Focus Day on the LUDF

14th May 2009

Achieve Target Production

OR

Maximise Profit?

Lincoln University
DairyNZ
Plant & Food Research
Ravensdown
LIC
Partners Networking to Advance South Island Dairying

S I D D C
South Island Dairying Development Centre

LUDF SEASONAL UPDATE

KEY TAKE HOME MESSAGES

- Generate and understand your business plan.
- Be able to adapt to both physical and business conditions during the season without compromising the overall business plan.
- Key things for LUDF to achieve at the end of May are:
  - Contain costs within the budget
  - Sound pregnant cows to meet herd requirements
  - Condition score targets met
  - Pasture cover target achieved
- The LUDF achieves consistently high profitability because the herd consumes a high volume of high quality pasture [15.5-16t DM/ha/yr estimate]. The high profitability is achieved in spite of an in-calf rate and per cow production at district averages.
- Assumptions around profitability of supplementary feeding need to be questioned. Production does not equal profit.
- Some of the ways cost can be reduced to enhance the bottom line are:

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SEASONAL UPDATE – MAY 2009

Summary for the season

- Estimated Operating Profit / ha for the season is $2,156 /ha
- Estimated Operating Expenses / kg MS = $3.92 /kg MS
- Production estimate for the Season is 1,645 kg MS and 385 kg MS/cow
- Per cow milk production peaked at 1.94 kg MS/cow per day and 8.12 kg MS/ha. Per ha peak was a few days later but close to previous seasons.
- The herd was put on Once a Day milking on the 9th of April
- Silage fed to date 383 Kg DM/cow Estimate until the end of the season 400 Kg DM/cow
- Nitrogen use for the season was 245 kg N/ha
- Eco-n was applied as normal this season
- Pasture eaten/ha is estimated between 15.5 to 16 t DM/ha
- 683 cows milked at peak from 704 wintered (3%) which is an excellent result considering the wet start to the season
- Teat seal used on the first calvers prior to calving resulted in a 54% reduction in Mastitis at calving, a reduction from around 30% to 15%
- AB Mating for 10 weeks resulted in 138 cows not in-calf at 10 weeks
- The herd will have a 9.5 week calving next season, which will give us more days in milk and a good chance of having most cows cycling by the start of Mating

Figure 1:

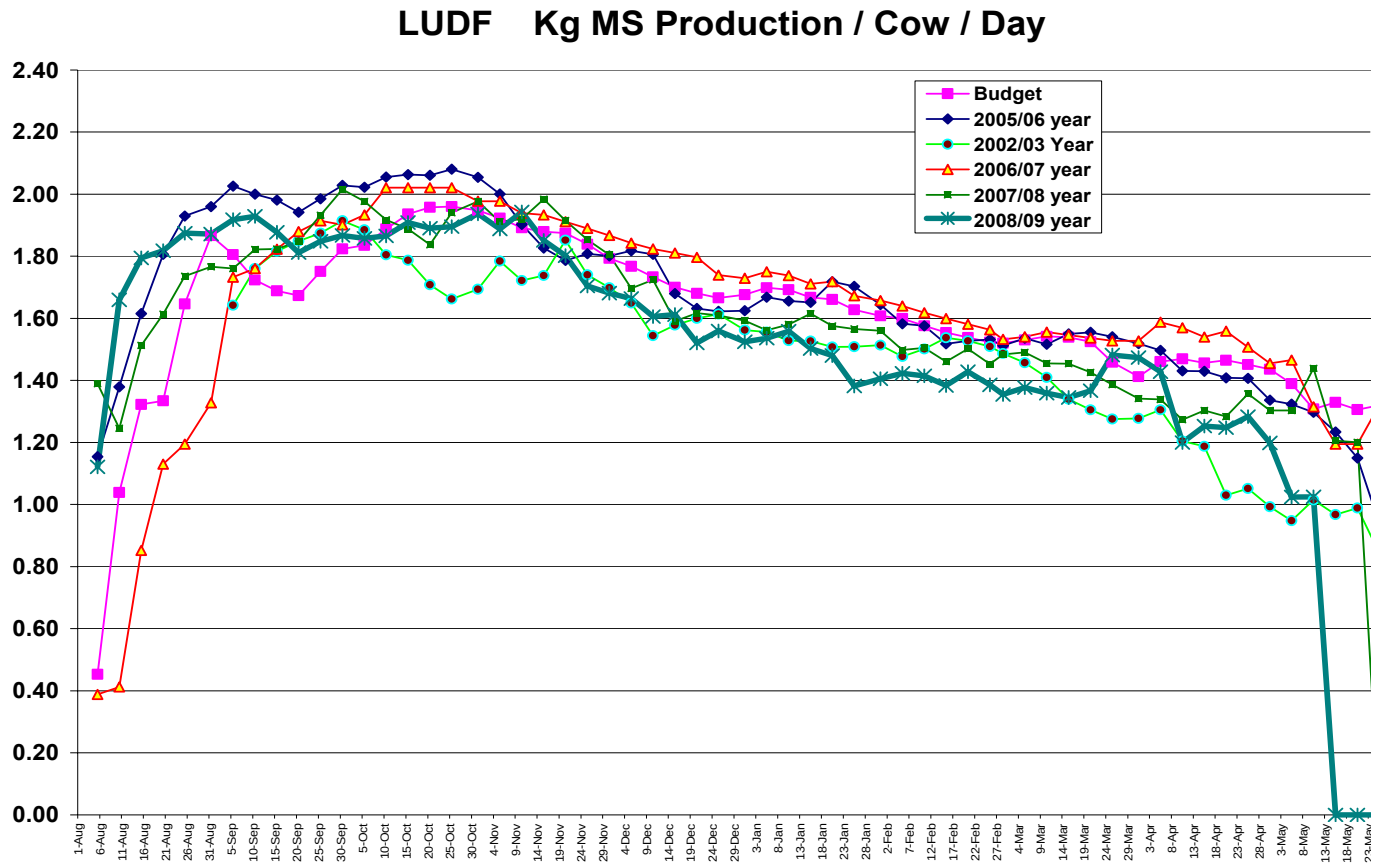
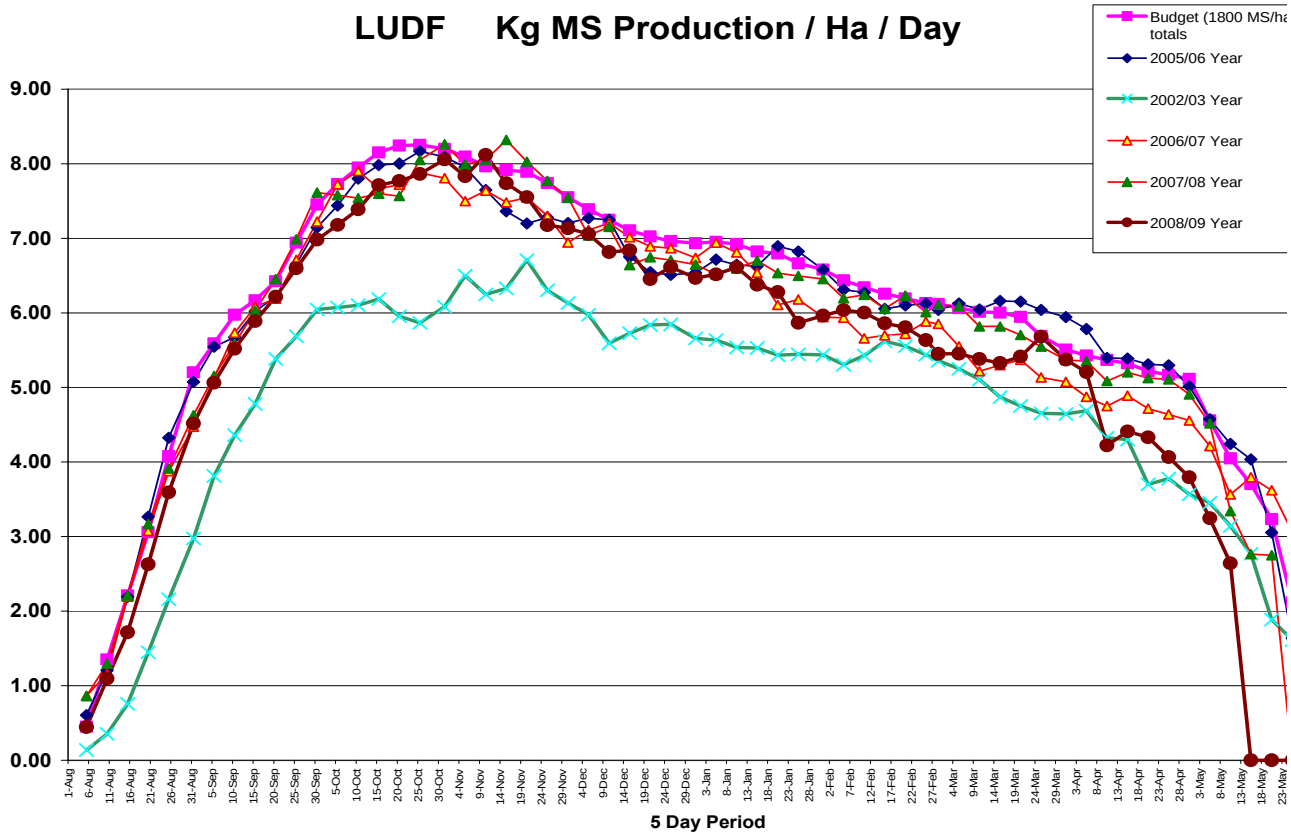


Figure 2:



Winter - Early Spring Period

Despite growth rates being similar to previous seasons, the biggest challenge for early spring was pasture utilization and avoiding pasture damage due to the prevailing wet weather conditions. As can be seen in Figure 4 rainfall in July and August was exceptionally high. Soils were very wet at the start of calving and remained very wet until mid September. Serious pasture damage was avoided for all but 2ha, but the farm was marked so badly that every paddock was heavy rolled before mid October.

By mid September many pastures had stale material in the base and soil on the leaves making them much less palatable than normal. There was enough feed but it was not our normal high quality pasture. It did not help either that we started the season with a higher Average Pasture Cover [APC] than normal (APC first week in August was 2829 kg DM/ha). We needed the higher cover this season because cows came home earlier than normal. We realised that the winter feed was short but we had no other options. As a consequence, we had some long paddocks the cows found very difficult to eat to residual in these wet conditions. In a normal spring this would have been achieved by springers with no difficulty.

As can be seen in Figure 5 feed quality suffered as a result with grass quality (MJME/kg DM) being lower than the last two seasons between September and November. The difference in pre-grazing pasture ME could represent 0.1-0.15 kg MS/cow/day, compared with the season 2006/2007.

Per cow milk production peaked at 1.94 kg MS/cow per day and 8.12 kg MS/ha. Peak production per cow was lower than the 2 kg MS/cow + we normally achieve. Per ha peak was a few days later but close to previous seasons.

There were some cows below target at calving, and also cows lost more body condition in early spring than in other seasons. In addition, it was harder for cows to turn this around. The date for liveweight gain to begin after calving was 7 days later than the previous season. In summary, cows were a bit lighter at calving, lost more condition and struggled all the way through the season to recover from this.

