

**PROJECT DAIRY 1** 

Performance of Cows Milked Once-a-Day for seasons 2014-15 to 2018-19 at the Massey University Dairy 1 Farm

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#### TABLE OF CONTENTS

Project Dairy 1 vision and objectives	4
Farm profile	5
Sustainable management plan	7
Farm soils	7
Forage profile	9
Herd composition and cow performance	11
Financial performance	15
Nitrogen utilisation efficiency	16
Reproductive performance at the herd level	17
Breeding program and selection index for once-a-day milking	18
List of publications	20
Research team	22
Acknowledgements	23
Appendix 1	24
Appendix 2	27

#### Vision

Dairy 1 farm at Massey University will be a collaborative 'living research farm', showcasing how to farm profitably and responsibly within resource limits. It will provide for a range of postgraduate and collaborative research and teaching opportunities across scientific disciplines.

#### **Objectives**

- To explore environmental and financial aspects of once-a-day milking.
- To produce milk in a manner that meets the environmental requirements of the Horizons Regional Council.
- To provide a link between Massey University and both urban and rural communities.
- To provide a resource for undergraduate and postgraduate teaching, and for research and extension.



### History

Dairy 1 farm was established in 1929 and occupies land purchased from the Batchelar Estate by the Government for the establishment of Massey Agricultural College. This later became Massey University. The farm produced winter milk for over 40 years. In July 2013, the farm changed from a split calving to a spring calving herd with all cows milked once-a-day (OAD) throughout the season.

### Location

Dairy 1 farm is located within the Palmerston North city boundary adjacent to the Massey University campus, following the eastern bank of the Manawatu River. It can be seen on both sides of Fitzherbert St on the eastern side of the Fitzherbert Bridge. The farm has 3.5 km of river frontage.

# FARM PROFILE

### **Dairy infrastructure**

- 142.7 ha total area, with 119.7 ha of effective area for milk production.
- A total of 63 paddocks, all with race access and water troughs (Figure 1).
- 24 aside herringbone shed equipped with Westfalia Metatrons.
- Circular yard with backing gate.
- 5 bay calf shed.
- Office, storage room, teaching room, chemical shed, toilets.
- Concrete feed-pad, 280 cow capacity.



Massey University Dairy 1 farm has a 24 aside herringbone milking shed.



Figure 1. Massey University Dairy 1 farm map.



Figure 2. Massey University Dairy 1 farm soils map.

### **SUSTAINABLE MANAGEMENT PLAN**

### Effluent

The effluent recycling system has the ability to turn dairy effluent into a clean, clear, pathogen and nutrientfree liquid that can be recycled and used as wash down water for the cowshed yard.

# Energy conservation and recycling

- A side-by-side vehicle and bikes are used on farm, rather than larger vehicles.
- The farm has a single tractor.
- Mechanical work is done by contractors.

Hot water cylinders in the dairy are well lagged.

- Containers are reused wherever possible.
- Baleage plastic is disposed of offsite.
- The dairy shed is not turned on until cows are in the shed.

#### Water

Water on the farm is from the Massey University bore.

Irrigation water source is used in an efficient manner on 35.4 ha during summer months.

### Shade and shelter

Shade and shelter are available in a number of paddocks from shelter belts and edge plantations.

Ungrazed areas on the farm are planted with a variety of trees and shrubs. New plantings have been made alongside the new pedestrian track and more are planned.

## FARM SOILS

The soils on Dairy 1 farm are well-drained river soils prone to summer drought (Figure 2). They have the following land use classification (LUC):

- LUC Class 1: Fine textured soils (silt loam, or fine sandy loam), well drained, not seriously affected by drought, well supplied with plant nutrients, and responsive to fertilisers. Minimal physical limitations for arable use and low risk of erosion. 60.2 ha, 50% of the farm.
- LUC Class 4: Very shallow and stony soils with very low moisture holding capacity. Moderate to high susceptibility to erosion under cultivation and moderate salinity. Severe climatic limitations and structural impediments to cultivation. 49.3 ha, 41% of the farm.

# Soil management objectives

- To establish optimum conditions in the alluvial soils to enable the adequate supply of plant nutrients, develop good soil structure and encourage biological activity.
- To monitor soil nutrient and soil moisture status regularly and adapt management according to these results.
- To supply nutrients to plants and animals to comply with Horizons Regional Council nutrient leaching targets and "best practice" management.
- To monitor likely nitrogen leaching from the farm using OVERSEER® nutrient budgeting software.

The Fitzherbert Bridge over the Manawatū River can be seen from Massey University Dairy 1 farm.

### **FORAGE PROFILE**

#### Overview

- Pasture is predominantly perennial ryegrass, along with white and red clover.
- Pastures are renewed on a ten-year rotation following establishment of annual or perennial crops (Table 1). These crops comprise annual ryegrass, lucerne, herb-mix (plantain and chicory), brassicas and maize, and are planted for winter and summer feeding (Figure 3). In the last two years, 29% of the pastures were renewed.
- Average pasture production has been recorded as 13.8 tonnes of dry matter (DM)/ha but ranges between 13.2 and 15.0 tonnes DM/ha (Figure 4 and Table 2).

