Glenmoa Farms Limited – Gleniffer

A dairy conversion for the next generation

Otago | John & Ruby Foley

Farm Systems Change – 2016 Dairy Farm Case Study

Ministry for Primary Industries
Manatū Ahu Matua

Glenmoa Farms Limited – Gleniffer

At a glance

Glenmoa Farms Limited – Gleniffer

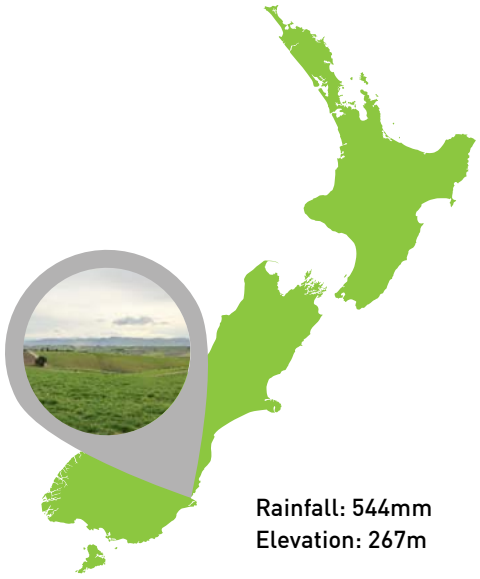
"People have to want to follow a process – so it has to be simple and easy to implement."

Aside from 10 years farming in the Gisborne region, John has spent the majority of his farming life in North Otago. Together with his wife Ruby, they have converted their intensive arable farm to three farm operations. One dairy farm runs a traditional dairy model (Glenmoa), which has now been sold and the most recent conversion is a hybrid style dairy farm (Gleniffer), which combines pasture with covered feed pads. John and Ruby farm the support land which is used for growing crops and to provide winter grazing for the cows.

John and Ruby consider that as the focus on land quality intensifies and land becomes more expensive, the way in which farms are developed and operated has to change. John and Ruby aim to create the farm of the future.

Season Ended	Total kgMS	FWE/kgMS
2015	231,313	$4.54
2016	242,520	$4.61

At a glance – 2014/15 Season



Rainfall: 544mm
Elevation: 267m

Farm Details

Milking Platform	**64.7 ha**
Dairy support	**114.1 ha**
Total	**178.8 ha**
Effective Milking Platform	**54.7 ha**
Est. kgDM grown (per effective ha/year)	**18,000**
Cows (per effective ha)	**7.3**

Livestock Details

Breed Type	**Friesian**
Peak cows milked	**400**
Production per cow (kgMS)	**578**
Live weight per cow (estimated actual kg)	**540**

Other Details

People working on farm (FTE)	**3.5**
Peak Production (KgMS/ Cow/Day for top month)	**2.4**
Start of Calving	**1 Aug**
Calved in 6 weeks	**76%**
Average Pasture Cover (kgDM/ha at calving)	**2,300**
Production (kgMS/effective ha)	**4,230**

Farming focus

John and Ruby have converted their arable farm to dairy. They know their land well, are clear on what it can produce and know how to measure the farm's inputs and outputs. It is second nature for them to "weigh in and weigh out", which is a key focus for purchased feed. While they are still in the early stages of their dairy conversion, their ability to monitor farm performance allows them to manage and be responsive to feedback.

DESIGNING A DAIRY FARM FOR THE FUTURE

John and Ruby took a futuristic approach to the dairy conversion on Gleniffer. Being sustainable is a critical success factor and a focus on the environmental impact is a key aspect of sustainability, alongside creating a great place to work for the team and delivering comfortable conditions for the livestock.

Read more on Page 5

Ministry for Primary Industries

Glenmoa Farms Limited – Gleniffer

A closer look

Designing a dairy farm for the future

For John and Ruby, the conversion of their arable farm into two dairy farm units was a major project. The conversion of the "traditional" dairy farm on Glenmoa was the catalyst for the thought process which lead to the design of dairy farm conversion on Gleniffer. The objective was to create a dairy farm which could be operated profitably, within the environmental limits set under Plan 6A by the Otago Regional Council for North Otago.

The dairy farm has been developed on 55 hectares, with approximately 400 Friesian cows which from the second season have been milked year-round using covered feed pads and a wintering pad. The covered feed pads and milking shed were constructed to give an easy flow for the cows, allowing them to move comfortably from feeding into the milking shed and back to the paddock. An important consideration for John and Ruby was giving the cows a comfortable environment. The real point of difference for their covered feed pads is the controlled air flow and maintenance of an ambient air temperature, which is achieved through it's design. John spreads straw over the slatted floor of the covered feed pads to increase cow comfort. The straw and effluent fall through the slatted floor into the storage bunkers below.

