Judge Valley Dairies Limited

Focus on a low breakeven and environmental sustainability

Waikato | John Hayward & Susan O'Regan

Farm Systems Change – 2016 Dairy Farm Case Study

Ministry for Primary Industries
Manatū Ahu Matua

Judge Valley Dairies Limited

At a glance

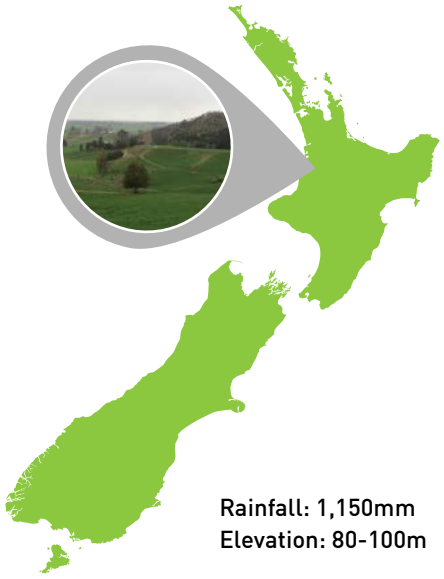
Judge Valley Dairies Limited

"Look beyond what you can see"

John Hayward and Susan O'Regan founded Judge Valley Dairies Limited in 2008 and currently farm a mixed herd of 440 cows on this 245 hectare property at Puahue, east of Te Awamutu. Judge Valley Dairies is the amalgamation of a dairy farm and neighbouring drystock farm, ranging in contour from flat to steep. With the support of two full-time staff and one permanent casual, leveraging a top level farming system and technology, John and Susan produced 206,887 kgMS off a milking platform of 140 hectares in the 2014/15 season.

Season Ended	Total kgMS	FWE/kgMS
2012	113,346	$4.33
2013	133,349	$3.73
2014	194,477	$4.42
2015	206,887	$3.62
2016	210,955	No data

At a glance – 2014/15 Season

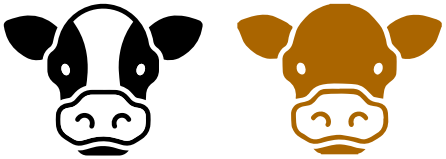


Rainfall: 1,150mm
Elevation: 80-100m

Farm Details

Milking Platform	**140 ha**
Dairy support	**105 ha**
Total	**245 ha**
Effective Milking Platform	**135 ha**
Est. kgDM grown (per effective ha/year)	**16,000**
Cows (per effective ha)	**3.3**

Livestock Details



Breed Type	**Jersey/ Friesian**
Peak cows milked	**440**
Production per cow (kgMS)	**470**
Live weight per cow (estimated actual kg)	**480**

Other Details

People working on farm	**3**
Peak Production (kgMS/ Cow/Day for top month)	**1.8**
Start of Calving	**1 Aug**
Calved in 6 weeks	**99%**
Average Pasture Cover (kgDM/ha at start of calving)	**1,739**
Production (kgMS/ effective ha)	**1,532**

Farming focus

Susan O'Regan and John Hayward take a **"look beyond what you can see"** approach when it comes to ensuring their farming operation is both economically and environmentally sustainable. When it comes to decision making, Susan and John make a habit of trying to predict what is going to happen in the industry and thinking outside the box about where they can do things differently to get a better result.

INCREASED FEED REAPS REWARDS

John and Susan are focused on ensuring their cows meet their potential. They have concentrated on fully feeding their herd, resulting in a 21 percent increase in milk production per cow between 2011/12 and 2014/15. Over the same period, cow live weight increased by 6.5 percent and cow efficiency reached 95 percent, up from 81 percent.

Read more on Page 5

ECONOMICALLY AND ENVIRONMENTALLY SUSTAINABLE

Focused on long-term stewardship and sustainability, John and Susan have developed their farm considering the most appropriate land use across their property. Steeper country less suitable for farming is planted in natives, pine and manuka, positively contributing to their operation. They are farming under best management practices, minimising nitrogen losses, and consider nutrient and environmental management to be a core driver of their business.