**Table 1.** Area allocation for different crops and pastureson Massey University Dairy 1 farm for the milking seasons2014-15 to 2018-19.

	Milking season							
ltem (per hectare area)	2014-15	2015-16	2016-17	2017-18	2018-19			
Total effective area	117.3	117.3	119.7	119.7	119.7			
Ryegrass-white clover*	76.2	94.5	100.0	104.9	104.9			
Annual ryegrass	-	-	-	9.7	9.7			
Lucerne	9.4	9.4	9.4	-	-			
Plantain-chicory- red clover	9.7	9.7	8.0	9.3	7.3			
Chicory irrigated	-	2.4	2.4	-	-			
Brassica crops: turnips	4.0	9.0	4.2	3.9	-			
Brassica crops: rape	8.6	-	-	2.1	-			
Brassica crops: kale	-	-	-	-	4.0			
Maize	-	-	2.1	-	-			





**Figure 3 A–D.** A) turnips. B) chicory. C) lucerne. D) ryegrass, white and red clovers.

\*Weighted average during season.

#### Pasture and crop management objectives

- To maximise total feed grown on the grazing area.
- To monitor the quantity and quality of feed grown.
- To monitor the paddocks through a forage and renovation plan, to ensure that paddocks on the farm are reaching their potential and being renovated when appropriate.
- To maintain a high quality feed through effective grazing management.
- To monitor all paddocks on the property regularly to optimise pasture production and utilisation.

80

**Table 2.** Mean pasture yield (tonnes of dry matter (DM)/ha) at Massey University Dairy 1 farm for the milkingseasons 2014-15 to 2018-19.

	Season						
Pasture production (t DM/ha)	2014-15	2015-16	2016-17	2017-18	2018-19		
Total	14.14	13.34	14.98	13.15	13.26		
Winter	2.22	1.88	2.13	2.13	2.09		
Spring	5.02	4.26	4.60	4.05	3.44		
Summer	3.83	3.83	4.34	3.25	3.83		
Autumn	3.07	3.37	3.91	3.72	3.90		



Figure 4. Mean daily pasture growth rates (kg of dry matter (DM)/ha/day) for the milking seasons 2014-15 to 2018-19 at Massey University Dairy 1 farm.

 The herd on Massey University Dairy 1 farm is a mix of Holstein-Friesian,<br/>Jersey and Holstein-Friesian/Jersey cross breed cows.

#### HERD COMPOSITION AND COW PERFORMANCE

- The herd is comprised of the main breeds of New Zealand (Table 3).
- Productive performance of the herd for the milking seasons 2014-15 to 2018-19 is presented in Table 4.
- Lactation curves of milksolids (fat plus protein) production per month for each of the milking seasons are shown in Figure 5.
- Productive performance of the three breeds is shown in Table 5, and lactation curves for daily yield of milk and milksolids are shown in Figure 6.

**Table 3.** Number of milking cows milked once-a-day atMassey University Dairy 1 farm for the milking seasons2014-15 to 2018-19.

	Season						
Milking cows	2014-15	2015-16	2016-17	2017-18	2018-19		
Total	256	264	258	251	242		
Holstein-Friesian	70	70	66	62	55		
Crossbreed	129	129	138	130	123		
Jersey	57	65	54	59	64		

	Season							
ltem	2014-15	2015-16	2016-17	2017-18	2018-19*			
Total								
Milk, kg	974,674	1,003,087	975,239	946,992	832,852			
Milksolids, kg	90,842	92,783	92,299	87,335	77,496			
Fat, kg	51,904	52,505	52,420	49,395	44,059			
Protein, kg	38,938	40,278	39,879	37,940	33,437			
Per cow								
Milk, kg/cow	3,807	3,800	3,780	3,773	3,442			
Milksolids, kg/cow	355	351	358	348	320			
Fat, kg/cow	203	199	203	197	182			
Protein, kg/cow	152	153	155	151	138			
Somatic cell count	130	113	103	107	112			
Live weight, kg/cow	490	469	489	484	486			
Per ha								
Stocking rate, cows/ha	2.18	2.25	2.16	2.10	2.02			
Live weight/ha, kg cow/ha	1,069	1,055	1,053	1,016	982			
Milk, kg/ha	8,309	8,551	8,147	7,911	6,958			
Milksolids, kg/ha	774	791	771	730	647			
Fat, kg/ha	442	448	438	413	368			
Protein, kg/ha	332	343	333	317	279			

Table 4. Total milk production per cow and per ha for the milking seasons 2014-15 to 2018-19 at Massey University Dairy 1 farm.

\*After drying-off in May 2019 cows were retained on the farm platform throughout the winter.



**Figure 5.** Lactation curves for milksolids (fat plus protein) the milking seasons 2014-15 to 2018-19 at Massey University Dairy 1 farm.

Herd management includes break feeding of herb-mix crop comprised of plantain, chicory and red clover during the spring and summer months.