A typical day for a cow on Gleniffer has her grazing in the paddock for 14 hours, eating at the covered feed pad for 8 hours and in the milking shed for 2 hours following a pattern similar to this over a 24 hour period:

milking → paddock → covered feed pad → milking → paddock → covered feed pad

For the most part the cow can move from the paddock to the feed pad at her own pace. There are three simple lane ways on the farm and each paddock has two entry points – one used as an entry and one used as an exit. The purpose of the two gateways is to minimise damage to pasture near the entry and exit. The water trough is located in the middle of the paddock, again to minimise the potential for pasture damage.

Automatic gate openers are used to allow the cows to leave the paddock at a pre-programmed time and walk at their own speed to the feed pad prior to each milking. The timing is altered slightly from time to time so the cows do not fall into a pattern and congregate at the exit before the gate opens, which would negate the benefit of the two gateways.

Designing the dairy farm for the future – *continued*

The covered feed pads are used for both feeding and shelter. All supplementary feed is delivered to the cows on the feed pad, which enables effective utilisation of the feed with minimal wastage. When the weather is hot in summer and wet or snowing in the winter, the covered feed pads provide shelter for the cows. Moving the cows off the paddocks during wet and snowy periods assists in protecting the soil from pugging.

The development of the covered feed pads and milking shed were important to creating the right working areas for both the farm team and the cows. John built the covered feed pads with plenty of space for the farm team to work, using the farm equipment and allowing space within the feed pad areas for the cows to move freely and comfortably. This was achieved by adding more width between the covered feed pads, to create better airflow. John installed security cameras over the covered feed pads so the cows could be monitored, which is especially important when calving for animal husbandry. John also installed security cameras over the fuel, storage and weigh bridge areas where the farm team operate, to provide peace of mind that the farm team are also safe. The gates from the covered feed pads open into a covered walkway leading into the milking shed. John designed the covered walkway to provide shelter for the cows from the heat in the summer and from the rain and snow in the winter. A 40-aside herring bone milking shed was built in preference to a rotary milking shed, because the capital cost and ongoing maintenance costs are lower, the cows are in full view of the milk harvester and drenching is easier for the farm team. Also, with a herd of 400 to 450 cows, the milking duration is similar as between the two types of milking shed.

The herd was purchased during the 2013/2014 season, in preparation for the start of the 2014/2015 season. Therefore, John and Ruby started with a milking cycle which was seasonal, with the herd calving in the spring starting on 20 July. Through the 2015/2016 season the herd was transitioning, so that by the 2016/2017 season the herd was split calving in August and in March. .

Designing the dairy farm for the future – *continued*

The greatest challenge for Ruby was the selection and management of the farm team. During the first season, the farm team comprised a range of nationalities for whom, in many instances, English was a second language. Therefore, Ruby initiated weekly English lessons to improve the communication among the farm team and arranged for them to attend relevant AgITO courses. Unfortunately, John and Ruby had a relatively high staff turnover, which made achieving consistency across all farm processes difficult and ultimately impacted farm performance. However, over time the farm team has evolved and is now led by a Farm Manager with significant dairy farm experience. John and Ruby encourage their farm team to understand and see the value of the farm process which they have designed to be simple, and ensures the care of both the farm team and the cows.