Read more on Page 10

IMPROVED ECONOMIES OF SCALE

John and Susan are focused on building scale to bring operational efficiencies and superior production for sustainable economic benefit. A decision to acquire the adjoining property of 36 hectares in the 2014 season took the milking platform from 104 hectares to 140 hectares. The larger operation has enabled greater efficiencies and increased the level of self containment, delivering economies of scale and a low breakeven through a more effective allocation of resources.

Read more on Page 12

Judge Valley Dairies Limited

A closer look

Increased feed reaps rewards

John and Susan farm to achieve repeatable results regardless of negative climatic impacts. With a focus on feeding their cows to meet their potential, they have seen a 6.5 percent increase in cow live weight, a 21 percent increase in milk production per cow and cow efficiency increase from 81 percent in the 2011/12 season to 95 percent over the 2014/15 season.

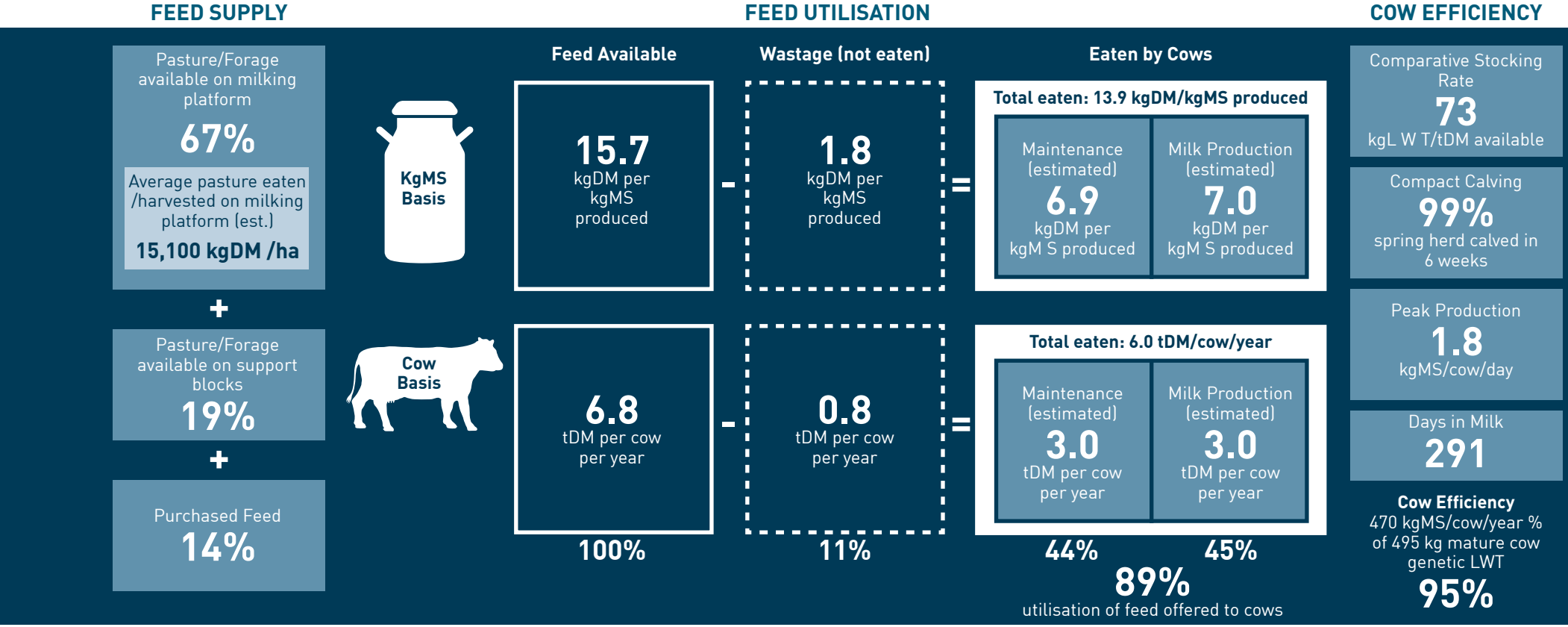
In 2013, John and Susan installed a feed pad which brought efficiencies from a labour and plant perspective and also minimised the wastage in feeding out. This also offered an opportunity to capture and manage more effluent and new management options for dried-off cows pre-calving. There is less energy demand from the cows as the feed is presented to them on the feed pad rather than requiring them to forage for it. Also, a mitigation of health and safety risk for the farm team as they no longer have to feed out over steep contours.

