribusinesses, raising awareness of the benefits of pasture renewal for the New Zealand economy

Reproduced from the Pasture Renewal Charitable Trust Pasture Condition Score Guide:

"Condition scoring every paddock on the farm will help determine your under-performing paddocks and identify those which may need to be renewed. The tool below is an example to rank every paddock on the farm from best to worst. Then look at underlying reasons for poor performance, and make the best decisions on actions to restore these paddocks back to full production.

Paddocks are scored from 5 (best) to 1 (worst) using the photos and descriptions below to make accurate decisions. It's designed to assist with plans for short, medium and long-term pasture renovation and renewal strategies, depending on the farm system and feed requirements.

NOTE: This ranking is indicative only and may need to be modified for your farm location. Weed content is a vital aspect to inspect as weed species vary between regions and farms.

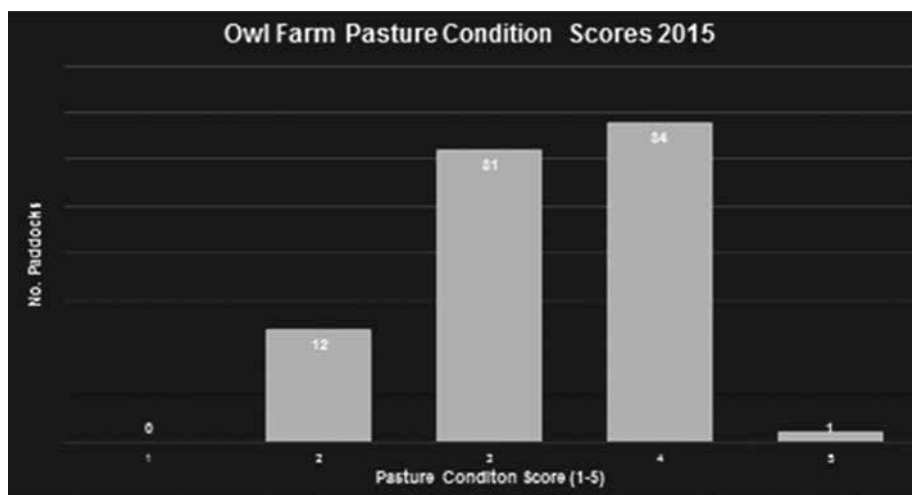
Key recommendation – choose the best performing cultivar and endophyte for your locality to ensure longevity of pastures and sow treated seed for proven results."

1. Pasture score all paddocks (completed late August 2015)

- Emma Bell & Kate Murray-Cawte PGW Seeds, Murray Lane & Anna-Lena Wright (Ballance) walked all paddocks across Owl Farm, scoring each paddock on the scale of 1 to 5
- Of the 78 paddocks scored, the following percentages of paddocks were ranked at condition scores between 2 and 5

Score	% of Owl Farm paddocks scored
1	0
2	15.4
3	39.7
4	43.6
5	1.3

Figure 1. Distribution of Owl Farm paddocks following the Pasture Condition Scoring process during winter 2015. **Score 1** = poorest condition. **Score 5** = Best condition (see next page for more detail)



Recommendations made to the Owl Farm, Farm Management Committee:

1. Seven paddocks (Total of 14.2 ha) spring sow to chicory 2015. Select next seasons (2016) chicory paddocks so these can be autumn sown (2016) to an annual ryegrass before establishing chicory in spring 2016.
2. 62 paddocks scored at score 2 & 3 (less those paddocks out for chicory) weed spray spring 2015.
3. 62 paddocks scored at score 2 & 3 (less those paddocks out for chicory) autumn 2016 undersow with Italian ryegrass with endophyte (E.g. Lush AR37 tetraploid Italian ryegrass or Asset AR37 diploid Italian ryegrass).

NOTES

APPENDIX

Reproduced from the Pasture Renewal Charitable Trust Pasture Condition Score Guide:
<http://www.pasturerenewal.org.nz/assets/Uploads/pasture-condition.pdf>

CONDITION SCORE 5

Description

- Whole paddock has dense sward of desired grasses and clovers

Suggested Action

- No action required. Would be happy if whole farm in this state



CONDITION SCORE 4

Description

- Parts of the paddock show signs of low level damage, less vigorous grasses and some weeds

Suggested Action

- Check fertility. Apply summer N to encourage tillering. Paddock probably OK for coming season



CONDITION SCORE 3

Description

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

Suggested Action

- Apply summer N. Undersow in the autumn with perennial ryegrass containing appropriate endophyte



CONDITION SCORE 2

Description

- Parts of the paddock have severe damage, a lot of weeds and bare ground

Suggested Action

Either

- Sow in perennial ryegrass in autumn, or:
- Undersow with Italian ryegrass in autumn and plan to renew in following 6-12 months, or:
- In spring oversow chicory with fertiliser, or undersow paddocks with chicory, and plan to renew in 6-18 months



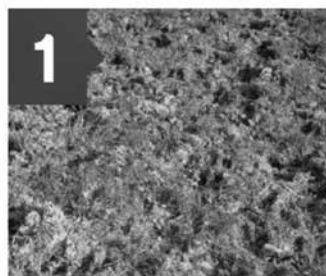
CONDITION SCORE 1

Description

- Entire paddock severely damaged

Suggested Action

- Sow into summer crop in spring, and plan to sow in perennial pasture in the autumn





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