

Focus Day

Lincoln University Dairy Farm

Information Handout

3rd July 2008

For further information visit:


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Next Focus Day: 9th October 2008

SIDDC – Partners networking to advance South Island Dairying



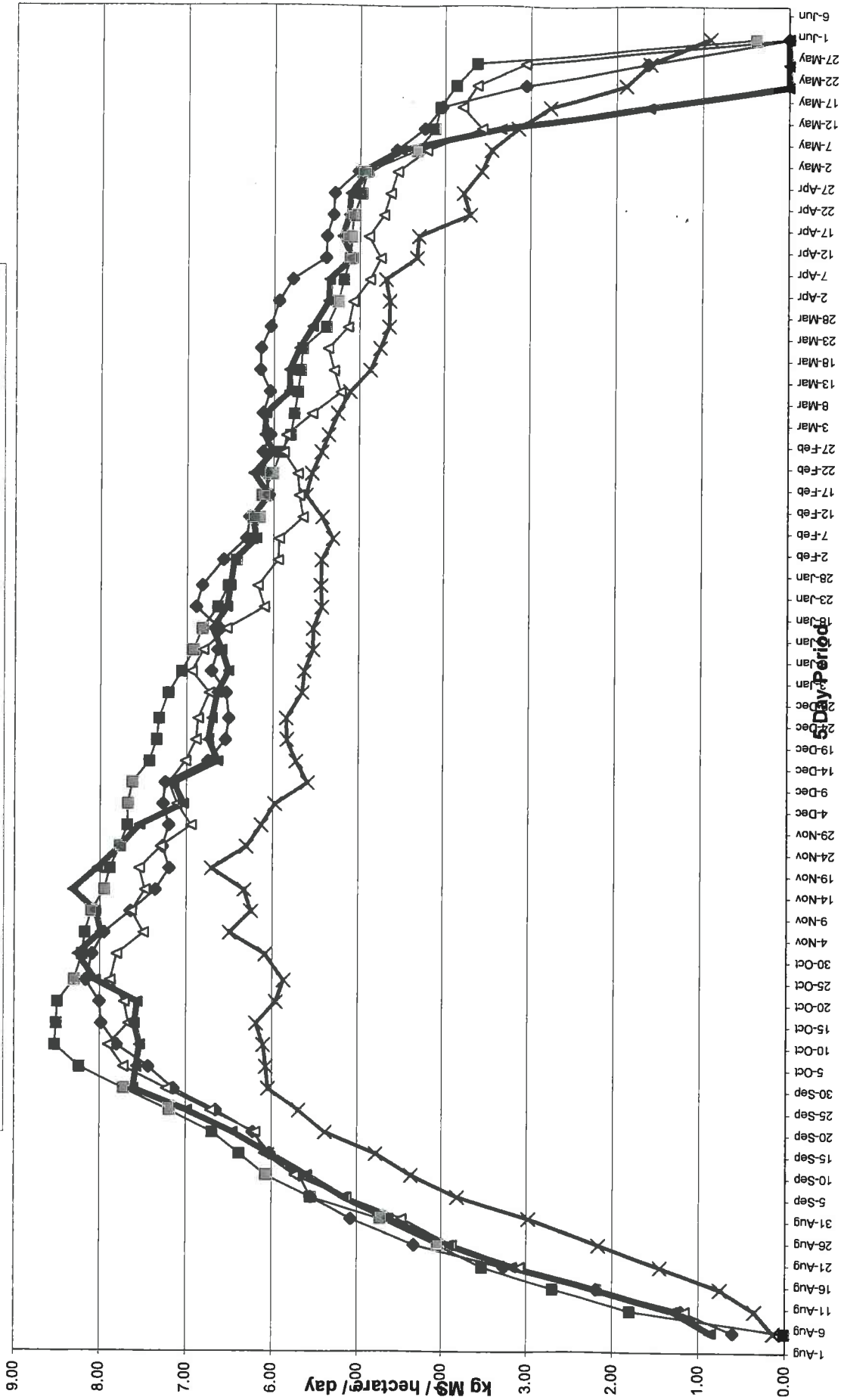
Programme

5.45 pm	Register Light Meal, tea/coffee	 The National Bank of New Zealand
6.30 pm	Welcome - Introduction to the programme – Main Hall	Virginia Serra
6.35 pm	The Season at LUDF vs Budget - Farm Production	Peter Hancox
6.50 pm	Introduction to: - End of year financials - DairyBase comparisons - Budget 2008/09	George Reveley
7.00 pm	Break into 3 Groups	Virginia Serra
7.30 pm	Financial Question Session	George Reveley Adrian van Bysterveldt Peter Hancox
8.00 pm	Wrap up of Question Session	George Reveley
8.05 pm	Irrigation & Effluent Audits and Actions	Peter Hancox, Adrian van Bysterveldt
8.15 pm	Runoff Review	George Reveley
8.25 pm	Greenhouse Gases – using LUDF to understand lifecycle analysis and emissions trading	Richard Christie, Andrew Barber
8.50 pm	Wrap Up, Notices and Thanks	Virginia Serra
9.00 pm	Supper - Depart	

Lincoln University Dairy Farm

Lincoln University Dairy Farm Kg MS Production / Ha / Day 2007-2008 Season

Legend:
 -■- Budget (1850 MS/ha) period totals
 -●- 2005/06 Year
 -x- 2002/03 Year
 -△- 2006/07 Year
 -◆- 2007/08 Year

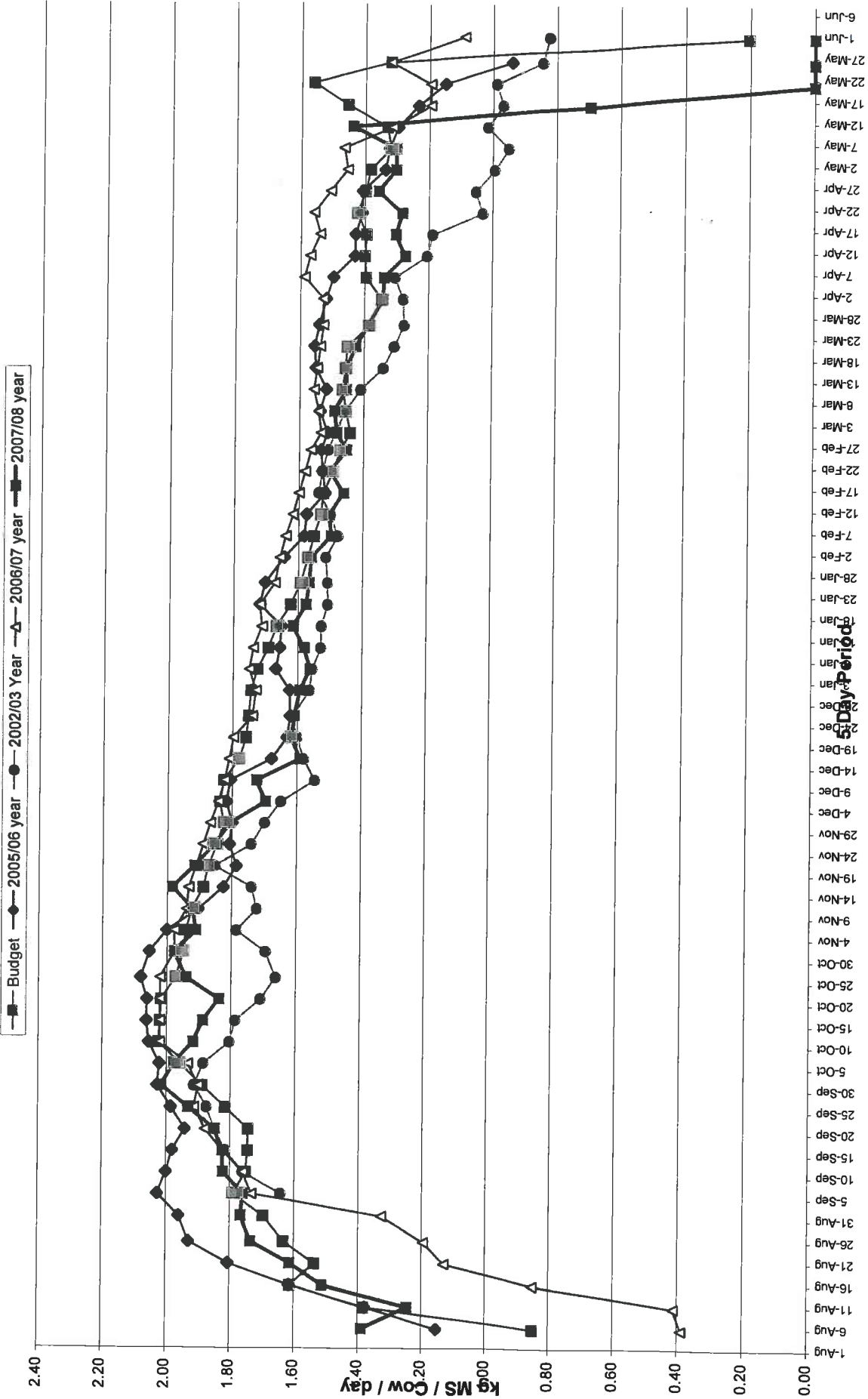


P Hancox - Farm Manager

milk graphs 08.xls

Lincoln University Dairy Farm

Lincoln University Dairy Farm Kg MS Production / Cow / Day 2007-2008 Season



milk graphs 08.xls

P Hancox - Farm Manager

Lincoln University Dairy Farm

Pasture analysis for 2007/08 season - pre grazing cuts

NOTE: We sample the paddocks immediately in front of the milkers, to height of 3.5cm (7 clicks on the rising plate meter)
The yellow entries indicate values that are at extreme or unusual levels.