Massey University Dairy 1 farm has a 24 aside herringbone milking shed that is turned on only when the cows are in the shed.

	Season									
		2013-14*			2014-15			2015-16		
Item	F	F×J	J		F	F×J	J	F	F×J	J
Cows	39	89	44		70	129	57	70	129	65
Milk yield, kg	4,196	3,536	3,000		4,526	4,453	3,210	4,533	4,268	3,148
Fat yield, kg	185	186	179		205	227	196	201	204	179
Protein yield, kg	153	141	129		171	178	140	174	171	137
Milksolids yield, kg	338	327	308		376	405	336	375	375	316
Fat percentage, %	4.44	5.30	6.01		4.63	5.12	6.13	4.53	4.80	5.68
Protein percentage, %	3.67	3.99	4.31		3.82	4.00	4.37	3.85	4.02	4.36
Milksolids percentage, %	8.11	9.29	10.32		8.45	9.12	10.50	8.38	8.82	10
Somatic cell score <sup>1</sup>	6.53	6.32	6.44		6.27	6.26	6.08	5.87	6.21	5.70
Live weight, kg	525	487	443		522	508	409	499	479	408
Biological efficiency, kg MS/kg live weight	0.64	0.67	0.70		0.72	0.80	0.82	0.75	0.78	0.77

**Table 5.** Milk production and cow performance for the milking seasons 2013-14 to 2018-19 at Massey University Dairy 1 farm.

#### Table 5. Continued

	Season									
		2016-17			2017-18			2018-19		
Item	F	F×J	J	F	F×J	J	F	F×J	J	
Cows	66	138	54	62	130	59	55	123	64	
Milk yield, kg	4,650	4,314	3,714	4,515	4,182	3,543	4,461	4,201	3,205	
Fat yield, kg	219	221	223	211	217	212	207	217	188	
Protein yield, kg	178	173	162	170	168	152	169	167	134	
Milksolids yield, kg	396	394	385	381	385	364	376	384	322	
Fat percentage, %	4.76	5.18	6.03	4.72	5.22	5.99	4.70	5.23	5.87	
Protein percentage, %	3.85	4.03	4.37	3.78	4.01	4.29	3.79	3.98	4.20	
Milksolids percentage, %	8.60	9.21	10.39	8.50	9.24	10.3	8.50	9.20	10.10	
Somatic cell score <sup>1</sup>	6.03	5.88	5.29	6.01	5.88	5.38	5.87	5.66	5.54	
Live weight, kg	537	494	417	529	493	418	539	500	420	
Biological efficiency, kg MS/kg live weight	0.74	0.80	0.92	0.72	0.78	0.87	0.70	0.77	0.77	

\*Transitioning milking season from twice-a-day milking to once-a-day milking. F = Holstein-Friesian, F×J = crossbreed, J = Jersey. <sup>1</sup>Somatic cell score calculated as lg2(somatic cell count).



The herd includes: Friesian (left), Friesian/Jersey crossbreeds (centre) and Jersey (right) cows.



**Figure 6.** Predicted lactation curves of yields of (a) milk, (b) milksolids (fat plus protein) for the three breeds milked in the season 2017-18 at Massey University Dairy 1 farm.



#### **FINANCIAL PERFORMANCE**

The physical and financial data from the farm were analysed through DairyBase, an industry benchmarking database. The benchmark that Dairy 1 farm is compared against for the financial analysis is OAD farms in the North Island (there are not enough OAD farms in DairyBase to allow a regional comparison). Some standardisation of numbers was required when entering the data, due to the farm being used for research and teaching purposes in addition to commercial operations. Metrics for repairs and maintenance, administration, rates and insurance were standardised using data from low input owneroperator farms in the Lower North Island (Systems 1 & 2 according to the DairyNZ farm system classification). Dairy 1 farm does not have a house, so the standardisation with properties with a house enables better comparison overall and reduces the potential of misleading conclusions.

The full comparison for the 2016-17 season with the benchmark group by kg of milksolids, by hectare and by cow is provided in Appendix 1, and the multiyear comparison of the 2014-15, 2015-16, and 2016-17 seasons' total expenses by category is provided in Appendix 2. There are some costs that remained higher than the benchmark, including animal health and breeding, due to the research/teaching role of Dairy 1 farm. Feed and grazing also are higher but so is the milk production per cow and per hectare. Interestingly, despite similar labour costs to the benchmark group of farms the labour productivity is consistently higher on Dairy 1 farm. Labour productivity was measured in kg of milksolids per full-time equivalent. The fulltime equivalent measure used in DairyBase includes all labour, both paid labour and owner labour and management, so it is a valid comparison.

A summary of the performance across the three seasons and the comparison with the benchmark group of North Island OAD farms is provided in Table 6.

The financial performance comparison indicates similar profitability between Dairy 1 farm and the OAD benchmark group in each of the three seasons. Higher costs per hectare and per kg of milksolids in the latter two seasons are counterbalanced by better production per cow and per hectare.