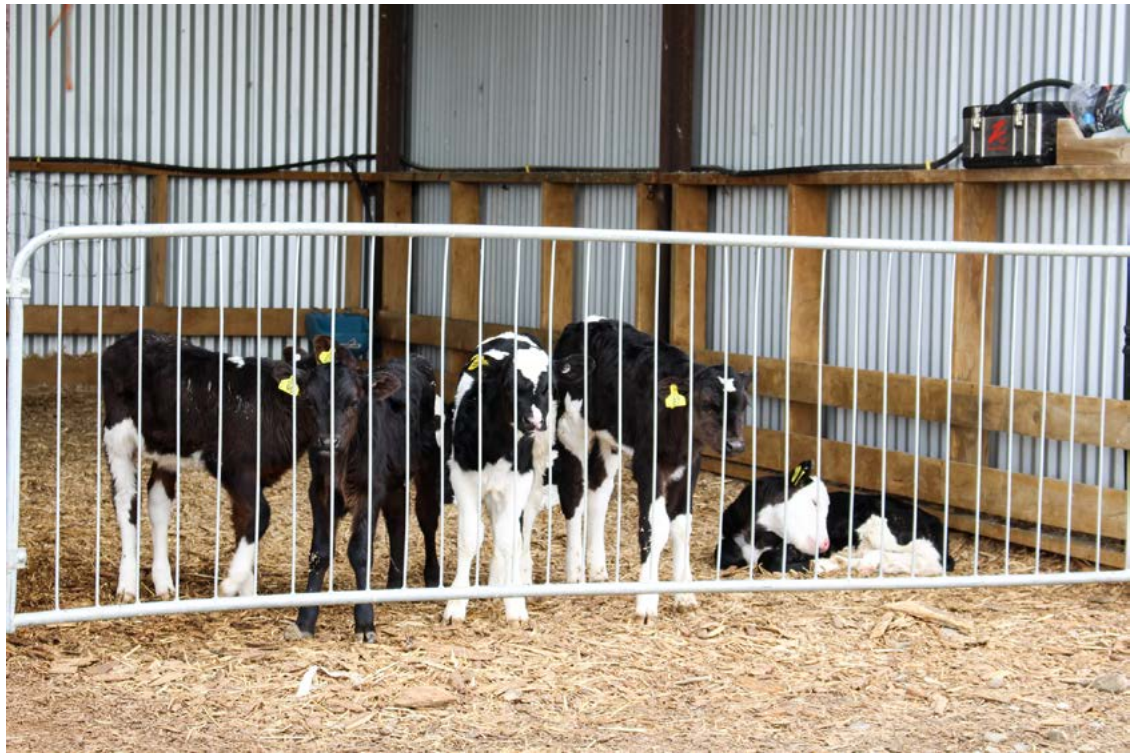
Initial planning anticipated that the feed intake for the cows would comprise of 34 percent of dry matter from pasture and 66 percent of dry matter consumed at the feed pad. Therefore, John's background in crop farming was important to accessing feed inputs, and he generally tenders all feed inputs on an annual basis. The dairy support land enables self sufficiency as far as is practicable. One of the farm team does a pasture walk once a week, taking plate meter readings to assess pasture covers. There are seven sites across the farm where soil moisture probes monitor irrigation needs. Every paddock has an annual soil test. All of these inputs are considered by John during his decision making. The farm is completely self sufficient in "manufacturing" the feed in accordance with the farm advisor feed recipes. The home grown grass silage, fodder beet, alkalage and straw are mixed with purchased feed comprising grain, dried distillers grain, soybean meal, tapioca, palm kernel and carrot pulp. They even make their own pellets for the calves using the mixer.

As the cows spring they are brought in to the covered feed pad area to calve. This enables the farm team to monitor the cows during calving and ensure the calves are fed colostrum within hours of calving.

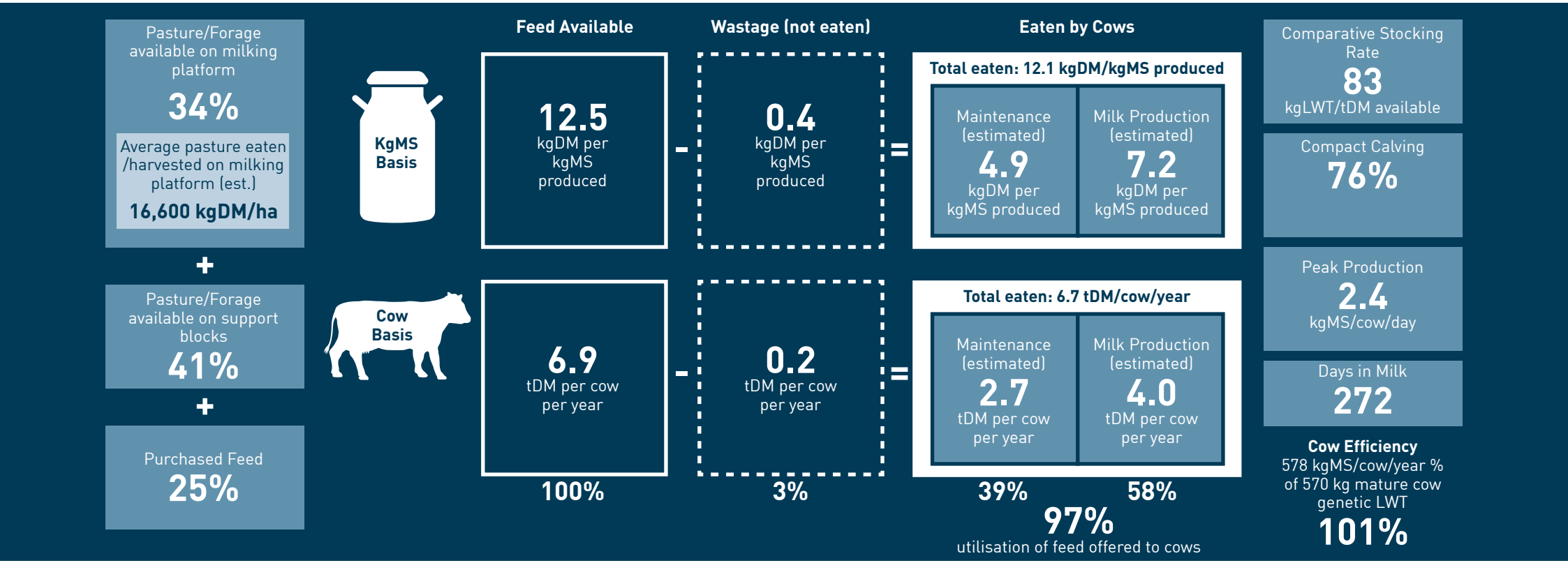
Almost all calves are reared, being fed milk and then progressing to a mix of milk and meal. The bull calves are raised and sold. The calves are weighed regularly and weaned at 100kg.

