Murdoch Southern Farms Limited

Adapting to the environment and staying true to vocation

Southland | Blair Murdoch & Rebecca Jamieson

Farm Systems Change – 2016 Dairy Farm Case Study

Ministry for Primary Industries
Manatū Ahu Matua

Murdoch Southern Farms Limited

At a glance

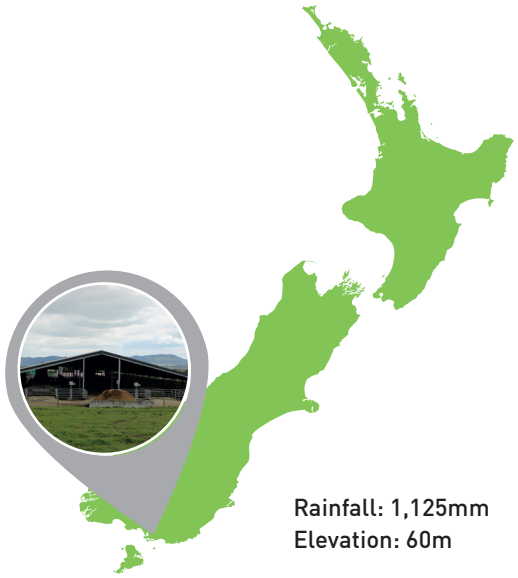
Murdoch Southern Farms Limited

"We strive to improve every year and learn something new every day."

In 2006 Blair Murdoch and Rebecca Jamieson were looking at their future in dairy farming. A number of their farming friends had moved south so they considered it as an option, making the decision to move from Taranaki to Hedgehope, Southland. The environment of Southland is different to that of Taranaki. They have adapted their farming practices to the Southland environment and breed efficient cows suited to their environment. The production per cow has lifted over the five years from 514kgMS/cow in 2011/2012 to 570kgMS/cow in 2015/2016. Blair and Rebecca are dedicated to their farming business and seek to do their best at all times.

Season Ended	Total kgMS	FWE/kgMS
2012	299,374	$4.52
2013	310,117	$4.79
2014	319,536	$5.04
2015	290,121	$5.09
2016	339,260	$4.10

At a glance – 2014/15 Season



Rainfall: 1,125mm
Elevation: 60m

Farm Details

Milking Platform	**273.9 ha**
Dairy Support	**0.0 ha**
Total	**273.9 ha**
Effective Milking Platform	**259.0 ha**
Est. kgDM grown (per effective ha/year)	**14,300**
Cows (per effective ha)	**2.2**

Livestock Details

Breed Type	**Friesian**
Peak cows milked	**565**
Production per cow (kgMS)	**513**
Live weight per cow (estimated actual kg)	**560**

Other Details

People working on farm	**3.5**
Peak Production (kgMS/ Cow/Day for top month)	**2.0**
Start of Calving	**29 Jul**
Calved in 6 weeks	**95%**
Average Pasture Cover (kgDM/ha at start of calving)	**2,224**
Production (kgMS/effective ha)	**1,120**

Farming focus

Blair and Rebecca are still aiming to fine tune their business, to have the complete package with healthy productive cows, to minimise wastage in its many forms and deliver consistent results year-on-year. They are mindful to always be open to new ideas and to constantly look for opportunities to improve their processes. Blair and Rebecca want to be rewarded by running a profitable business, however their focus first and foremost is the cows.

ADAPTING TO THE ENVIRONMENT

Blair and Rebecca are focused on adapting to succeed. They chose farming as their business and in 2006 bought a dairy farm in Southland. Since then they have sought to adapt their farming practices to the Southland environment and continued to invest in their farming business.

Read more on Page 5

BREEDING TO SUCCEED

Their cows are the foundation on which Blair and Rebecca build their farming business. To achieve the best outcomes from all other aspects of the farm activities, the cows are bred based on four key attributes – body structure, udder composition, fertility and survival.

Read more on Page 12

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A closer look

Adapting to the environment

“To be proud of what we do and strive to do the best we can within the constraints - passing on to the next generation in a better way.”

Blair and Rebecca began farming in Taranaki with the aspiration to increase cow numbers and grow their business. However, they were unable to find a farm in Taranaki to meet that criteria. Following in the footsteps of a few of Blair’s friends they found themselves a farm at Hedgehope in Southland. The 149 hectare farm purchased by Blair and Rebecca had been a dry stock and then deer farm before being converted to dairy. This together with a leased block became of the foundation of the farming operation.