In hindsight we could have fed more silage to the cows and used a mower to clean up the paddocks instead of the cows. But we do not own a mower and we were not prepared to change the rules at that time and may make the same choice in the future.

The team on farm did a fantastic job dealing with a very difficult spring and a very wet farm to minimise the effect of pasture damage and to avoid future pasture growth reductions.

Lessons learned:

- Cow condition targets are crucial for the sustainability of this system, reinforcing the need to achieve CS 5 on cows and 5.5 on heifers. Average condition for the herd could be misleading.
- Do not start with too much cover
- Ensure enough grazing for September calvers is available off-farm until the 20th of August

Figure 3: LUDF Monthly Growth Rates last 3 Seasons

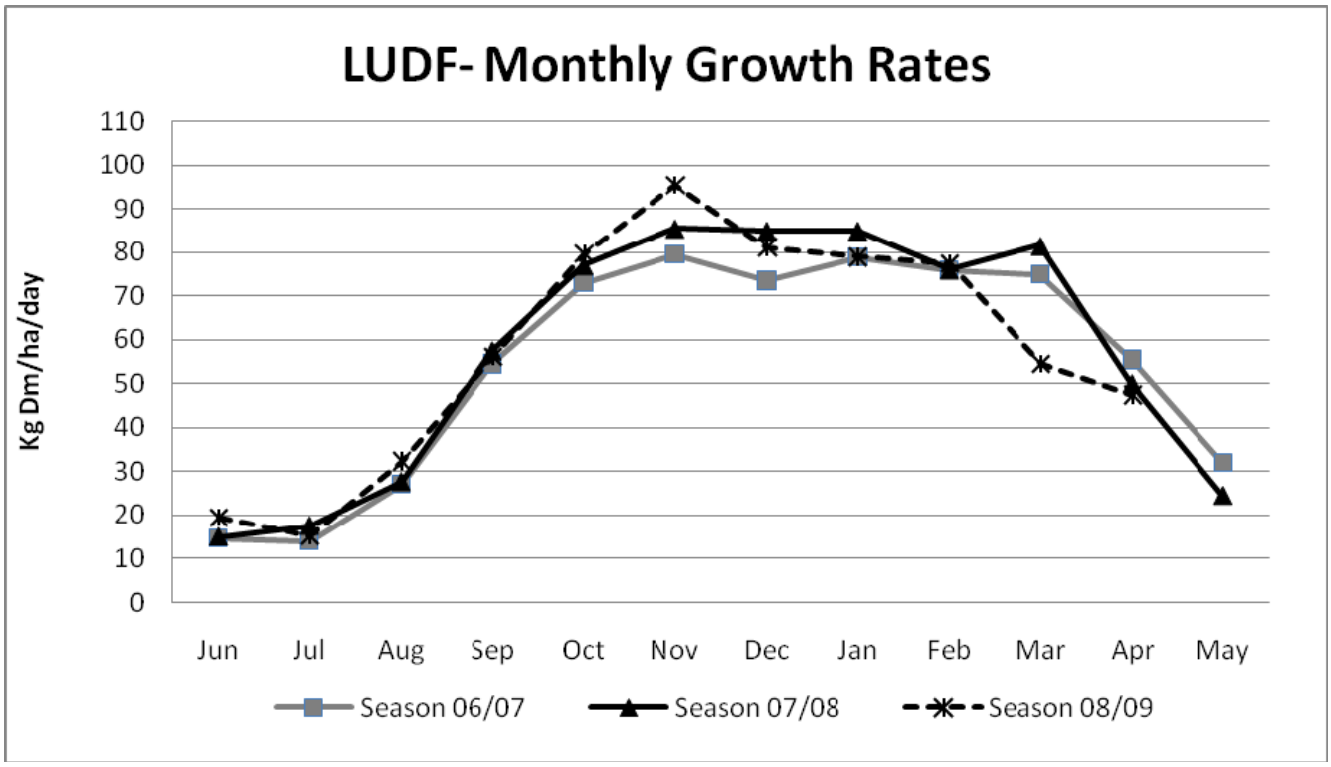


Figure 4: Monthly Rainfall June – September period last 2 Seasons

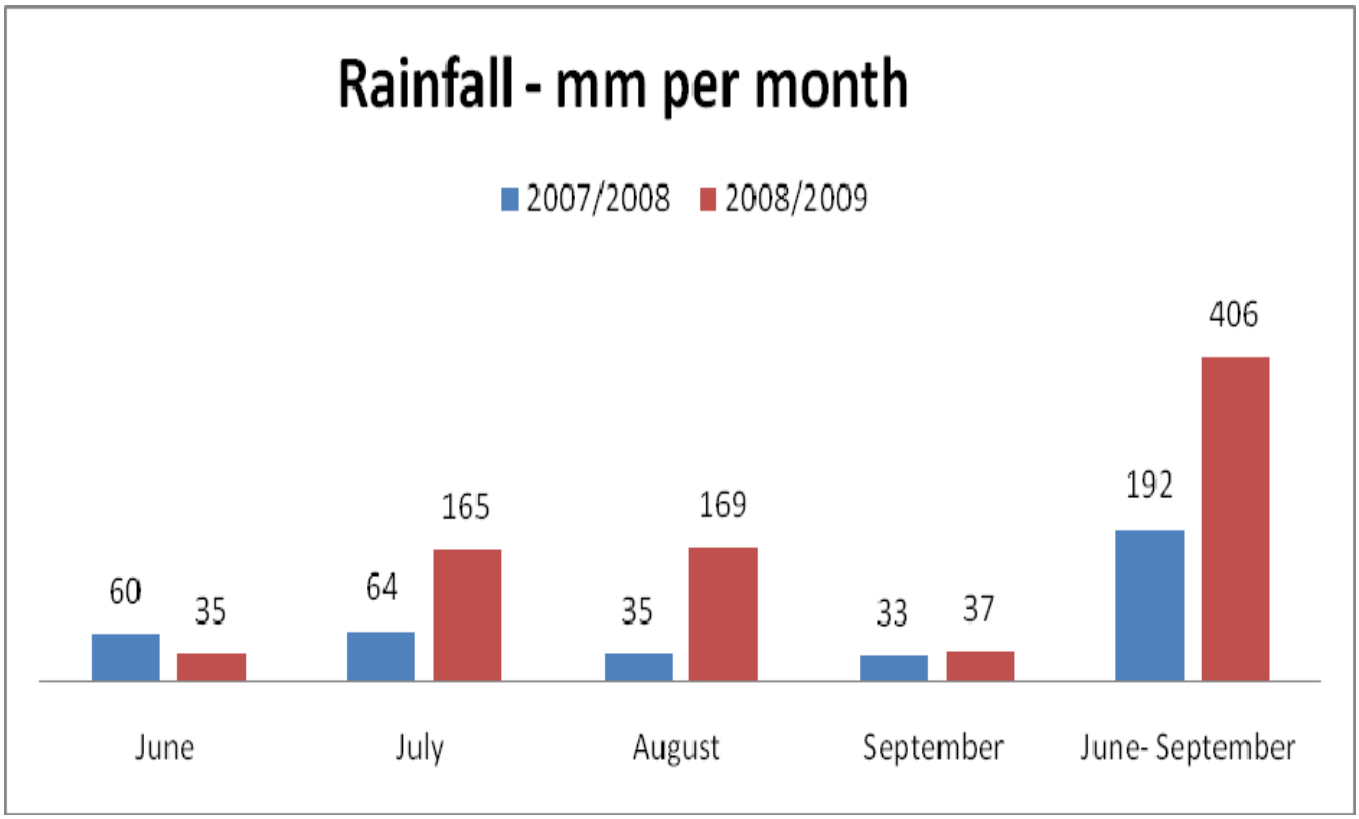
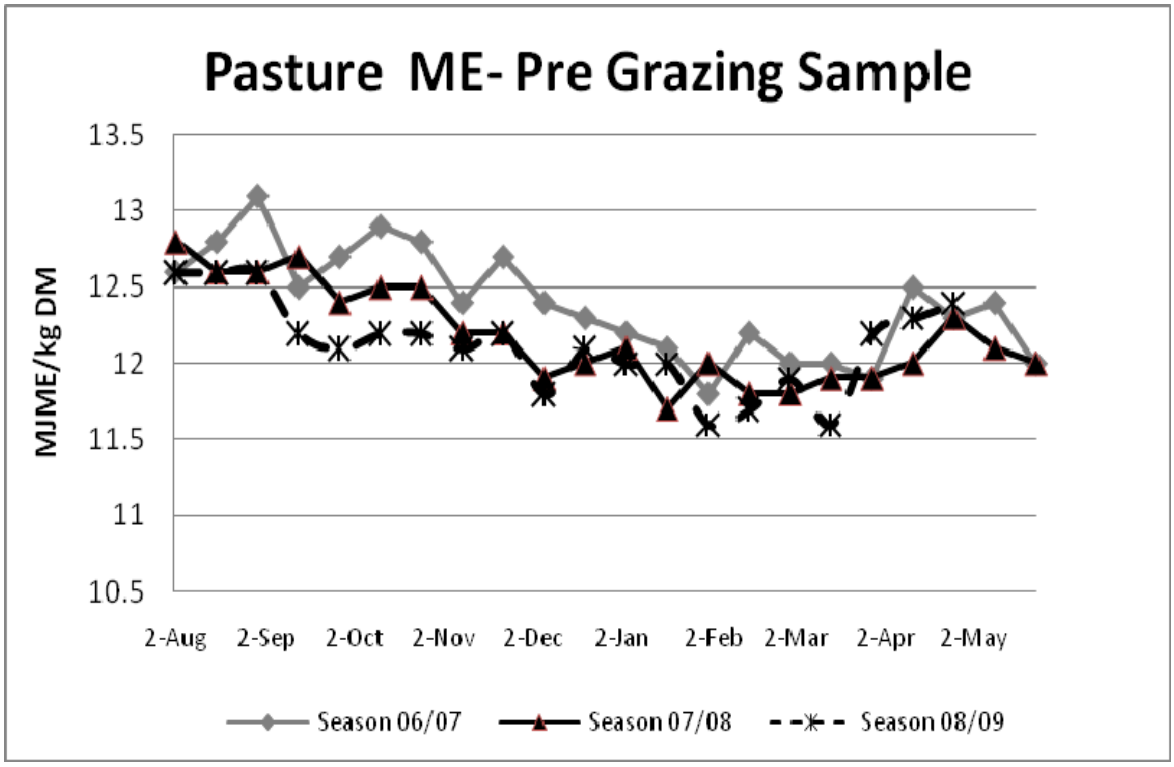


Figure 5: Pre-Grazing Pasture Quality (MJME/kg DM)



Late Spring - Summer Period

Summer was very good in terms of pasture growth and we were growing above demand for most of the time between October and February. For that period round length was kept between 19-21 days. We only fed a small amount of silage (3t) at the end of December to cope with a small deficit that appeared as a consequence of a small drop in pasture growth.

Paddocks S5 was re-grassed in early December and paddock S4 was re-grassed in mid January. These paddocks had a very good establishment and out performed all the other paddocks in terms of growth rates, growing above a 100 kg DM/ha through the autumn.

