An eye opening look at heifer development

QUEEN of CALVES™

Introducing a breakthrough in heifer development

A revolutionary calf nutrition programme created by Bell-Booth Ltd. and researched here in New Zealand under Kiwi conditions.

A world first, *Queen of Calves*™ enables the calf to extract more energy from its total diet and direct that energy towards lean growth.

A breakthrough that economists say has the capacity to deliver real change and provide an outstanding return on investment. Even in a volatile payout environment.

Let's talk about changing your earning ability, one heifer at a time.

$900

more milk production over 5 year lactation cycle

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Does improved calf rearing effect your profitability?

In 2008, Professor Chris Triggs from Auckland University studied the milk production of 6,900 New Zealand cows, on 49 dairy farms of varying size, breed, production and location that were raised on *Queen of Calves*. Using Livestock Improvement Corporation (LIC) records he calculated these cows produced 18% more milk in the first year when compared to similar cows.

In their second year, they produced another 18% more milk.

While Professor Triggs had the compelling statistical data* showing significant increased milk production in favour of the *Queen of Calves* programme, the 'how and why' remained unaccounted for.

*(P>0.001)

$900
more milk
over 5 lactations

Massey University looks at 'how and why'

Research scientists at Massey University were invited to study the differences in the rate and type of growth that heifer calves develop using *Queen of Calves*, and to compare the results with an identical group of calves raised on an identical diet but without *Queen of Calves*. Three groups of 20 calves of same-breed type, same BW and same birth weight were selected; the trial went through to and included the first season's milking.

The treated calves reached the target weaning weight eight days earlier than the 'control'.

The research findings have been peer-reviewed and published in the Journal of Dairy Science*

Nineteen 'treated' and nineteen 'control' calves from the Massey University calf trial joined the Number 4 Massey dairy herd as heifers in 2009, along with 49 same-age heifers that were not raised on *Queen of Calves*. These 49 heifers were raised and grazed with the trial heifers and are described in the report as 'farm cohort'.

*Margerison, J.K., A.D.J. Roberts, and G.W. Reynolds. The effect of increasing nutrient and amino acid concentration of milk diets on dairy heifer individual deed intake, growth, development, and lactation performance. J. Dairy Sci. Vol. 96 No. 10, 2013. Pp 6539-6549.

In the paper, ***Heifer rearing to optimise farm profitability****, DairyNZ Principal Scientist, John Roche, and others say, '...lifelong increases in milk production resulting from accelerated growth rates during the first eight weeks of life indicating possible significant return from a short-term investment".

The authors go on to conclude that 'the majority of that work (reported in their paper) has been undertaken in high-production, housed dairy systems. Further research is required in grazing systems.'

The BERL report describes the various impacts in a research trial in the New Zealand grazing system, of a pre-weaning heifer calf-rearing programme developed by Bell-Booth, called *Queen of Calves.*

*Proceedings of the 5th Australasian Dairy Science Symposium 2014

“The Queen of Calves system, if adopted by only 10% of the national herd (500,000 cows in milk) within, say, 10 years’ time could multiply up to a total value chain increase in GDP of about $340 million per year.”

Kel Sanderson *MAgrSci (Hons) (AgEcon)*

Director, Business & Economic Research Limited (BERL)

A five year study on milk production and survivability

In May 2014, all surviving cows from the 2009 intake completed a fifth lactation and the data from the five lactations was analysed by Wellington economists Business and Economic Research Limited (BERL).

The study reveals alarming trends

In the course of their report BERL highlighted a couple of alarming trends that exist in the New Zealand dairy industry:

a) it is estimated 20% of New Zealand’s heifer replacement calves do not make it to herd entry

b) by the third milking, approximately another 20% have exited the herd through failing to become pregnant or as a result of other production-limiting factors.