**Table 6.** Financial performance from 2014-15 to 2016-17 milking seasons at Massey University Dairy 1 farm.Benchmark data is sourced from DairyBase, it is fromonce-a-day owner operator farms in the North Island.

	Season								
	201	4-15	201	5-16	2016-17				
ltem	Dairy 1 farm	Benchmark*	Dairy 1 farm	Benchmark*	Dairy 1 farm	Benchmark*			
Milksolids, kg/ha	759	834	775	755	771	701			
Milksolids, kg/cow	369	314	358	315	358	285			
Milksolids, kg/full-time equivalent	60,561	48,039	66,273	46,189	70,999	41,939			
Gross farm revenue, \$/ha	4,290	5,369	3,672	3,460	5,690	4,707			
Operating expenses, \$/ha	3,411	4,348	3,694	3,474	4,498	3,629			
Operating profit, \$/ha	879	1,021	-22	-14	1,193	1,078			
Gross farm revenue, \$/kg milksolids	5.65	6.44	4.74	4.58	7.38	6.71			
Operating expenses, \$/kg milksolids	4.50	5.21	4.77	4.60	5.83	5.18			
Operating profit, \$/kg milksolids	1.16	1.22	-0.03	-0.02	1.55	1.54			
Operating Profit Margin, %	20.5%	19.0%	-0.6%	-0.4%	21.0%	22.9%			

\*65 farms were included in the benchmark group for this analysis.

#### **NITROGEN UTILISATION EFFICIENCY**

Nitrogen (N) utilisation efficiency (NUE), defined as N captured in milk and meat as a percentage of the total N input (e.g. supplements, fertiliser) is an indicator of N losses to the environment. From June 2016 through May 2017, NUE at the farm-scale level was studied at Dairy 1 farm.

Biophysical characteristics were generated from the Moorepark Dairy Systems Model (Shalloo et al. 2004) and then a whole-farm assessment of NUE and N losses was modelled with the N balance model (Ryan et al. 2011).

**Table 7.** Herd performance data generated by theMoorepark Dairy Systems Model for the milking season2016-17 at Massey University Dairy 1 farm.

Farm size, ha	119.7
Milking cows	257
Stocking rate, milking cows/ha	2.15
Fertiliser, kg N/ha per year	134
Replacement rate, %	18.3
Grazed pasture intake, kg dry matter/cow per year	3427
Pasture silage intake, kg dry matter/cow per year	304
Concentrate intake, kg dry matter/cow per year	-
Crops intake, kg dry matter/cow per year	234
Average live weight, kg	486

Ryan W, Hennessy D, Murphy JJ, Boland TM, Shalloo L 2011. A model of nitrogen efficiency in contrasting grass-based dairy systems. *Journal of Dairy Science* 94: 1032-1044.

Table 7 shows the high proportion of directly grazed pasture offered to cows, reflecting the low input strategy of Dairy 1 farm. The intake of crops includes grazing a herb crop [mix of plantain, chicory and red clover], turnips, and lucerne.

The whole-farm N balance considers all N imported and exported from the milking platform. The N fertiliser applied reflects the high reliance on pasture production to feed the cows throughout the season.

**Table 8.** Annual farm-gate nitrogen (N) balance (kg N/ha), N use efficiency (%) and N leaching (kg N/ha) for themilking season 2016-17 at Massey University Dairy 1 farm.

Item	per ha
Concentrate N consumed	-
Crop N consumed	17.6
Fertiliser N	133.8
N input in the replacement cows	4.0
N atmospheric deposition	9.0
Total N inputs	164.4
Milk N	56.3
Live weight change N	0.1
Calf N	2.3
Cull cow N	4.7
Total N output	63.3
Soil N mineralisation	81.7
N surplus	101.0
N utilisation efficiency	26
N leaching	19.5

Massey University Dairy 1 farm is managing pastures with minimal inputs for optimal milk production.

11

Shalloo L, Dillon P, Rath M, Wallace M 2004. Description and Validation of the Moorepark Dairy System Model. *Journal of Dairy Science 87*: 1945-1959.

The N output on the whole-farm level was comprised of two categories: N included in saleable products (livestock sales and milk) and N losses from the farm. The proportion of N able to be leached was estimated as the remaining proportion of N inputs (e.g. fertiliser, excreta, mineralisation). In turn, this leachable N was converted into N leaching (kg N/ha year) using the N balance model developed by Ryan et al. (2011). Table 8 reports a surplus of 101 kg of N. Given the climatic conditions and drainage calculated for the specific soil conditions of Dairy 1 farm, this represented 19.5 kg N leached per ha.

#### REPRODUCTIVE PERFORMANCE AT THE HERD LEVEL

• Reproductive performance of the herd for the milking seasons 2014-15 to 2018-19 is presented in Table 9.

**Table 9.** Herd reproductive performance of cows milkedonce-a-day for the milking seasons 2014-15 to 2018-19at Massey University Dairy 1 farm.

Calves stay on the farm until December. Yearling heifers are grazed off farm until June and 100 spring calving cows are grazed off farm for 6 weeks in June/ July if required. While in May 2019 the farm became self-contained and all cows and heifer replacements remained on the farm, the practice of off-grazing cows in the winter will recommence in 2020.