We used the soil moisture deficit information from our 4 Aquaflex sites around the farm to help schedule irrigation. In late spring and summer our aim was to keep soil moisture levels just far enough below Field Capacity to allow for rain events without exceeding Field Capacity and any consequent leaching. This allowed us to survive extended periods with evapo-transpiration rates that are higher than we can replace by irrigation on a daily basis, and also gives us some time if a breakdown occurs.

Autumn – End of the Season

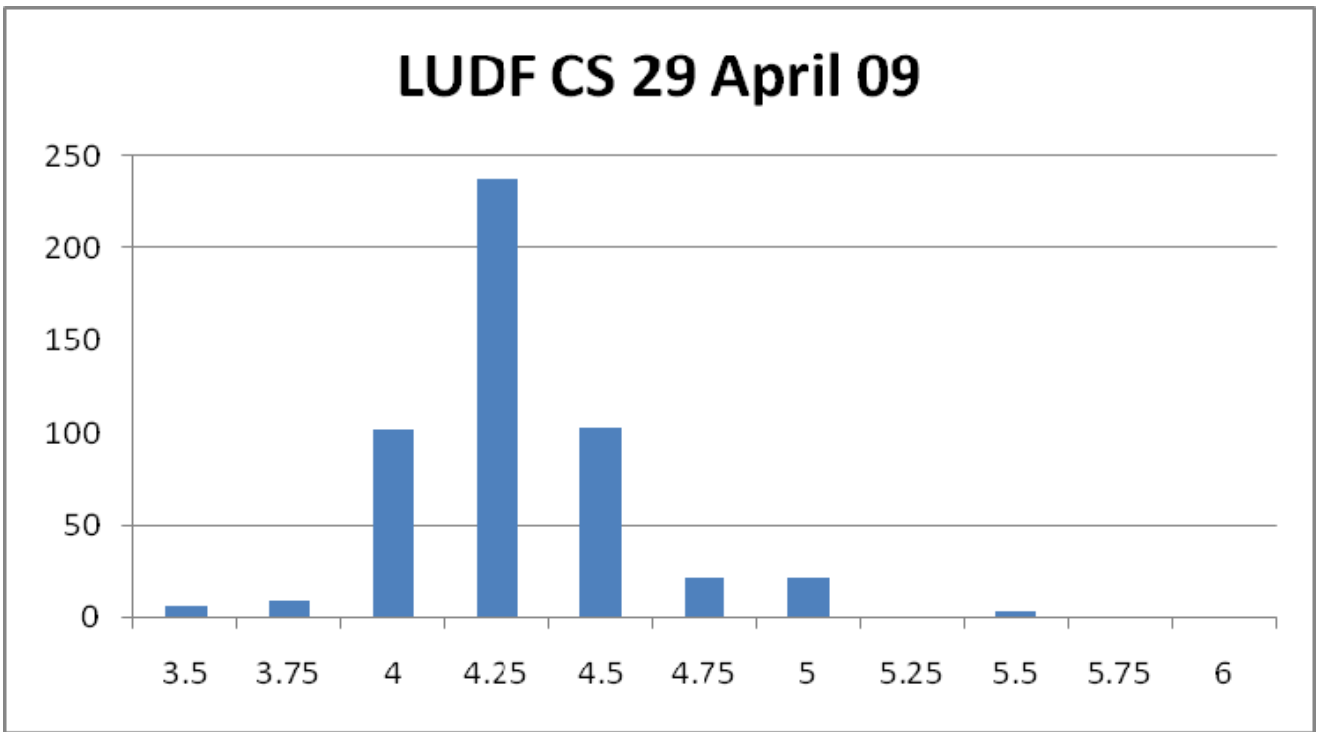
Pasture Growth in autumn has been significantly lower than the last two seasons with a big dip in mid March as can be seen in Figure 3. In early April soil temperature were 4^{o}C below last year.

This information, plus cow condition and the volume of silage needed to feed the herd this autumn, prompted the use of Once a Day milking of the whole herd from the 9th of April. We also had 125 less cows in milk at the end of April compared to the same date last season.

Pasture quality test in early March showed that the DM% was only 12.7%. This very low level meant that cows were struggling to harvest enough DM to maintain milk production and live weight gain.

Similar to other seasons, as soon as we give them grass silage we observe that their production lifts and weight gain improves even though the silage is lower quality than the pasture.
Cow condition is a priority and cows have been dried off according to condition. The aim is to have all cows above 4.5 by the end of May, which proved harder than we thought it was going to be. As this is a priority, apart from putting the herd on once a day we have been proactive with drying cows off. Figure 6 shows the distribution of cow condition by the end of April.

Figure 6: CS of the herd on the 29th April

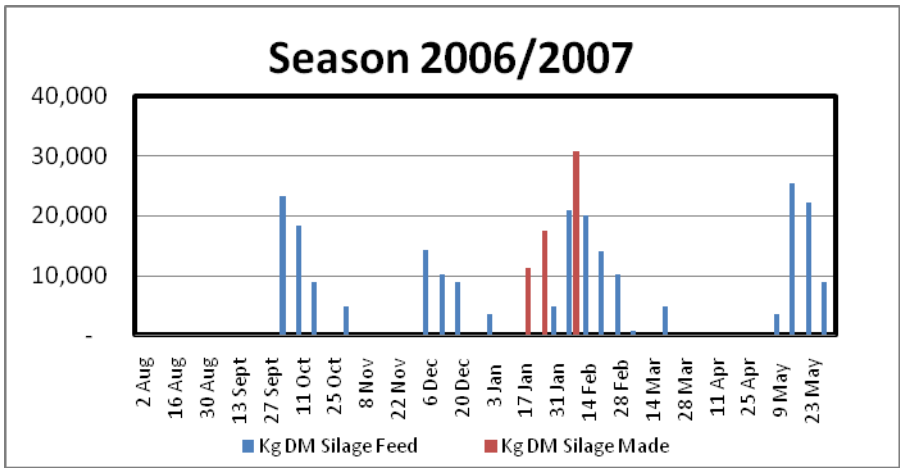


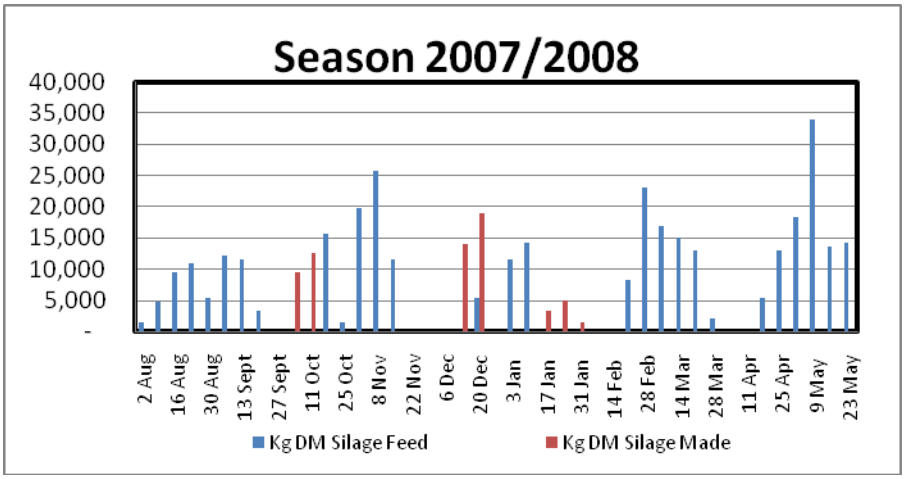
Currently we are milking 389 cows. All early calving cows with a condition score of 4.25 and below, all 3 years old, and all high SCC cows have been dried off. Also, all low producers from herd test information have been dried off.

14th April	Dried off 25 August calvers of CS 3.5 and below
8th May	Dried off further 72 August calvers and all 3 years old below 4.25
10th May	Dried off further 45 cows below CS 4.25

SUPPLEMENTARY FEEDING

Figure 6: Summary of Supplement Fed Last 3 Seasons:





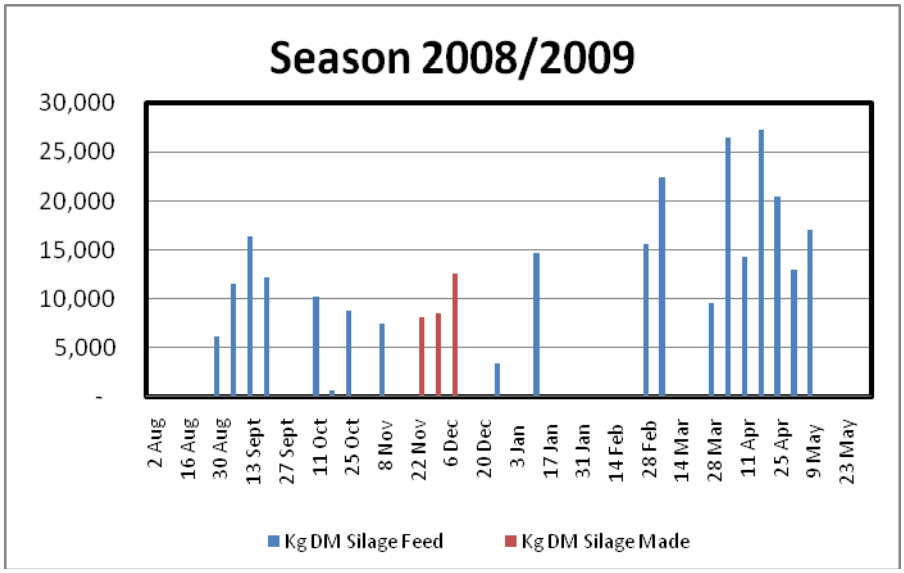


Table 2: Supplements Fed last 3 seasons

SUPPLEMENTS FED TO DATE	Season 08/09*	Season 07/08	Season 06/07
Kg Supplement fed			
kg DM /cow	**383**	502	323
kg DM total	**260,251**	341,360	226420
Kg Supplement fed			
kg DM /cow Jun-Dec	**113**	204	130
kg DM/ cow Dec- May	**270**	298	193
Supplement Made Total	**44736**	64,923	59,270