The heifer replacements go off the farm to grazing on a Farmlands weight gain contract to a farm in Central Otago. The heifers stay there until they return to the farm to calve as R2 heifers at an average weight of 550kg.

They rear more heifer replacements than needed, so that they can replace cull cows especially the older cows with high somatic cell counts.



Feed to milk efficiency 2014/15 season



What does this show?

Feed Supply

The dairy support land managed by John and Ruby is the primary source of the feed supply for the cows, which is consumed in the covered feed pads. Together with pasture, the farm sourced feed is 75 percent of the total diet for the cows. The purchased feed is diverse and includes grain, tapioca, dried distillers grain, alkalage, straw, potatoes and silage.

Feed Utilisation

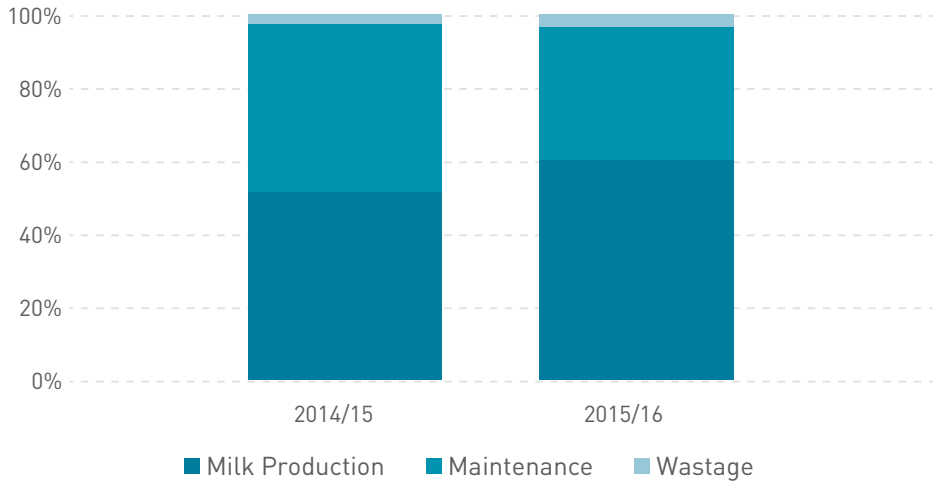
The use of the feed pad improves feed utilisation, by minimising feed wastage to between 1 percent and 8 percent. The farm advisor prepares a feed mix for the cows each month, which changes depending on feed available and the weather. The farm team use their mobile phones to access the feed app for the current feed mix. All feed comes on-farm over the weigh-bridge and then goes into storage. Every 10 days a reconciliation of feed used and available is completed. The farm team use Bluetooth technology across the loader and mixer wagon to measure and weigh in the feed ingredients according to the feed mix, before feeding to the cows on the feed pads.

Cow Efficiency

The farm operates a relatively high comparative stocking rate at 83, and also achieves very high per cow production. This is reflective of the high feed quality delivered to the cows. A milking platform of 55 ha minimises the physical work required of cows in terms of walking distances. These factors, combined with a compact calving, deliver a long held high peak production of 2.4kgMS/cow/day. The cows are fed well throughout the year, which is reflected in the effective conversion of feed into milk production, achieving a cow efficiency of 101 percent.

