Western Bay of Plenty Dairy Farm

Robust management decisions for long-term sustainability

Bay of Plenty

Farm Systems Change – 2016 Dairy Farm Case Study

Ministry for Primary Industries
Manatū Ahu Matua

Western Bay of Plenty Dairy Farm

At a glance

Western Bay of Plenty Dairy Farm

"Working together, as a team, for everyone's success"

Located near Pukehina, this Western Bay of Plenty farm totals 318.5 hectares and was originally a sheep and beef farm. Through diversification of the land use, it now comprises 32.5 hectares of kiwifruit, 13 hectares of radiata pine, 200 hectares milking platform and 73 hectares dairy support. A herd of 614 crossbred cows, which produced 298,174kgMS in the 2014/2015 season, are farmed on this rolling to easy hill country property.

Season Ended	Total kgMS	FWE/kgMS
2012	304,522	$3.31
2013	295,258	$3.69
2014	303,871	$5.07
2015	298,174	$4.42
2016	318,849	No data

At a glance – 2014/15 Season

Rainfall: 1,460mm
Elevation: 95m

Farm Details

Milking Platform	**200.0 ha**
Dairy Support	**73.0 ha**
Total	**273.0ha**
Effective Milking Platform	**200.0 ha**
Est. kgDM grown (per effective ha/year)	**14,300**
Cows (per effective ha)	**3.1**

Livestock Details

Breed Type	**Crossbreed**
Peak cows milked	**614**
Production per cow (kgMS)	**486**
Live weight per cow (estimated actual kg)	**480**

Other Details

People working on farm	**3.2**
Peak Production (kgMS/ Cow/Day for top month)	**2.1**
Start of Calving	**10 Jul**
Calved in 6 weeks	**86%**
Average Pasture Cover (kgDM/ha at start of calving)	**2,180**
Production (kgMS/effective ha)	**1,491**

Farming focus

This farm is owned by a husband and wife team, who are committed to making decisions for their farming business after thoroughly investigating and analysing the costs and benefits of each option. Their excellent cow performance reflects their careful consideration of feed types and suitability of their cows to the hills. The result - quality cows that are producing to their potential.

CONSISTENTLY WELL-FED COWS

The dry summers on this 200 hectare Western Bay of Plenty farm meant summer/autumn production was very much determined by the weather and what feed was brought in from their dairy support block. In 2004, a feed pad was installed enabling a variety of feed types, both grown and purchased, to be fed effectively to their 614 cow herd.

Read more on Page 5

DIVERSIFICATION OF LAND USE

The diversification of this farming business provides multiple income streams. In 1982 the development of farmland into kiwifruit began on the flatter areas of the farm. Now there is a 32.5 hectare canopy of kiwifruit and 13 hectares in radiata pine on the steeper slopes, generating income complementary to the dairying income.

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Western Bay of Plenty Dairy Farm

A closer look

Consistently well-fed cows

These farmers identified there was an opportunity to improve the production of this high quality crossbred herd to reach their breeding potential. However, to deliver the improvement required investment in the farm infrastructure was needed, to enable different feed types to be fed efficiently to the cows, maximising their opportunity to reach their production potential.

The installation of a feed pad in 2004 means that a variety of feeds are now able to be fed depending on quality, cost and availability. This has allowed feed quality to be maintained; even in November when pasture quality has been variable and in the dry autumn periods. Crops such as chicory were trialled but the dry summers reduced the yield more than desired. In recent years the farmers have been growing maize followed by oats. They also purchase reject kiwifruit from a local packhouse as a quality alternate food source and over the past 14 years have progressively refined their use of the kiwifruit as a complementary feed source. The cows are fed up to a maximum of 12kg a week to maintain milk quality (so there is no tainting of the milk). The risk of acidosis is successfully managed by diet balance and using magnesium oxide as a buffer.

With a focus on maintaining the milk production consistently throughout the season, these farmers are open to trying different feed alternatives. For example, from the spring through to September a small amount of soya bean meal is fed for a short period to give the cows a boost as they return to milk after calving.

The focus on breeding over the years has contributed to the cows being above average at BW88/48 and PW111/60 with a 95 percent ancestry. Over the past five years, the well-grown crossbred cows, which weigh around 480kgLWT, have consistently produced above their live weight in milk solids at 492kgMS to 525kgMS. The total production has been between 295,528kgMS and 318,849kgMS during the past five seasons.