Sample Reference	Date sampled	% Protein	% WSC	% NDF	% ADF	Digestibility (DMD)	MJIVIC		
							per kgDM	% DM	% OM
S4 - 21.8 clicks	26/06/2007	20.4	31.4	30.1	15.4	88.6	13.2	18.7	90.4
N4 - 19.9 clicks	26/06/2007	20.7	32.3	28.5	15.4	88.0	13.0	21.0	89.5
S1 - 19.4 clicks	27/07/2007	16.9	29.1	36.4	19.0	86.0	12.8	20.5	90.0
S8	23/08/2007	22.3	26.7	30.8	16.6	87.7	13.1	21.6	90.0
S7	24/08/2007	22.1	23.3	36.2	18.6	82.2	12.1	19.8	88.7
S2 - 24.4 clicks	12/09/2007	19.1	26.0	37.2	19.0	85.6	12.6	21.2	89.2
N10 - 23.4 clicks	12/09/2007	20.1	26.1	36.3	18.9	85.5	12.7	20.8	90.0
N2 - 20 clicks	28/09/2007	23.3	20.5	31.1	18.2	85.2	12.5	15.7	88.5
N4 - 23.3 clicks	28/09/2007	21.5	23.1	33.2	18.7	85.3	12.6	17.4	89.4
N6 - 24 clicks	28/09/2007	23.5	17.8	33.4	19.2	84.7	12.3	16.8	87.8
S3 - 22.1 clicks	4/10/2007	23.5	19.3	36.9	20.0	84.3	12.4	16.5	88.8
S6 - 23.4 clicks	4/10/2007	19.3	23.4	34.9	21.2	83.2	12.2	17.9	88.7
N11 - 22.9 clicks	4/10/2007	23.6	21.1	33.1	18.3	84.6	12.3	17.1	88.1
S8 - 16 clicks	25/10/2007	24.6	20.2	34.2	18.3	84.1	12.5	17.8	89.8
S9 - 17 clicks	25/10/2007	24.4	20.0	34.7	18.9	84.2	12.5	18.7	89.3
N7 - 17.1 clicks	12/11/2007	25.7	18.0	31.5	18.6	83.8	12.3	14.9	88.6
N6 - 16.4 clicks	12/11/2007	21.9	19.9	30.8	19.2	82.5	12.1	15.3	88.2
N11 - 18.6 clicks	28/11/2007	23.3	15.1	37.5	20.7	81.0	11.9	15.8	88.4
S2 - 22.4 clicks	4/12/2007	22.4	16.5	28.8	21.4	80.3	11.9	15.5	89.0
S8 - 21.6 clicks	4/12/2007	22.6	17.6	34.1	20.3	81.0	11.9	14.1	88.3
N4 - 21.4 clicks	4/12/2007	28.5	14.7	32.7	18.8	81.8	12.0	14.8	88.7
N1 - 16.9 clicks	19/12/2007	21.6	16.8	33.5	20.2	81.9	12.1	16.4	88.8
S2 - 18.9 clicks	19/12/2007	20.6	17.9	36.6	21.0	81.1	12.1	19.0	89.6
N1 - 17.7 clicks	10/01/2008	21.7	15.5	36.1	21.0	80.8	11.9	14.7	88.5
N6 - 17.3 clicks	10/01/2008	21.9	15.5	37.1	21.9	79.1	11.6	14.9	88.5
N4 - 17.2 clicks	16/01/2008	21.8	16.4	34.8	20.4	79.8	11.8	16.3	88.8
N7 - 19.9 clicks	16/01/2008	21.4	16.9	35.3	19.8	82.2	12.2	17.0	89.3
S6 - 17.5 clicks	16/01/2008	25.2	15.6	33.3	19.3	82.1	12.1	16.0	88.8
N9 - 18.8 clicks	25/02/2008	24.9	12.6	36.6	22.1	80.1	11.8	16.0	89.1
N10 - 17.8 clicks	25/02/2008	24.0	13.2	39.3	23.0	79.6	11.8	15.8	89.4
N2 - 18.2 clicks	17/03/2008	21.8	15.5	37.0	20.8	80.8	11.9	15.6	88.6
N7 - 18.0 clicks	17/03/2008	22.8	15.1	33.8	21.2	81.1	11.9	15.0	88.5
S1 - 22.7 clicks	28/03/2008	20.7	17.8	36.3	21.2	81.9	12.0	15.7	88.5
S3 - 20.9 clicks	28/03/2008	25.4	13.8	35.7	20.2	81.4	12.0	15.7	89.1
N1 - 19 clicks	18/04/2008	26.5	13.4	35.9	20.4	82.6	12.3	13.7	89.8
S6 - 20.6 clicks	18/04/2008	22.0	15.8	38.6	21.5	82.0	12.2	13.1	89.6
N6 - 14 Clicks	12/05/2008	23.3	22.3	32.5	18.6	84.6	12.6	18.3	89.9
S8 - 13.3 Clicks	12/05/2008	23.2	24.2	31.1	17.8	84.8	12.7	18.4	90.1
CURRENT ROLLING AVERAGES :		22.6	19.5	34.4	19.6	83.0	12.3	16.9	89.1

Weekly Dataset from Lincoln University Dairy Farm

Date (Totals at end of period)	29-Apr-08	6-May-08	13-May-08	20-May-08	COWS
Total Cows Wintered (July 1st Total)	704	704	704	704	HAVE
Farm grazing ha (available to milkers)	161.5	161.5	161.5	161.5	BEEN
Dry Cows on farm / East block / other	0/9/0	0/46/0	0/197/0	0/210/0	DRIED
Culls (Includes culls put down & empties)	0	0	65	0	OFF
Culls total to date	29	29	94	94	
Deaths (Includes cows put down)	0	0	0	0	THIS
Deaths total to date	11	11	11	11	IS
Calved Cows available (Peak Number 680...)	647	610	394	370	THE
Treatment / Sick mob total	5	6	0	0	LAST
<i>lame, mastitis, other, colostrums</i>	2/5/0/0	2/6/0/0	0/0/0/0	0/0/0/0	DATA
Milking twice a day into vat	640	602	394	370	SHEET
Milking once a day into vat	2	2	0	0	FOR
Total Cows Milked into vat	642	604	394	370	2007-08
Days in Milk actual cow days/Peak Cows	249	255	259	263	SEASON
MS/cow/day (Actual kg / Cows into vat only)	1.3	1.2	1.22	1.21	
MS/cow to date (total kgs / Peak Cows 680)	397	405	410	414	
MS/ha/day (total kgs / Total ha used - eg 161.5ha)	5.1	4.6	3.0	2.8	
MS/ha to date (total kg / Total ha used)	1673	1705	1725	1744	
Herd Average Condition Score					
Whole Herd LW (kgs)	497	499	510	519	
Soil Temp Tues 10.00am 10cm	12.0	7.5	6.0	6.5	
Growth Rate (kgDM/ha/day)	46	17	29	19	
Plate meter height - ave half-cms	11.6	10.2	10.4	9.9	
Ave Pasture Cover (x140 + 500)	2126	1939	1953	1894	
Pre Grazing cover (ave for week)	3243	2809	2460	2563	
Post Grazing cover (ave for week)	1480	1450	1450	1450	
Highest pre-grazing cover	3340	2870	2772	2708	
Area grazed / day (ave for week)	5.40	5.12	3.40	3.40	
Grazing Interval	30	32	48	48	
Pasture ME (pre grazing sample)					
Pasture % Protein					
Pasture % DM					
Pasture % NDF					
Supplements Type	Grass silage	Grass silage	Grass silage	Grass silage	
Supplements fed kg DM/cow/day in paddock	4.2	7.0	6.7	6.7	
Supplements fed to date kg per cow (680 peak)	411	461	481	502	
Supplements Made Kg DM / ha cumulative	401.8	401.8	401.8	401.8	
Units N applied/ha and % of farm	20units,22%	20units,16%	20units,19%	0	
Kgs/ha N to Date (on the NON-effluent area 133ha)	190	194	199	199	
Rainfall (mm)	0	53est	0	0.4	
ET Weekly Soil & Science readings (mm)	18est	5est	5est	9.0	
Days irrigated each week	0	0	0	0	
Irrigation mm applied per week	0	0	0	0	
Stock Water Consumed litres / cow / day	76	58	41	54	

Lincoln University Dairy Farm - Farm Walk notes

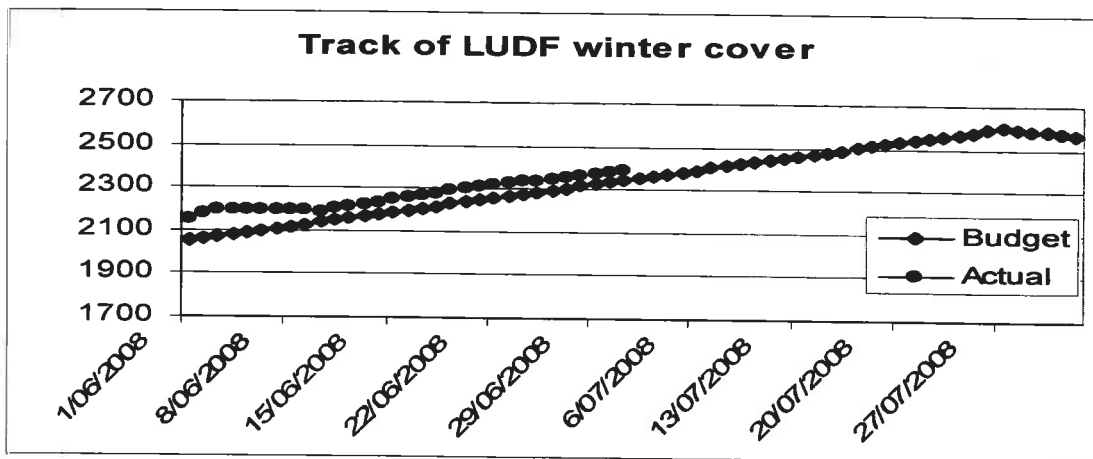
Tuesday, 1st July 2008

Critical issues for the short term

1. Monitor condition score gain and draft out cows not making fast enough progress particularly those mobs on Kale.
2. Look out for and treat any cow with mastitis.