To maintain pasture quality, cover levels are managed at an average of between 1,740kgDM/ha and 2,240kgDM/ha with high levels of pasture utilisation. The additional feeding of maize silage during the early spring helps to protect pasture cover levels at that time.

Cover levels are managed more effectively through split calving which has improved the balance between pasture growth and feed demand. The Friesians, which currently make up around a quarter of the herd, calve in the autumn, while the Jerseys calve in the spring. This reduces stocking rates with autumn calvers dried off over late summer, typically a time of low pasture growth rates. The split calving also brings the benefit of a reduced spring calving period, with 99 percent of cows calved in six weeks, enabling greater milk production ahead of a dry summer.

Cows which were calving at BCS 5 in 2011/12 now calve at BCS 5.5, enabling them to produce at their best and reducing the additional feed requirement to lift BCS between the low point and calving.

Feed to Milk Efficiency 2014/15 Season



What does this show?

Feed Supply

It is estimated that 15,100kgDM/ha is eaten or harvested from the dairy platform from an estimated 16,000kgDM/ha grown. In total, 67 percent of the herd's requirements come from pasture and feed available from the milking platform. A further 19 percent is grown on support areas, mainly as maize silage, and 14 percent is purchased as palm kernel expeller and molasses.

Feed Utilisation

Prior to construction of the feed pad, maize silage from the runoff was fed out in paddocks with wastage of 2.8kgDM/kgMS calculated across the 2012/2013 season. The benefits of the feed pad were seen immediately with wastage over the following season halved to 1.4kgDM/kgMS. Wastage has remained below 2kgDM/kgMS ever since.

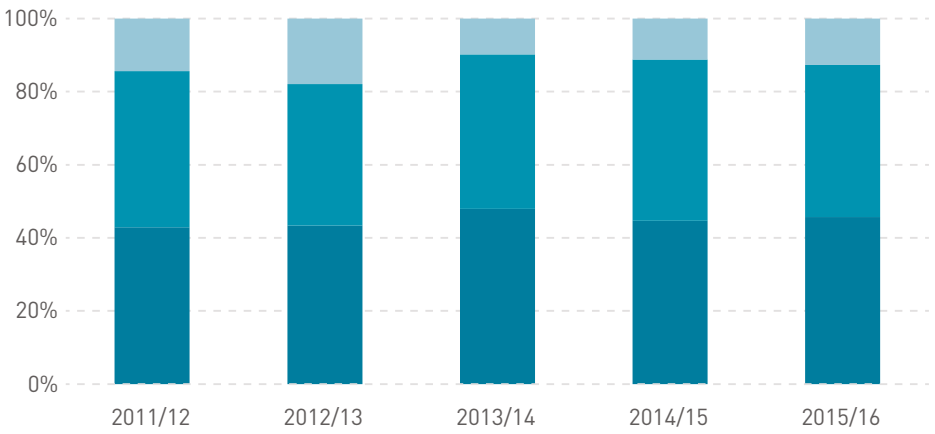
Cow Efficiency

John and Susan's focus on feed management and animal husbandry sees their herd operate at an estimated 45 percent efficiency in terms of converting the megajoules of metabolisable energy (MJME) in all feed available into the MJME sold in milk solids.

Split calving and a compact calving period reflects the short mating period of six weeks with any empty cows either culled or carried over into the autumn herd. These factors all contribute to a longer lactation period of 291 days.