	Milking season						
Calving and mating	2014-15	2015-16	2016-17	2017-18	2018-19		
Planned start of calving	20/07/14	24/07/15	24/07/16	24/07/17	29/07/18		
Calved by week 3, %	67	75	69	71	76		
Calved by week 6, %	90	95	89	88	93		
Calved by week 9, %	98	100	98	98	100		
Planned start of mating	15/10/14	15/10/15	14/10/16	20/10/17	20/10/18		
3-week submission rate, %	96	92	95	95	97		
6-week pregnancy rate, %	85	76	74	83	79		
Empty rate, %	8	9	12	9	9		
Length of AB, weeks	10	10	10	10	10		
Length of total mating, weeks	10	10	10	10	10		

Cows grazing at Massey University Dairy 1 farm.



#### BREEDING PROGRAM AND SELECTION INDEX FOR ONCE-A-DAY MILKING



The best cows and bulls with the traits considered important to OAD milking are selected for breeding.

# Objectives

- To breed cows suitable for OAD milking with a specific focus on reducing cow wastage often associated with deduced milking frequency.
- To develop a OAD selection index in collaboration with Livestock Improvement Corporation that can be used to select the best cows and bulls as parents of the heifer replacements.
- The index takes into account the traits that OAD farmers have identified as being important for successful OAD milking.

Figure 7 shows all of the traits considered in the OAD selection index, and their relative weighting.



Figure 7. Traits weightings for the once-a-day selection index.

Breeding Worth is the industry index, which ranks cows and bulls on their ability to breed profitable and efficient replacement dairy heifers for twice-aday milking. The OAD selection index is developed considering different weightings on the individual traits within the breeding worth plus four functional traits (adaptability to milking, shed temperament, milking speed and overall opinion). Table 10 shows how Traits Other than Production recorded on the whole herd each year changed over the life of Project Dairy 1

Table 10. Traits Other than Production (TOP)scores of once-a-day milking seasons 2014-15to 2018-19 at Massey University Dairy 1 farm.

	Milking season									
ltem	2014-15	2015-16	2016-17	2017-18	2018-19					
Capacity	7.09	6.72	6.59	6.80	7.09					
Udder support	6.20	6.40	7.10	6.80	7.07					
Front udder	5.73	5.93	6.41	6.11	6.40					
Rear udder	6.26	6.27	7.09	6.74	7.00					
Front teat placement	4.52	4.62	4.56	4.57	4.70					
Rear teat placement	6.13	5.76	5.51	5.82	6.10					
Udder overall	5.98	6.15	6.48	6.31	6.60					



Massey University Dairy 1 farm is within the Palmerston North city boundary and the view from below the Fitzherbert Bridge shows the Summerhill residential area.

#### LIST OF PUBLICATIONS

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Thank you to Christine Finnigan, dairy farmer, for her support in the transition to once a day milking.

**APPENDIX 1** 

DairyBase\*

#### **Physical Data Summary**

Massey University No.1 Dairy Farm (Farm ID: 626701) Dairy Season ended. 2017 Printed. 1 November 2019



This information was collected in the level-1 questionnaire. It is used to generate adjustments and KPI's in both Financial and Physical Detail reports. Please check that it is correct.

Dairy Co Supplied: Production System: Business Type: Calving Season: Winter Milk:	Fonterra 2 Feed imported for dry Owner operator Spring only No	cows 1-10%	Balance Month Milking Interva Organic:	: May I: Onc No	/ e a day full season
Region: % Milking Area Irrigated: Farm Dairy Type:	Lower North Island Less than 30% H24		District Season's rainf: NIWA 10 Yr Av	Mar all (mm): Rainfall (mm): 960	nawatu
Stock Predominant dairy breed: Peak Cows Milked: Stocking rate (Cows/ha): Replacement Calves Reared:	Crossbred 258 2.2 62		Land Area ( Total Dairying less Ungrazeal Effective Dairy Support block	<u>ha)</u> area: ble area: ing area: effective area:	142.7 23.0 119.7 0.0
Labour			Defined Young	Stock area:	1.3
LaDOUT Full time paid labour equival Full time unpaid labour equiv FTE unpaid management: Total FTEs: Milking Cups per FTE	ents: 1.3 valents: 0.0 0.0 1.3 18		Non-dairy eme	ctive area:	0.0
Production		Total	Per ha	Per cow	Composition
Milk Litres:		975,239	8,150	3,780	
Fat kg: Protein kg: Financial year - Milksolids kg Production year - Milksolids	j: kg:	52,420 39,879 92,299 92,299	438 333 771 771	203 155 358 358	5.4% 4.1% 9.5%
Number in Benchmark Group: Benchmark Group Selected by: Benchmark Group Ranked by:	65 Profitabil Milking ir	ity analysis hterval : 2- Once a day f	ull season Is	arm business type : sland : North Island	1- Owner operator
Data entered by:	Financia	l: Nicola Shadbolt	E	xtended Physical: 1 - Waikato (JG)	DairyBase Data Collector
Disclaimer: This report and the data and informat warranties in respect of the Informati (whether in contract, tort (including n	tion in it ("Information") is inte on are expressly excluded. D egligence), breach of statutor	nded as general informatio airyNZ does not warrant the y duty, or otherwise) to any	n only and is not inte at the Information is person who has red	ended as general or sp complete or accurate. I seived or relied on this	ectic advice. All implied DairyNZ will not be liable report or the Information.