The high per cow production has been achieved by the farming team consistently delivering year after year performance in the following areas:

Greater emphasis on ensuring cows are at BCS 5 plus by calving – this is an increase from a BCS of 4.6 to 4.7 four or five years earlier.

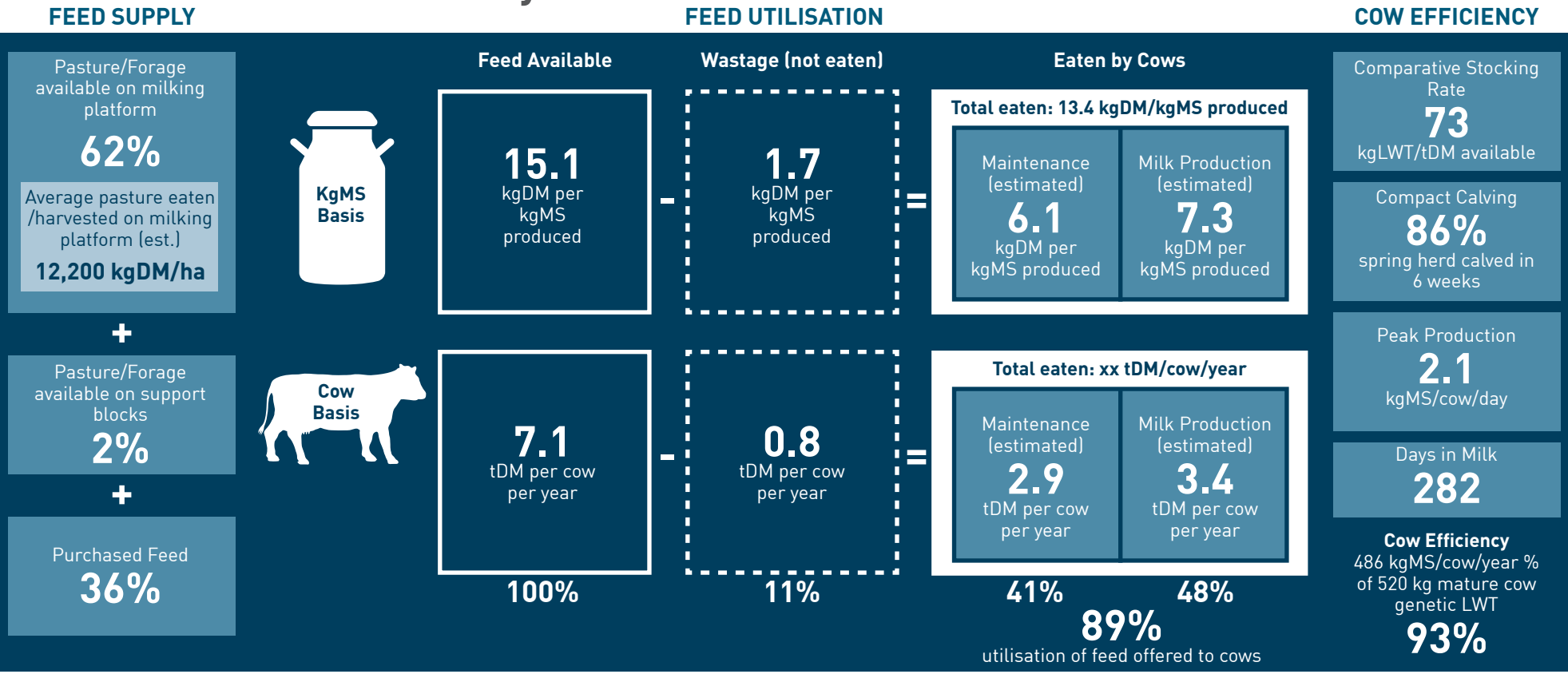
Calving starts around 10 July, when the coastal region near Pukehina has good winter pasture growth rates. The early start and compact calving with 86 percent to 93 percent of the herd calved within six weeks, allows for around 63 percent of production to be delivered through the vat by the end of December.

A long lactation period of 282 to 294 days is achieved by providing additional feed during the summer/autumn period with cows dried off in late May. As they aim to have the cows close to BCS 5 by dry-off the cows do not need a long dry period to build condition before calving.

