### Southland Dairy Farm Focus on farm technology for long-term financial sustainability



### Southland

Farm Systems Change – 2016 Dairy Farm Case Study

Ministry for Primary Industries Manatū Ahu Matua



# Southland Dairy Farm At a glance

## Southland Dairy Farm

#### "Having confidence in what we are doing."

of dairy support land. The team working on this farm are continually looking at ways to use sustainability. They produced 474,876 kgMS on the effective milking platform of 340 hectares in the 2014/15 season.

During the 2015/2016 season a 115 hectare dairy farm was purchased and this operates with a 50/50 share-milker.

### At a glance – 2014/15 Season



Milking Platform	363.0 ha
Dairy Support	179.4 ha
Total	542.4 ha
Effective Milking Platform	340.0 ha
Est. kgDM grown (per effective ha/year)	13,600
Cows (per effective ha)	2.6

Breed Type

(kgMS)

Peak cows milked

Production per cow

Live weight per cow

(estimated actual kg)

Farm Details

#### Season Ended Total kgMS FWE/kgMS 2012 484.020 \$4.38 2013 472.655 \$4.27 2014 494.267 \$4.39 2015 474.876 \$5.00 2016 555.954 \$3.92

Other Details Livestock Details People working on farm 7 Peak Production (kgMS/ 2.4 Cow/Day for top month) Start of Calving 5 Aug Friesian Calved in 6 weeks 83% 897 Average Pasture Cover (kgDM/ha at start of 2,145 529 calving) Production 580 1.397 (kgMS/effective ha)

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### Farming focus

These Southland farmers adopt the "having confidence in what we are doing" motto. They have improved their herd management by going back to basics to improve cow performance and health. The use of technology supports their decision-making and enhances farming performance.



### **GETTING PERFORMANCE FROM HEALTHY COWS**

These Southland farmers have focused on keeping their cows healthy. Feeding the cows well delivers a body condition score of 5.0 at calving for their well grown Friesians. This, along with a compact calving, provides for high peak production.

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### **GETTING THE MOST FROM TECHNOLOGY**

These Southland farmers use technology to effectively manage feed delivery to the cows, to monitor the health of the cows and to measure the soil moisture levels on the farm. The use of these technology tools assist in the effectiveness and efficiency of the farming business by supporting the decisions made on-farm day to day.

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# Southland Dairy Farm Acloser look

## Getting performance from healthy cows

The Friesian cows have a recorded ancestry of 90 with herd BW76/41 and herd PW85/52. The estimated actual live weight is the same as the mature cow genetic live weight of 580kg.

The key focus is on getting the basics right to achieve the best from the herd, by breeding the perfect cow for their system to increase milk production, rather than simply increasing cow numbers.

These Southland farmers start at the beginning and focus on growing all the calves to 100kg before weaning. They are shifted to the dairy support land. The replacements stay on the dairy support land until they return to the milking platform to calve as R2s. Young stock is managed from birth through to joining the herd to retain complete control of growth rates and stock health. The heifers are all mated using Artificial Insemination, which takes time, but it gives a larger range of replacements to select from. The Heifers are an average weight of 350kg at mating and at 10 June had an average weight of 540kg.

There are four key attributes applied to the breeding plan. These are capacity of the cow, udder composition, Kiwi cross/Friesian bulls and fertility. A bull match computer tool assists with selection of the bull for the cow. For example, a cow with a weak udder is matched with a bull that has udder strength in the bloodline to deliver ongoing improvement in herd quality. Generally they use kiwi cross bulls over Friesian heifers and Friesian bulls over all cross bred Heifers and cows.

A balanced diet is a critical part of ensuring overall cow health and performance. The feed is adjusted through the season to deliver optimal levels of protein and starch. Cows are fed on the basis that higher protein in the feed mix increases production, whereas increasing carbohydrates leads to more weight gain, so cow condition can be lifted. They aim for calving condition of 5.5 at dry-off and feed depending on calving group.

Spring calving is compact, with 83 percent of the herd calved in 6 weeks. This results in a high number of days at peak production.

Good feeding levels deliver peak production for the month of October based on milk supply data an average of 2.4kgMS/cow. The herd test result for October was 2.5kgMS/ cow.