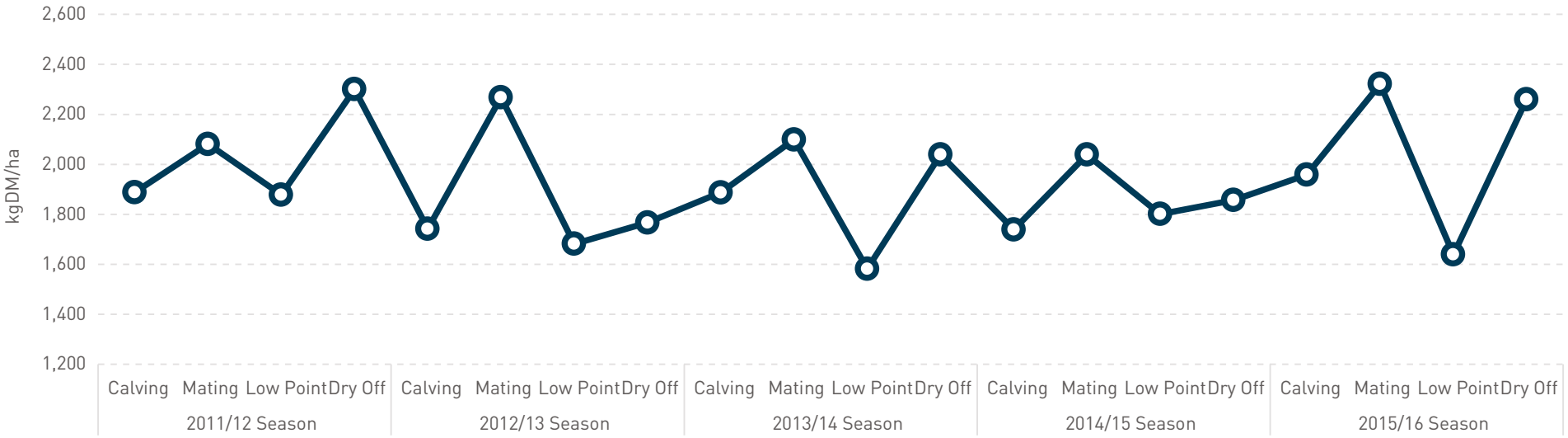
Feed to milk efficiency performance over time