Maintaining feed quality is important to achieving peak production, which is 2.1kgMS/cow/day for the best month - either September or October. The surplus pasture is conserved as silage and pre-graze mowing has also been used over the last few seasons, with 50 percent to 70 percent of the farm mowed from October to December. A high quality feed, such as Dried Distillers Grain (DDG) or a protein type feed, is used at this time to counteract any drop in pasture quality.

This focus has helped reduce the drop off from peak production to a low of 6.2 percent in the 2014/2015 season, for the three months following peak, against an industry target of less than 21 percent. This results in a smoother milk production curve and higher per cow production over the remainder of the season.

Feed to milk efficiency 2014/15 season



What does this show?

Feed Supply

The farm is estimated to grow, depending on the season, from 12,650kgDM/hectare in a drought season to 15,500kgDM/hectare in a year with a wet autumn. Of this, between 10,200kgDM/hectare and 14,400kgDM/hectare is estimated to be harvested by the cows. The fluctuating quantity of pasture is complemented throughout the year with purchased feed.

In the 2014/15 season, an estimated 12,200kgDM/hectare contributed 62 percent of total feed, with a further 2 percent from support blocks and purchased feed of 36 percent. The proportion of purchased feed varies up to 39 percent in seasons when drought has resulted in lower pasture growth. Purchased feed is a combination of kiwifruit, corn waste, special mixes, Palm Kernel Expeller (PKE), Dried Distillers Grain (DDG) and molasses. In total, cows are offered 7.1tDM/cow with a farm feed conversion efficiency of between 14.1kg and 15.2kgDM per kgMS produced.

Feed Utilisation

The consistent quality and quantity of feed offered enables cow feed conversion efficiency to hold steady at around 13kgDM eaten per kgMS produced. This feed conversion rate is also reflected in the consistent level (from 48 percent to 51 percent) of the metabolisable energy in feed available converted to milk production.

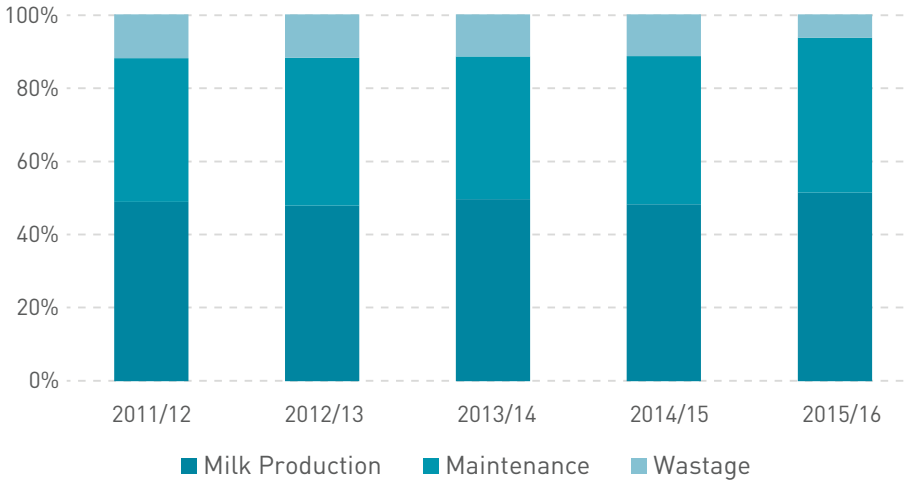
Cow Efficiency

The comparative stocking rate has been relatively consistent at around 73 over the last five seasons. This measure of the kgLWT/tDM of feed available generally goes hand in hand with the level of pasture utilised. When the stocking level is higher, there is more pressure on stock. While this can lead to higher utilisation and less wastage, at too high a stocking level it will result in more feed going into maintenance and less into milk production.

A compact calving period for the 2014/15 year of 86 percent calved in six weeks and a peak production level of 2.1kgMS/cow/day contributes to the high cow efficiency of 93 percent based on cows producing 486kgMS and having a genetic mature live weight of 520kg.