An extended lactation of around 292 days, with a high average production across the entire lactation of 1.7-1.9kgMS per cow, enables the cows to produce at the high level of 529 kg MS/cow.



## Feed to milk efficiency 2014/15 season



### What does this show?

#### Feed Supply

It is estimated that 12,300kgDM/hectare is eaten or harvested from the milking platform. This provides 68 percent of the feed required for the herd. A further 17 percent is grown on dairy support land, and 15 percent is purchased comprising of PKE, Dried Distillers' Grain (DDG), barley grain, and straw.

In total, the cows are offered 7.0tDM/cow with feed available of between 13.2kg and 14.5kgDM per kgMS produced, over the five past years.

#### **Feed Utilisation**

The consistent quality and quantity of feed offered means that cow feed conversion is very good with 12.6kgDM eaten per kgMS produced. This feed conversion is also reflected in the consistent level between 49 percent to 53 percent of the MJME in feed available converted to milk produced. The high comparative stocking level of 83kg Live Weight/tDM and use of the covered feed pad enable a high 91 percent level of utilisation.

#### **Cow Efficiency**

The high production per cow is achieved through a combination of initiatives. A compact calving period of 83 percent calved within six weeks from the 5 August planned start of calving, and a peak production level of 2.4kgMS/cow/day results in the high efficiency of 91 percent with cows producing 529kgMS from a genetic mature live weight of 580kg. In addition, the days in milk of 292 also contributes to the high per cow production.

**COW EFFICIENCY** 

### Feed to milk efficiency performance over time



#### Season Ended 2012 2013 2014 2015 2016 **Comparative Stocking Rate** 79 78 82 83 82 kgLWT/tDM available Farm Feed Conversion 14.4 14.5 13.2 13.8 11.8 kgDM/kgMS produced 13.0 12.7 12.5 12.6 10.8 Cow Feed Conversion kgDM/kgMS produced 0.7 Feed Wasted 1.4 1.8 1.2 1.0 kgDM/kgMS produced Feed Grown 81% 84% 87% 85% 88% % of feed available Feed Purchased 19% 16% 13% 15% 12% % of feed available

### Monthly Per Cow Milk Solids Production



### Animal health 2014/15 season



### What does this show?

The Cow Health Index is a weighted score out of 100 comprising body condition score, cow losses, lame cow interventions, herd pregnancy rate, mastitis, somatic cell count and heifer live weight.

The measures are coded using the traffic light system. Green indicates areas where targets have already been achieved orange where there is opportunity to improve and red where performance has been less than desired.

Herd Survivability Metrics

3 year-olds Retention Rate	76%
Replacement Rate at calving	24%
Heifer Mating LWT % Mature Cow LWT	59%
Herd Empty Rate	11%

The herd survivability metrics combine to influence the costs associated with maintaining herd numbers.

The replacement heifers are well grown and have increased over the years from an average live weight of 520kg to 540kg. They are 93 percent of mature cow genetic live weight 60 days pre calving in the 2014/15 and 2015/16 seasons.

Given the farmers have a large number of replacements, they can cull older cows and also those cows with mastitis and uneven udders.

### Animal health performance over time

#### Animal Health



	Season Ended				
	2012	2013	2014	2015	2016
Cow Health Index (Max 100)	78	81	91	81	91
Annual Cow Losses	2%	1%	1%	2%	1%
Lame Cow Interventions	13%	17%	8%	14%	7%
Six Week Herd Pregnancy	78%	81%	80%	71%	75%
Mastitis	20%	17%	14%	18%	10%
BMSCC (000s)	214	193	222	177	164
Heifer LWT 60d pre-calving % of Mature Cow Genetic LWT	90%	90%	91%	93%	93%

#### What does this show?

The Body Condition Score drops during the summer with the dry weather. Rather than feed more to all of the cows, selected cows are culled to keep the herd to a feed level that can be maintained.

For a large herd the cow losses are low, ranging between 1 percent and 2 percent. This is due to the focus on cow condition before calving, with blood tests conducted three times each year to check the bloods and livers are healthy for each cow.

A keen focus on staff training means each member of the farm team has a good eye for identifying cows that are unwell.