Summary of Key Factors affecting Grazing Management & Animal Performance

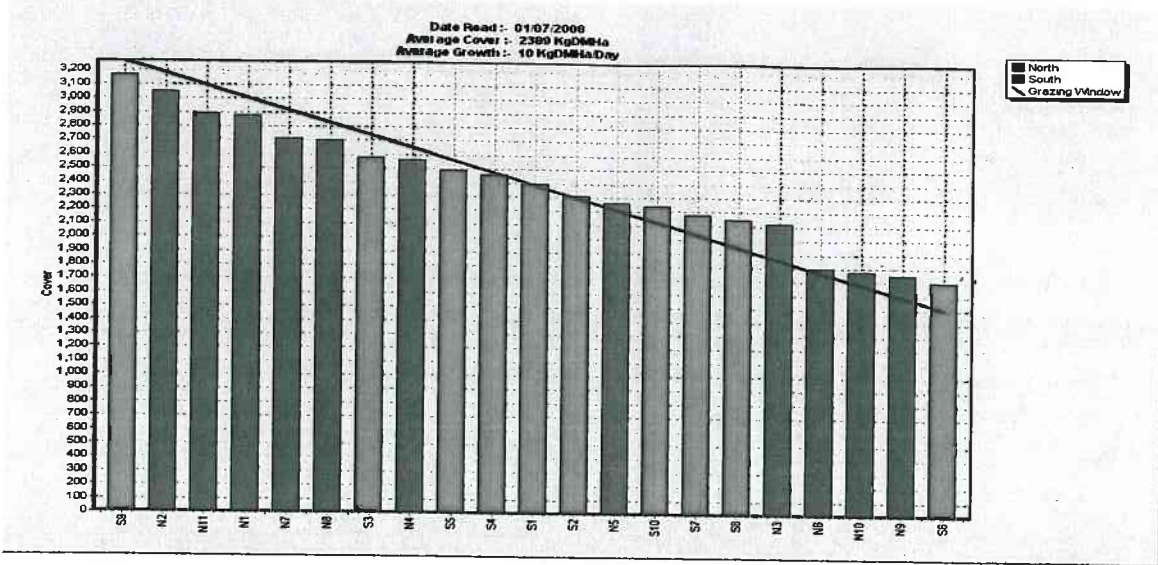
3. SOIL TEMP at 9am has varied between 2 and 7 °C, with the average about 5 °C.
4. PASTURE GROWTH was 10 kg DM/ha (last week 19 on the milking platform).
5. Average pasture cover has risen from 2302 kg DM/ha to 2389 kg DM/ha.



6. The target average cover for the planned start of calving has been lifted from 2500 to 2600 because more cows are going to be coming home earlier from winter grazing than earlier planned. We needed to do this to make the feed budget work.
7. The need to lift the target average farm cover on the platform to 2600 has also put on more pressure to find some additional grazing for the mob on the farm. Since the last farm walk we have had the 126 thinnest cows on the milking platform for only two days, otherwise they were eating a paddock of overly long grass on the heifer runoff. This paddock was going yellow in the base and if left for several more weeks the re-growth would have been slow. The mob was back fenced and the re-growth on the first breaks in the paddock is very noticeable.
8. All mobs are back fenced and when there is rain forecast they are also on/off grazed. This means between 4 and 8 hours on the paddock and up to 20 hours in the dairy yard. Ground conditions are currently very soft on the south block after the 65mm of rain over the last few days.

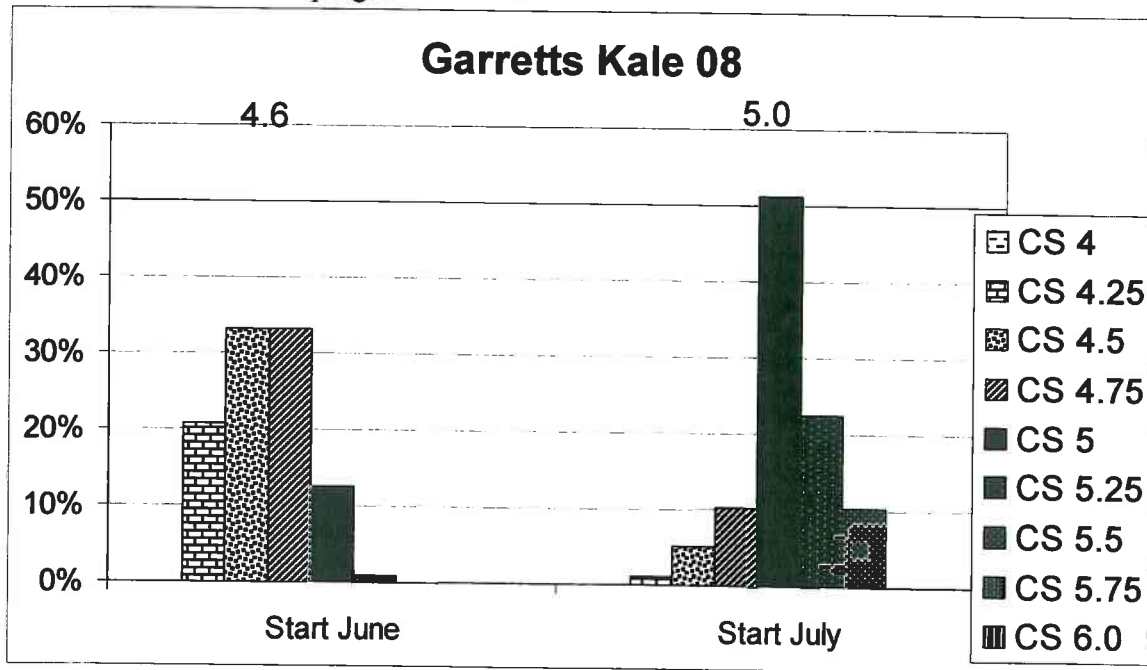
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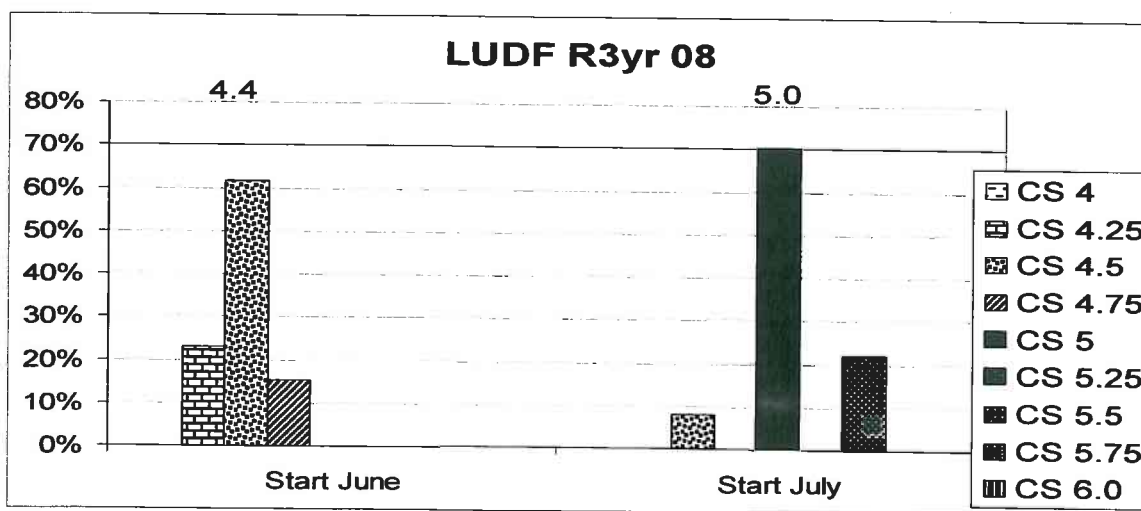
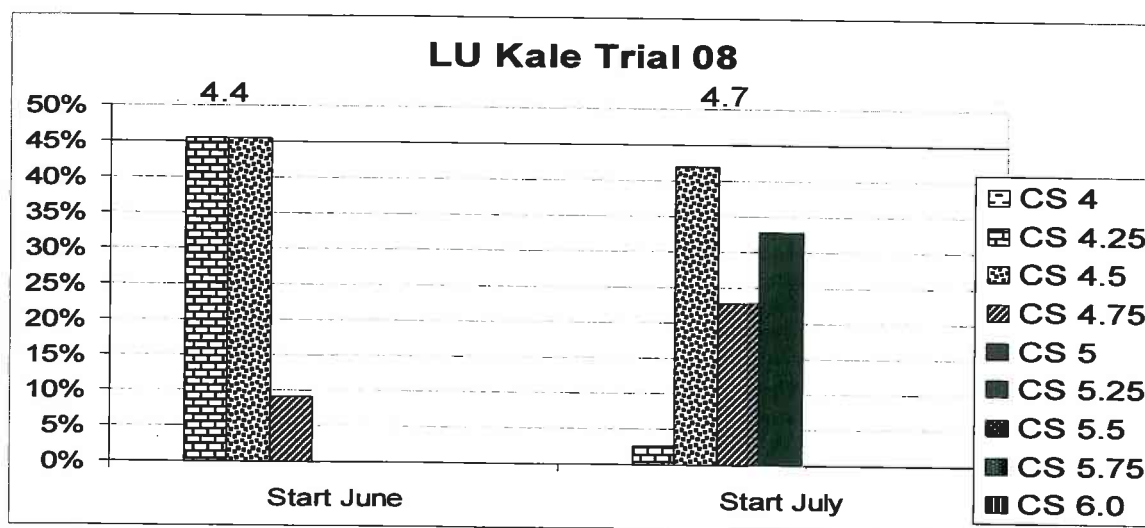
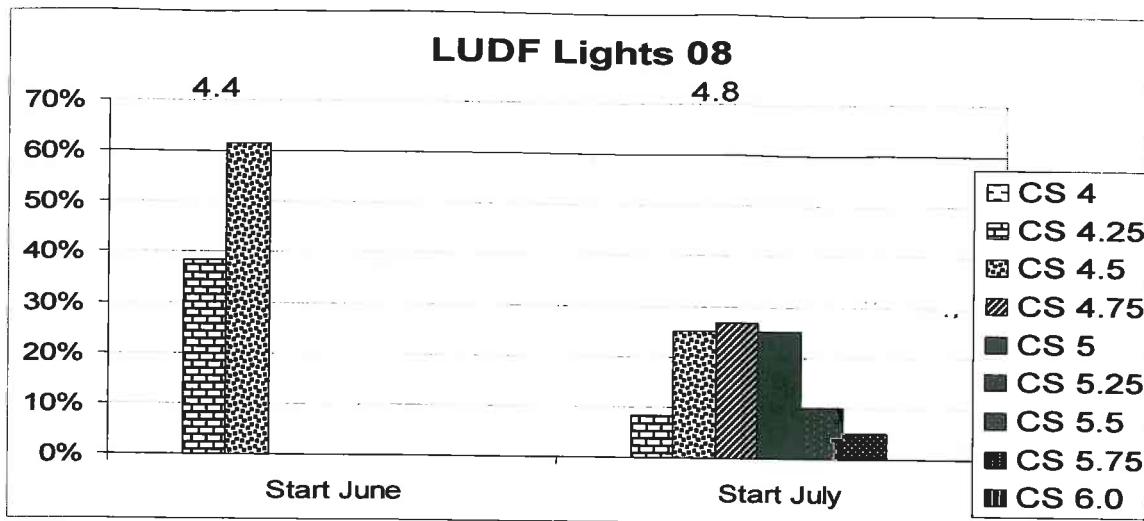
This weeks pasture wedge



10. The target line is at the average cover for our budgets for today and the wedge shows that we have achieved this and the wedge is getting steeper in shape.