A common practice in Southland is for the cows to go off-farm to grazing during the winter. After sending their herd off farm to winter grazing for a few years, Blair and Rebecca decided they wanted to keep their cows at home. To achieve this they purchased 124 hectares adding to the original 149 hectares. This enabled them to personally manage the care of their cows through the winter. For both Blair and Rebecca the care of their livestock goes to the core of their vocation as dairy farmers. They have sought ways to expand their farming operation so they can be self-contained with the herd staying on-farm year round. The replacements are grown out on leased land. As the Southland land prices increased, Blair and Rebecca considered other ways to become self-contained.

They went to the South Island Dairy Event (SIDE) and learned about barn housing. In 2008 they borrowed the money and built a free-stall barn instead of buying more land. Although with hindsight Blair and Rebecca have identified aspects of the structure and flow around the free-stall barn that could have been implemented differently, overall it delivers on their objectives to consistently feed their cows, to protect their pasture during wet conditions and make feeding out easier for the farm team.

Blair particularly wanted to improve the transition process for the cows and the free-stall barn has allowed greater control from dry cow diet to milking cow diet. The cows are scanned so Blair and the farm team can split the herd into smaller mobs based on calving date. This enables feed to be matched to the different dry off dates and the different transition dates. The bulk of the feed is delivered in the free-stall barn and the concentrates fed through the in-shed feeders in the milking shed.

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Adapting to the environment continued

The free-stall barn system relies on a capable farm team who are attuned to the cows and able to identify when a cow is off-colour. The focus is on preventative animal health care and everything depends on getting the feed mix balanced between starch and sugar. If the cows get too heavy then there is a risk of metabolic issues. If they get too light then the cows may not get in calf or hold the calf. Blair and Rebecca work closely with their farm advisors to understand the feed requirements for the cows and manage the feed processes carefully.

The free-stall barn feeding system leads to increased collection of effluent. As the technology changes Blair and Rebecca are able to apply fertiliser more strategically by using the information from whole farm soil testing and effluent analysis to target fertiliser application. Overall they estimate a net saving of approximately $40,000 through reducing fertiliser cost and increasing cost of effluent management.

The inclusion of the free-stall barn to the farming system provided an opportunity for Blair and Rebecca to smooth their cashflow by winter milking and now they produce 12,000 – 13,000kgMS through to late June/early July. This in turn gives Blair and Rebecca flexibility with timing on culling of cows to maximise their revenue. They are particularly mindful of the beef schedule during times of low milk payout, ensuring they feed the cows that are producing and cull the underperforming cows to be sold at the best price. The ability to determine the optimum timing is important to achieve overall farm performance.

The climatic conditions in Southland are a challenge. The weather, as with most parts of New Zealand, can be variable and Southland can range from droughts to snow storms. Blair and Rebecca have sought to develop a farming system that complements the climate, the animals and the people. They continue to fine tune and change a little bit here and little bit there to continuously improve their farming business performance. Then they aim to deliver consistently at an ever higher level of performance.