The key to keeping the cow losses down is prevention. This flows back to feeding the cows well, ensuring the cows have the right minerals, teat seal to minimise risk of mastitis and drafting cows that are losing weight to a separate mob for special care. The level of lameness varies depending on the seasons. During a wet autumn the free-stall barn is used to take the cows off wet ground and minimise risk of lameness.

Again, staff training is important to ensure yard handling protects the cows from the backing gate. The proactive identification of even a slight limp for treatment assists in the management of cow lameness.

The level of mastitis has been progressively lowering. This is attributed to the level of staff training, together with proactive management of cows by using teat seal on cows and heifers and a focus on the overall health of the cow.

The body condition score at mating has been gradually lifting. This may contribute to the low empty rate, which has been 10 – 12 percent for a 10 -11 week mating period. The heifers are run separately from the older cows so do not have the same competition for feed when getting incalf. The heifer live weight 60 days pre-calving has been consistently improving, which demonstrates the farming team's focus on growing the replacements well to prepare them for success in the herd.

### **Environmental performance**

This Southland farm is located near Winton, adjacent to Oreti River, with some waterways that run through the farm.

The 363 hectare farm (340 hectares effective) is part of the Oreti catchment, which will undergo the Limit Setting Process in 2018 (as part of the Environment Southland response to the National Policy Statement for Freshwater).

The annual rainfall is 1,050mm. The soils are predominately Makarewa although include Winton and Selwyn soils.

The milking platform has a flat contour. The dairy support land is located 2km to 6km from the milking platform.

### Free-stall barn and feed pad

A free-stall barn was built in 2011 to house up to 660 cows and is used predominately over the winter period. A feed pad is used for feeding the cows during the milking season. The purchased feed includes DDG, PKE, barley grain and straw.

Consistent with the focus on cow health and performance, the owners of this farm planned the combination of these two structures to achieve multiple outcomes. This included more control over feed and cow condition, increased utilisation of pasture (as a prevention of pasture damage), better utilisation of feed, the ability to get more days in milk and extend lactation, and a more sustainable wintering system, with the dairy support land being winter cropped twice.

The free-stall barn is used to house the cows in milk from 10th May for 9 hours between morning and night milking's and then they go out to pasture at night when the weather allows, which was about 82 percent of the time last winter. The lameness dropped by 90 percent within 7 days of using the barn.

The cows are dried off based on their calving dates and they stay in the barn 24/7 until they move to the springer mob two weeks before calving. At that time they go out onto pasture at night depending on the weather.

Once a cow has calved, the free-stall barn is used as a feed pad. The cows in milk go into the free-stall barn for a short time twice a day and are on pasture at night, unless there is extreme weather and then the cows stay longer in the free-stall barn.

#### Maximising the use of nutrients

When the free-stall barn was built in 2011, it included the construction of an effluent storage pond (5 million litres). This enables storage of effluent during wet periods and then allows spreading at times when soil conditions are optimum to maximise the plant uptake of nutrients.

The farm has a soil moisture monitoring system, which allows the application of effluent based on soil moisture.

Effluent is viewed as a fertiliser and as such, money in the bank.

#### Cropping

Historically, the cows have been wintered on the fodder crops. However, there was concern that cropping and feeding during the winter on the milking platform over the long term was not sustainable because of damage to the soil structure. As a result, the cows are now fed in the covered feed pad during the winter. Sugar beet fits in well with this farming system as a high-quality feed that can be lifted and then fed in the covered feed pad during the winter.

The dairy support land provides grass and cereal silage which is later fed in the covered feed pad or on the feed pad. The young stock are grown out on the dairy support land. The dairy support land is a gentle walk from the milking platform so the livestock do not have to travel by truck.

The water quality is tested for the waterways that run through the property at both entry point and exit point, to ensure water quality is protected during the journey through the farm property. The water testing process provides reassurance to the team working this farm that they are caring for the water quality of the waterways that pass through this property.

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## Getting the most from technology

Technology is used in a range of areas on-farm to improve effectiveness and efficiency, including:

- automatic cup removers in the milking shed;
- automatic draft system including scales in the milking shed;
- automatic wash systems for milk silos;
- automatic scrapers in the free-stall barn;
- weather station data for rain and soil measurements;
- mastitis detection system in milking shed;
- feed mixer app for cow feed mix;
- scales on feed wagon.