11. Cow condition score progress is as follows





The next WEEKLY farm walk is on Tuesday 8th July 2008 at 9.00am.
 Farmers or their managers are always welcome to walk with us. Please call to notify us of your intention and bring your plate meter.

Management Group

Peter Hancox (Farm Manager), George Reveley (for SIDDC), and Adrian van Bysterveldt DairyNZ).



Variance Report for LUDF

Compare Actuals Actual(2008) With Budget - Main (2008)
DateRange: Jun To May

	Actuals 2008		Budget 2008		Variance		GST Exclusive Actuals 2008 as a % of Budget 2008	
	\$	Qty	\$	Qty	\$	Qty	\$	Qty
INCOME								
Cattle Sales (Sales)								
Bobby Calves	7,076	423	15,465	388	(8,389)	35	46 %	109 %
R1yr Heifers	54,000	45			54,000	45	0 %	0 %
R2yr Heifers	3,390	6			3,390	6	0 %	0 %
Mixed Age Cows	90,876	136	47,735	4	43,141	132	190 %	999 %
	155,342		63,200		92,142		246 %	
INCOME	155,342		63,200		92,142		246 %	
MILK								
Milk Sales								
Milk Solids	1,837,246	278560.4	1,430,805	294700	406,441	(16139.6)	128 %	95 %
Milk [Final Payment]	355,021		198,775	589400	156,246	(589400)	179 %	0 %
	2,192,267		1,629,580		562,687		135 %	
MILK	2,192,267		1,629,580		562,687		135 %	
NET INCOME	2,347,609		1,692,780		654,829		139 %	
FARM EXPENSES								
Administration								
Accounting Svces	(2,718)		(2,500)		(218)		109 %	0 %
Tolls(claimable)	(2,741)		(4,800)		2,059		57 %	0 %
Stationery	(391)		(496)		105		79 %	0 %
Hospitality/Sundry	(2,329)		(1,600)		(729)		146 %	0 %
Other Admin Expense	(15)		(46)		31		33 %	0 %
Farm Consultant	(19,528)		(16,850)		(2,678)		116 %	0 %
Internet Charges	(742)		(1,908)		1,166		39 %	0 %
	(28,464)		(28,200)		(264)		101 %	
Animal Health								
Vet Fees	(7,875)		(3,908)		(3,967)		202 %	0 %
Drench	(2,492)		(3,046)		554		82 %	0 %
Trace Minerals	(9,754)		(9,475)		(279)		103 %	0 %
Vaccines	(1,168)		(2,310)		1,142		51 %	0 %
Other Drugs	(679)		(2,077)		1,398		33 %	0 %
Mastitis/Dry Cow	(11,634)		(9,283)		(2,351)		125 %	0 %
Bloat	(4,650)	1000	(4,061)		(589)	1000	115 %	0 %
Teatspray	(2,780)	500	(2,707)		(73)	500	103 %	0 %
Calving Expenses	(1,390)		(1,440)		50		97 %	0 %
	(42,422)		(38,307)		(4,115)		111 %	
Breeding Expenses								
Admin /Identity Tags	(14,407)		(14,378)		(29)		100 %	0 %
Herd Test	(4,900)		(3,086)		(1,814)		159 %	0 %
Lease Sires	(6,020)	14	(4,200)		(1,820)	14	143 %	0 %
CIDR's	(3,255)	55	(3,720)		465	55	87 %	0 %
Artificial Insem.	(17,419)		(22,524)		5,105		77 %	0 %
Pregnancy testing	(3,062)		(2,910)		(152)		105 %	0 %
MINDA	(3,241)		(2,796)		(445)		116 %	0 %
	(52,305)		(53,614)		1,309		98 %	
Electricity								
Irrigation Power	(48,533)		(60,000)		11,467		81 %	0 %
Dairy Shed	(17,012)		(17,868)		856		95 %	0 %
	(65,544)		(77,868)		12,324		84 %	
Feed								
Winter Grazing	(85,596)		(69,120)		(16,476)		124 %	0 %
Hay/Straw Purchases	(1,890)		(3,520)		1,630		54 %	0 %



Variance Report for LUDF

Compare Actuals Actual(2008) With Budget - Main (2008)
DateRange: Jun To May

	Actuals 2008		Budget 2008		Variance		GST Exclusive Actuals 2008 as a % of Budget 2008	
	\$	Qty	\$	Qty	\$	Qty	\$	Qty
Feed								
Silage Purchased	(85,921)	455959.8			(85,921)	455959.8	0 %	0 %
Calf feed	(10,929)	12.3	(3,762)		(7,167)	12.3	291 %	0 %
Grazing R1	(8,023)		(8,892)		869		90 %	0 %
Grazing R2	(15,346)		(3,520)		(11,826)		436 %	0 %
Silage Making	(8,456)	22110	(35,000)		26,544	22110	24 %	0 %
	(216,161)		(123,814)		(92,347)		175 %	
Fertiliser								
Superphosphate	(19,297)	85680	(15,494)		(3,803)	85680	125 %	0 %
Nitrogen (Urea)	(39,209)	61105	(37,690)		(1,519)	61105	104 %	0 %
Eco-n	(21,050)	315.5	(15,268)		(5,782)	315.5	138 %	0 %
Fertiliser Spreader	(10,494)	1054.3	(10,299)		(195)	1054.3	102 %	0 %
	(90,050)		(78,751)		(11,299)		114 %	
Regrassing								
Category	(370)				(370)		0 %	0 %
Cultivation	(2,700)		(5,460)		2,760		49 %	0 %
Drilling	(814)		(770)		(44)		106 %	0 %
Spraying	(2,759)		(1,893)		(866)		146 %	0 %
Seed Purchase	(1,605)	206.4	(3,924)		2,319	206.4	41 %	0 %
	(8,248)		(12,047)		3,799		68 %	
Rates & Insurance								
Insurance	(6,000)		(6,000)				100 %	0 %
Rates	(7,914)		(7,914)				100 %	0 %
	(13,914)		(13,914)				100 %	
Repairs & Maint								
Farm Buildings	(73)		(989)		916		7 %	0 %
House Maintenance	(95)		(2,500)		2,405		4 %	0 %
Water Supply	(488)		(989)		501		49 %	0 %
Irrigation	(17,956)		(12,312)		(5,644)		146 %	0 %
Fences & Yards	(15,098)		(3,000)		(12,098)		503 %	0 %
Shelter Trees	(5,134)		(5,000)		(134)		103 %	0 %
Drainage	(8,380)		(9,000)		620		93 %	0 %
Tracks	(15,335)		(9,000)		(6,335)		170 %	0 %
Tools	(903)		(2,000)		1,097		45 %	0 %
Plant & Equipment	(3,040)		(6,505)		3,465		47 %	0 %
Dairy Shed Plant	(7,532)		(6,000)		(1,532)		126 %	0 %
Effluent	(9,820)		(3,000)		(6,820)		327 %	0 %
Minor Cap. purchases	(5,108)		(5,000)		(108)		102 %	0 %
	(88,963)		(65,295)		(23,668)		136 %	
Shed Expenses								
Detergents	(2,692)		(4,500)		1,808		60 %	0 %
Cleaners	(186)		(1,100)		914		17 %	0 %
Rubberware	(1,707)		(4,100)		2,393		42 %	0 %
Filters	(189)		(600)		411		31 %	0 %
Brooms and Brushes	(454)		(800)		346		57 %	0 %
	(5,228)		(11,100)		5,872		47 %	
Vehicle Expenses								
Petrol	(3,247)	211.3	(3,500)		253	211.3	93 %	0 %
Diesel	(4,988)	1900	(7,500)		2,512	1900	67 %	0 %
Oil & grease	(528)		(400)		(128)		132 %	0 %
Ute	(1,425)		(3,000)		1,575		48 %	0 %
Tractor	(2,903)		(3,000)		97		97 %	0 %
Motorbike	(5,696)		(4,000)		(1,696)		142 %	0 %



Variance Report

for
LUDF

Compare Actuals Actual(2008) With Budget - Main (2008)
DateRange: Jun To May

	Actuals 2008		Budget 2008		Variance		GST Exclusive Actuals 2008 as a % of Budget 2008	
	\$	Qty	\$	Qty	\$	Qty	\$	Qty
Vehicle Expenses								
WOF & rego	(18,787)		(600)		600		0 %	0 %
			(22,000)		3,213		85 %	
Wages & Employment								
Perm Staff/Bonus	(13,697)		(12,000)		(1,697)		114 %	0 %
Casual	(18,216)	1170.5	(7,920)		(10,296)	1170.5	230 %	0 %
Accrued Leave	(1,839)				(1,839)		0 %	0 %
ACC	(4,926)		(4,926)				100 %	0 %
Protective clothing	(2,055)		(2,076)		21		99 %	0 %
Recruitment	(2,500)		(1,518)		(982)		165 %	0 %
Staff Development	(1,867)		(1,800)		(67)		104 %	0 %
Assistant 2	(144,276)		(146,124)		1,848		99 %	0 %
Stores/Tea Supplies			(600)		600		0 %	0 %
	(189,376)		(176,964)		(12,412)		107 %	
Weed & Pest								
Herbicides	(1,977)		(1,938)		(39)		102 %	0 %
	(1,977)		(1,938)		(39)		102 %	
FREIGHT								
Freight Livestock	(2,500)				(2,500)		0 %	0 %
Freight General	(522)		(677)		155		77 %	0 %
	(3,022)		(677)		(2,345)		446 %	
FARM EXPENSES	(824,460)		(704,489)		(119,971)		117 %	
TRADING SURPLUS	1,523,149		988,291		534,858		154 %	
RUN-OFF EXPENSES								
Run-off Fertiliser								
Category	(24,666)	41211.1	(30,078)		5,412	41211.1	82 %	0 %
	(24,666)		(30,078)		5,412		82 %	
Run-off regrassing								
Category	(6,019)		(2,395)		(3,624)		251 %	0 %
	(6,019)		(2,395)		(3,624)		251 %	
Run-off R & M								
Category	(84)		(3,300)		3,216		3 %	0 %
General	(20,716)		(17,600)		(3,116)		118 %	0 %
Vehicle			(500)		500		0 %	0 %
	(20,800)		(21,400)		600		97 %	
Run-off Admin								
Category	(33,150)		(33,150)				100 %	0 %
	(33,150)		(33,150)				100 %	
RUN-OFF EXPENSES	(84,636)		(87,023)		2,387		97 %	
RUN-OFF SURPLUS	(84,636)		(87,023)		2,387		97 %	
GST								
GST								
GST Payments			(86,023)		86,023		0 %	0 %
GST Component			116,511		(116,511)		0 %	0 %
			30,488		(30,488)		0 %	
GST			30,488		(30,488)		0 %	
INCOME (EXPENSE)	\$ 1,438,514		\$ 931,756		\$ 506,758		154 %	