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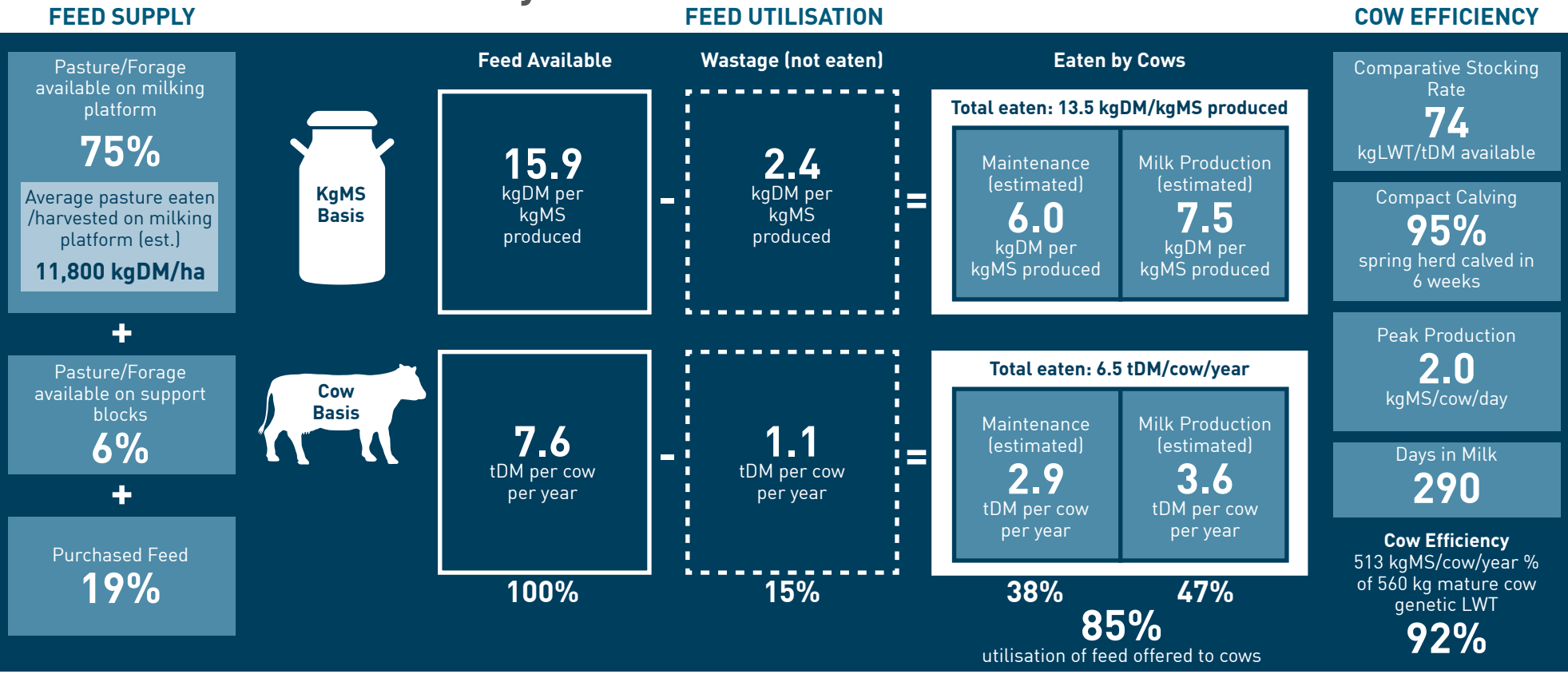
Feed to milk efficiency 2014/15 season



What does this show?

Feed Supply

It is estimated that between 11,800kgDM/ha and 12,400kgDM/ha is eaten or harvested, with more in years of greater pasture growth. In total for the 2014/15 year, 75 percent of the herd's requirements were met from pasture and feed from the milking platform. A further 6 percent was from other crops, and 19 percent was purchased as barley, dried distillers grain, PKE, molasses and straw.

Feed Utilisation

Cow feed conversion is consistently between 12.3kgDM and 13.5kgDM eaten per kgMS produced, reflecting similar feed quality across the years, although a variety of feeds were used. The cows achieved a 47 percent conversion of feed into milk in 2015 lifting to 51 percent in 2016.

The feed mix is monitored and changes depending upon stage of lactation to best deliver the dietary requirements of the cows. Although PKE has been part of the mix in the past Blair and Rebecca are seeking to identify alternative feed options.

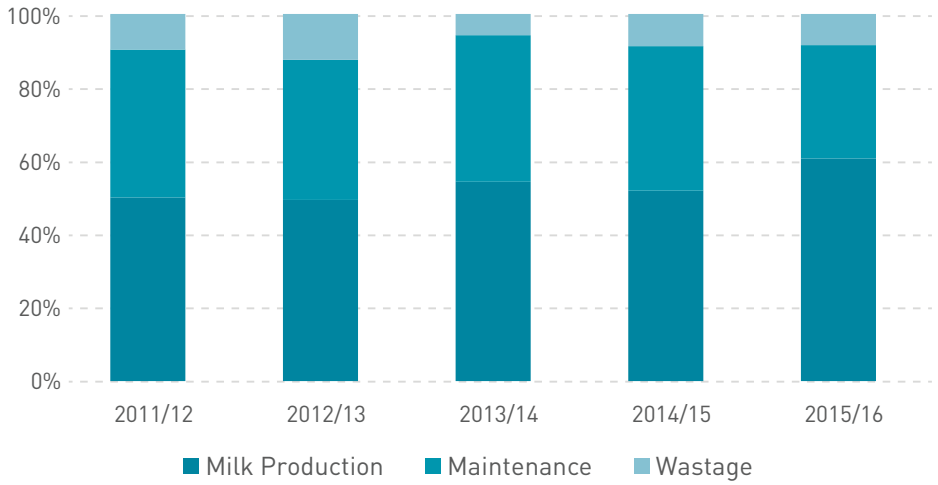
Cow Efficiency

High per cow production is achieved through a combination of initiatives. A very compact calving period for the 2014/15 year of 95 percent for the spring herd calved within six weeks, from a 29 July planned start of calving, and a peak production level of 2.0kgMS/cow/day leads to the high efficiency of 92 percent with cows producing 513kgMS and having a genetic mature live weight of 560kg.