A simple investment assessment is completed before the purchase which includes a cost v benefit analysis and discussions with other farmers and suppliers to understand the value both initially and ongoing.

With all of this technology, the underlying aim is to enhance the existing knowledge of the farm team. The technology available helps to improve planning and the farm team operate in a proactive way rather than being reactive. In respect of animal health, prevention is generally less expensive (in both time and dollars) than cure. The rotary milking shed has a mastitis detection system installed which measures conductivity enabling a cow to be identified and automatically drafted out. The farm team can then check the cow's udder and treat her, if needed, before the next milking. The use of technology in this instance supports the skills and knowledge of the farm team.

A mobile phone app designed by dairy farmers for feeding grass and other stock food to their herds more effectively is used to analyse the cow/herd rations. The app organises the feed into a recipe which enables the total diet to be reviewed. It makes modifying the ration simple and accurate so it can be changed when required. This allows the recipe to be set and then shared with the farm team so everyone knows the feed plan. It also allows the cost of feed to be calculated for each recipe.

By using the weather station data in conjunction with soil test data, the farming team are able to strategically spread effluent across the farm area. The targeted effluent application maximises the benefit to the soil and reduces the need for chemical fertiliser.



### Financial performance 2014/15 season



### What does this show

The livestock trading and other income contributed \$0.97kgMS in the 2014/2015 season. The livestock sales were \$0.79kgMS reflecting the approach taken by this farmer to cull cows harder and bring through a large number of replacements.

The key financial metric used by this farmer is farm working expenses which is monitored and reviewed carefully month to month.

The feed cost increased in the 2014/2015 season and this is attributed to the change in feed mix and the overall increase in feed both grown (hay, silage and crop) and purchased feed (DDG and PKE). In previous seasons feed cost per kgMS has ranged between \$1.88kgMS and \$1.98kgMS. Overall expenses are relatively consistent year on year. Like most in business, this farmer is watchful to ensure that expenses are monitored closely against revenue. This attention to their financial performance is demonstrated in the breakeven milk price before debt servicing and depreciation in the range between a low of \$3.37kgMS in 2012/2013 season and \$4.03kgMS high in the 2014/2015 season.

The results for the 2015/2016 show that FWE/ kgMS has dropped back to \$3.92kgMS with lower total FWE spread across an additional 7,434kgMS from the existing production base and 73,644kgMS from the additional dairy farm.



\$2.50

\$2.50

\$5.00

\$0.97

\$4.03

Feed Costs

Other FWE

Total FWE

Livestock Trading and Other Income

**Breakeven Milk Price** Before debt servicing and depreciation

### Financial performance over time

		Seasor	n Ended	
Financial Efficiency	2012	2013	2014	2015
Feed cost per kgMS	\$1.98	\$1.94	\$1.88	\$2.50
Other FWE per kgMS	\$2.40	\$2.33	\$2.51	\$2.50
Breakeven Milk Price	\$3.80	\$3.37	\$3.77	\$4.03
Return On Assets %	5%	4%	11%	(1%)
Capital employed per kgMS	\$35	\$45	\$41	\$47
Milk Price	\$5.98	\$5.80	\$8.78	\$4.42



		Seasor	Ended	
Profit and Loss to EBITDA	2012	2013	2014	2015
(per kgMS)				
Milk income	\$5.98	\$5.80	\$8.78	\$4.42
Dividends	\$0.31	\$0.36	\$0.22	\$0.17
Livestock trading	\$0.26	\$0.54	\$0.39	\$0.79
Other operating income	\$0.00	\$0.01	\$0.00	\$0.01
Total income	\$6.56	\$6.71	\$9.40	\$5.39
Feed costs	\$1.98	\$1.94	\$1.88	\$2.50
Other FWE	\$2.40	\$2.33	\$2.51	\$2.50
Total FWE	\$4.38	\$4.27	\$4.39	\$5.00
EBITDA	\$2.18	\$2.44	\$5.01	\$0.39