Physical Data Summary

Lincoln University Dairy Farm
Dairy Season ended: 2008

Date Printed: 30 June 2008
Farm ID: 420232

Dairy Co Supplied:	Fonterra	Balance Month:	June
Production System:	3	Milking Interval:	Twice a day
Business Type:	Owner operator	Organic:	No
Calving Season:	Spring only	District	Selwyn
Winter Milk:	No	Season's rainfall (mm):	
Region:	Marlborough-Canterbury	Predominant Soil Type	Sedimentary
NIWA 10 Yr Av Rainfall (mm):	0		
% Milking Area Irrigated:	More than 30%		
Farm Dairy Type:	R50		

Stock	
Predominant dairy breed:	Crossbred
Peak Cows Milked:	680
Stocking rate (Cows/ha):	4.2
Replacement Calves Reared:	245
Non-replacement Calves Reared:	52

Land Area (ha)	
Total Dairying area:	185.0
less Ungrazeable area:	23.5
Effective Dairying area:	161.5
less Defined Young Stock area:	0
Milking area:	161.5
Dairy Run-off effective area:	51.0
Non-dairy effective area:	0.0

Labour	
Full time paid labour equivalents:	3.5
Full time unpaid labour equivalents:	0.0
FTE unpaid management:	0.0
Total FTEs:	3.5
Milking Cups per FTE	14.4

Production	Total	Per ha	Per cow	Composition
Milk Litres:	3,165,088	19,598	4,655	
Fat kg:	163,382	1,012	240	5.2%
Protein kg:	118,311	733	174	3.7%
Milksolids kg:	281,693	1,744	414	8.9%
Non-replacement calf milk (l):	14,560			
Non-replacement calf MS (kg):	1,296			

Number in Benchmark Group:	
Benchmark Group Selected by:	
Benchmark Group Ranked by:	

Data entered by:	Financial: DairyBase	Extended Physical:
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Key Performance Indicators

Lincoln University Dairy Farm
Dairy Season ended: 2008

Date Printed: 30 June 2008
Farm ID: 420232

Number in Benchmark Group:

Benchmark Group Selected by:

Benchmark Group Ranked by:

FARM PHYSICAL KPI's	2007-08		2006-07		2005-06	
	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
Cows/ha	4.2		4.1		4.0	
Kg Milksolids/ha	1,744		1,703		1,775	
Kg Milksolids/cow	414		410		440	
Cows/FTE	196		186		163	
Kg MS/FTE	81,258		76,379		71,685	

PROFITABILITY Dairy	2007-08		2006-07		2005-06	
	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
Gross Farm Revenue/ha	14,732		8,386		7,903	
Operating Expenses/ha	6,174		5,369		5,306	
Operating Profit (EFS)/ha	8,558		3,017		2,597	
Gross Farm Revenue/kg MS	8.45		4.93		4.45	
Operating Expenses/kg MS	3.54		3.15		2.99	
Operating Profit (EFS)/kg MS	4.91		1.77		1.46	
FWE/kg MS	3.23		2.81		2.67	
Operating Profit Margin %	58.1%		36.0%		32.9%	
Asset Turnover %	26.2%		16.2%		18.8%	
Operating Return on Dairy Assets %	15.2%		5.8%		6.2%	

Financial Detail

Lincoln University Dairy Farm
Dairy Season ended: 2008

Date Printed: 30 June 2008
Farm ID: 420232

Number in Benchmark Group:

Benchmark Group Selected by:

Benchmark Group Ranked by:

	Total \$		\$ Per kg MS		\$ Per Ha		\$ Per Cow	
	Farm	% of GFR	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
GROSS FARM REVENUE (GFR)								
Net Milk Sales	2,192,267	92.1%	7.78		13,574		3,224	
Net Dairy Livestock Sales	155,342	6.5%	0.55		962		228	
Value of Change in Dairy Livestock	31,635	1.3%	0.11		196		47	
Other Dairy Revenue	0	0.0%	0.00		0		0	
Dairy Gross Farm Revenue	2,379,244	100.0%	8.45		14,732		3,499	
Non-Dairy Cash Income	0	0.0%	0.00		0		0	
Value of Change in Non-dairy livestock	0	0.0%	0.00		0		0	
TOTAL GROSS FARM REVENUE	2,379,244	100.0%	8.45		14,732		3,499	
OPERATING EXPENSES								
Labour Expenses								
Wages	187,321	7.9%	0.66		1,160		275	
Labour Adjustment - Unpaid	0	0.0%	0.00		0		0	
Labour Adjustment - Management	0	0.0%	0.00		0		0	
Total Labour Expenses	187,321	7.9%	0.66		1,160		275	
Stock Expenses								
Animal Health	42,422	1.8%	0.15		263		62	
Breeding & Herd Improvement	52,305	2.2%	0.19		324		77	
Farm Dairy	5,228	0.2%	0.02		32		8	
Electricity (Farm Dairy, Water Supply)	17,012	0.7%	0.06		105		25	
Total Stock Expenses	116,967	4.9%	0.42		724		172	
Feed Expenses								
Supplement Expenses								
Net Made, Purchased, Cropped	96,267	4.0%	0.34		596		142	
Less Feed Inventory Adjustment	12,500	0.5%	0.04		77		18	
Calf Feed	10,929	0.5%	0.04		68		16	
Total Supplement Expenses	94,696	4.0%	0.34		586		139	
Grazing & Run Off Expenses								
Young & Dry Stock Grazing	74,854	3.1%	0.27		463		110	
Winter Cow Grazing	85,596	3.6%	0.30		530		126	
Run-off Lease	33,150	1.4%	0.12		205		49	
Owned Run-off Adjustment	0	0.0%	0.00		0		0	
Total Grazing & Run-Off expenses	193,600	8.1%	0.69		1,199		285	
Total Feed Expenses	288,296	12.1%	1.02		1,785		424	
Other Working Expenses								
Fertiliser	29,791	1.3%	0.11		184		44	
Nitrogen	60,259	2.5%	0.21		373		89	
Irrigation	48,533	2.0%	0.17		301		71	
Regrassing	8,248	0.3%	0.03		51		12	
Weed & Pest	1,977	0.1%	0.01		12		3	
Vehicles	10,024	0.4%	0.04		62		15	
Fuel	8,763	0.4%	0.03		54		13	
R & M - land & buildings	67,063	2.8%	0.24		415		99	
R & M - plant and equipment	21,899	0.9%	0.08		136		32	
Freight and General	5,077	0.2%	0.02		31		7	
Total Other Working Expenses	261,634	11.0%	0.93		1,620		385	
Overheads								
Administration	28,464	1.2%	0.10		176		42	
Insurance	6,000	0.3%	0.02		37		9	
ACC	0	0.0%	0.00		0		0	
Rates	7,914	0.3%	0.03		49		12	
Depreciation	100,576	4.2%	0.36		623		148	
Total Overheads	142,954	6.0%	0.51		885		210	
Total Dairy Operating Expenses	997,172	41.9%	3.54		6,174		1,466	
Non-Dairy Operating Expenses	0							
TOTAL OPERATING EXPENSES	997,172	41.9%	3.54		6,174		1,466	
OPERATING PROFIT								
DAIRY OPERATING PROFIT (EFS)	1,382,072	58.1%	4.91		8,558		2,032	
Non-Dairy Operating Profit	0	0.0%	0.00		0		0	
TOTAL OPERATING PROFIT	1,382,072	58.1%	4.91		8,558		2,032	

Lincoln University Dairy Farm

Actual 2006/07 vs 2007/08

Year ending May 31st		2006/07		2007/08			
Milk production	Milksolids	1,703/ha	274,965	281,670	1,744/ha	6,705	
Cows	Peak number & prodn	677cows	4.19/ha	406/cow	680cows	4.21/ha	414/cow
Staff	3.75 FTE's	181cows/FTE		73,324ms/FTE			75,112ms/FTE
Income			c/kgMS	c/kgMS		\$ change	
Milk Income	93%	1,250,426	4.55	7.78	2,192,267	941,841	43%
Stock Sales	6.8%	92,472	0.34	0.55	155,342	62,870	40%
Other Income	0.65%	8,840	0.03			8,840	
Accommodation rentals	0.0%		-	0.14	40,560	40,560	100%
	100%	1,351,738	4.88	8.48	2,388,169	1,036,431	43%
Stock Purchases		4,200				4,200	
Gross Farm Revenue		1,347,538	8,344/ha		2,388,169	1,040,631	44%

Expenses	Actual		2006/07		Actual		\$ change in expense	% change in expense
		\$/cow	c/kgMS	c/kgMS		\$		
Administration	24,093	36	0.09	0.10	28,464	4,371	15%	
Animal Health	38,652	57	0.14	0.15	42,422	3,770	9%	
Breeding Expenses	35,933	53	0.13	0.19	52,305	16,372	31%	
Electricity	17,980	27	0.07	0.06	17,012	-968	-6%	
Employment	186,791	276	0.68	0.67	189,376	2,585	1%	
Employee Accommodation Rentals	-	0	-	0.14	40,560	40,560	100%	
Feed & Grazing, & Runoff	230,726	341	0.84	1.07	300,797	70,071	23%	
Runoff Net Cost (reported in "Feed" above)	24,929	37	0.09	0.30	84,636	59,707	71%	
Fertiliser & Lime	68,096	101	0.25	0.32	90,050	21,954	24%	
Freight & Cartage	3,056	5	0.01	0.01	3,022	-34	-1%	
Irrigation Costs	51,246	76	0.19	0.24	66,489	15,243	23%	
Rates & Insurance	13,914	21	0.05	0.05	13,914	1	0%	
Regrassing	14,689	22	0.05	0.03	8,248	-6,441	-78%	
Repairs & Maintenance	43,288	64	0.16	0.25	71,007	27,719	39%	
Shed Expenses	9,579	14	0.03	0.02	5,228	-4,351	-83%	
Vehicle Expenses	33,506	49	0.12	0.07	18,787	-14,719	-78%	
Weed & Pest	919	1	0.00	0.01	1,977	1,058	54%	
		0	-	0		0		
Cash Farm Working Expenses	797,397	1,178	2.81	3.37	949,657	152,261	16.0%	
Depreciation est	94,666		0.34	0.36	100,600			
Total Operating Expenses	892,063		3.24	3.73	1,050,257			
Dairy Operating Profit	455,476		1.66	4.75	1,337,912	882,437		
	2,820/ha				8,284/ha	5,464		
Cash Operating Surplus	550,142				1,438,512			