An extended lactation which has increased from 278 to 290 days in milk contributes to the high per cow production.

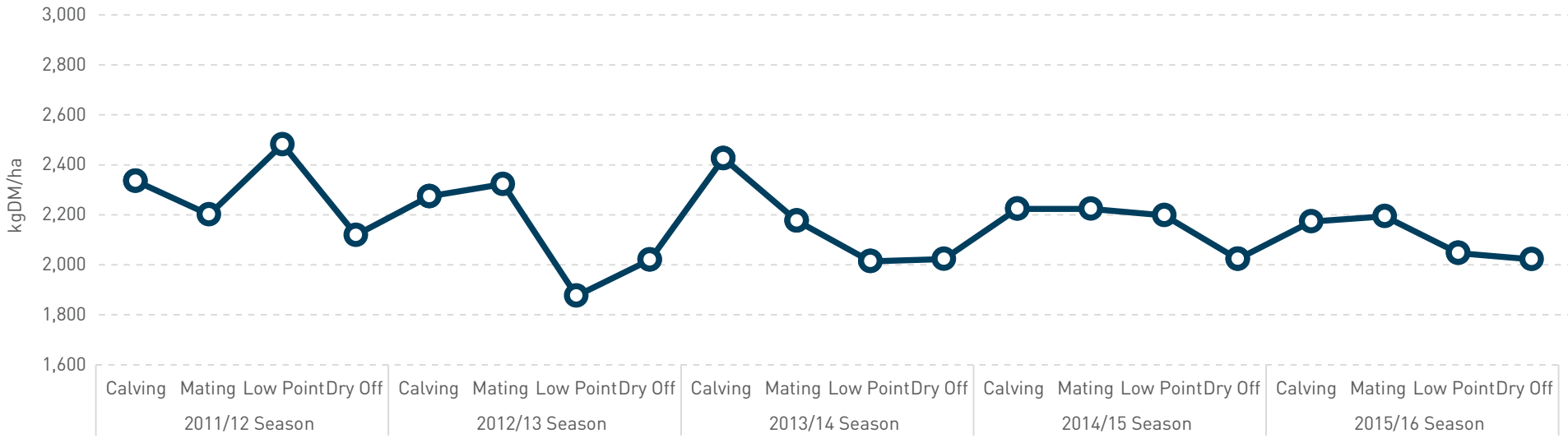
Feed to milk efficiency performance over time