Validation Messages: None



#### Profitability KPI's

Massey University No 1 Dairy Farm (Farm ID: 626701) Dairy Season ended: 2017 Printed: 1 November 2019



Number in Benchmark Group: Benchmark Group Selected by: Benchmark Group Ranked by. 65 Profitability analysis Milking interval : 2- Once a day full season

Farm business type : 1- Owner operator Island : North Island

FARM PHYSICAL KPI's	2016	-17	2015	5-16	2014	-15
	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
Cows/ha	2.2	2.5	2.2	2.4	2.1	2.7
Kg Milksolids/ha	771	701	775	755	759	834
Kg Milksolids/cow	358	285	358	315	369	314
Cows/FTE	198	147	185	147	164	153
Kg MS/FTE	70,999	41,939	66,273	46,189	60,561	48,039

PROFITABILITY	2016	-17	2015	5-16	2014	-15
Dairy	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
Gross Farm Revenue/ha	5,690	4,707	3,672	3,460	4,290	5,369
Operating Expenses/ha	4,498	3,629	3,694	3,474	3,411	4,348
Operating Protit (EFS)/ha	1,193	1,078	-22	-14	879	1,021
Gross Farm Revenue/kg MS	7.38	6.71	4.74	4.58	5.65	6.44
Operating Expenses/kg MS	5.83	5 18	4 77	4 60	4 50	5 21
Operating Profit (EFS)/kg MS	1.55	1.54	-0.03	-0.02	1.16	1.22
FWE/kg MS	5.03	4.06	4.48	3.54	4.10	4.15
Operating Profit Margin %	21.0%	22.9%	-0.6%	-0.4%	20.5%	19.0%

LIQUIDITY	2016-17	2015-16	2014-15
Net Cash Income	682,933	454,732	516,012
Farm Working Expenses	464,382	415,839	372,413
Cash Operating Surplus	218,551	38,893	143,599

#### **Profitability Cash Flow**

CASH	\$/KG MS	\$	NON CASH ADJUSTMENTS	\$	CASH + NON CASH	\$
DAIRY SALES					DAIRY GFR	
Net Milk Net Livestock Other Dairy	6.80 0.60 0.00	627,549 55,304 0	+ Value of Change in Dairy Livestock	-2,019	Net Milk Net Livestock Other Dairy	627,549 53,365 0
NET CASH INCOME	7.40	682,933			DAIRY GFR	680,914

CASH FWE	\$/KG MS	\$	NON CASH ADJUSTMENTS	\$	OPERATING EXPENSES	\$
Wages Stock Expenses Supplementary Feed Grazing and Support block Other Working Expenses Overheads	1.34 0.91 0.51 0.66 1.24 0.37	123,946 83,958 46,709 60,658 114,653 34,458	+ Labour Adj - Feed Inventory Adj +Ownd Supp block Adj +Depreciation	0 -32,340 0 41,485	Labour Expenses Stock Expenses Total Supplement Expenses Total Grazing and Support block Other Working Expenses Total Overheads	123,946 83,958 79,049 60,658 114,653 75,943
FARM WORKING EXPENSES	5.03	464,382			OPERATING EXPENSES	538,207
CASH OPERATING SURPLUS	2 37	218,551	NET ADJUSTMENTS	-75,844	DAIRY OPERATING PROFIT (EFS)	142,707



#### **Financial Detail**



Massey University No.1 Dairy Farm (Farm ID: 626701) Dairy Season ended: 2017 Printed: 1 November 2019

Number In Benchmark Group: Benchmark Group Selected by: Benchmark Group Ranked by: 65 Profitability analysis Milking interval : 2- Once a day full season