*Supplement fed to the 11 May 2009

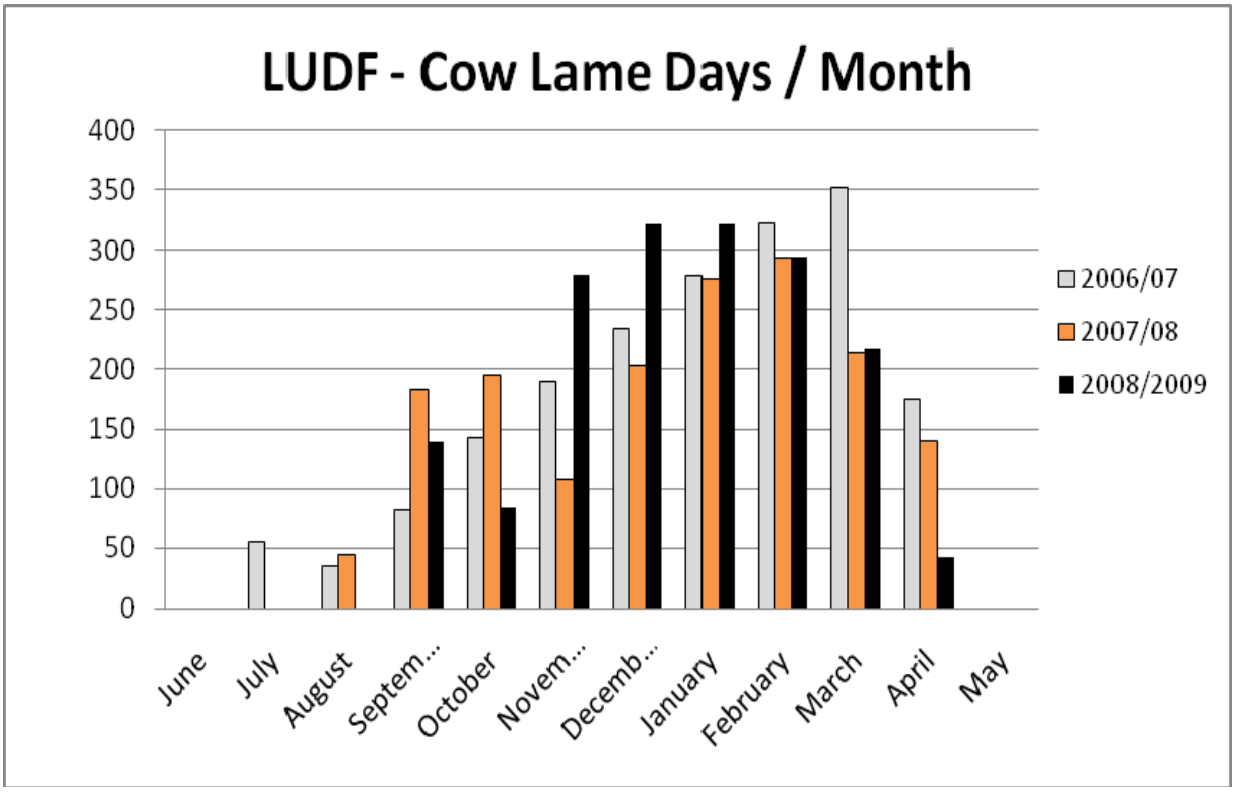
SUPPLEMENTS PURCHASED	Season 08/09	Season 07/08	Season 06/07
Kg DM bought in	**198,024**	276437	167,150
Kg DM/ cow	**291**	406	246
Kg DM /ha	**1245**	1738	1051

ANIMAL HEALTH

Table 3: Summary of Cow Wastage

Month		Season 08/09	Season 07/08
June	Heart Failure		1
August	Accidental	1	0
	Bloat		0
	Other	1	2
	Milk Fever	2	1
September	Liver Problems	2	0
	Bloat		0
	Milk Fever		1
October	Bloat	1	0
	Milk fever		1
	Johnnes		1
October to May	Bloat		0
	Unknown		1
	Broken Back (mating)		1
	Johnnes	1	2
Total		**8**	**11**

Figure 6:


LUDF - Cow Lame Days / Month
400
350
300
250
200
150
100
50
0
June
July
August
Septem...
October
Novem...
Decemb...
January
February
March
April
May
2006/07
2007/08
2008/2009

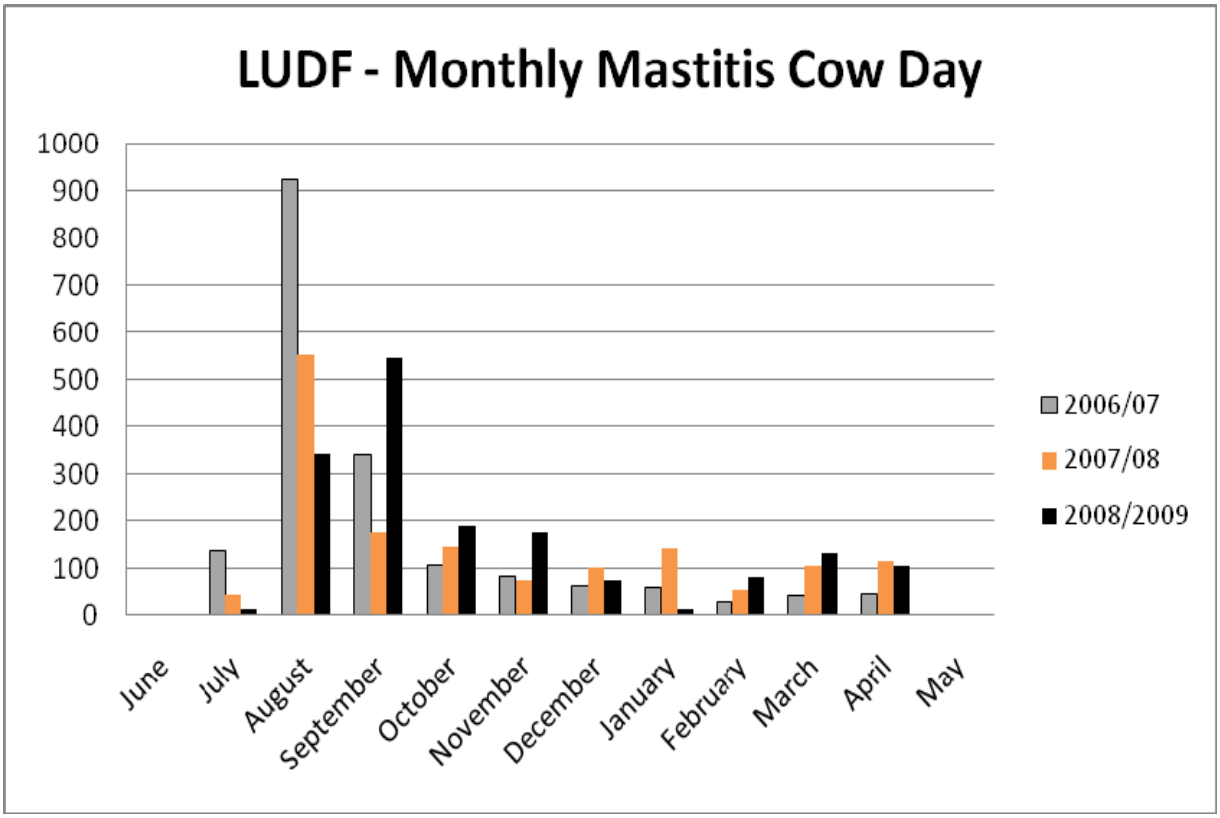

LUDF - Monthly Mastitis Cow Day
1000
900
800
700
600
500
400
300
200
100
0
June
July
August
September
October
November
December
January
February
March
April
May
2006/07
2007/08
2008/2009

Table 4: Production Losses due to Mastitis

	Season 04/05	Season 05/06	Season 06/07	Season 07/08	Season 08/09
Cows milking day lost *	639	723	1854	1550	1680
Average MS lost / day	1.5	1.5	1.5	1.5	1.5
Total MS lost	959	1085	2781	2325	2520

*a cow milking day is every full day that a cow is in the treatment mob and its milk is being withheld from factory supply.

The level of mastitis this season is again twice the level of 04-06 seasons reflecting more cows wintered on kale and wet spring conditions. We will treat at least the 180 late calving cows being trucked to kale feeding with Dry Cow Antibiotics and Teat Seal.

REPRODUCTIVE PERFORMANCE

Table 5: LUDF - Progress to Date Calving/ Mating data Comparison

SEASON	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Days to mid (all herd)		22	23	14	12	16	15
4 wk calving rate %	64	63	61	69	72	66	63
% still to calve 1 month PSM	14	17	12	12.6	9	7	6.3
% treated as Anoestrus		36.7	24.3	14.5	17	8	23
% in-calf at **12 weeks**	84	83	79.5	84	86	86*	80
% MT at **12 weeks**	16	17	20.5	16	14	14*	20

*at end of Feb PD

SUMMARY SEASON 2008 / 2009

1. Mating Period was 10 weeks and the herd was only mated with AB. Previous seasons has been 8 weeks of AB and then bulls for another 7 weeks, with late calvers (pregnant after week 12) were sold.

2. Heifers were synchronised and AI to calve at least 7 days earlier than the mixed age cows.

3. Heat Detection: Heat detection was done with the aid of a camera /computer system that reads Kamar heat mount detectors and drafts cows automatically. The system worked very well and was relied on entirely in the last 5 weeks of the mating period. It does draft some false positive cows as it is set to draft Kamars with not much colour change. The system requires cows' records be up to date and full discipline maintained around putting Kamars back on the cows after mating.

MATING CALENDAR

Table 6: Mating Calendar Season 2008/2009

		Total cows in Herd **680 cows**
20th October	**85 non cycling cows** calved more than 35 days were treated with CIDR	
29th October	**42 additional** non cycling cows calved more than 35 days were treated with CIDR	
30th October	**MATING BEGAN**	
20th November (+ 21 days)	**16 additional** cows treated with CIDR	TOTAL CIDR treated so far **143 cows**
4th December (+35 days)	85 early CIDR treated cows were PT and **9 were re-treated**	
11th December (+ 42 days)	Cows mated on week 1 that have not cycled since, were PT and **5 cows** were found to be not in calf (phantom pregnancy) and treated with CIDR.	Total CIDR so far **148 cows** (including 9 re-treated)
18th December (+49 days)	Cows mated on week 2 that have not cycled since were PT and **5 cows** were found to be not in calf (phantom pregnancy) and treated with CIDR	Total CIDR so far **153 cows** (including 9 re-treated)
25th December (+56 days)	Cows mated on week 3 that have not cycled since were PT, and **5 cows** were found to be not in calf (phantom pregnancy) and treated with CIDR	Total CIDR so far **158 cows** (including 9 re-treated)
15th January (35 days after 6 weeks of Mating)	Cows PT and 463 were judged pregnant	463 cows pregnant of 680 cows = 68% ***6 weeks in calf rate***
8th January	**Mating Finished After 10 weeks**	
12th February (35 days after 10 weeks of Mating)	Cows PT and 542 were judged pregnant	542 cows pregnant of 680 cows = 80 % in calf in 10 weeks of mating

Results with CIDR Treated Cows
Total of 158 cows were CIDR treated (23% of total cows)
45% of first 85 cows treated early confirmed pregnant in the first 6 weeks
62% of the 42 cows treated at the start of mating were confirmed pregnant

Table 7: Cost of Mating Strategy

	What happened 2009 10 weeks AB only			What may have happened 8 weeks AB & bulls for 7 further weeks		
Cows to start mating	680			680		
AB straws used	1146	17	-$19,482	1005	17	-$17,085
Kmars used	1400	2.5	-$3,500	1259	2.5	-$3,148
Sore feet difference	0		$0	0		$0
Time spent			$0	35 days	20	-$700
Feed difference			$0	63 days	28	-$1,764
Bull lease costs	0	0	$0	12	450	-$5,400
Culls	79	300	$23,700	86	300	$25,800
Late IC cows for sale	0		$0	35	800	$28,000
Good MT cows for sale	57	464	$26,448	25	464	$11,600
			$27,166			**$37,304**
Difference			**-$10,138**			