Feed to Milk Efficiency

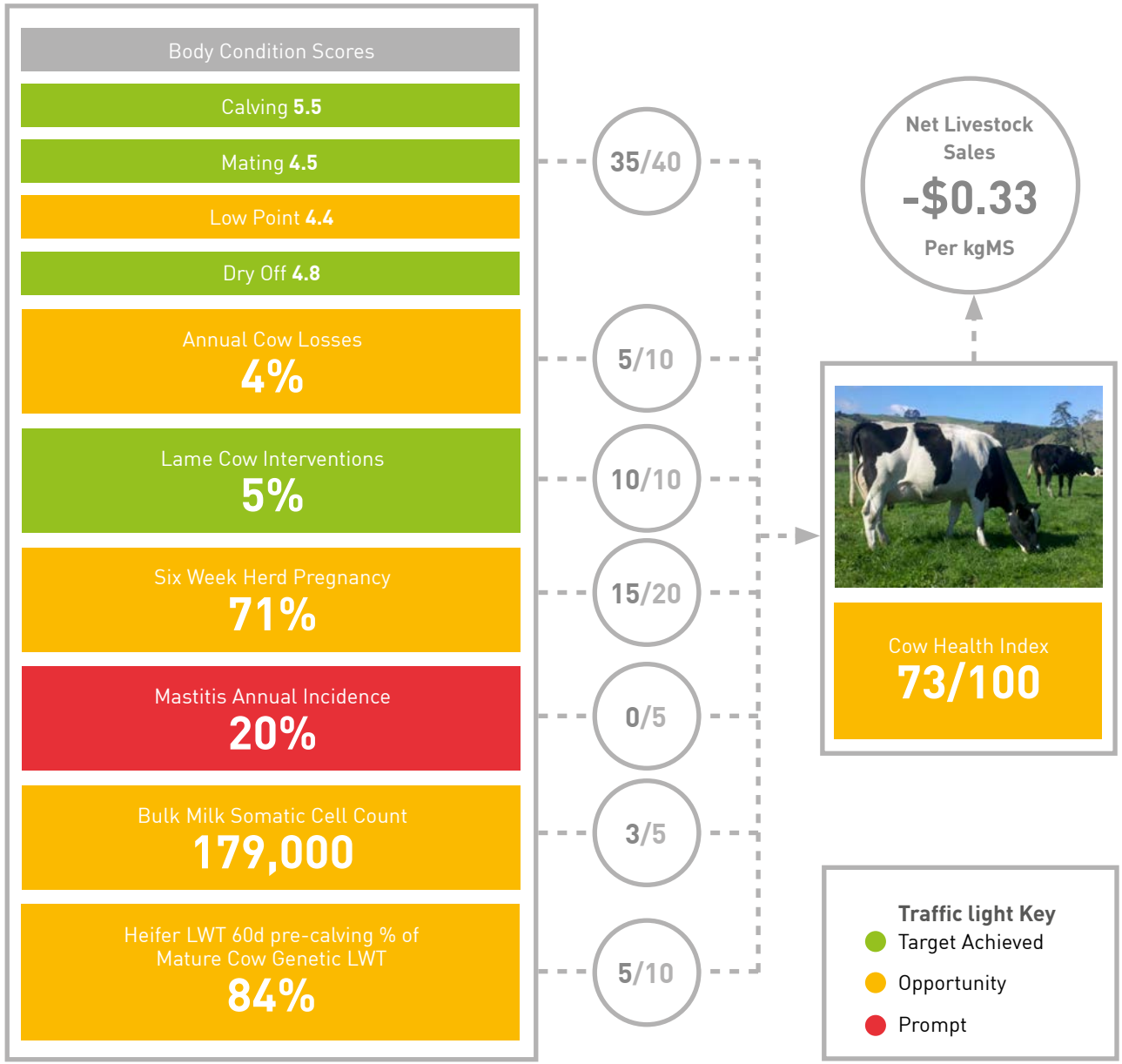


	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Comparative Stocking Rate kgLWT/tDM available	80	75	77	73	73
Farm Feed Conversion kgDM/kgMS produced	16.3	16.1	14.6	15.7	15.3
Cow Feed Conversion kgDM/kgMS produced	14.0	13.3	13.2	13.9	13.4
Feed Wasted kgDM/kgMS produced	2.3	2.8	1.4	1.8	1.9
Feed Grown % of feed available	97%	83%	83%	86%	86%
Feed Purchased % of feed available	3%	17%	17%	14%	14%

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.

During the 2014/2015 season, John and Susan purchased cows which required treatment for mastitis. The purchased cows contributed to an overall increase in mastitis levels during this season. The 2016 season saw a return to previous levels.

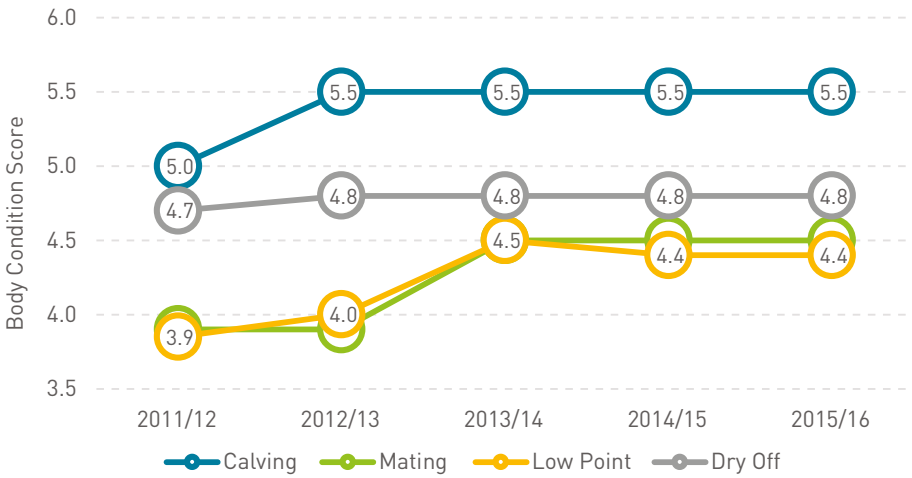
Herd Survivability Metrics

3 year-olds Retention Rate	76%
Replacement Rate at calving	14%
Heifer Mating LWT % Mature Cow LWT	No data
Herd Empty Rate	7%

The herd survivability metrics influence the costs associated with maintaining herd numbers. John and Susan keep 15 percent of replacements, split between autumn and spring calves. Replacements are well grown at 84 percent of mature cow genetic live weight 60 days from calving.

Animal health performance over time

Animal Health



	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Cow Health Index (Max 100)	43	43	68	73	86
Annual Cow Losses	2.5%	3.5%	2.0%	4.0%	1.1%
Lame Cow Interventions	7.8%	5.6%	2.0%	5.0%	2.3%
Six Week Herd Pregnancy	63%	No data	57%	71%	75%
Mastitis	16%	16%	17%	20%	16%
BMSCC (000s)	195	188	182	179	200
Heifer LWT 60d pre-calving % of Mature Cow Genetic LWT	No data	No data	78%	84%	85%

What does this show?