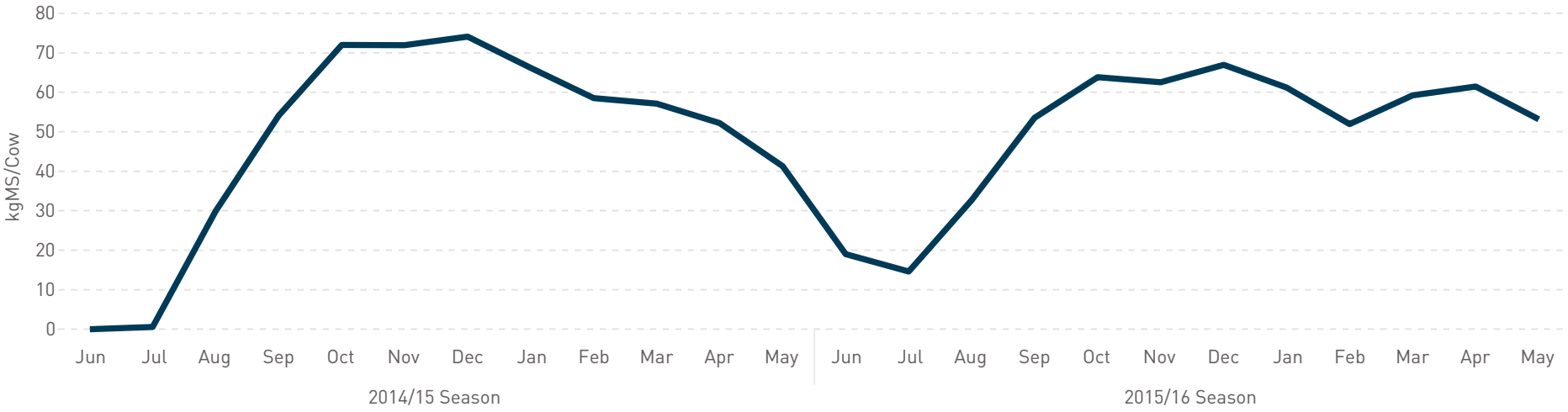
Feed to milk efficiency performance over time