Conclusion More direct profit would have been achieved by running bulls and selling late in calf cows.
This option would actually have been much less flexible for delivery dates and would have cost more silage being fed to the pregnant sale cows - possibly as much as the profit from generating them

Lincoln University Dairy Farm

May 2009 update (Includes estimates)

Year ending May 31		Actual estimated		2008/09	161.5 ha	Actual 07 - 08	Difference	
	159.1ha							
Milk production		$5.20/kgms	1,645/ha	*261,720*	281,670	1,770/ha	-19,951 kgms	
Cows	Peak number &prodn	680cows	4.28/ha	*385/cow*				
Staff	3.70FTE's	184cows/FTE		*70,735ms/FTE*				
							$ change	
Income				*c/kgMS*	*c/kgMS*			
Milk Income	91%	1,360,941		*5.20*	*7.71*	2,173,027	-812,086	-37%
Surplus dairy stock	4%	61,790		*0.24*	*0.27*	75,000	-13,210	-18%
Other stock sales	5%	67,789		*0.26*	*0.29*	80,324	-12,535	-16%
Other Income	0%-0			-	*0.00*	0	0	#DIV/0!
	%			-			0	
	100%	**1,490,520**		***5.70***	***7.98***	2,248,027	-757,507	-34%
Stock Purchases		**15,400**				-	15,400	
Gross Farm Revenue		**1,475,120**	**9,272/ha**			**2,248,027**	**-772,907**	**-34%**

Expenses			*2008/09*	*2007/08*	**Actual**	$ change in expense	% change in expense
		$/cow	*c/kgMS*	*c/kgMS*	$		
Administration	21,500	31.6	*0.08*	*0.10*	28,464	-6,964	-24%
Animal Health	44,671	65.7	*0.17*	*0.15*	42,422	2,249	5%
Breeding Expenses	45,500	66.9	*0.17*	*0.19*	52,305	-6,805	-13%
Electricity	16,500	24.3	*0.06*	*0.06*	17,012	-512	-3%
Employment	234,281	344.4	*0.90*	*0.67*	189,376	44,905	24%
Feed purchased	91,267	134.2	*0.35*	*0.22*	61,345	29,922	49%
Silage making	8,096	11.9	*0.03*	*0.12*	33,032	-24,936	-75%
Replacement grazing	124,452	182.9	*0.48*	*0.37*	103,824	20,628	20%
Winter grazing	108,000	158.7	*0.41*	*0.36*	102,596	5,404	5%
Fertiliser & Lime	158,568	233.1	*0.61*	*0.32*	90,050	68,518	76%
Freight & Cartage	2,500	3.7	*0.01*	*0.01*	3,022	-522	-17%
Irrigation Costs	54,500	80.1	*0.21*	*0.24*	66,489	-11,989	-18%
Rates & Insurance	14,751	21.7	*0.06*	*0.05*	13,914	837	6%
Regrassing	14,088	20.7	*0.05*	*0.03*	8,248	5,840	71%
Repairs & Maintenance	34,400	50.6	*0.13*	*0.25*	71,007	-36,607	-52%
Shed Expenses	10,750	15.8	*0.04*	*0.02*	5,228	5,522	106%
Expenses	19,000	27.9	*0.07*	*0.07*	18,787	213	1%
Weed & Pest	1,909	2.8	*0.01*	*0.01*	1,977	-68	-3%
Accommodation allowance (4 houses)	20,000	29.4	*0.08*	*0.07*	20,000	0	
Cash Farm Working Expenses	**1,024,733**	**1,305**	***3.92***	***3.30***	**929,098**	**95,635**	**10.3%**
Depreciation est	107,426		***0.41***	**0.34**	94,666		
Total Operating Expenses	1,132,159		***4.33***	**3.63**	1,023,764		
Dairy Operating Profit	**342,961**	***504***	***1.31***	**4.35**	**1,224,263**	-881,302	
	2,156/ha				**7,695/ha**	-5,539	
Cash Operating Surplus	**450,387**		***1.72***		**1,318,929**	-868,542	**-65.9%**
	2,831/ha				**8,167/ha**		

PROFITABILITY AT LUDF THIS SEASON

- We have been able to contain some costs but overall costs have risen 9.9% compared with last year
- The farm will generate 7% less milk.
- Predicted milk price is currently 32% lower than last season's
- Stock Income will be reduced by about 16.5%
- Last season the Dairy Operating Profit was $8,205/ha
- Our best expectation is to generate Dairy Operating Profit of $2,341/ha or $1.37/kg ms

OPPORTUNITIES TO INCREASE/ MAINTAIN PROFIT THIS AUTUMN

Some options we explored

1. Dry off low producing cows early and purchase grazing off farm. (Drying off light condition cows and having them grazed off farm is a normal practice – We were not able to find suitable additional grazing.)
2. Replace already purchased silage with PKE or cheap maize silage available in the district. These system changes were rejected due to their probable unrepeatability and the need for capital equipment.
3. Hold over some items of R & M – some savings have been made.

Some options considered – not adopted this autumn

1. Reduce staff
2. Growing an autumn sown crop on the LUDF platform
3. Reducing fertiliser applications - all the annual fertiliser was applied in one application earlier in the milking season.

OPTIONS FOR NEXT SEASON

Some of the options we have already decided for next season.

1. Stocking rate – reduce the herd size from 705 to 680 at the beginning of winter. This is not a huge system change but will potentially save 160kg silage purchased per cow, and will reduce direct cow costs like wintering, animal health and mating. Milksolids per cow will have to rise to cover fixed costs for this option to be successful.
2. One less full time staff member.
3. Split the Superphosphate application so that the second one can be left out if milk price is lower than $4.70, and Phosphate price has not dropped from current.
4. Reduce replacements being reared (23% would just maintain herd size at current reproduction and death rates). We will cull 10 tail end rising 1yr heifers, and will winter 160.
5. Increase the number of days post calving anoestrus before beginning a CIDR programme (from 35 to 42 days cows and 49 days first calvers).
6. Treat MA cows with Teat Seal following Dry Cow antibiotic for the cows being trucked to kale winter feeding. Treating the entire herd is an option, it appears to be cost neutral but potentially providing significant profit from overall lower mastitis losses.

Some of the options we are in the process of exploring for next season

1. Mating with AB only until farm replacements have been generated [3-4 weeks]. This may not be a very smart option because the longer AB period has been generating 100 surplus recorded heifer calves for sale at 4 days old - easily paying for extra AB. What will the demand be for these calves in August 2011?
2. Any system changes that others can show have/or will make LUDF more profit. A working group has begun to explore a range of systems with other high performing Canterbury farms. Early results from this indicate that pasture is best and controlling cost is the other key.

Farm policy that will not change

- Grazing management system
- Non-induction
- Synchronising 1st calving heifers to begin calving 1 week before the Mixed Age cows.
- All cows at Condition Score 5 at calving
- The use of eco-n autumn and spring on the whole farm
- Teat seal for first calvers

Why does LUDF grow so much grass?

Peter Hancox (LUDF), Keith Cameron (Lincoln University), Graham Kerr (Agriseeds), George Reveley (SIDDC)

Summary

- It is estimated that cows on the LUDF consume 16 – 16.5 t DM/ha/year of pasture across its milking platform. Its best pastures are 8 years old.
- Part of the reason for excellent pasture production is the property. It has good soils, a quality irrigation system (5.5mm water/day), and its Eastern location has milder winters than on the Plains.
- Management is also important, and LUDF objectives are:
  - To correct soil fertility & use 'eco-n'.
  - To actively identify poor paddocks & renovate them well.
  - To monitor soil moisture as the basis of irrigation applications.
  - To focus on a "7 click" post-grazing residual year round.
  - To strongly avoid pugging & treading damage
- Checklist

  Below is a checklist to appraise your own situation. Be honest, this may help you change some practices so your herd harvests more Metabolisable Energy per ha. This typically results in greater profit.

Target		LUDF	Your farm
Measure	Individual paddock growth assessed (actively target poor producers)	✓	
Soil	Drainage installed if needed	✓	
	pH target 5.6 - 6.2	✓	
	Soil Phosphorus target 30 – 40	✓	
	Sulphur target 10 – 12	✓	
	Nitrogen target as required (about 200kgN/ha, none on effluent areas)	✓	
	'eco-n' applied spring & autumn	✓	
Regrassing	Good kill old pasture	✓	
	Drill paddocks (not in 15cm rows)	✓	
	Check grass grub, slugs, stem weevil (seed treat if required)	✓	
	Spray weeds in new pasture	✓	
Irrigation	Irrigation water monitoring (mm applied matched to soil water holding capacity & water loss)	✓	
Pasture Management	Grazing residuals - 7 clicks all year	✓	
	Pre grazing growing season: target 2800- 3100 kgDM/ha	✓	
	Pre grazing Winter: target max 3800	✓	
	Avoid pugging (on/off graze, sacrifice paddock spring)	✓	

Introduction

The LUDF was all cultivated and sown into permanent pasture in March 2001 with a 50:50 mix of *Bronsyn* and *Impact* ryegrasses, prior to milking starting in spring 2001. Soil type varies across the farm, with free draining *Eyre*, *Paparua* and *Templeton* soils in the northern block, and poor draining *Wakanui* and *Temuka* in the southern.

LUDF's irrigation system is good, with minimal water restrictions, using two pivots with boom backs to apply up to 5.5mm water/day. These are supplemented by laterals and k-line. The farms location at Lincoln means milder winter conditions than further west on the Plains (e.g. Lincoln has 25/year less frosts than Ashburton).

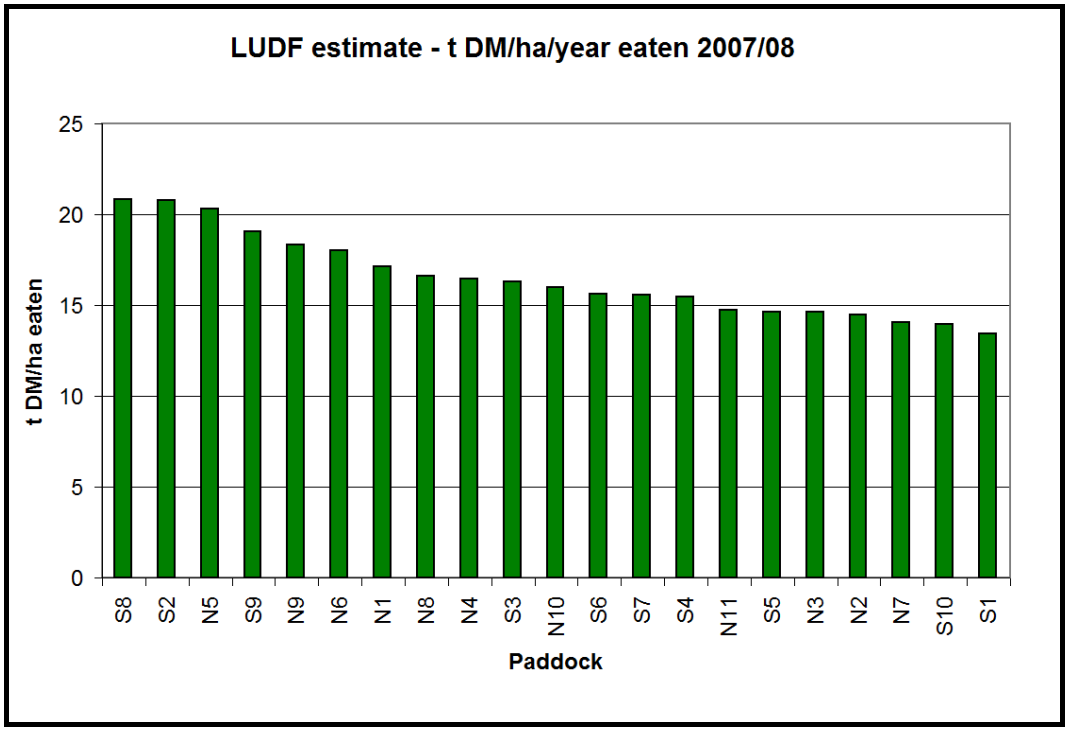
It is estimated that cows on the LUDF consume 16 – 16.5 t DM/ha/year of pasture across the milking platform. This is based on estimated growth of 19 - 20 t DM/ha/year and utilisation of around 85%. The best pastures on the LUDF are 8 years old, and show no sign of deteriorating.