Feed to Milk Efficiency

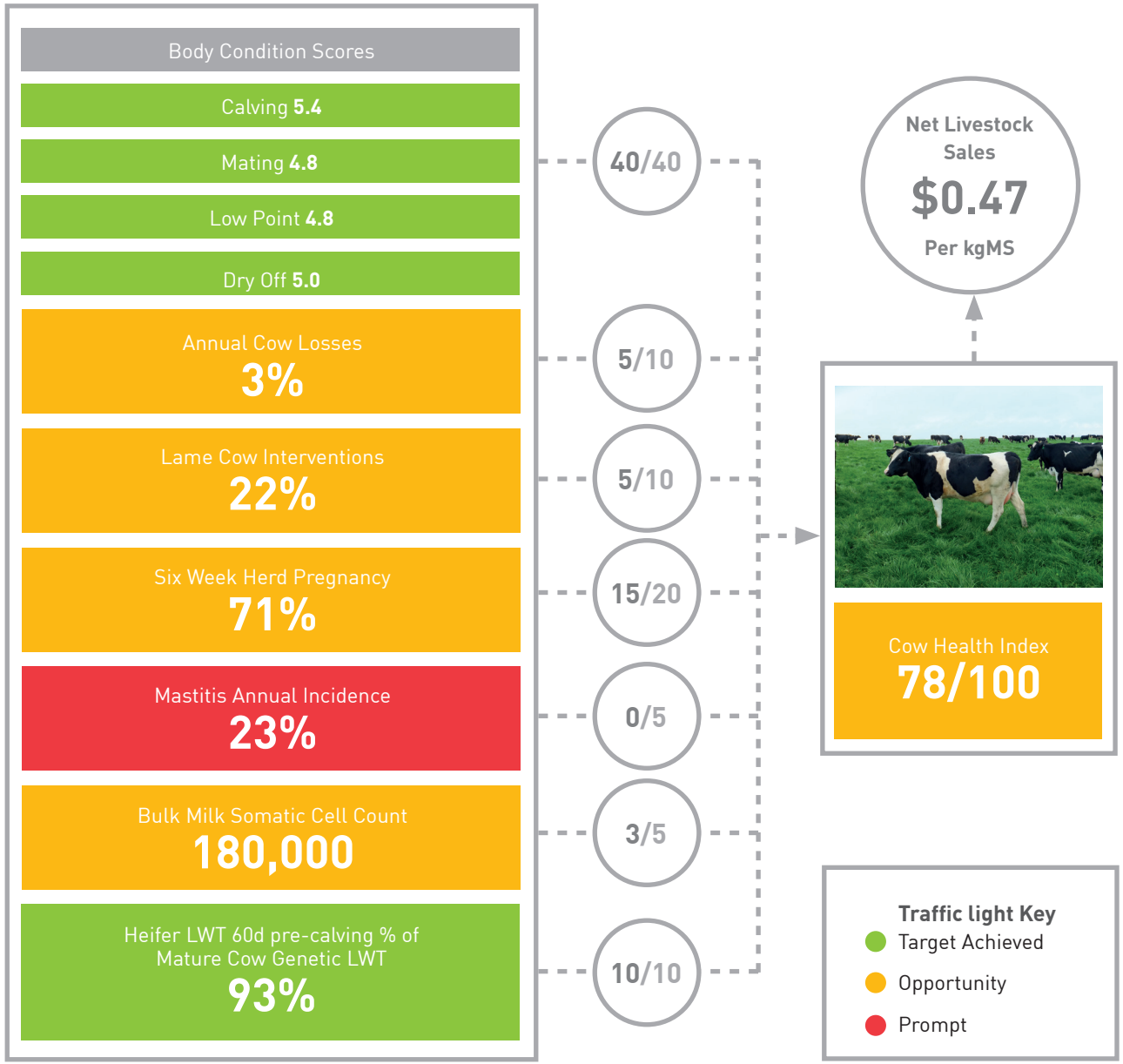


	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Comparative Stocking Rate kgLWT/tDM available	75	73	70	74	70
Farm Feed Conversion kgDM/kgMS produced	15.7	15.5	15.1	15.9	14.6
Cow Feed Conversion kgDM/kgMS produced	13.5	13.5	12.8	13.5	12.3
Feed Wasted kgDM/kgMS produced	2.2	2.0	2.3	2.4	2.3
Feed Grown % of feed available	84%	81%	81%	81%	82%
Feed Purchased % of feed available	16%	19%	19%	19%	18%

Average Pasture Cover



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.

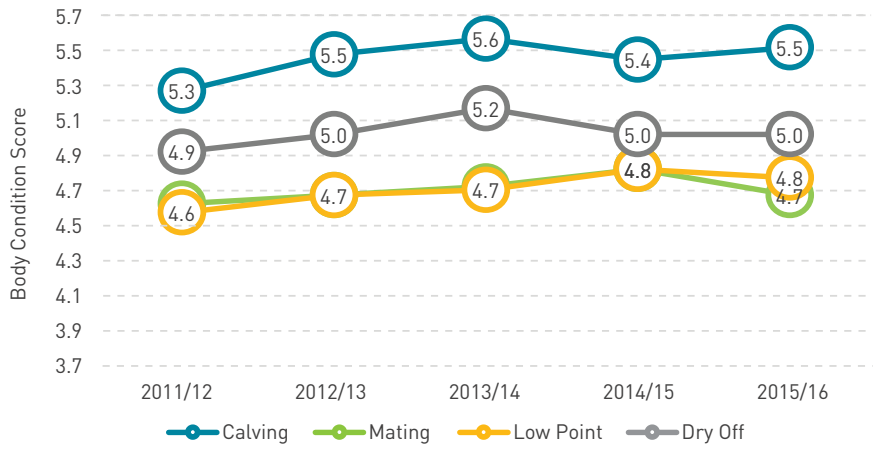
Herd Survivability Metrics

3 year-olds Retention Rate	97%
Replacement Rate at calving	20%
Heifer Mating LWT % Mature Cow LWT	no data
Herd Empty Rate	12%

The replacement heifers are well grown and over the years the average live weight of each heifer has increased from 490kg to 520kg, which takes them to 93 percent of mature cow genetic live weight 60 days pre calving in the 2014/15 year. With better feeding and care these heifers have a greater probability of performing well and being retained in the herd as three-year olds. For 2014/2015 the retention rate was 97 percent with a replacement rate of 20 percent. As Blair and Rebecca are seeking to increase cow numbers, they limit their level of culling so there may be some high somatic cell count cows in the herd.