Feed to Milk Efficiency

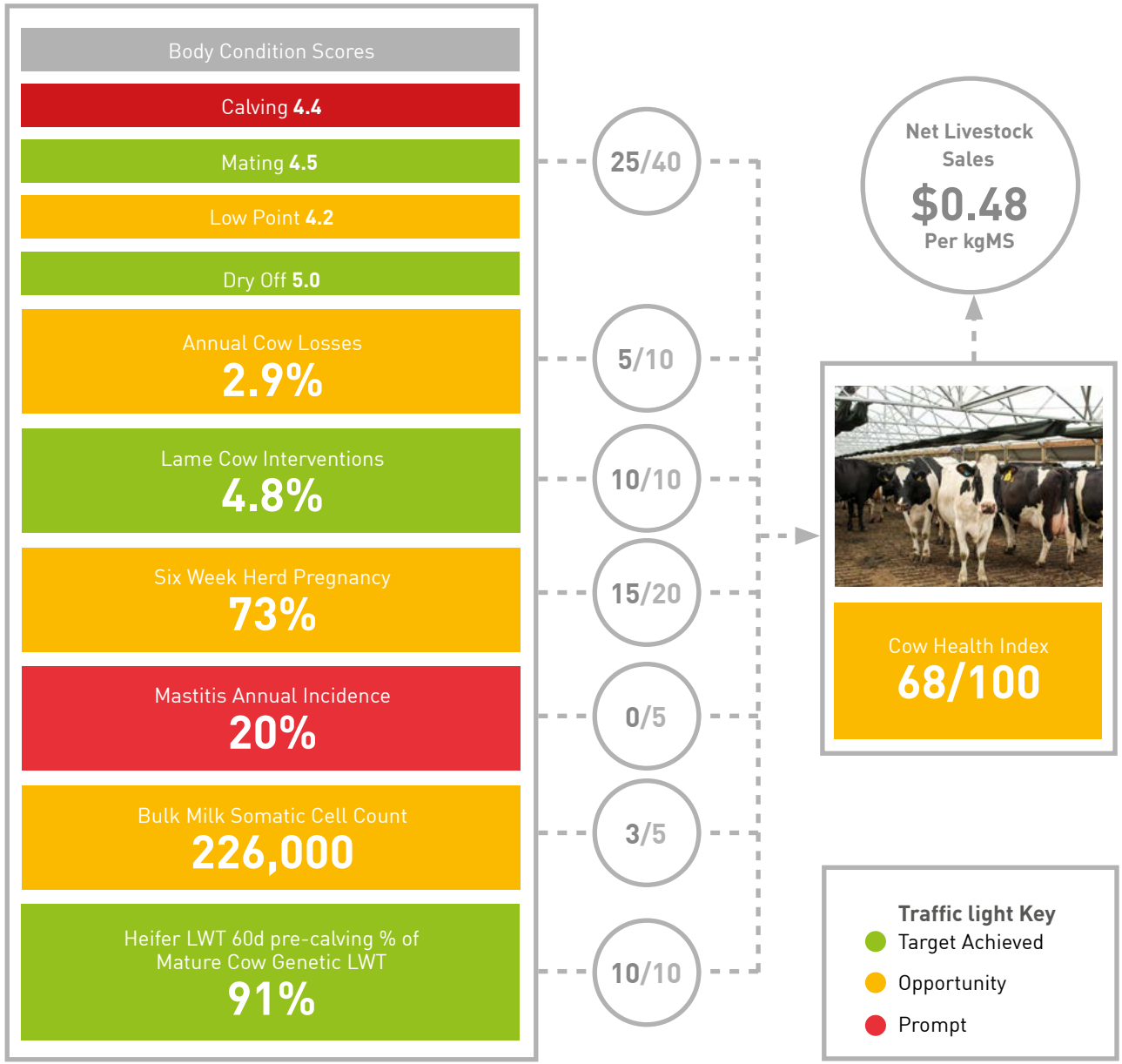


	Season ended 2015	2016
Comparative Stocking Rate kgLWT/tDM available	83	80
Farm Feed Conversion kgDM/kgMS produced	12.5	12.0
Cow Feed Conversion kgDM/kgMS produced	12.1	11.6
Feed Wasted kgDM/kgMS produced	0.4	0.4
Feed Grown % of feed available	75%	74%
Feed Purchased % of feed available	25%	26%

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

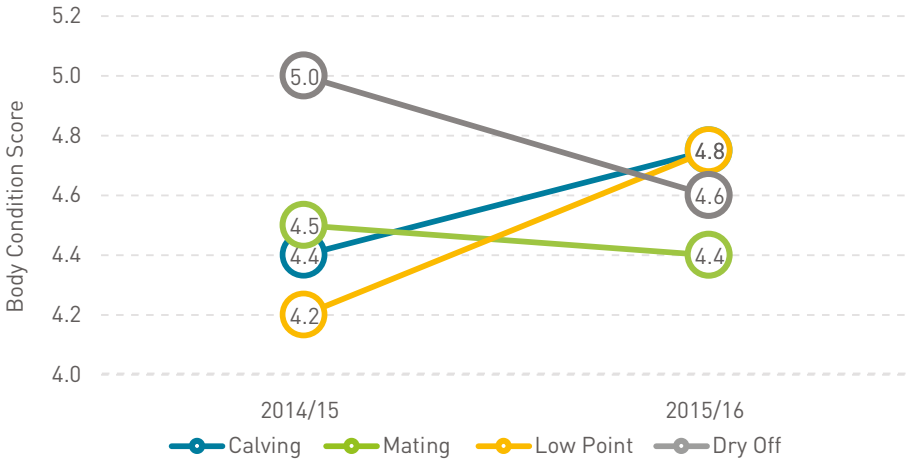
3 year-olds Retention Rate	No data
Replacement Rate at calving	19%
Heifer Mating LWT % Mature Cow LWT	96%
Herd Empty Rate	No data

As the herd was purchased to begin the 2014/2015 season, there are elements of animal health over which John and Ruby had no control. For example, the body condition score at calving. A number of the older cows had high somatic cell counts and were more susceptible to mastitis. John and Ruby are now selectively culling these cows and keeping up to 23 percent as replacements.

The animal health results reflect the learning curve for John and Ruby, as they transition from arable farming to dairy farming, and develop the herd they purchased into the herd they want.