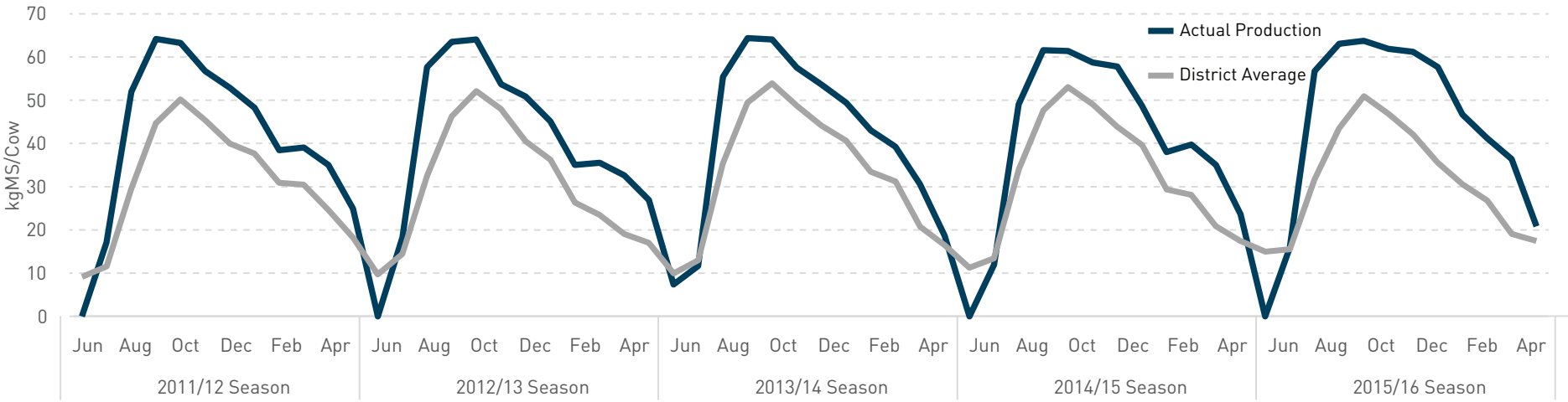
Feed to milk efficiency performance over time