Animal health performance over time

Animal Health



	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Cow Health Index (Max 100)	83	76	91	78	78
Annual Cow Losses	2%	4%	2%	3%	2%
Lame Cow Interventions	42%	19%	15%	22%	19%
Six Week Herd Pregnancy	75%	68%	80%	71%	69%
Mastitis	14%	14%	18%	23%	25%
BMSCC (000s)	186	198	159	180	194
Heifer LWT 60d pre-calving % of Mature Cow Genetic LWT	88%	92%	93%	93%	92%

What does this show?

The Body Condition Score (BCS) at calving is consistently strong at over 5.0. As the cows are in good condition at dry-off the lift to calving is manageable with a planned winter feed programme. However, when the BCS at mating is lower it may contribute to some variability in the six week herd pregnancy percentage as the cows get in-calf and hold better when BCS is optimal.

The cow losses are relatively low, although there are times when things go wrong and in the 2012/2013 season Blair and Rebecca experienced metabolic disorders which was caused by overfeeding the cows.

Blair and Rebecca are challenged with lame cows which although improving is directly related to wet conditions at certain times of the year, especially during the winter. They have blood tested the cows and by increasing the level of minerals delivered to the cows there has been an improvement in the hardness of the cow hooves. Blair and Rebecca have the cow hooves checked in December and February/March each year at which time the cows hooves are trimmed, if needed, and they receive a report on the hoof health of the cows.
The combination of these preventative animal health actions has contributed to the reduction in the level of lameness from 42 percent for 2011/2012 to 19 percent in 2015/2016.

Since 2011/2012 the level of mastitis has increased from 14 percent to 25 percent in 2015/2016, however the level of BMSCC has remained relatively consistent except for the 2013/2014 season when there was a drop. Blair and Rebecca focus on prevention rather than cure, with dry cow and teat seal administered at dry off. Any cows showing signs of mastitis are treated and those treated 2 – 3 times for mastitis are likely to be culled. Because of the cost, they haven't completed herd testing over the years and there may be cows which would be identified through that process for culling. The management of mastitis continues to be an area they work to improve.

The six-week pregnancy rate varies from season to season although cow condition is relatively consistent at mating. In addition, the empty rate fluctuated between 6 percent to 9 percent during a 12-week mating period and then lifted to 16 percent with a 10-week mating period. The cows that are to be culled are not mated rather left as empty and milked through to dry off.

Environmental Performance

Blair and Rebecca have adapted to a different climate with different farming demands.

Their 274 hectare farm is located near Hedgehope. The farm sits within 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).

Rebecca and Blair are members of the Hedgehope Catchment Group contributing to submissions on the Water 2020 environment plan.

With a 1,125mm rainfall, the land is predominately Pukemutu soil. It is a naturally poorly drained soil which responds well to mole and tile drainage. With some gentle rolling contour, the property is self-contained carrying both mature and young stock. Purchased feed of 1,220 kgDM/cow includes DDG, PKE, barley, soya, molasses and straw which is fed throughout the year to lactating and dry cows.

Use of barn

Blair and Rebecca built their free-stall barn in 2008. They use the barn when the cows are dry for feeding and shelter and as a feed pad during the milking season.

With the heavy soil type, they need to manage grazing during wet periods to minimise pugging and soil compaction. As the costs of grazing have increased Blair and Rebecca have focused more on the use of the land and caring for their cows to manage the BCS for calving and associated transitions from winter feed to lactation feed.

They have also worked on achieving better utilisation of purchased feed which they have used to extend the lactation and aim to minimise the period during which the cows are dry.

Maximising the use of nutrients

Blair and Rebecca undertake regular soil testing on a paddock by paddock basis. Their fertiliser fepresentative has developed a simple and effective plan to target fertiliser applications to address soil test results.

They test the nutrients in the slurry from the free-stall barn, and target effluent and manure applications to paddocks where silage has been made to replace the missing nutrients.

Blair and Rebecca operate two effluent ponds - one for the milking shed and one for the free-stall barn. The ponds provide significant storage and the ability to store effluent during wet periods. This allows effluent to be spread when soil conditions are optimal for maximising the uptake of nutrients.