There are four key parts to achieving high pasture production on the LUDF.

1. Identify poor producing paddocks

The first step to keeping a productive pasture platform is assessing what each paddock is growing, to identify poor producing paddocks. An example is below.

This can be done by totalling the "cow grazings days" of each paddock over the year (as in this example) or from weekly plate meter readings (the *Pasture Coach* software can do this automatically).

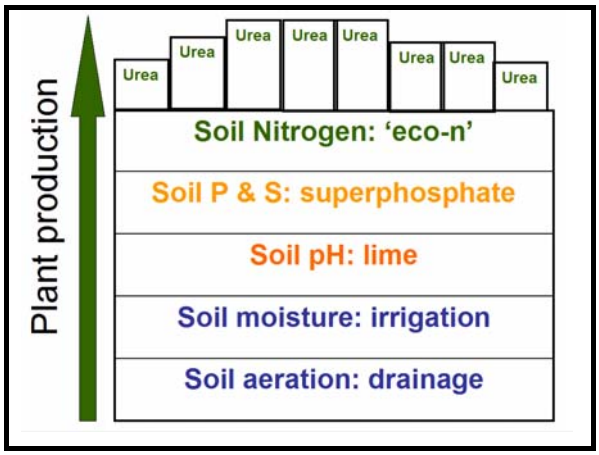


This analysis has allowed the LUDF to actively target the "tail" of poor producing paddocks. As a result pasture growth of all paddocks is reasonably even.

1-2 paddocks (5-10%) of LUDF have been renovated a year, depending on need.

2. Soil factors

This diagram (right) describes the factors addressed in improving pasture production, starting with the most important at the base.



Drainage

Has been undertaken in the southern part of the farm to improve pasture growth and utilisation with good effect.

Irrigation monitoring

Soil water monitoring is undertaken to make sure water is being applied at the correct time, to suit the water holding capacity of soils.

Soil pH & fertility

Underlying soil fertility on the LUDF is good, but nothing special. Target levels are:

pH	P	K	S
5.8 – 6.2	30 – 40	5 – 8	10 – 12

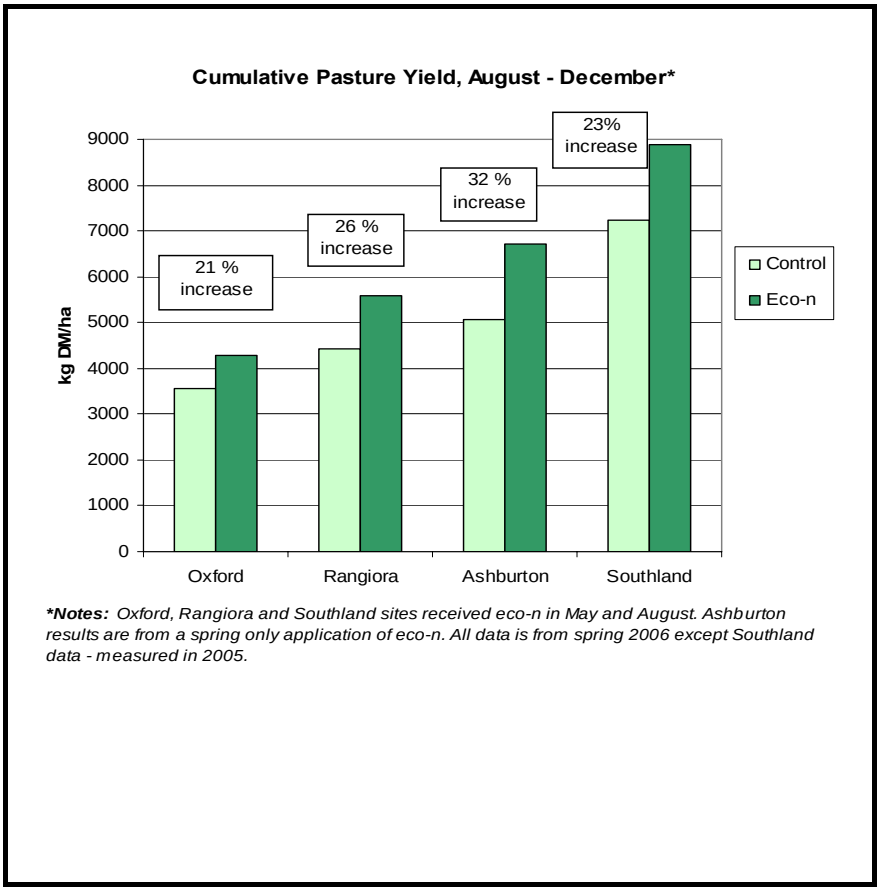
Eco-n

Eco-n is applied autumn and spring, to reduce nitrogen losses and increase pasture production.

Measurements on the LUDF over 2008/09 show eco-n increased growth by 25% between urine patches, and 36% in urine patches.

Nitrogen

Around 200 kg N/ha fertiliser is applied to the non-effluent areas, effluent areas receive no bag N. The N is applied strategically, in applications of around 30kg N/ha through spring and autumn, depending on growth. Usually N is not applied over summer as this is a period of high N mineralisation from the soil.



***Notes:** Oxford, Rangiora and Southland sites received eco-n in May and August. Ashburton results are from a spring only application of eco-n. All data is from spring 2006 except Southland data - measured in 2005.*

3. Establishing a top pasture

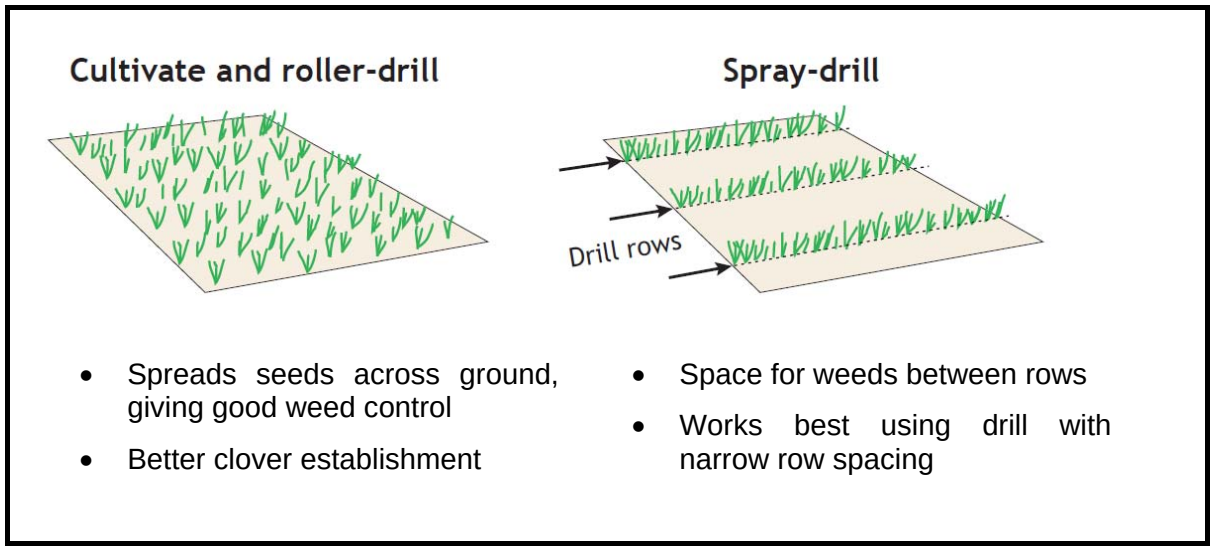
When the decision is made to renovate a paddock, there are a number of targets.

Good kill old pasture

The LUDF generally renovates "pasture to pasture", so a kill of existing plants is important. The pasture to be sprayed needs to be actively growing, not too long, and sprayed with the correct rate of the appropriate chemical.

Ryegrass ground cover = weed control

The LUDF, like most dairy properties, has its fair share of weed seeds in the soil.
Surface cultivation is undertaken so a roller-drill can be used, to give sustainable weed control through a strong ryegrass population, as shown in the diagram below.



If using spray- drill (no cultivation) we would recommend a direct drill with narrow row spacing (e.g. 7.5cm or 10cm) to leave less space between rows for weeds to establish. Diamond or cross drilling is another alternative.

Weed spray

New pastures are boom spray on the LUDF to control weeds during establishment. This is an important to protect the investment in new pasture.

Apart from this pastures are not boom sprayed for weeds - a healthy ryegrass population is the weed control.

Insecticide at sowing

Before sowing pastures are checked for slugs, grass grub and stem weevil. If required appropriate seed coating or slug bait would be used.

4. Managing ryegrass for performance

The best pastures on the LUDF are 8 years old, and show no signs of deterioration. Their productivity has been enhanced with good grazing management.

Post-grazing residual of 7 clicks

A consistent post-grazing residual of "7 clicks" or units on the plate meter is targeted year round. At the LUDF this has delivered high pasture utilisation, kept pastures well tillered, high in clover and persistent.

Feed pinch periods

The weekly monitoring of pasture cover allows decisions to be considered early when average cover across the farm starts to fall, to avoid a reduced growth rate ("it takes grass to grow grass"). Options might include reducing allocations to cows, adding supplement, culling cows or applying extra N.

Avoiding treading/pugging damage

Treading or pugging can limit pasture production, and pugging can also decrease pasture production by up to 35% in the following 2 months. In severe situations it can reduce pasture plant density so re-sowing is required. The LUDF have a policy to minimise pugging or treading damage as much as is practical, to keep pastures strong and healthy.

In wet conditions on/off grazing is used, or stock are spread out in larger breaks to minimise damage.

In seasons with particularly wet early spring conditions, the poorest paddock on the farm chosen for renovation has been used as a "sacrifice paddock" for holding stock, to protect the other 95% of the milking platform.