Judge Valley Dairies' herd cow health index has improved dramatically from 43 percent in 2012 to 73 percent in 2015 and 86 percent in 2016.

With cow condition a key driver of production, this attribute receives a weighting of 40 percent in the Cow Health Index. Judge Valley Dairies scores 35/40 with the cows maintaining good body condition across three of the critical times – calving, mating and drying off. Over the last three years there has been a significant lift in the BCS at mating and low point.

Judge Valley Dairies' Cow Health Index score is further enhanced with the reduced incidence of lame cows – only 2.3 percent of cows treated in 2016.

The reduced loss of animals (down from 4 percent in 2015 to 1 percent in 2016) and the herd's six week in-calf rate, (up from 63 percent in 2012 to 75 percent in 2016) complete the picture.

Given the low empty rates and the high percentage of heifers that get back in calf, the opportunity exists to keep fewer replacements, reducing rearing costs.

John and Susan consider herd testing a valuable investment in maintaining their herd asset as it helps them to make better decisions on culling, thereby continuing the improvement in overall herd quality.

Economically and environmentally sustainable

John and Susan are very conscious of the environmental impact of their farm and farming practices. Their commitment to environmental sustainability is thoughtfully managed alongside best farming practices, ensuring Judge Valley Dairies performs as a profitable business. John and Susan are very strong advocates for the environment and frequently host groups, government officials and overseas visitors.

The farming operation is located in the Rotorangi district, within the Waipa Zone of the greater Waikato River Catchment. The 245 hectare farm includes a 140 hectare dairy platform with the remainder of the farm made up of support land for grazing, native and riparian areas, or pine and Manuka plantings.

The land contour ranges from flat to easy rolling hills to steep sidings. The soil types across the property are predominantly Otorohanga silt loam and Puketarata silt/clay loam. The rainfall is around 1,150 mm per annum.

Considered land use

John and Susan undertook a land use capability assessment in 2014, which identified areas on their property that are suitable for different land use and classes of stock, as well as areas that should be retired.

Since that assessment, approximately 20 hectares of the farm has been retired in native, riparian and wetland areas, with a further 4.5 hectares in pine trees and 5 hectares of manuka plantations for high potency honey production.

Plans are underway for fencing off a further 10 hectares of the steeper country (class 7 land) to provide grass management with a handful of animals set stocked at a very light rate in these blocks.

With erosion and sediment falling into water identified as an issue, a further wetland is planned for construction this year and another 8 hectares of manuka is to be planted as part of Judge Valley Dairies' joint venture with Comvita, a global company which uses honey in its natural health products.

A predominately self-sufficient operation

Judge Valley Dairies is fairly self sufficient, with all cows managed on the property throughout the year.

With split calving in August (70 percent of the herd) and March (30 percent of the herd), the property is milked on all year round, with dried-off cows predominantly managed on the feed pad from drying off until calving. As discussed on Page 5, this regime supports the management of pasture cover levels, improving the balance between pasture growth and feed demand.

The younger stock are carried through on pasture outside the milking platform, but still within the farm. 26 hectares of maize is also grown on the farm, with up to 624tDM of maize silage harvested annually. Only a small amount of grass and hay supplements are purchased on a seasonal basis, including 20t of molasses and 460tDM of PKE.

Embracing technology

John and Susan have embraced technology, leveraging it to bring greater management information and precision across their operation in addition to environmental benefits. A Halo system enables them to electronically monitor their water system, including rain and tank monitoring as well as milk and soil temperature. This Halo system has already paid dividends, providing evidence of milk temperature to support a claim for compensation for uncollected milk.

Environmental performance

Crops

John and Susan have planned their maize cropping system to provide flexibility and minimise any negative impact on the environment. The maize crops are split 50/50 into early and late crop and further split into effluent and non-effluent. The "effluent maize" receives effluent solids during the appropriate times of the year when the crop can be accessed without damage and is actively growing.