Brief Analysis	2004 / 05	2005 / 06	2006/07	2007 / 08
Milksolids payout	\$4.56	\$4.07	\$4.55	\$7.87
Return on Dairy Assets	6.9%	5.5%	6.7%	14.6%
CFWE % of GFR	58%	62%	57%	40%
Operating Profit/ha	\$2,768	\$2,367	\$3,002	\$8,284
Cash Farm Working Expenses / kg milksolids	\$2.64	\$2.68	\$2.81	\$3.37

Lincoln University Dairy Farm

Initial Budget for 2008/09

Year ending May 31		Budget	2008/09		Actual 07 - 08	Difference
Milk production	Milksolids	\$7.00/kgms	1,800/ha	290,700	281,670	1,744/ha 9,030 kgms
Cows	Peak number & prodn	672cows	4.16/ha	433/cow		
Staff	4.35 FTE's	154cows/FTE		66,828ms/FTE		
Income						
Milk Income	92%	2,034,900		c/kgMS 7.00	c/kgMS 7.78	\$ change 2,192,267 - 157,367 -7%
Surplus dairy stock	3%	71,000		0.24	0.55	155,342 -84,342 -54%
Other stock sales	2%	54,443		0.19		
Other Income	0%	-		-	0.00	0 #DIV/0!
Accommodation rentals	2%	40,560		0.14		40560 0
	100%	2,200,903		7.57	8.33	2,388,169 -187,267 -8%
Stock Purchases						
Gross Farm Revenue		2,200,903	13,628/ha		2,388,169	-187,267 -8%

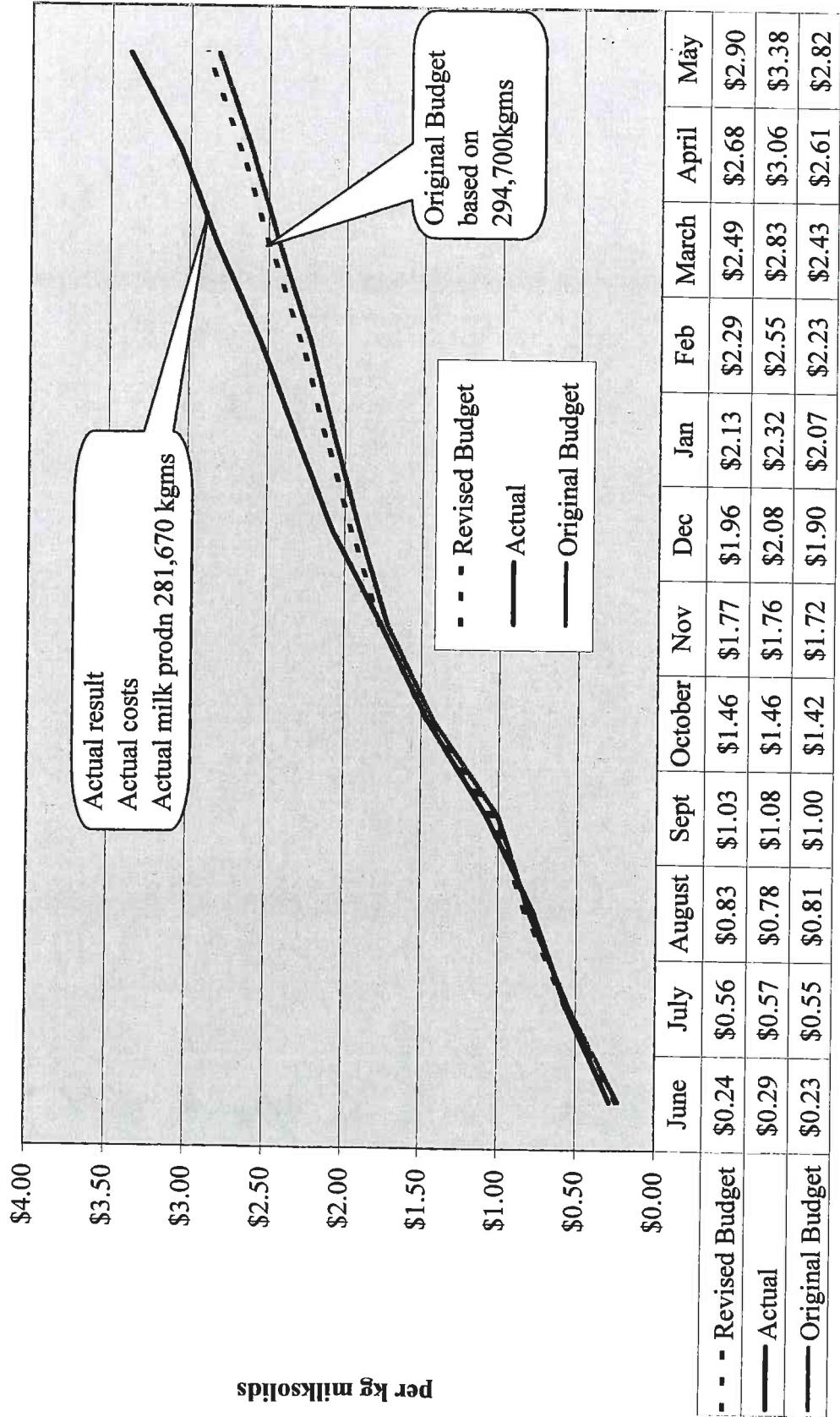
Expenses			2008/09	0	Actual	\$ change in	% change in
		\$/cow	c/kgMS	c/kgMS	\$	expense	expense
Administration		31,100	46	0.11	0.10	28,464	2,636 9%
Animal Health		40,594	60	0.14	0.15	42,422	-1,828 -4%
Breeding Expenses		55,721	83	0.19	0.19	52,305	3,416 7%
Electricity		17,741	26	0.06	0.06	17,012	729 4%
Employment		236,722	352	0.81	0.67	189,376	47,346 25%
Employee Accomodation rentals		40,560	60	0.14	0.14	40,560	0 #DIV/0!
Feed & Grazing, & Support land		383,748	571	1.32	1.07	300,797	82,951 28%
Fertiliser & Lime		133,140	198	0.46	0.32	90,050	43,090 48%
Freight & Cartage		672	1	0.00	0.01	3,022	-2,350 -78%
Irrigation Costs		72,920	109	0.25	0.24	66,489	6,431 10%
Rates & Insurance		14,883	22	0.05	0.05	13,914	969 7%
Regrassing		14,088	21	0.05	0.03	8,248	5,840 71%
Repairs & Maintenance		56,000	83	0.19	0.25	71,007	-15,007 -21%
Support block Net Cost (reported in "Feed" above)		134,590	200	0.46	0.30	84,636	49,954 59%
Shed Expenses		12,750	19	0.04	0.02	5,228	7,522 144%
Vehicle Expenses		22,000	33	0.08	0.07	18,787	3,213 17%
Weed & Pest		1,938	3	0.01	0.01	1,977	-39 -2%
					0	0	
Cash Farm Working Expenses		1,134,577	1,306	3.90	3.37	949,658	184,919 19.5%
Depreciation est		107,426		0.37	0.34	94,666	
Total Operating Expenses		1,242,003		4.27	3.71	1,044,324	
Dairy Operating Profit		958,900	1,427	3.30	4.77	1,343,845	-384,945
		5,937/ha				8,321/ha -	2,384
Cash Operating Surplus		1,066,326				1,438,511	-372,185

Capital Changes							
Fonterra shares						54,448	-54,448
Capital Improvements & Purchases		272,000				106,530	165,470
Principal		-				-	0
Vehicles -		0				-	0
Total Capital changes		272,000				160,978	111,022
Cash Surplus		\$794,326	4,918/ha			\$1,277,533	483,207

Capital (at start of period, June 2008)		change (\$)	% change	% of total gain	Previous season's value	
Land & Improvements	\$44,353 /ha	8,249,664	2,111,664	34.4%	82%	6,138,000
Fonterra Shares	281,670	1,608,336	-256,191	-13.7%	-10%	1,864,527
Farm with shares	\$61,040 /eff ha	9,858,000				
Cows		1,183,600	475,100	67.1%	18%	708,500
R2 Heifers		291,600	111,600	62.0%	4%	180,000
R1 Heifers		240,000	120,300	100.5%	5%	119,700
Plant/Mach		152,550	27,550	22.0%	1%	125,000
Total debt Inc. Current A/c on June 1		-				
Total Capital		11,725,750	2,590,023	28.4%		9,135,727
Change in capital for the 12 months		2,590,023	increase in capital			