Feed to Milk Efficiency

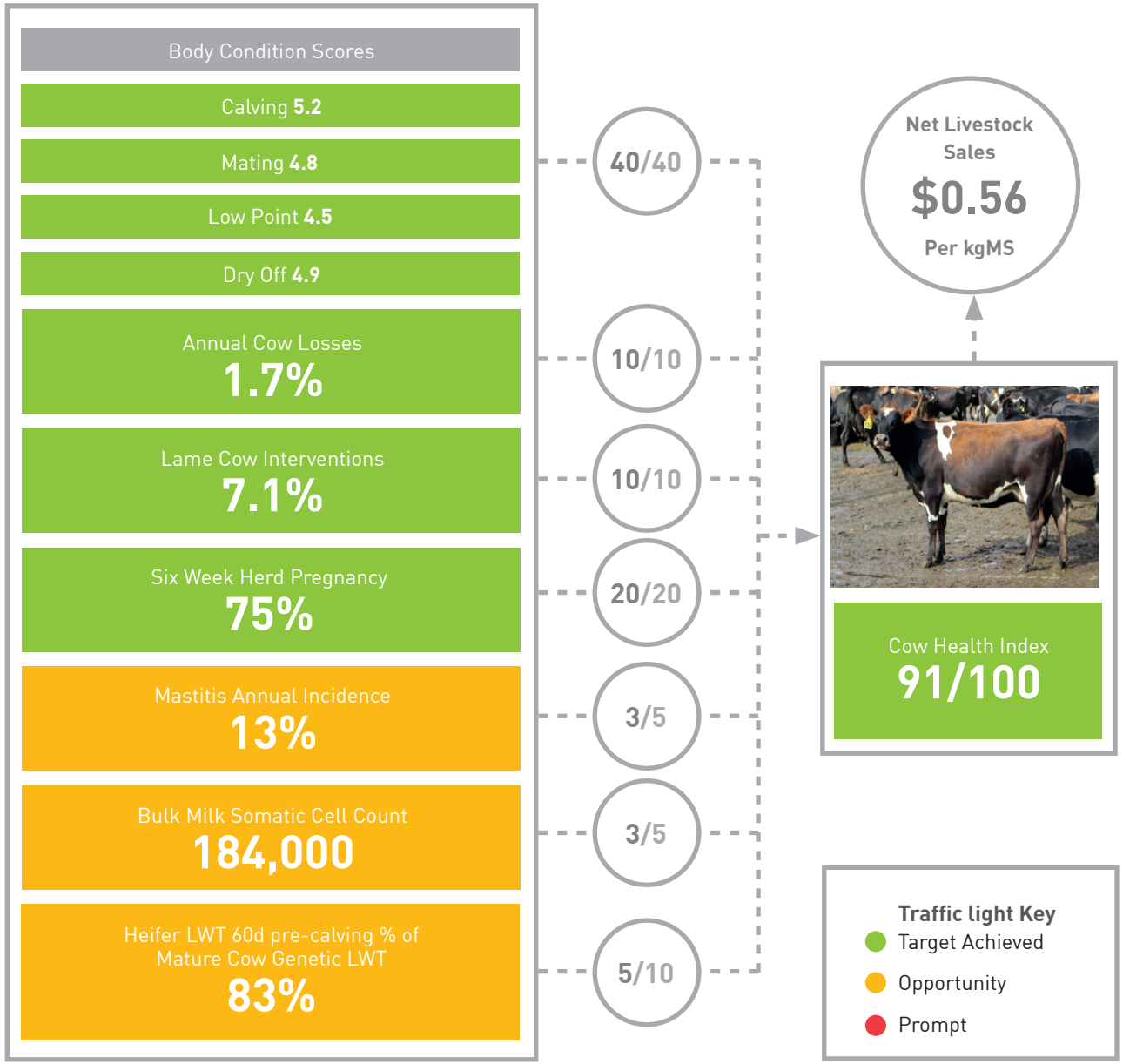


	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Comparative Stocking Rate kgLWT/tDM available	72	73	73	73	74
Farm Feed Conversion kgDM/kgMS produced	14.9	15.2	14.6	15.1	14.1
Cow Feed Conversion kgDM/kgMS produced	13.1	13.4	13.0	13.4	13.2
Feed Wasted kgDM/kgMS produced	1.8	1.8	1.6	1.7	0.9
Feed Grown % of feed available	70%	61%	61%	64%	67%
Feed Purchased % of feed available	30%	39%	39%	36%	33%

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.

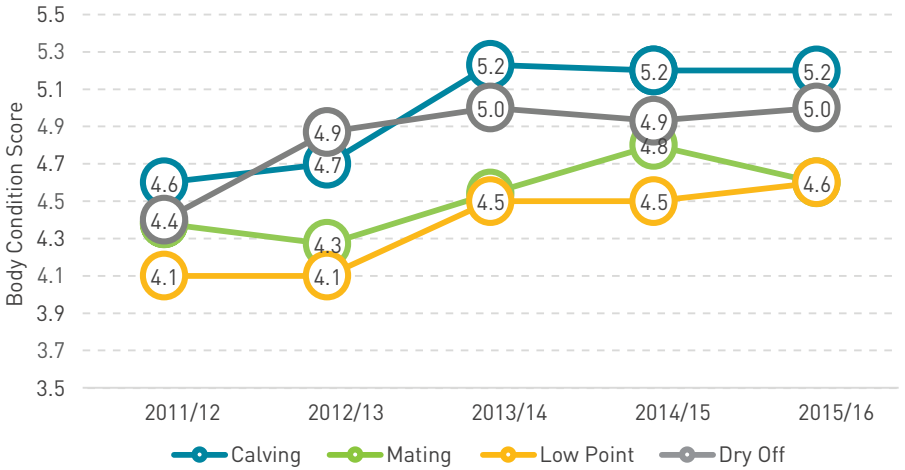
Herd Survivability Metrics

3 year-olds Retention Rate	87%
Replacement Rate at calving	20%
Heifer Mating LWT % Mature Cow LWT	No data
Herd Empty Rate	12%

The herd survivability metrics all combine to influence the costs associated with maintaining herd numbers. The replacements are well grown with heifers reaching 425kg LWT, 83 percent of mature cow genetic live weight 60 days pre-calving in the 2015/16 year. Well-grown heifers have a greater chance of being retained in the herd as three-year olds and, in this case, 87 percent of heifers are still in the herd in their second year, with a replacement rate of 20 percent heifers going into the herd.

Animal health performance over time

Animal Health



	Season Ended				
	2012	**2013**	**2014**	**2015**	**2016**
Cow Health Index (Max 100)	50	76	93	91	91
Annual Cow Losses	1.3%	1.3%	1.8%	1.7%	1.3%
Lame Cow Interventions	No data	4.5%	5.2%	7.1%	7.3%
Six Week Herd Pregnancy	No data	78%	76%	75%	77%
Mastitis	No data	10%	9%	13%	13%
BMSCC (000s)	138	155	160	184	178
Heifer LWT 60d pre-calving % of Mature Cow Genetic LWT	77%	81%	84%	83%	82%

What does this show?