Profitable use of supplements at the LUDF

John Roche, Principal Scientist, Animal Science, DairyNZ

POINTS TO CONSIDER

- Supplements can be used profitably as long as they are **ONLY** used to maintain the desired rotation length, post-grazing residual, and farm cover, and are not used to "feed cows better" when there is adequate pasture.
- In these situations, total responses will be in the order of 6 to 8g milksolids/MJ ME supplement offered (Note: minimal wastage).
- If used to "feed cows better" when there is no shortage of pasture, average immediate responses that can be expected are in the range of 3 to 5g milksolids/MJ ME, and subsequent milksolids yield will likely be reduced due to lower pasture quality.

Supplements and profit

There are two things to remember about feeding cows:

- Supplements can ***increase*** your profits
- Supplements can ***decrease*** your profits

To ensure you are in the first category, you need to know the true cost of the supplement and the actual responses (milk and non-milk) you will receive from feeding the chosen supplement.

Beware the marginal analysis

Many people undertake marginal analyses to determine the economics of feeding supplements.

- They work out the purchase cost of the supplement (A);
- They assume an often inflated milk production response, and multiply this by the milk price promised (B).
- They subtract A from B

Oh, if life could only be this simple!

This is often referred to as the Margin Over Feed (MOF), Margin Over All Feed (MOAF), or Margin Over Feed and Fertiliser (MOFF). This is an economic measure that has spelt ruin for many dairy farmers internationally. As an example, Richard Johns, a farmer from Wales, was given an award in 1996 for being in the top 2% of UK dairy farmers on a MOF basis. Despite receiving this prestigious honour recognising his economic success, his total cost of milk production was $9/kg milk solids (**in 1996!**) and, despite receiving a milk price of $9.60/kg milk solids, his farm profit was not sufficient to pay tax! His story is not an isolated case.

True cost of supplements

The total cost of feeding supplements can often be 50 to 100% greater than the actual cost of the supplement. Two key characteristics of systems that employ supplements profitably are:

- supplements are inexpensive (but high quality)
- feeding system is simple and inexpensive

The cost of making silage at LUDF is 19c/kg DM, while the cost of purchased silage is 38c/kg DM. Management decision rules ensure pasture is not wasted (i.e. substituted pasture is eaten) and capital employed is minimal. Therefore, the **additional costs,** including feeding-out expenses, labour and shed expenses (if extending lactation), would be **5 to 7c/kg DM fed** (if feeding approximately 5kg DM/cow/day). The total cost of feeding supplement would, therefore, be approximately 26c/kg DM for pasture silage made at LUDF and 45c/kg DM for purchased silage (this is assuming no additional capital requirement).

When will my cows benefit from feeding supplements?

Pasture is an excellent quality feed and is very well balanced for the nutritional requirements of dairy cows. New Zealand research has shown no increase in production when pasture energy is replaced by supplement energy. Therefore, supplements should **ONLY** be used to maintain post-grazing residuals of 7 to 8 clicks (3.5 to 4cm), achieve the desired grazing rotation, and maintain required pasture cover for your farm at a particular time of the season.

This is how LUDF uses supplements. They recognise pasture surpluses early, through regular monitoring of pasture cover, and harvest their supplements to maintain an optimal pre-grazing mass (~3,100kg DM/ha). Supplements are fed to maintain a rotation length suitable for growth rate at the time, while maintaining post-grazing residuals of ~1,500 kg DM/ha. This facilitates:

- maintaining the highest quality pasture for grazing (direct consumption)
- conserving a very high quality supplement for later (deferred consumption)

and both of these enable LUDF to maintain reasonable milk yields/cow (2.03kg milksolids) and lactation lengths (263 days).

What supplements should I feed?

In the majority of circumstances in New Zealand, when pasture supply is not sufficient to meet demand, cows require an energy supplement.

Energy comes in different forms – sugars, starch, fats, fibre, and even protein. It does not matter what this supplement is as long as it is of high quality (i.e. palatable and digestible). Independent experiments undertaken in New Zealand over the last 15 years have shown that replacing digestible fibre with sugars or starch does not increase milk production or the efficiency of digestion. You should, therefore, judge your supplement choice on energy content/kg DM and price (c/MJ ME).

What milksolids response should I expect to supplements?

Experiments all over the world have reported that when supplements are used appropriately (i.e. to fill true feed deficits), each MJ of supplementary metabolisable energy eaten will result in 6-8g milksolids. Responses were generally less than 4g milksolids/MJ ME fed, when supplements have been used to "feed cows better". Responses to high quality pasture silage (~11 MJ ME/kg DM) measured in NZ experiments were 6.5g MS/MJ ME offered.

Margin and sensitivity

At current stocking rates (4.3 cows/ha), LUDF require between 400 and 500kg DM of supplement/cow/year. There is little surplus pasture for conservation; in 08/09, LUDF made 65 kg silage DM/cow. Therefore, approximately 350 kg DM of pasture silage needs to be purchased.

Gross revenue from feeding silage at LUDF would be 39c/kg silage DM offered (at a $5.20 payout and 11.5MJ ME/kg silage DM). At $6/kg MS, gross revenue would be 45c/kg DM offered.

In comparison, provided there is no additional capital investment required, **total costs** would be:

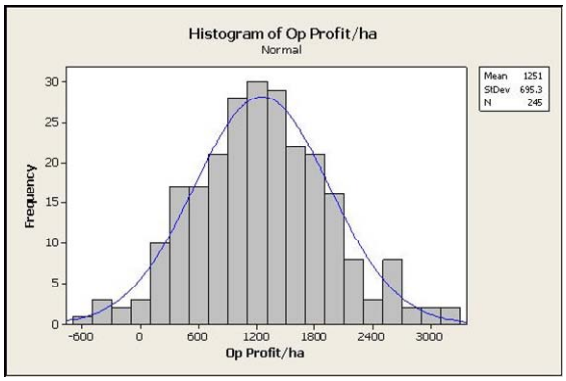
- 26c/kg DM for silage produced on LUDF, allowing 13c profit/ kg DM of silage fed (19c/kg DM at a $6 milksolids price).
- 45c if silage is purchased, reducing operating profit by 6c/kg silage DM at a $5.20/kg milksolids price, and allowing no operating profit at a $6/kg milksolids price.

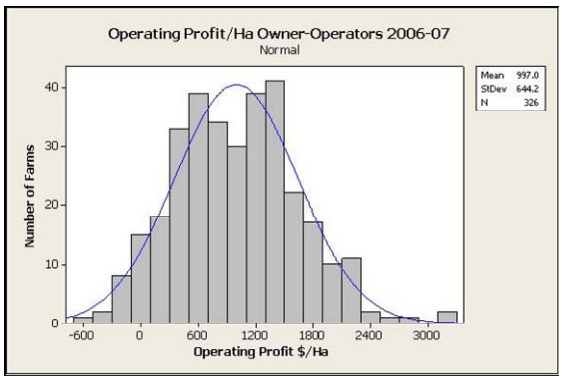
Final point

Many of the expenses associated with changing a system are long term. For example, you will continue to pay repairs and maintenance, interest, and depreciation whether or not the payout is large enough to use supplements. Therefore, the decision to alter your system should be based on a sound knowledge of what supplements a cow requires and when she requires them, what are the likely responses to those supplements, and a full economic analysis of the existing system relative to the proposed alternative.

[For more information on Feeding Supplements visit www.dairynz.co.nz Farm Fact – 1.56 Feeding Supplements in the Autumn]

Distribution of Operating Profit





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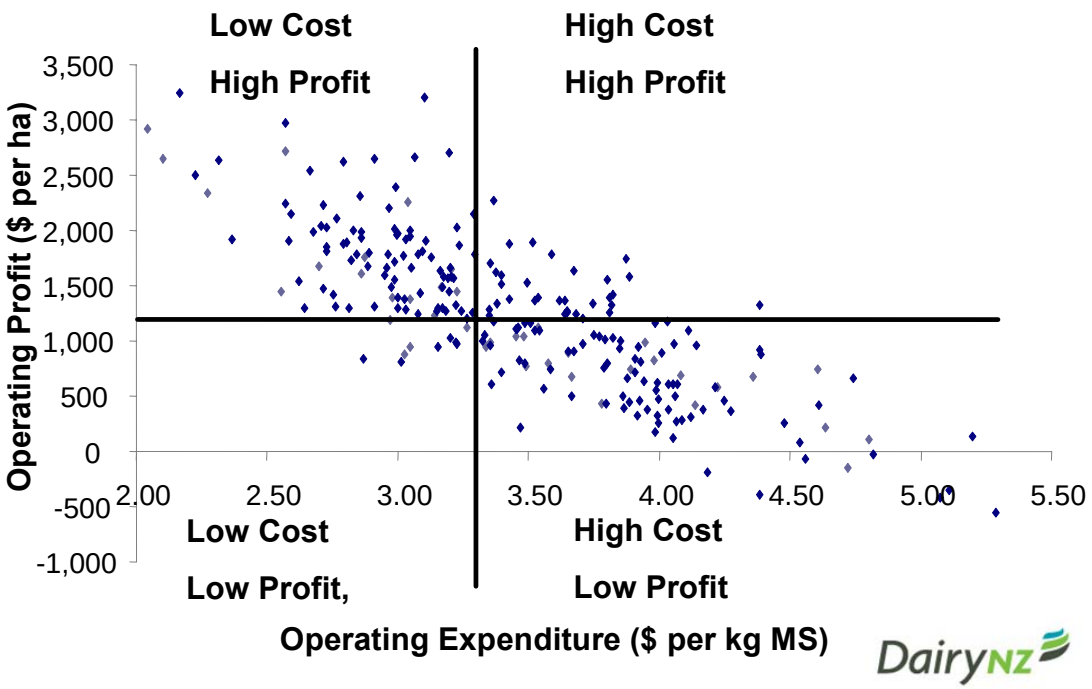
A wide range in operating profit



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Source: DairyNZ Economics Group, 2005-06 DairyBase Economic Survey

Ruakura Farmers Conference, 1999

Determining How To Make Inputs Increase Your Economic Farm Surplus

Kevin Macdonald
Dairying Research Corporation
Hamilton

Table 2: Milksolids responses to N boosted pasture and supplements @ $3.50/kg MS.