Animal health performance over time

Animal Health



	Season Ended	
	2015	**2016**
Cow Health Index (Max 100)	68	78
Annual Cow Losses	2.9%	3.4%
Lame Cow Interventions	4.8%	10.5%
Six Week Herd Pregnancy	73%	84%
Mastitis	20%	36%
BMSCC (000s)	226	245
Heifer LWT 60d pre-calving % of Mature Cow Genetic LWT	91%	95%

What does this show?

As 2014/2015 was the first year of conversion, the body condition score (BCS) is not reflective of farm policy and by the second season changes in BCS had been achieved.

In the first season, as the cow condition was only 4.4 at calving, it took until December for the cows to reach peak production of 2.4kgMS/cow/day, as they were still using feed for weight gain. If the herd had been in BCS5 at calving, it would have been possible to produce in excess of 2.0kgMS/cow/day by September.

The body condition score has improved in 2015/2016 to a closer banding between 4.4 and 4.8, demonstrating a lift in both calving and low-point body condition scores. This assists with maintaining cow health to get in-calf and more effective feed utilisation.

The BMSCC increased from 226 to 245 and the mastitis increased from 20 percent to 36 percent. This is an area of focus for John and Ruby, with their farm team increasing early identification of cows requiring treatment.

In the 2015/2016 season, the decision to change the calving pattern for the herd was taken. The herd are now mated to calve from 1 August and 1 March.

The six week pregnancy rate has increased from 73 percent to 84 percent, alongside an empty rate of 11.5 percent. The cows calved in the first six weeks has lifted from 76 percent to 95 percent. The pregnancy KPI's have improved in the second season.

John and Ruby are able to identify opportunities to improve performance in the seasons to come, through continuing their focus on keeping the processes simple. They are very clear that they will get it right and to achieve that it must be done simply, otherwise the team won't want to follow the process.

Environmental Performance

Over the years, fertiliser and irrigation have been used to improve pastoral production. The challenge for the future is to sustain profitable levels of production, without adversely affecting the environment through nutrient and sediment loss to waterways within the Otago Regional Council boundaries.

The Otago Water Plan Change 6A (water quality) was approved on 26 March 2014 and is now operative. Schedule 15 sets limits for water quality in lakes and rivers and Schedule 16 sets thresholds for the quality of any discharge before it enters a water body. There are three defined nitrogen sensitive zones with different load limits. These are a) large lake catchments have a 15kgN per ha per year limit; b) sensitive aquifers have a 20kgN per ha per year limited and c) the rest of Otago has a 30kgN per ha per year limit. From 1 April 2020 the discharge thresholds are 1.0mg/l nitrate-nitrite nitrogen, 0.035mg/l dissolved reactive phosphorus, 0.2mg/l ammonia Cal nitrogen and 550 cfu/100ml Escherichia coli.

It is within this framework that John and Ruby wanted to develop a dairy farm of the future. Their success is highlighted by North Otago Irrigation Company granting them an Environmental Award in both 2016 and 2017, following an audit and confirmation of a high grade in all areas of farm management.

Located inland from Oamaru, the farm topography is mainly easy hill together with 15ha of steep hill and the soil types are Ngapara and Taiaroa respectively which are predominantly Pallic soils.

During the planning phase, John and Ruby considered the whole farm system, including the effluent and feed storage. This has resulted in a purpose built facility, with two covered feed pads, an above ground effluent tank, feed bunkers, concrete silage pits and concrete areas for machinery movement. To John and Ruby, "its all about the system".

The two covered feed pads have concrete slatted floors and are used as feed/wintering pads to accommodate the 400 cows comfortably. The feed pads were installed to future proof the dairy farm, with a focus on the following:

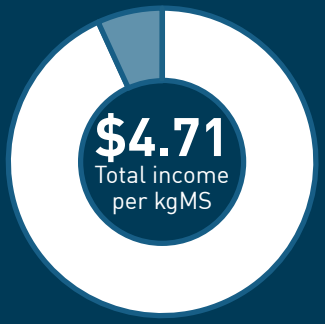
- Capture the effluent (and control spreading of nutrients during optimum conditions) thereby decreasing the nutrient loss to the environment and capture the nutrients to maximise the use as a fertiliser (reduce fertiliser spend).
- Incorporate supplement feeding, ease of feeding out and use of feed.
- Ability to winter milk.
- Provide shelter for the cows in extreme weather conditions.
- Reduce pasture damage in wet conditions through reducing pugging damage.

The investment in irrigation technology (soil moisture probes) allows water to be applied to set triggers which allows targeted application of water to plant requirements and decreases drainage through the soil profile (which is associated with the removal of nutrients to below the root zone for plant uptake).