The ponds are emptied at the beginning of winter to provide maximum storage capacity through the winter and into spring.

They also use K line for the spreading of effluent from the milking shed and an umbilical system for the spreading of the slurry from the free-stall barn.

Cropping

Blair and Rebecca constantly review and revise their cropping plan. They have used kale with baleage to feed in paddock. The whole crop is grown on the milking platform and then harvested to be fed to milkers at calving time while the dry cows are fed straw and silage in the barn. In the last couple of seasons they have double-cropped kale, then barley, then new grass to save on cultivation costs. They have also wintered their R2 heifers on the milking platform on kale with baleage.

In the future

Blair and Rebecca seek opportunities to be more sustainable in the future. They constantly scrutinise the price of purchased in feeds (especially protein), investigate new pasture species (i.e. they are part of the Agriseeds Green Into Gold Programme), and investigate breeding the right type of cow for their farming system. This season they are trialling grass and baleage as winter crop instead of kale for the cows that do not fit into the barn. The R2s are being wintered off farm as their lease of 88 hectare has ended.

Blair and Rebecca have identified opportunities including capturing and using rain water from the barn roof in other ways on the farm. This also reduces the amount of rain water which goes into the effluent ponds. They are also investigating other options at the milking shed to reduce water usage and switching electricity for solar power.

Breeding to succeed

In 2006 when Blair and Rebecca moved to Southland they bought four Friesian/Cross-bred herds and combined them to form the base of their dairy herd.

However, a limitation for Blair and Rebecca has been the base number of cows from which to expand the herd. They want to build their young stock numbers so they can increase the cows to calve to 615 and peak milk 590. They have 172 calves in the 2016/2017 season and expect by the 2018/2019 season to have lifted cow numbers. This will enable them to both cull and sell cows to further develop their herd and optimise the livestock income.

Blair and Rebecca have a clear definition of the cow they want to breed and have embarked on a ten-year programme to progressively improve the quality of their herd. They particularly focus on four aspects of cow attributes – body structure, udder composition, fertility and survival.

Blair and Rebecca use SireMatch to assist with the selection of the bull semen which is based on the best bull available from either Ambreed or LIC. They seek to breed cows that have a high protein content in the milk, are not too tall, have a 580kg LWT, good rump angles and low BMSCC. They have used short gestation semen in the past couple of years and last year used artificial insemination (AI) for all the herd. Blair and Rebecca do not use AI on cows that are to be culled.

In the 2014/2015 season they had a higher proportion of bull calves to heifer calves which impacted on the level of replacements. In the 2015/2016 season they had seven sets of freemartins which again impacts upon the level of replacements.

The focus on cow breeding is the foundation of the farming business. When the calves are born they are ear-tagged and the calving date entered into the herd records.

Then the calves are all DNA tested and the breeding data is not confirmed until the results of the DNA testing are received back.

Then the next step is ensuring the young stock are well fed and grown out, so that when they join the herd they produce milk rather than continue to grow.

For that reason Blair and Rebecca personally manage the care of all their livestock. They lease 40 hectares where the young stock are grazed. The young stock are taken off the milking platform when they are weaned at 110kg and return to the milking platform as R2s to calve at 520kg. Throughout that growth period the focus is on consistently feeding the young stock well to grow them out properly.

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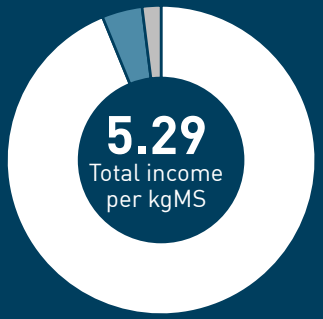
Financial performance 2014/15 season

Income per kgMS



Milk Income per kgMS
Livestock Trading per kgMS
Other Income per kgMS

FWE per kgMS

Feed Expenses per kgMS
Other FWE per kgMS

Profit and Loss

	$000s	Per Cow	Per KgMS
Milk Income	1,466	$2,594	$5.05
Livestock Trading & Other Income	70	$123	$0.24
Total Income	1,536	$2,717	$5.29
Feed Costs	621	$1,100	$2.14
Other FWE	856	$1,516	$2.95
Total FWE	1,477	$2,616	$5.09
EBITDA	59	$101	$0.20

What does this show?