Herd	Extra feed source	g MS/kg DM fed	g MS/MJ ME fed
2	N boosted pasture	108	
3	N boosted pasture	79	
6	Maize grain	99	7.6
7	Maize silage	78	7.4
8	Balanced ration	99	7.9

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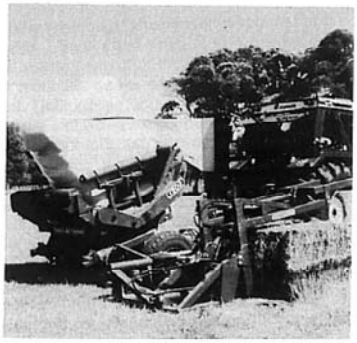
Ruakura Farmers Conference, 1993



Silage for Milk Production

D A Clark
Dairying Research Corporation
Hamilton

- Cows fed silage for 30 days in Spring, Summer, and Autumn
- 5 kg DM @10.8 MJ ME/kg DM

Spring	**6.4 g MS/MJ ME**
Summer	**6.2 g MS/MJ ME**
Autumn	**6.1 g MS/MJ ME**

DairyNZ

Animal Science 2002, 75: 433-445

The influence of cow genetic merit for milk production on response to level of concentrate supplementation in a grass-based system

J. Kennedy[1,2†], P. Dillon[1], P. Faverdin[3], L. Delaby[3], F. Buckley[1] and M. Rath[2]

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[2]*Department of Animal Science, Faculty of Agriculture, University College Dublin, Belfield, Dublin 4, Ireland*
[3]*INRA, UMR Production du lait, 35590 St Gilles, France*

Table 4 *The effect of genotype and feeding system over the 3 years (3 × 96 cows) on milk production*

Genotype†	MM			HM				Significance§		
Feeding system‡	LC	MC	HC	LC	MC	HC	s.e.	F	G	G × F
Milk (kg per cow per year)	6421	6681	7196	7389	7739	8461	86·4	***	***	
SCM# (kg per cow per year)	5938	6380	6674	6683	7013	7666	80·1	***	***	¶
Fat (kg per cow per year)	247	269	272	274	288	313	4·0	***	***	*
Protein (kg per cow per year)	217	232	250	247	261	288	3·0	***	***	
Lactose (kg per cow per year)	299	312	339	343	357	391	4·1	***	***	
Fat (g/kg)	38·6	40·6	38·0	37·2	37·3	37·2	0·50	***	***	*
Protein (g/kg)	34·0	34·8	34·9	33·5	33·8	34·1	0·24	***	**	
Lactose (g/kg)	46·6	46·8	47·2	46·4	46·1	46·2	0·17	***		¶

† MM = medium genetic merit, HM = high genetic merit.
‡ LC = low concentrate feeding level, MC = medium concentrate feeding level, HC = high concentrate feeding level.
§ F = effect of concentrate feeding level; G = effect of genotype. G × F = effect of interaction between genotype and concentrate feeding level.
¶ Approaching significance ($P < 0·10$).
# SCM = solids-corrected milk.

Multiyear project → System response (BCS included)

- 386, 810, or 1540 kg concentrates/year
- 460 to 600 kg MS/year
- 50 to 85 g MS/kg concentrates (4 to 7 g MS/MJ ME)

J. Dairy Sci. 86:610–621

Effect of Genetic Merit and Concentrate Supplementation on Grass Intake and Milk Production with Holstein Friesian Dairy Cows

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‡INRA, UMR Production du Lait, 35590 St. Gilles, France

ABSTRACT

A total of 48 high genetic merit (HM) and 48 medium merit (MM) cows, each given a low (LC), medium (MC), or high (HC) level of concentrate supplementation, were used in a split-plot design experiment, which was run in three consecutive years, to evaluate animal production responses. Individual cow intakes were estimated twice each year while at pasture; measurement period 1 (MP1) was in May/June, and measurement period 2 (MP2) was in early September, corresponding on average to d 110 and 200 of lactation, respectively. In MP1, cows were offered 0 (LC), 3 (MC), and 6 kg (HC), whereas in MP2 the levels were 0 (LC), 0 (MC), and 4 kg (HC) of concentrate daily. Genotype had a significant effect on all milk production parameters in MP1 and MP2. The HM cows had the highest yield of milk, fat, protein, and lactose, whereas the MM cows had the highest milk fat, protein, and lactose concentrations. The HM cows had significantly higher grass dry matter intake (GDMI) estimates. In MP1, the average responses, per kg concentrate dry matter, was +1.10 kg of milk, +0.038 kg of protein, +0.032 kg of fat. The corresponding values in MP2 were +0.94 kg of milk, +0.037 kg of protein, and +0.025 kg of fat. The response to concentrate was linear and independent of preexperimental milk yield. In MP1, the partial regression coefficients relating daily GDMI to an increase in 1 kg of preexperimental milk yield (PMY), preexperimental BW (PBW), and concentrate intake (CI) were 0.123, 0.006, and −0.54, respectively, whereas the corresponding values in MP2 were 0.190, 0.007, and −0.444, respectively. This study indicates that with high yielding dairy cows, an grass only GDMI of 17 kg of supporting milk yield of 30-kg/d is achievable. In this scenario, concentrate supplementation will result in lower substitution rates, and higher milk yield response than previously published with lower yielding cows.
(**Key words:** genetic merit, concentrate supplementation, grass dry matter intake)

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Abbreviation key: **CI** = concentrate intake, **DMD** = dry matter digestibility, **GDMI** = grass dry matter intake, **GOMI** = grass organic matter intake, **HC** = high concentrate, **HM** = high merit, **LC** = low concentrate, **LN** = lactation number, **MC** = medium concentrate, **MADF** = modified acid detergent fiber, **MM** = medium merit, **MP** = measurement period, **OMD** = organic matter digestibility, **PBW** = preexperimental BW, **PD** = predicted difference, **PI** = pedigree index, **PMF** = preexperimental milk fat, **PMP** = preexperimental milk protein, **PMY** = preexperimental milk yield, **TDMI** = total dry matter intake, **TOMI** = total organic matter intake.

INTRODUCTION

Milk production in Ireland is very dependent on the efficient utilization of grazed grass (Dillon et al., 1995). Grazed grass, when managed properly, is the lowest cost feed (O'Kiely, 1994). Much of the variation in the direct costs of milk production on dairy farms is associated with poor utilization of grazed grass. Therefore, high milk yields must be obtained from a mainly grazed grass-based diet, if costs are to be minimized.

Ulyatt and Waghorn (1993) and Muller and Fales (1998) emphasized that the limitations to cow productivity in pasture-based dairy systems arise from low voluntary intake of herbage and from nutrient levels that differ from those required by lactating cows. The limitation to intake is especially apparent in early lactation, when cows approach peak lactation and grazed herbage is low in DM and often has high CP content. Milk production responses to concentrate supplementation at pasture depend mainly on grass supply and quality, season of year, stage of lactation, and level and type of supplementation (Leaver et al., 1968; Journet

62 to 70 g MS/kg concentrate DM
~ 76 to 86 g MS/kg concentrate (incl. BCS)
~6.4 to 7.2 g MS/MJ ME (total)

DairyNZ

Lincoln University | SIDE | DairyNZ | Plant & Food Research | Ravensdown | LIC
Partners Networking to Advance South Island Dairying

SIDDC
South Island Dairying Development Centre

J. Dairy Sci. 89:3532–3543

Holstein-Friesian Strain and Feed Effects on Milk Production, Body Weight, and Body Condition Score Profiles in Grazing Dairy Cows

J. R. Roche,*[1,2] D. P. Berry,† and E. S. Kolver*
*Dexcel, Hamilton, New Zealand
†Teagasc Moorepark, Fermoy, Co. Cork, Ireland

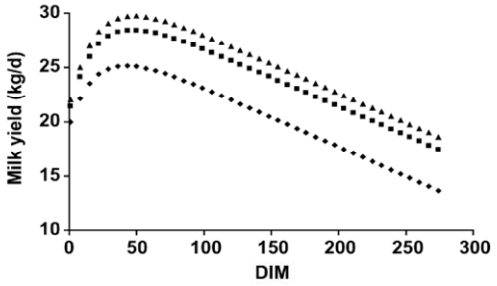

Figure 3. Effect of level of concentrate supplementation on the lactation profile for milk yield in cows receiving 0 (◆), 3 (■), or 6 (▲) kg of DM of a concentrate pellet daily throughout lactation.

- 0, 2.9, and 5.8 kg DM conc/cow/d
- 439, 502, and 515 kg MS
- 80 and 50 g MS/kg conc
- Add increase in BCS
  =100 and 60 g MS/kg DM
- 7.7 and 4.6g MS/MJ ME

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J. Dairy Sci. 86:1–42

***Invited Review:* Production and Digestion of Supplemented Dairy Cows on Pasture**

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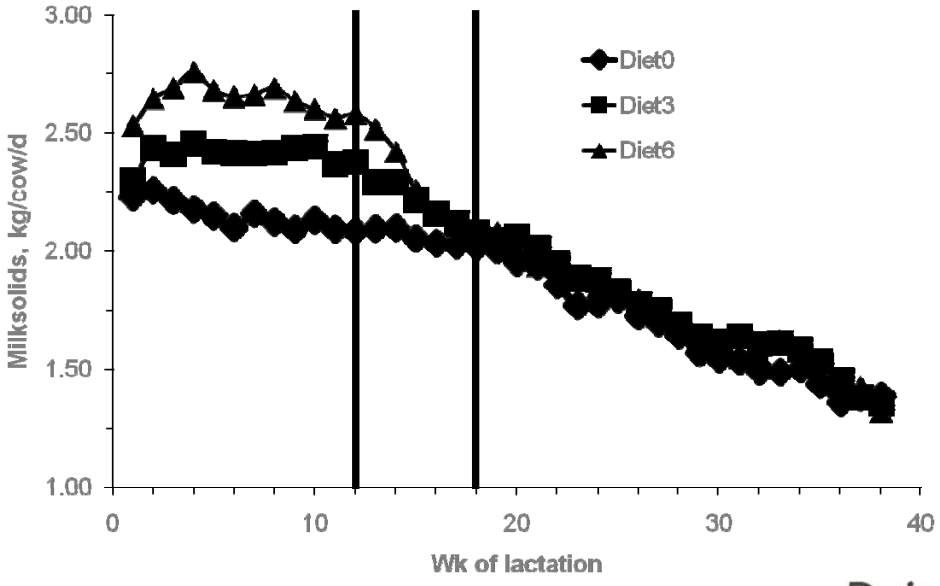
- Supplementation reduced grazing time by 12 min/kg concentrate
- Response to supplements = 1 kg milk/kg concentrate
  - @ 8% fat and protein ~ 80g MS/MJ ME
  - Assume 30% energy into BCS. This is used with 80% efficiency
- Total response of 100g MS/kg concentrate ~ 7.7g MS/MJ ME

- **Average response on NZ dairy farms is 3.5 to 4.0 g MS/MJ ME**

DairyNZ

Cows supplemented for 12 Wk

80 to 90g MS per kg Conc DM



Roche et al., unpublished

Response to supplements

Grazing Residual kg DM/ha (clicks)	Milksolids g MS/MJ ME
1,300 to 1,500 (6.0 to 8.0 clicks)	5.5 to 8.0
1,500 to 1,800 (8.0 to 9.5 clicks)	3.0 to 5.5
>1,800 (>9.5 clicks)	neg to 3.0

Feeding silage @$5.20/kg MS

Conserved pasture

- Milk revenue = 39c/kg DM
- Feed cost = 19c/kg DM
- Additional = 7c/kg DM
- Total cost = 26c/kg DM
- Margin/loss = +13c/kg DM

Purchased silage

- Milk revenue = 39c/kg DM
- Feed cost = 38c/kg DM
- Additional = 7c/kg DM
- Total cost = 45c/kg DM
- Margin = -6c/kg DM

Feeding silage @$6.00/kg MS

Conserved pasture

- Milk revenue = 45c/kg DM
- Feed cost = 19c/kg DM
- Additional = 7c/kg DM
- Total cost = 26c/kg DM
- Margin/loss = +19c/kg DM

Purchased silage

- Milk revenue = 45c/kg DM
- Feed cost = 38c/kg DM
- Additional = 7c/kg DM
- Total cost = 45c/kg DM
- Margin = 0c/kg DM