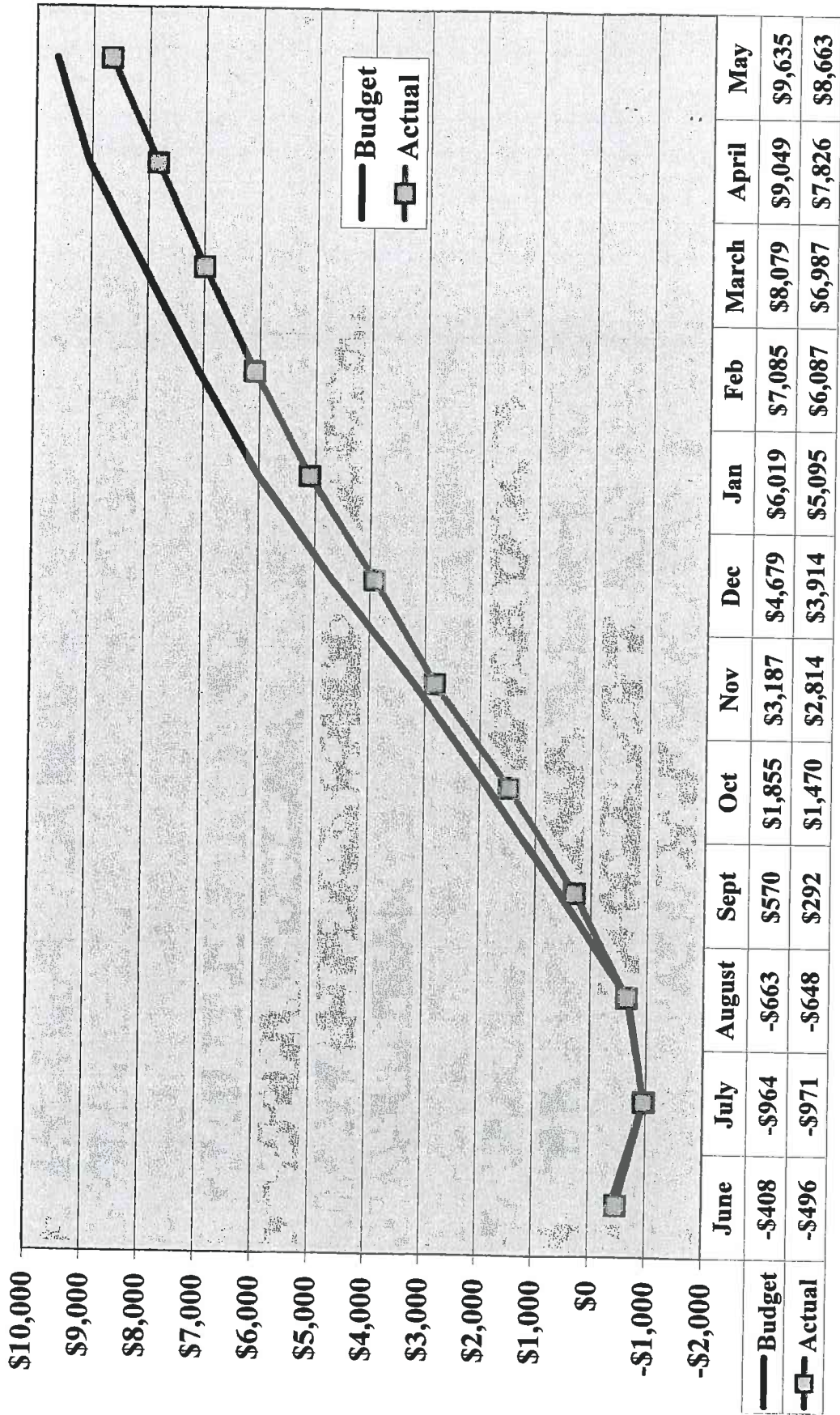
Brief Analysis	2008/09 at a range of payouts						2007 - 08
	2008/09	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	2007-8
Milksolids payout	\$7.00	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	\$7.78
Return on Dairy Assets	8.2%	5.8%	7.0%	8.3%	9.5%	10.7%	14.6%
CFWE % of GFR	52%	59%	55%	51%	48%	45%	40%
Operating Profit/ha	\$5,937	\$4,192	\$5,092	\$5,992	\$6,892	\$7,792	\$8,284
Cash Farm Working Expenses / kg milksolids	\$3.90	\$3.90	\$3.90	\$3.90	\$3.90	\$3.90	\$3.37

Accumulated cost of milk production Actual vs budget based on production of 294,700kg milk solids



LUDF Cash Surplus/ha 2007-08 assuming \$7.87/kg milk solids

Version based on actual costs @ June 20th 2008



Benchmarking best Practice for Irrigation productivity in Canterbury Dairy Farming

**A dissertation submitted in partial
fulfilment of the requirements for
the degree of Master of Applied
Science**

At

Lincoln University

By

William J. Grayling

Lincoln University

2008

Abstract of a dissertation submitted in partial fulfilment of the requirements for the
Degree of M.Appl.Sc

Benchmarking best Practice for Irrigation productivity in Canterbury Dairy Farming

By William J. Grayling

Irrigation is an integral component of Canterbury dairy farming to produce reliable summer pasture production to support high performing dairy cows. Within the Canterbury region there is becoming increased pressure over the allocation and use of the finite resource that is fresh water.

This study investigated the levels of production (milksolids, MS) from irrigation (megalitres, ML) which were being achieved on what were thought to be ten of the best farms in the Canterbury region in terms of converting irrigation water into milk production. From the analysis of case study information for the ten farms involved, benchmark figures for production from water use were developed along with the associated costs of irrigation water.

The highest level of irrigation productivity over three years was 348 kg MS/ML of irrigation or 139 kg MS/ML of total water (irrigation + rainfall); this was on the Lincoln University Dairy Farm (LUDF). Centre pivot irrigated farms had the greatest level of productivity from water use at 106 kg MS/ML of total water followed by rotary boom and border dyke irrigated farms at 87 and 78 kg MS/ML respectively. Target levels of irrigation productivity for Canterbury dairy farms derived from the three best performing farms in this study should be 100-120 kg MS/ML of total water when allowing for the impact of purchased feed (including winter grazing).

Increased irrigation water use resulted in a subsequent decrease in productivity in terms of milksolids per megalitre of irrigation. A strong relationship also existed between drymatter harvested and subsequent milksolids production per unit of water; an

approximate 1% increase in drymatter harvested per hectare resulted in a 2.5% increase in milksolids production from total water used.

The average cost of applying one megalitre of water across the 10 farms was \$35 although this price per megalitre ranged from \$60 for pivot, \$53 for rotary boom and \$7 for border dyke irrigation. When including the cost of capital (9% interest on the purchase cost of system), the cost of water increased to \$116 and \$85/ML for pivot and rotary boom irrigation respectively and \$34/ML for border dyke irrigation.

Operating profit (described as earnings before interest and tax, EBIT) was only able to be gathered accurately for three of the farms in this study with levels ranging from \$233/ML to \$671/ML of irrigation. There is scope for more work into establishing the levels of profitability being achieved on best practice farms and could be a useful set of data in the future.

Two components for potential improvement of irrigation productivity on Canterbury dairy farms are increased soil moisture monitoring to reduce irrigation water applied and the upgrading of irrigation systems to reduce irrigation round lengths. A reduction in the interval between irrigation events will allow farmers to suspend irrigating when climatic conditions are favourable and begin again with the whole farm covered rapidly, preventing potential losses in production.

Keywords: irrigation, irrigation productivity, water use efficiency, dairy farming, milksolids, benchmarks, pasture yield, profitability.



PAGEBLOOMER

On-Site Irrigation Evaluation

Centre Pivot with Overlapping Sprinklers

Report prepared for

Peter Hancox

**Lincoln University Dairy Farm
LINCOLN**

Report Code: PBA07014

Project Date: 26/11/2007

Printed on: 4/03/2008



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Key Findings

An evaluation of the centre pivot irrigation system at Lincoln University Dairy Farm was undertaken for Peter Hancox on 26/11/2007 and 21/01/2008. The evaluation was conducted by Dan Bloomer of Page Bloomer Associates for the Lincoln University Dairy Farm.

The purpose of this evaluation was to assess the performance of the North Pivot, with a prime focus on applied depth and system distribution uniformity. The system had previously been evaluated and significant differences in applied depth found when the corner arm was and was not operating. A number of additional key performance indicators were assessed.

A separate assessment of the effluent distribution system was undertaken as part of a DairyNZ/Sustainable Farming Fund project. The outcomes of that are reported separately.

There is discrepancy between November and March test results. Note the two tests were done under different weather and machine conditions.

Test 1 in November had the corner arm and end gun operating. Test 2 in January did not. There was significantly more wind during testing in November. The machine speeds were different, 50% in November and 100% in January.

Pressure limitations do not appear to be significantly affecting the machine, unlike the findings of the previous evaluation.

Two graphs in the report show depth of water applied in each of the two tests. Based on machine speed control settings (50% and 100%), Test 1 values should be double Test 2 values. This is not the case.

The difference in the mean applied depths appears to be related to machine speed. While the setting was doubled, the measured speed did not double. It increased from 1.48 m/minute to 2.78 m/minute, or only 187%. This compares well with the difference in mean depth measured.

A calculation of travel speed and distance indicates the pivot will complete one revolution of the field in fifteen 15 hours when set at 100% speed. At 50% speed it would take 28 hours.

The graphs show considerable variation in depths applied at points along the machine. This is largely related to effluent blockage effects. However, the slower speed also causes some extra variation as the machine stops over some buckets longer. And wind effects probably increased variation during November testing.

The effluent distribution system is having negative impacts on the performance of the irrigator. Effluent sprays directly on to the irrigation nozzles, coating them in fibrous sludge. This dries, builds up and stops the sprinklers turning. Immediately areas under the jets receive large irrigation applications and other parts much less. Ultimately the effluent build-up prevents water escaping the nozzle altogether.

It was also noted that the sprinklers on the end corner arm unit are not turning off correctly when the arm is folded in. With the arm tracking at 90 degrees (in the end tower radius) there were still up to six sprinklers operating. Because the machine is currently being run backwards this excess adds to the wet soil and wheel track rutting problems.

The system's Potential Application Efficiency (the amount of pumped water stored in the soil for plant growth) is estimated at 76% with the corner arm and end gun

operating, based on calculated distribution uniformity, estimated leakages and estimated runoff.

The low quarter Distribution Uniformity (DU_{lq}) of the system with the corner arm and end gun operating, was calculated at $DU_{lq} = 0.77$ the radial uniformity from Test 1. This is generally considered fair for an irrigation system of this type.

System End Pressure was measured at 152 kPa above the pressure regulator while the corner arm and end gun were operating. When the arm and gun were off, the pressure was slightly higher at 195kPa. These pressures are just satisfactory.

Based on supplied information, the required Crop Irrigation Rate at the time of peak demand is $350 \text{ m}^3/\text{ha}/\text{week}$ or $23100 \text{ m}^3/\text{week}$ if the entire 66.0 ha area is irrigated.

RECOMMENDATIONS

Irrigator travel

- Check the operating speed to ensure machine control set "100%" is twice "50%" speed, and that the time for a single field rotation is as expected.
- Fix the irrigator, so it does not damage fences when operating clockwise.
- Run it clockwise to help address the wheel track rutting problem.

Corner Arm Sprinklers

- Make sure the sprinklers are turning on and off correctly to avoid excess applications and wheel track formation.

Effluent outlets

- Lower the effluent nozzles so the effluent stream does not interfere with irrigation nozzle operation.

1.1.2 Lincoln University Dairy Farm effluent irrigation evaluation

Pivot with splash plates in three sets of seven outlets, approximately one span each set. The seventh outlet on set one is effectively treating part of the area served by set two. Similarly, the seventh outlet on set two is effectively serving area three.

Visual field observations noted definite areas where heavy effluent application had been made (Figure 2). This is most probably the more fibrous component of the effluent stream which appears to be applied first.

Two evaluation tests noted visually quite different material being applied at the beginning of the day's application compared to some twenty minutes later. Pasture growth and utilisation appear very different in these areas.