The Cow Health Index has moved from 50 in the 2012/2013 season to 91 in the 2014/2015 season. However, the low score of 50 reflects a lack of data rather than a lack of performance.

Over the five seasons there has been an improvement in body condition score. The focus on cow condition is evident at all four critical times throughout the season and the dry off and calving condition has been held consistently in the last three seasons.

These farmers also score extremely well for low cow losses and have a low annual incidence of cows treated for lameness. The annual incidence of mastitis and the increasing bulk milk somatic cell count are aspects of performance identified for investigation. The initial assessments indicated that changes to the milking machinery and earlier culling of cows with high somatic cell counts may improve both mastitis and bulk milk somatic cell count results.

The six week in-calf rate of 75 percent for the 2014/15 year is right on industry target. The empty rate is low at only 4.8 percent in the 2012/13 season. However, this has increased over the last two seasons to 10 percent and 12 percent as the mating period has been shortened by two weeks from 13.5 weeks to 11.5 weeks. A combination of shortening the mating period and stopping induction resulted in the lift in empty rates from sub 5 percent. These farmers have chosen not to use CIDRs, rather they rely on adequate and balanced nutrition to support fertility in their cows. As the herd and replacements now remain on the farm throughout the season the focus is on achieving a lower empty rate of 8 percent, which these farmers believe they can do over time. In this way cost savings can be made through rearing fewer young stock while still allowing for ongoing improvement in herd quality.

Overall, the results demonstrate a high commitment to maintaining and continually improving animal health.

Environmental Performance

This dairy farm is located near Pukehina, in the Waitahanui catchment, in the Western Bay of Plenty.

The 318.5 hectare farm contour ranges from easy rolling hills to steep sidings, and sits mainly on Ohinepanea sandy loam soil. With an annual rainfall of around 1,460mm, this farm is managed as a 200 hectare effective milking platform, 55 hectare young stock grazing block with another 13 hectares planted in radiata pine and 32.5 hectares planted in kiwifruit and the remaining 73 hectares for dairy support.

The farmers carefully considered the best use of land when planning their conversion from sheep and beef to dairy, and then diversification into kiwifruit. Their aim was to balance the land use with the contour, to enable best management and ease of activities across the land.

Historically, during the winter 200 mature cows and a third of the R2s were taken off the milking platform onto leased support land. This allowed the farm to have less pressure during wet winters and enabled the build-up of feed prior to calving. However, to build increased resilience into their farming business, they now winter all livestock on their own land.

A large feed pad built in 2004 with capacity for 720 cows is used all year round with time on the feed pad increased during the autumn and spring to avoid pugging damage to pastures. The cows are fed maize silage, PKE, DDG and kiwifruit on the feed pad. This minimises feed wastage and allows nutrient to be captured and reapplied to appropriate areas of the farm.

Consistent with good practice, a holding pond is used to store effluent during wet periods, maximising the use of nutrients for plant uptake and preventing contamination of waterways. Nitrogen and potash applications are made strategically using the little and often principle to maximise nutrient uptake.

The radiata pine plantation is located on the steeper sidings, which assists with both sediment runoff and erosion protection.

Diversification of land use

These farmers, originally sheep and beef farmers, sought early on to identify farming options that would provide them with a resilient and diversified farming business. This would give them consistency of income year on year and the ability to plan with greater certainty.

They were able to look over the boundary fence to gain insights from the neighbouring dairy farms and kiwifruit orchards. In considering the options for diversification, an area of particular interest was how New Zealand's infrastructure for the dairy and kiwifruit sectors was organised, compared to the infrastructure for sheep and beef processing and distribution – specifically consistency of income flows throughout the season and systems of processing purchases.

Confident in the versatility of the land, the decision was made to progress with a conversion from sheep and beef to dairy. The subsequent diversification into kiwifruit in the 1980s reflected their confidence in Zespri's clear communication to orchardists of market forces, demand and the implications for harvest and resale of the fruit. This mix of business has provided relatively consistent income flows with the ups and downs between dairy and kiwifruit generally offsetting, making it easier to manage cashflow and plan investment. The decision to allocate land for planting radiata pine came later and was based on the principle of investing now for future returns and improving the match of contour to land use.