Immediately post-harvest, all maize areas are replanted, grazed periodically during the winter, and then harvested for silage just before they are re-planted into maize. This cropping regime has been in place since 2013. Over time this will result in further reductions in the nitrogen loss. From the current nitrogen loss levels on the maize crop within 10 years, losses may reduce to less than 20 percent of current levels. This level of permanent cropping requires appropriate soil and nutrient management however with John and Susan's focus on the long term health of their property, this cropping option is feasible.

The benefit of crops being grown in the same place year on year is that nitrogen losses will continue to drop on these crops for the next eight years. This is due to reduced nitrogen mineralisation of the soil which continues until an equilibrium type state is reached in about year 10. This will further reduce the environmental footprint of this property.

Feed pad minimises wastage

The 350-cow feed pad and feed bunkers with 500t capacity minimise feed wastage and reduce nutrient losses from the milking herds. Lactating cows spend an average of three hours per day on the feed pad.

For the 2014/15 year, the farm had a nitrogen loss of 42kg N/ha. This is expected to reduce to 37kg N/ha by continuing the current maize cropping regime. The absence of winter cropping means reduced phosphorus loss with the farm recording losses of only 1.2kg P/ha.

Effluent management

Consistent with best practice, a holding pond is available to store effluent during wet conditions, preserving nutrients and preventing contamination of waterways. A flood wash system uses green water recycled through the effluent pond and a weeping wall to separate the solids, allowing for the strategic application of solids across the farm.

The effluent area spans 62 hectares including 63 percent of the dairy platform and 13 hectares of the land planted in maize. Unusual to this property is the non-contiguous nature of the effluent block. Additional investment has been made to allow effluent to be applied to all appropriate land not just that which is most accessible to the milking shed. The predominant soil type across the effluent area is a mix of Otorohanga and Punui silt loams.

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Improved economies of scale

The acquisition of an additional 34 hectares in 2014 provided the opportunity for John and Susan to manage a larger operation, generating greater efficiencies and production. Economies of scale have enabled the spreading of costs across the larger farm and herd and an increase in kilograms of milk solids produced.

The bigger parcel of land has also enabled greater flexibility in land use and made the farming operation more self-sufficient. Increased feed has resulted in a lift in per cow production by 21 percent over the last few years.

While in high income years the focus is often on getting more production, John and Susan now want to become more efficient by consistently operating at a lower cost.

Economies of scale have allowed John and Susan to reduce total farm working expenses from $4.33/kgMS to $3.62/kgMS over the period from 2011/12 to 2014/15.

The feed pad has reduced wastage of home-grown maize and grass silage, creating efficiencies and reducing the need for bought-in feed and exposure to both access to supply and pricing volatility.

The average income from each kgMS has increased, reflecting John and Susan's focus on the areas of farm and animal management to best maximise their returns. By analysing the components that determine milk price, they identified the importance of protein and identified the cows that produced the greatest protein levels. By looking at the attributes of these cows, and managing the composition of their herd they have made changes to reap greater returns.

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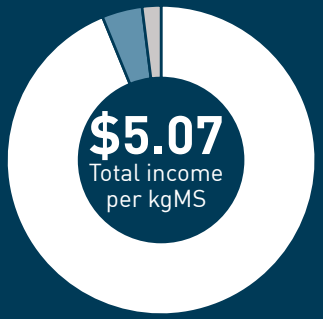
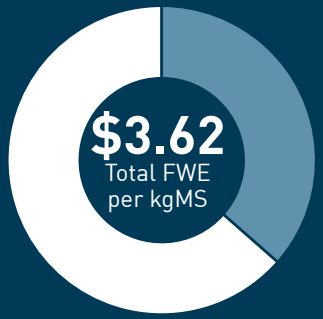
Financial Performance 2014/15 Season

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	984	$2,236	$4.76
Livestock Trading & Other Income	65	$148	$0.31
Total Income	1,049	$2,384	$5.07
Feed Costs	286	$651	$1.38
Other FWE	463	$1,052	$2.24
Total FWE	749	$1,703	$3.62
EBITDA	300	$681	$1.45

Breakeven Milk Price
(per kgMS)

What does this show

John and Susan changed milk processor from Fonterra to Open Country Dairy in 2012/2013. The realisation of the share investment assisted with capital expenditure on the purchase of the neighbouring property and further investment in farm infrastructure.