Overall there has been an increase in total farm working expenses from $4.52/kgMS in 2011/12 to $5.09/kgMS in the 2014/15 season. However, this drops back in the 2015/2016 season to $4.10/kgMS. The movement between years for feed costs reflect the impact of changes in the mix of feed comprising the cost per tonne and tonnes purchased. Blair and Rebecca endeavour to manage the cost of feed by monitoring the market prices for feed and using supply contracts. With Other Farm Working Expenses (FWE) there are costs which can be deferred between seasons however delaying essential or core tasks can be detrimental in the long run. For example, maintaining laneways, hoof trimming, dry cow therapy and teat seal. As a result it is expected that Other FWE may vary from season to season. The steady pasture growth in 2015/2016 contributed to a saving on feed costs.

The 50,000kgMS lift in production in the 2015/2016 season contributes a $0.40kgMS reduction in FWE/kgMS through spreading the costs across higher total milk production. For the 2014/2015 season the breakeven before debt servicing and depreciation is $4.85/kgMS. This contrasts with the breakeven for 2011/2012 of $3.90 and for 2015/2016 of $3.52.

The total production for 2011/2012 was 299,374kgMS from 582 peak cows and total production for 2015/2016 was 339,260kgMS from 595 peak cows, which is an increase of 39,886kgMS – an average increase in production per cow of 11 percent.

The fixed costs continue to increase, especially those associated with compliance irrespective of the milk production.

Breakeven Milk Price (per kgMS)

Feed Costs $2.14

\+

Other FWE $2.95

=

Total FWE $5.09

−

Livestock Trading and Other Income $0.24

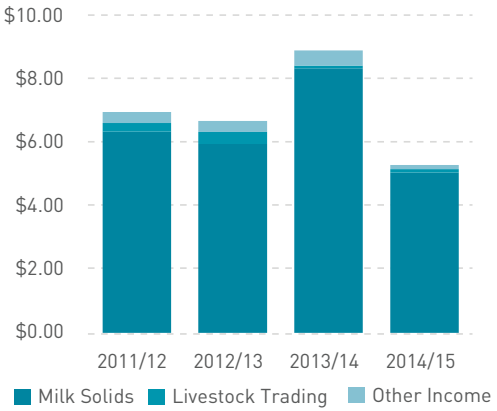
=

Breakeven Milk Price
Before debt servicing and depreciation
$4.85

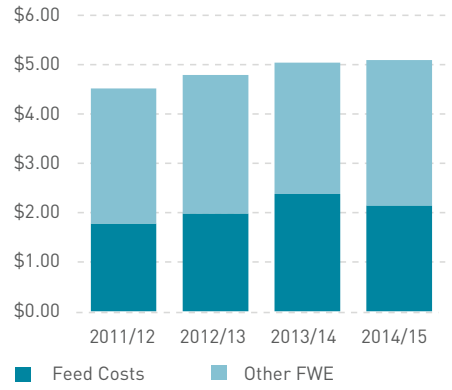
Financial performance over time

	Season Ended			
Financial Efficiency	**2012**	**2013**	**2014**	**2015**
Feed cost per kgMS	$1.78	$1.98	$2.38	$2.14
Other FWE per kgMS	$2.74	$2.81	$2.66	$2.95
Breakeven Milk Price	$3.90	$4.06	$4.48	$4.85
Return On Assets %	4%	3%	8%	(1%)
Capital employed per kgMS	$42	$40	$40	$38
Milk Price	$6.34	$5.95	$8.34	$5.05

Income per kgMS



Expenses per kgMS



	Season Ended			
Profit and Loss to EBITDA (per kgMS)	**2012**	**2013**	**2014**	**2015**
Milk income	$6.34	$5.95	$8.34	$5.05
Dividends	$0.33	$0.34	$0.48	$0.12
Livestock trading	$0.28	$0.38	$0.08	$0.11
Other operating income	$0.01	$0.01	–	$0.01
Total income	**$6.96**	**$6.68**	**$8.90**	**$5.29**
Feed costs	$1.78	$1.98	$2.38	$2.14
Other FWE	$2.74	$2.81	$2.66	$2.95
Total FWE	**$4.52**	**$4.79**	**$5.04**	**$5.09**
EBITDA	**$2.44**	**$1.89**	**$3.86**	**$0.20**

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Definitions

Definitions

General

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 (i.e. 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 CO2 equivalents
Nitrogen Conversion Efficiency	A ratio of product divided by N input (N input includes fertiliser, supplement and N fixation), expressed as a percentage
Nitrogen Loss	An estimate of the Nitrogen that enters the soil beneath the root zone, expressed as kg N/ha/year
P 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 Sales 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

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