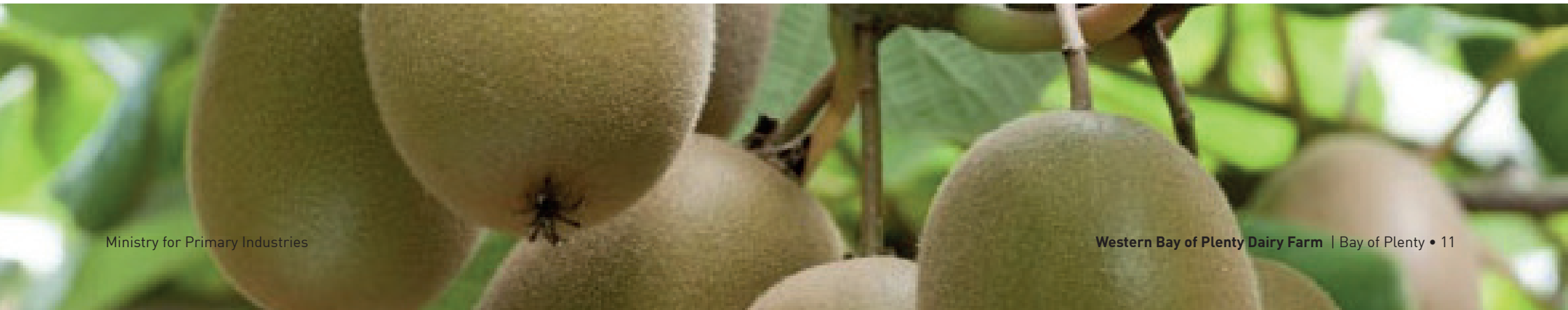
It was very clear to them at the outset there needed to be division of labour across the team in order to spread the workload and ensure effective management of both dairy and kiwifruit operations. To this end, the husband and wife team split the leadership with one focused on dairy and the other on kiwifruit. However, they are both integrally involved in the farming business as a whole and maintain clear perspectives on the various aspects of both marketplaces.

This approach enables broader thinking on how these business activities can be complementary, for example considering kiwifruit as a source of complementary feed for the cows. Kiwifruit are considered a good quality milking feed with a high energy, yet relatively low protein content. Over the past fourteen years, they have been refining the complementary feed mix of kiwifruit for their cows aware that it is very high in soluble sugars and there is a risk of acidosis if cows eat too much fruit. They now feel they have the balance right with kiwifruit an excellent food source for putting weight on the cows as well as being cost effective.

The kiwifruit orchard was an important contributor to the farming business and served to enable consistency of income in the years of ups and downs in the dairy payout. Unfortunately in 2010, the PSA bacteria resulted in half the orchard being condemned and those vines were removed. The implications were challenging for the business.

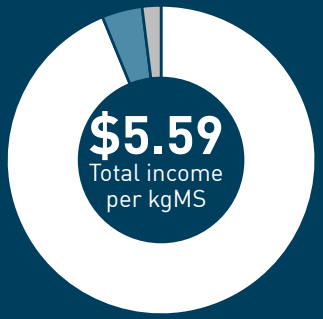
Especially difficult were employment decisions which had to be made for both permanent and temporary workers as a result of the drop in kiwifruit production. The effects were seen not just on this farm, but across the community with significant job losses. Fortunately, these farmers were able to retain their permanent employees who worked on the removal and disposal of the condemned kiwifruit vines and began the replanting process.

The dairy farm has funded the redevelopment of the kiwifruit orchard and provided cashflow for the period from 2010 to 2016. Last season saw the first crop from replanting, with the kiwifruit orchard contributing to its costs. While it has been a long recovery process, these farmers have drawn on their experiences farming sheep and beef to manage their way through the lean periods. They look forward to next season when they expect the kiwifruit orchard will once again deliver a contribution to their farming business.



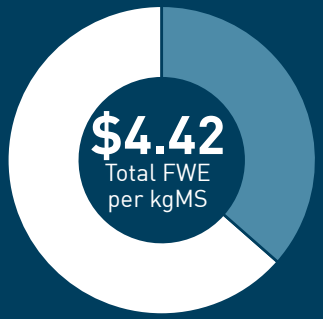
Financial performance 2014/15 season

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	1,536	$2,502	$5.15
Livestock Trading & Other Income	132	$215	$0.44
Total Income	1,668	$2,717	$5.59
Feed Costs	404	$658	$1.36
Other FWE	913	$1,487	$3.06
Total FWE	1,317	$2,145	$4.42
EBITDA	351	$572	$1.17