John started out working on a farm, progressing through sharemilking to farm ownership, so he has absolute focus on income and expenditure, understanding how to get the most out of every aspect of the farming operation. John and Susan look at the milk price and assess where they get paid the most. Then they calculate the return from the best cow in each herd, Friesian versus Jersey, to determine where to get the best return for their business. They use that information to make decisions on genetics and feed to achieve their objectives.

The effect of production increasing from 113,346kgMS in 2012 to 210,955kgMS in 2016 has been to spread farm working expenses across a larger production base and thereby reduce cost per kgMS.

Total farm working expenses have reduced from $4.33/kgMS to $3.62/kgMS over the period from 2011/12 to 2014/15. During the same period, feed costs increased from 29 percent of total farm working expenses to 38 percent. However, the increase on a per kgMS basis was only from $1.26/kgMS to $1.38/kgMS. This demonstrates the advantage of scale in being able to spread costs across an increasing level of production achieved through better feed utilisation.

Capital employed per kgMS has reduced from $81 in 2012 to $61 in 2015, increasing the opportunity for return on capital.

Financial Performance Over Time

	Season Ended			
Financial Efficiency	**2012**	**2013**	**2014**	**2015**
Feed cost per kgMS	$1.26	$1.11	$2.04	$1.38
Other FWE per kgMS	$3.07	$2.63	$2.37	$2.24
Breakeven Milk Price	$2.16	$1.45	$3.76	$3.31
Return On Assets %	7%	10%	13%	3%
Capital employed per kgMS	$49	$38	$31	$30
Milk Price	$6.03	$5.63	$8.30	$4.76

	Season Ended			
Profit and Loss to EBITDA (per kgMS)	**2012**	**2013**	**2014**	**2015**
Milk income	$6.03	$5.63	$8.30	$4.76
Dividends	$0.37	$0.20	$0.02	$0.02
Livestock trading	$1.69	$1.94	$0.58	$0.21
Other operating income	$0.11	$0.14	$0.06	$0.08
Total income	**$8.20**	**$7.91**	**$8.95**	**$5.07**
Feed costs	$1.26	$1.11	$2.04	$1.38
Other FWE	$3.07	$2.63	$2.37	$2.24
Total FWE	**$4.33**	**$3.73**	**$4.42**	**$3.62**
EBITDA	**$3.88**	**$4.17**	**$4.54**	**$1.45**

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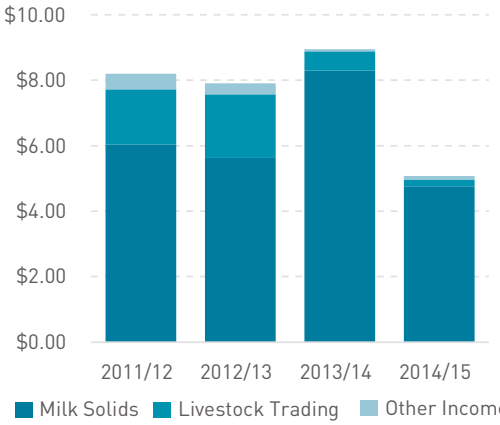
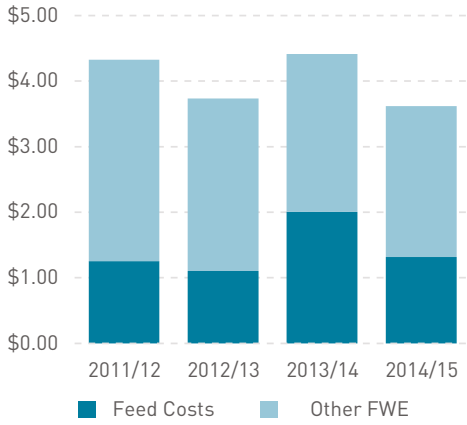
Income per kgMS



Expenses per kgMS



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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, euthanized, 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 LIC (modified by ancestry) for a fully grown mature cow (5 – 7 years) at Body Condition Score 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/kg DM) 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 N input (N input includes fertiliser, supplement and N 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.

Ministry for Primary Industries
Manatū Ahu Matua
PO Box 2526, Wellington 6140
New Zealand
0800 00 83 33
www.mpi.govt.nz

ISBN: 978-1-77665-427-7 (online)

October 2016

New Zealand Government