Farm business type : 1 Owner operator Island : North Island

	Tot	al \$	\$ Pe	r kg MS	\$ F	Per Ha	\$ P	er Cow
GROSS FARM REVENUE (GFR)	Farm	% of GFR	Farm	Benchmark	Farm	Benchmark	Farm	Benchmark
Net Milk Sales	627,549	92.2%	6.80	5.91	5.244	4,142	2.432	1.684
Net Dairy Livestock Sales	55,384	8.1%	0.60	0.73	463	510	215	207
Value of Change in Dairy Livestock	-2,019	-0.3%	-0.02	0.02	-17	14	-8	6
Other Dairy Revenue	0	0.0%	0.00	0.06	0	41	0	17
DAIRY GROSS FARM REVENUE	680,914	100.0%	7.38	6.71	5,690	4,707	2,639	1,914
Non-Dairy Cash Income								
value of Change in Non-dairy livestock								
Total Gross Farm Revenue								
OPERATING EXPENSES								
Labour Expenses								
wages	123,946	18.2%	1.34	0.69	1,036	485	480	197
Labour Adjustment - Unpaid	0	0.0%	0.00	0.14	0	101	0	41
Labour Adjustment - Management	0	0.0%	0.00	0 48	0	333	0	135
Total Labour Expenses	123,946	18.2%	1.34	1.31	1,036	919	480	374
Stock Expenses								
Animal Health	51,862	7.6%	0.56	0.24	433	169	201	69
Breeding & Herd Improvement	15,184	2.2%	0.16	0.18	127	126	59	51
Farm Dairy Electricity (Farm Dainy Water Supply)	4,903	0.7%	0.05	0.07	41	49	19	20
Total Stock Exponses	12,009	1.8%	0.13	0.13	700	92	47	3/
Feed Expenses	03,900	12.370	0.91	0.02	702	430	323	111
Supplement Expenses								
Net Made Purchased Cropped	46 709	6.9%	0.51	0.56	390	390	181	159
Less Feed Inventory Adjustment	-32 340	-4 7%	-0.35	-0.02	-270	-12	-125	-5
Calt Feed	0	0.0%	0.00	0.07	0	49	0	20
Total Supplement Expenses	79.049	11.6%	0.86	0.64	661	451	306	104
Grazing & Run Off Expenses				Condisional Condisiona Condisional Condisional Condisiona Condisional Condisional Condisional Condisional Condisio		1010		0.0.00
Young & Dry Stock Grazing	35,206	5.2%	0.38	0.24	294	167	136	68
Winter Cow Grazing	25,452	3.7%	0.28	0.00	213	0	99	0
Support block Lease	0	0.0%	0.00	0.07	0	51	0	21
Owned Support block Adjustment	0	0.0%	0.00	0.10	0	70	0	28
Total Grazing & Support block expenses	60,658	8.9%	0.66	0.41	507	288	235	117
Total Feed Expenses	139,707	20.5%	1.51	1.05	1,168	739	542	300
Other Working Expenses	50 444	7.00/	0.50	0.50	447	050	007	1.40
Nitrogen	05,444	1.0%	0.00	0.00	447	000	207	143
Irrigation	1 466	0.0%	0.00	0.00	12	13	6	1
Regrassing	9 385	1.4%	0.02	0.07	78	49	36	20
Weed & Pest	6,374	0.9%	0.07	0.04	53	27	25	11
Vchicles	7,850	1.2%	0.09	0.17	66	121	30	49
Fuel	3,012	0.4%	0.03	0.06	25	43	12	17
R & M - land & buildings	17,400	2.6%	0.19	0.25	145	175	67	71
R & M - plant and equipment	8,640	1.3%	0.09	0.13	72	93	33	38
Freight and General	7,082	1.0%	0.08	0.05	59	38	27	16
Total Other Working Expenses	114,653	16.8%	1.24	1.35	958	944	111	384
Overheads		4 704			~~~	100		50
Administration	11,831	1.7%	0.13	0.19	99	130	46	53
Insurance	7,030	1.0%	0.00	0.09	09	00	21	20
Bates	15 000	0.1%	0.01	0.05	125	100	50	14
Depreciation	41 485	6.1%	0.16	0.15	347	267	161	109
Total Overheads	75 943	11.2%	0.40	0.84	635	591	294	240
TOTAL DAIRY OPERATING EXPENSES	538 207	(9.0%)	5.83	5.18	4 4 4 8	3 629	2 086	14/6
Non-Dairy Operating Expenses	000,201	10.070	0.00	0.10	1,100	0,020	2,000	1,710
Total Operating Expenses								
OPERATING PROFIT								
DAIRY OPERATING PROFIT	142,707	21.0%	1.55	1.54	1,193	1,078	553	438
Non-Dairy Operating Profit								
Total Operating Profit								

#### **APPENDIX 2**

#### Multiyear Financial Detail (total \$)

DairyBase\*

Massey University No.1 Dairy Farm (Farm ID: 626701) Dairy Season ended: 2017 Printed: 1 November 2019

	2016-17	2015-16	2014-15	2013-14
Business Type : Region	OO:LNI	OO:LNI	OO:LNI	OO:LNI
Milking Area (ha)	119.7	119.7	119.7	119.7
Peak Cows	258	259	246	240
Milksolids Kg	92,299	92,782	90,842	87,665