Breakeven Milk Price
(per kgMS)

What does this show

This analysis is of the dairy operation only and excludes the kiwifruit and other farming operations. These farmers have seen an increase in total farm working expenses from $3.30/kgMS and $3.69/kgMS in the 2011/12 and 2012/13 seasons respectively, followed by a lift to $5.07/kgMS in the 2013/14 season with a higher milk price. Feed costs contributed $0.76/kgMS to the increase in farm working expenses from $3.31/kgMS to $5.07/kgMS. The higher milk price gave an opportunity to catch up on repairs and maintenance, and undertake riparian protection. Farm working expenses dropped to $4.42/kgMS in the 2014/15 year. A change to the accounting for contract milker and sharemilker payments causes the milk price to vary from the payout in the season.

After deducting Livestock Trading and other Income received of $0.44/kgMS; the 2014/15 season has a breakeven milk price of $3.98/kgMS before debt servicing and depreciation. This is down from $4.06/kgMS in the previous season when Livestock Trading and Other Income was higher, partially offsetting some of the increased costs of production. The bought in feed has decreased from between 20 and 25 percent in the 2011/12 to 2013/14 seasons to between 15 and 18 percent. During drought years there is an increase in purchases to maintain feed levels for the cows. These farmers try different options in higher milk payout seasons when they can afford to test options and then apply those learnings during lower payout seasons.

This farm consistently generates a positive return on assets, ranging between 4 percent and 11 percent in recent seasons. The results reflect the focus on maintaining a resilient dairy farming business.

Financial performance over time

	Season Ended			
Financial Efficiency	**2012**	**2013**	**2014**	**2015**
Feed cost per kgMS	$1.51	$2.09	$2.27	$1.36
Other FWE per kgMS	$1.79	$1.60	$2.80	$3.06
Breakeven Milk Price	$2.42	$2.99	$4.06	$3.98
Return On Assets %	6%	4%	11%	4%
Capital employed per kgMS	$30	$30	$30	$29
Milk Price	$4.35	$4.38	$7.76	$5.15

	Season Ended			
Profit and Loss to EBITDA (per kgMS)	**2012**	**2013**	**2014**	**2015**
Milk income	$4.35	$4.38	$7.76	$5.15
Dividends	$0.41	$0.53	$0.30	$0.30
Livestock trading	$0.29	$0.13	$0.65	$0.09
Other operating income	$0.18	$0.04	$0.07	$0.05
Total income	**$5.23**	**$5.08**	**$8.78**	**$5.59**
Feed costs	$1.51	$2.09	$2.27	$1.36
Other FWE	$1.79	$1.60	$2.80	$3.06
Total FWE	**$3.30**	**$3.69**	**$5.07**	**$4.42**
EBITDA	**$1.93**	**$1.39**	**$3.71**	**$1.17**

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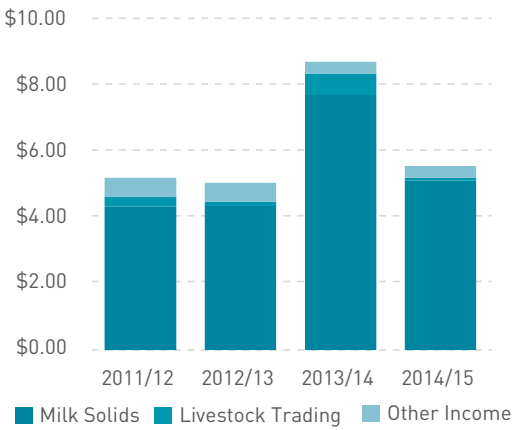
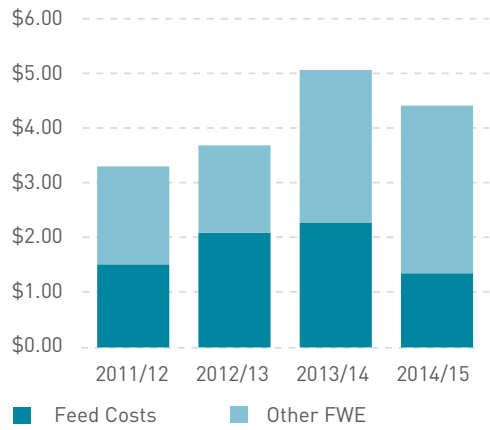
Income per kgMS



Expenses per kgMS



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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