In the future, undertaking detailed soil mapping to improve the understanding of the soils would be beneficial as this would enable improvement in managing effluent and manures and fertiliser planning. Ultimately, increasing understanding of the interactions between the environmental elements of the farming processes may assist in optimising asture and forage production and animal health.

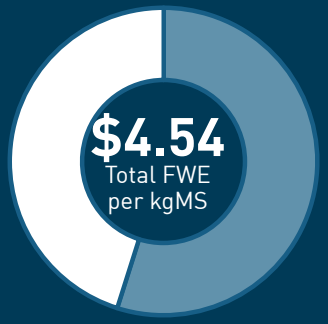
Financial performance 2014/15 season

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	1,021	$2,553	$4.42
Livestock Trading & Other Income	67	$169	$0.29
Total Income	1,088	$2,722	$4.71
Feed Costs	603	$1,508	$2.61
Other FWE	446	$1,115	$1.93
Total FWE	1,049	$2,623	$4.54
EBITDA	39	$99	$0.17

What does this show

The feed costs for 2014/2015 at $2.61kgMS are 57 percent of total farm working expenses. In the 2015/2016 season, the feed costs increased to $3.04kgMS. Although only 25 percent of feed is purchased off-farm, the dairy support land supplies the majority of the feed, and therefore costing this feed is important to assessing the overall performance of the farming business. This highlights the importance of managing feed inputs. John's arable farming skills and knowledge are integral to effective sourcing of feed purchases. Obtaining the feed quantities with quality and pricing aligned is critical to the success of the farm business. With feed costs at this level, a high milk price is required, even though production is high on a per cow basis, in order to breakeven.

The breakeven milk price for 2014/2015 was $4.25kgMS compared to the farm advisor's projection during planning of $4.51kgMS.

Farm revenue comes from two sources, therefore optimising revenue from milk production and livestock is a primary focus.

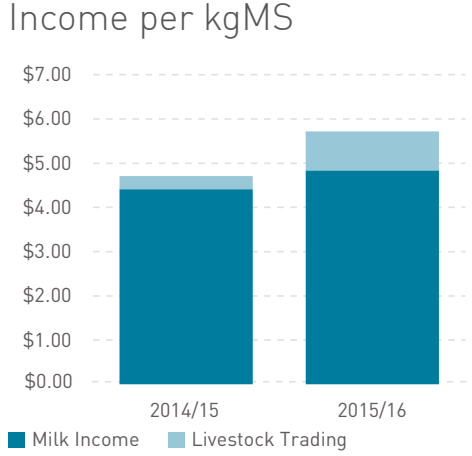
There are opportunities for better utilisation of resources in the future. For example, with an expanded soil testing program, it may be possible to reduce the quantity of purchased fertiliser. This may lead to better outcomes both financially and environmentally.

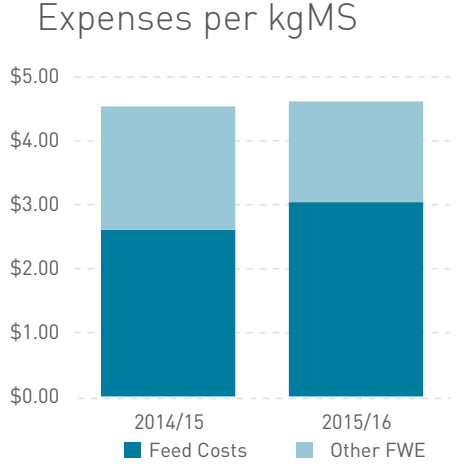
Breakeven Milk Price
(per kgMS)

Financial performance over time

	Season Ended	
Financial Efficiency	**2015**	**2016**
Feed cost per kgMS	$2.61	$3.04
Other FWE per kgMS	$1.93	$1.57
Breakeven Milk Price	$4.24	$3.73
Return On Assets %	0%	3%
Capital employed per kgMS	$44	$41
Milk Price	$4.42	$4.83

	Season Ended	
Profit and Loss (per kgMS)	**2015**	**2016**
Milk Income	$4.42	$4.83
Dividends	-	-
Livestock trading	$0.29	$0.89
Other operating income	-	-
Total income	$4.71	$5.72
Feed costs	$2.61	$3.04
Other F.W.E.	$1.93	$1.57
Total F.W.E.	$4.54	$4.61
EBITDA	$0.17	$1.11





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 (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^2 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

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ISBN: 978-1-77665-744-5 (online)

December 2017

New Zealand Government