	2016	-17	2015	-16	2014	-15	2013-	14
GROSS FARM REVENUE (GFR)	Total \$	% of GFR	Total \$ 9	6 of GFR	Total \$ 9	% of GFR	Total \$ %	6 of GFR
Net Milk Sales	627,549	92.2%	406,194	92.4%	473,650	92.2%	737,648	124.7%
Net Dairy Livestock Sales	55,384	8 1%	48,538	11 0%	42,362	8 2%	292,558	49 4%
Value of Change in Dairy Livestock	-2,019	-0.3%	-15,144	-3.4%	-2.458	-0.5%	-438,446	-74.1%
Other Dairy Revenue	0	0.0%	0	0.0%	0	0.0%	0	0.0%
DAIRY GROSS FARM REVENUE	680,914	100.0%	439,588	100.0%	513,554	100.0%	591,760	100.0%
Non-Dairy Cash Income								
Value of Change in Non-dairy livestock								
Total Gross Farm Revenue								
OPERATING EXPENSES								
Labour Expenses								
Wages	123,946	18.2%	110,438	25.1%	86,982	16.9%	106,447	18.0%
Labour Adjustment - Non-paid	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Labour Adjustment Management	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total Labour Expenses	123,946	18.2%	110,438	25.1%	86,982	16.9%	106,447	18.0%
Stock Expenses	ARRANGED AND AND AND AND AND AND AND AND AND AN	100000000000	Internet Manufacture		10-10-00-00-00-00-00-00-00-00-00-00-00-0	10,000,000,000	0.51900.0074.02079	a contractor
Animal Health	51,862	7.6%	27,445	6.2%	31,574	6.1%	30,103	5.1%
Breeding & Herd Improvement	15,184	2.2%	10,666	2.4%	16,417	3.2%	12,565	2.1%
Farm Dairy	4,903	0.7%	3,677	0.8%	7,035	1.4%	8,414	1.4%
Electricity (Farm Dairy, Water Supply)	12,009	1.8%	12,654	2.9%	10,655	2.1%	8,752	1.5%
Total Stock Expenses	83,958	12.3%	54,442	12.4%	65,681	12.8%	59,834	10.1%
Feed Expenses								
Supplement Expenses	10000000000	100000000			0.000	10000000		10000
Net Made, Purchased, Cropped	46,709	6.9%	60,281	13.7%	44,890	8.7%	61,365	10.4%
Less Feed Inventory Adjustment	-32,340	-1.7%	8,758	2.0%	-1,195	-0.9%	7,168	1.2%
Calf Feed	0	0.0%	0	0.0%	0	0.0%	19,919	34%
Total Supplement Expenses	79.049	11.6%	51,523	11.7%	49,385	9.6%	74.116	12.5%
Grazing & Support block Expenses		5.000					~~ ~~~	
Young & Dry Stock Grazing	35,206	5.2%	63,906	14.5%	16,100	3.1%	93,488	15.8%
Winter Cow Grazing	25,452	3.7%	13,260	3.0%	7,821	1.5%	9,500	1.6%
Support block Lease	0	0.0%	0	0.0%	U	0.0%	U	0.0%
Owned Support block Adjustment	0	0.0%	77.400	0.0%	0	0.0%	100.000	0.0%
Total Grazing & Support block expenses	00,000	0.9%	100 000	17.0%	20,921	4.170	102,900	17.4%
Other Working Expenses	139,707	20.0%	128,685	29.3%	73,306	14.3%	177,104	20.0%
Eartiliaar	52 444	7.00/	20.476	C 79/	40.050	0.0%	10 000	2.0%
Nitrogen	55,444	0.0%	29,476	0.0%	16,059	9.0%	10,900	2.9%
Irrigation	1 466	0.0%	2 280	0.0%	92	0.0%	12 075	0.0%
Degraceing	0.295	1 / 10/	2,200	0.0%	0 125	1.0%	20.200	2.2/0
Weed & Pest	6 374	0.9%	5 311	1.2%	7 979	1.6%	3,963	0.7%
Vehicles	7 850	1 2%	11 331	2.6%	10,780	2 1%	9,200	1.6%
Fuel	3 012	0.4%	5 482	1.2%	4 172	0.8%	6,605	1.1%
R & M - land & buildings	17 400	2.6%	9,600	2.2%	26 160	5.1%	42 576	7.2%
R & M - plant and equipment	8 640	1.3%	7 080	1.6%	7 800	1.5%	31 305	5.3%
Freight and General	7 082	1.0%	6 208	1.4%	6 190	1.2%	11 069	1.9%
Total Other Working Expenses	114 653	16.8%	76.847	17.5%	118,358	23.0%	163 982	27.7%
Overheads			,					
Administration	11.831	1.7%	12 944	2.9%	11 119	2.2%	17 814	3.0%
Insurance	7 038	1.0%	8 199	1.9%	8 000	1.6%	4 014	0.7%
ACC	589	0.1%	522	0.1%	462	0.1%	498	0.1%
Rates	15,000	2.2%	15,000	3.4%	13.000	2.5%	724	0.1%
Depreciation	41,485	6.1%	35,137	8.0%	31,436	6.1%	39,667	6.7%
Total Overheads	75,943	11.2%	71.802	16.3%	64.017	12.5%	62,717	10.6%
DAIRY OPERATING EXPENSES	538,207	79.0%	442.218	100.6%	408,344	79.5%	570.084	96.3%
Non-Dairy Operating Expenses	2							
Total Operating Expenses								
OPERATING PROFIT								
DAIRY OPERATING PROFIT	142,707	21.0%	-2,630	-0.6%	105,210	20.5%	21,676	3.7%
Non-Dairy Operating Profit								
Total Operating Profit								

# NOTES



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