Table 1: Summary of Effluent Irrigation Performance

Pivot Pots	Section 3	Whole Field	
Application Area	10.36	26.34	ha
Effluent Mean Depth	7.9	7.6	mm
Hi Quartile Mean Depth	13.2	13.8	mm
Low Quartile Mean	2.6	3.1	mm
DU high	1.66	1.81	
DU low	0.32	0.41	
Mean Application Rate	110	106	mm/h
Max Application Rate	183	192	mm/h

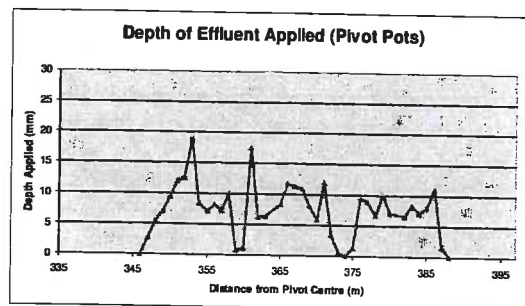


Figure 3. Effluent application pattern measured under span 7

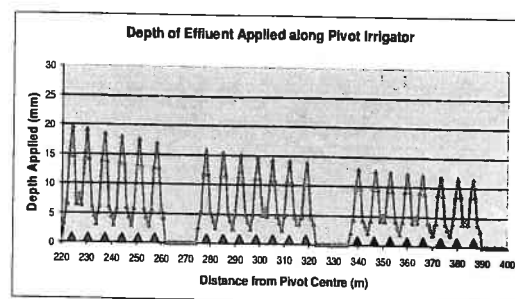


Figure 4. Derived application all sections included.

The graph (Figure 4) is as the machine operates over the field as a whole. The graph assumes each section will be operated at the same pivot speed and for the same number of passes. The application pattern shown is an overlapping of the apparent nozzle performance based on measurements made in the field.

1.1.3 Effluent Application Area

The effective area over which effluent is applied is a calculated value. It is determined from areas calculated by subtracting inner from outer extents of rings of application as determined from derived application patterns (shown in Figure 4).

Table 2: Area of Effective Effluent Coverage

Section		Inner 1	Outer 1	Inner 2	Outer 2	Total (ha)
1	Radii	221	261	275	281	
1	Areas	15	21	24	25	7.11
2	Radii	282	322	337	343	
2	Areas	25	33	36	37	8.87
3	Radii	344	389			
3	Areas	37	48	0	0	10.36
				TOTAL		26.34

1.1.4 Lincoln University Dairy Farm improvements

The effluent irrigation is adversely affecting the performance of the pivot as a water irrigation system. Severe blockages and stoppages of the rotators are clearly evident and is measurably reducing the performance of the machine.

- If possible, the effluent outlets should be lowered sufficiently to avoid splash reaching the irrigator rotator nozzles.

The effluent is applied in bands so not all the area is actually used.

Note that there are varying depths applied as the machine travel speed is higher further from the pivot centre. This effectively compromises efficiency, reducing uniformity across the field as a whole.

- Management can address this by operating the end effluent nozzles more frequently than those closer in to the centre.
- Better management and mixing of effluent from the sump may reduce problems of dumped fibre.

LUDF

The support land a review of 2007-08

East Block 18ha Spray irrigated (Car parking area for the SI Machinery Field Days)
This block has been part of the LUDF operation since the conversion of the farm. It has been used to rear calves, feed cows at both ends of the milking season, and supply a limited volume of silage.

The Heifer Block

In May of 2007 33ha of the cropping farm was also transferred to the care of the LUDF team to be used to rear replacements and supply silage to the milking platform. This block is irrigated with a gun and 4ha has sprinklers.

The block was in 3 paddocks (now 9) and two thirds was sown in April 07 with Bealey (17ha) and Tabu (17ha). This meant that the block was slow to get going and feed had to be found elsewhere early last winter. The block has been cropped for a very long time and as a result soil organic matter is very low and the nitrogen supply at a low level. This led to slow pasture production and very little surplus pasture to come off as silage.

Production

We have totalled all the grazing and silage to come off the total area for the production year 2007 – 08

Feed consumed by replacements, cows or harvested as silage was 11,355kg/ha

The cost to the farm to do this

Fertiliser	\$24,666
Irrigation & R & M	\$20,800
Regrassing	\$6,019
Vehicles	\$4,000
Rental	\$33,150
Staffing approx 2hrs/day mostly manager time	\$21,960
	\$110,595

Taking this cost and the estimated harvested yield the feed cost

$$\$110,595 / (11,355 \times 51) = \$0.19 \text{ per kg DM}$$

When calculate the value of the same amount of grazing and purchased silage the difference is \$12,238 . That is the block made a small “profit” to the dairy farm at the rental chosen at the beginning of the year.

Next year we will be more determined to separate the runoff enterprise off from the dairy farm enterprise, charging current rates for grazing and the silage to avoid the type of anomaly that the \$12,238 calculated represents.

**The Total Resource Use and
Greenhouse Gas Emissions of the
Lincoln University Dairy Farm
Life Cycle Assessment**

**Prepared by
Andrew Barber and
Glenys Pellow
The AgriBusiness Group**

May 2008



1.0 EXECUTIVE SUMMARY

This project has determined, based on Life Cycle Assessment methodology, the total resource use and greenhouse gas emissions (GHG) or carbon footprint of milk solids produced by the Lincoln University Dairy Farm (LUDF). The system boundary is to the farm gate. The 2006-07 production year was used for the assessment. LUDF is a high performance dairy farm producing over 1700 kg milksolids per hectare on a pasture based system.

Once the inventory was established two impact categories were chosen, resource use measured as total energy in megajoules (MJ) and GHG emissions measured as kilograms of carbon dioxide equivalents (kgCO₂eq).

The functional unit that these two impact categories were measured against was a tonne of milk solids (t MS).

Where there are multiple product outputs from a production system and the inputs can not be attributed to a specific product then the LCA study must either avoid allocation altogether by system boundary expansion or choose a method of allocation, often either economic or biological. Environmental impacts were allocated between the co-products milk and meat according to biological causality at a ratio of 85:15, which is based on the feed requirements to produce milk and meat. Economic allocation would have used a ratio of 93:7.

The LUDF energy and resource inputs per unit of production were found to be almost identical to what this study determined for a “typical” NZ dairy farm, despite being an irrigated property that pumps water from a depth of 90 metres. The LUDF is significantly more intensive than the “typical” NZ farm so consequently resource inputs per hectare were 130% higher.

This study also determined the carbon footprint of a “typical” NZ dairy farm to enable the results to be compared and ensure that this was done using the same methodology and emission factors. Table 1 compares the carbon footprint of the Lincoln University Dairy Farm with a “typical” NZ dairy farm on a production, per hectare and per cow basis.

Table 1 Carbon Footprint of the LUDF vs. a “Typical” NZ Dairy Farm

	Carbon Footprint (kgCO ₂ eq/t MS)		Carbon Footprint (kgCO ₂ eq/ha)		Carbon Footprint (kgCO ₂ eq/cow)	
	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm	Lincoln Uni. Dairy Farm	Typical NZ Dairy Farm
Direct Energy	380	360	755	375	185	135
Indirect Energy	730	780	1,455	815	350	290
Capital	50	140	105	145	25	50
Methane	4,770	5,570	9,510	5,805	2,300	2,070
Nitrous Oxide	2,950	3,070	5,875	3,200	1,420	1,140
Total	8,875	9,920	17,700	10,340	4,280	3,690

As shown in Table 2 the LUDF GHG emissions were found to be 11% lower on a production basis than the typical NZ dairy farm. If the use of eco-nTM was also taken into account (assuming it was applied across the whole LUDF as it was in the 2007-08 season and not on the typical NZ farm) then emissions per tonne of milk solids were 21% lower.

When compared to the most recently published AgResearch findings for the “typical” NZ dairy farm (Basset-Mens et al., 2007) LUDF’s GHG emissions were 21% lower per unit of production (compared to our estimate of 11%). There is insufficient detail presented in the AgResearch report to determine why their “typical” NZ emissions are so much higher than found in this study despite having very similar production and stocking characteristics. However by comparing this studies estimate of “typical” NZ dairy emissions with the LUDF result, it ensures that the same methodology has been applied to both the LUDF and the “typical” NZ scenario. The estimated 11% lower emissions may then be conservative.

Table 2 Comparison of NZ Dairy and LUDF Energy and GHG Emissions

	MJ / t MS	kgCO ₂ eq / ha	kgCO ₂ eq / t MS
Basset-Mens et al.,	18,100	11,320	11,185
Typical NZ Dairy Farm (this study)	21,143	10,340	9,920
LUDF – no eco-n	21,750	17,700	8,875
LUDF – with eco-n	21,885	15,645	7,845

The efficiency of the LUDF emission per unit of output (milksolids) can be attributed in part to achieving higher than average productivity per cow and high grass harvest and conversion. Other management details such as auditing irrigators, tracing soil moisture and closely monitoring the property provide additional efficiencies.

A technical analysis of the NZ Emissions Trading Scheme was conducted. The Agricultural ETS will be applied to the animal and field emissions of methane and nitrous oxide. Total LUDF animal and field emissions that will attract the Agricultural ETS are 2,006 tCO₂eq (20% lower than the LCA result). At \$25/tCO₂ the additional cost in the first year based on 90% of the emissions being allocated for free and assuming there have been no significant changes since the 2005 base year, will be \$5,015. By the time the free allocation is phased out this will have increased to \$50,160. Any change in carbon emissions either above (e.g. increased stock numbers) or below (e.g. by using a mitigation strategy like eco-n™) the 2005 base year will be charged at the full cost of carbon from the outset of the Agricultural ETS. Table 3 describes the impact of different carbon prices, free allocations and the use of eco-n™.

Table 3 Emissions Trading Scheme Farm Costs

Emission Source	Allocation of 90% of 2005 Emissions			Full Price of Emissions		
	Carbon price > \$15	\$25	\$50	\$15	\$25	\$50
Methane emissions	\$1,860	\$3,105	\$6,205	\$18,615	\$31,030	\$62,055
Field nitrous oxide emissions	\$1,150	\$1,915	\$3,825	\$11,480	\$19,130	\$38,265
Total Farm Carbon Cost	\$3,010	\$5,015	\$10,030	\$30,095	\$50,160	\$100,320
Eco-n Carbon Credit	\$4,045	\$6,740	\$13,480	\$4,045	\$6,740	\$13,480
Total Farm Carbon Cost Using eco-n	-\$1,035	-\$1,725	-\$3,450	\$26,050	\$43,420	\$86,840