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## Definitions

## Definitions

#### General

ocherat	
kgDM	Kilograms of Dry Matter at 11MJ ME
kgMS	Kilograms of Milk Solids
MJ ME	Mega Joules of Metabolic Energy
Animal Health	
Actual LWT (Live weight)	Actual live weight of mature cows (5 – 7 years) with Body Condition Score of 4.5 at 100 days in milk
Annual Cow Losses	All cows which died (died, euthanised, pet food) during the season divided by cows calved
BW (Breeding Worth)	The index used to rank cows and bulls based on how efficiently they convert feed into profit. This index measures the expected ability of the cow or bull to breed replacements that are efficient converters of feed into profit. BW ranks male and female animals for their genetic ability for breeding replacements. For example a BW68 cow is expected to breed daughters that are \$34 more profitable than daughters of a BW0 cow.
BMSCC (Bulk Milk Somatic Cell Count)	Arithmetic average of Bulk Milk Somatic Cell Count for the season
BCS (Body Condition Score)	An assessment of a cow's body condition score (BCS) on a scale of 1-10 to give a visual estimate of her body fat/protein reserves
Cow Health Index	Weighted score out of 100 comprising BCS (40), Heifer LWT (10), Reproductive outcomes (20), Lameness (10) , Cow losses (10), Mastitis (5) and Bulk Milk Somatic Cell Count (5)
Genetic Mature Cow LWT (Live weight)	Live weight Breeding Value from Livestock Improvement Corporation (LIC) (modified by ancestry) for a fully grown mature cow (5 – 7 years) at BCS 4.5 at 100 days in milk
Lame Cow Interventions	The recorded incidence of new lame cow treatments per cows that have calved in the season (new being the same leg after 30 days or a new leg)
Mastitis	The recorded incidence of new cases per the number of cows, including heifers, calved for the season (new being the same quarter after 14 days or a new quarter)
PW (Production Worth)	An index used to measure the ability of the cow to convert feed into profit over her lifetime.
Recorded Ancestry	This is an "identified paternity" measure. The higher the level the more accurate the BW and PW information. It indicates the level of recording of an animal's dam and sire and includes all female relatives related through ancestry (ie sisters, nieces, etc) and is used when she is a calf. The evaluation of untested animals is based solely on ancestry records.
Reliability	A number on a scale of 0 to 99 which measures how much information has contributed to the trait evaluation for the animals, and how confident we can be that a Breeding Value is a good indication of the animal's true merit. The more herd testing data available the higher the score.
Replacement Rate	The number of heifers to calve divided by the total herd to calve for the season, expressed as a percentage

Feed Efficiency	
Comparative Stocking Rate	Total kilograms of mature cow genetic live weight of cows calved divided by tonnes of dry matter available
Cow Feed Efficiency – Eaten	Standardised (11 MJ ME/kgDM) kilograms of dry matter eaten per kilogram of milk solids produced
Farm feed Efficiency – Available	Standardised (11MJ ME/kgDM) or kilograms of dry matter per kilogram of milk solids produced
PKE	Palm Kernel Expeller
DDG	Dried Distillers' Grain
Environmental	
Green House Gas Emissions	Green house gases on a whole farm basis expressed as CO <sup>2</sup> equivalents
Nitrogen Conversion Efficiency	A ratio of product divided by Nitrogen input (Nitrogen input includes fertiliser, supplement and Nitrogen fixation), expressed as a percentage
N loss (Nitrogen loss)	An estimate of the Nitrogen that enters the soil beneath the root zone, expressed as kg N/ha/year
P loss (Phosphorus loss)	An estimate of the Phosphorus lost to water as surface and subsurface run off, expressed as kg P/ha/year
Financial	
Net Livestock Sales	Net Income from Livestock sales (sales less purchases)
Breakeven Milk Price	The breakeven milk price is the payout needed per kgMS to cover the direct costs of production
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation and is the cash surplus available from the farming business
Feed Costs	All feed purchases, irrigation, nitrogen, grazing, silage/hay contracting, cropping costs, regrassing, pest and weed control, leases, related wages
FWE (Farm Working Expenses)	Direct farm working costs including owner operator remuneration before interest, taxation, depreciation, amortisation
Livestock Trading	The income from livestock trading including both Net Livestock Income and accounting adjustments for changes to both the number of cows and the value of cows on hand at year end.
Milk Price	Total milk income divided by total kgMS

#### **Ministry for Primary Industries** Manatū Ahu Matua

PO Box 2526, Wellington 6140 New Zealand 0800 00 83 33 www.mpi.govt.nz

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