ONLY

62%

of New Zealand’s cows complete a third year’s production

Queen of Calves gives more years to your herd

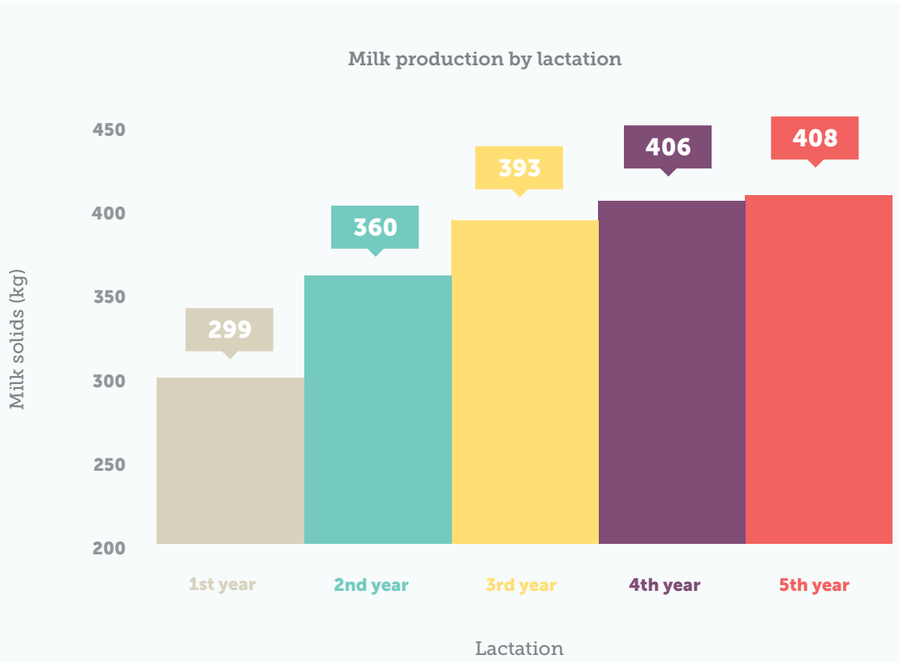
Compare the facts: 95% of the cows at Massey’s research farm that were raised on a *Queen of Calves* program completed a third lactation.

- The better-developed heifers not only survived, they out-produced the same-age and same-breed cows in the same herd by 150 kilograms MS in the five lactations.
- Compared to the same-age group, the *Queen of Calves* cows produced on average an increase of 30 kilograms more milk solids, per year, in the first five lactations.
- That’s 150 kilograms additional milk solids over the five lactations. And at a $6 payout, that’s $180 more milk per cow each year. And over five lactations, that’s another $900 per cow.

What does this mean for milk production?

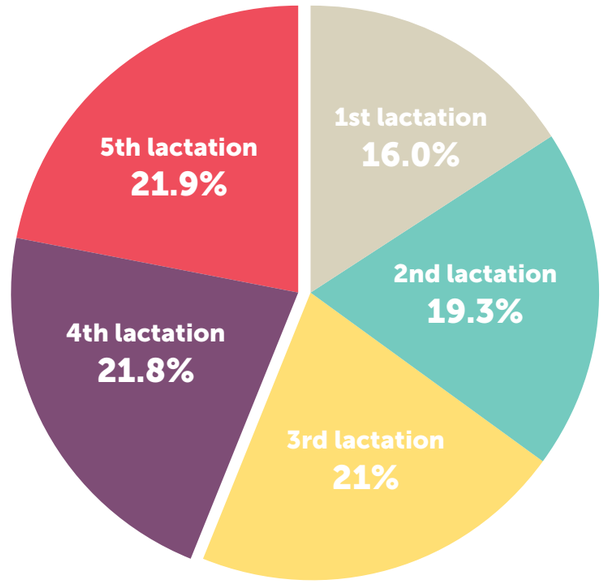
Consider a typical cow's first five years of milk production. In her first lactation, a dairy cow produces 16% of the total. In the second year, she produces 19.3% and in her third year, 21%. However a massive 44% of the total milk is produced during the 4th and 5th lactations. But with 40% of New Zealand's cows being culled from the herd by the end of their third lactation, those cows only produce about 55% of what they are genetically capable of.

They miss the good years.

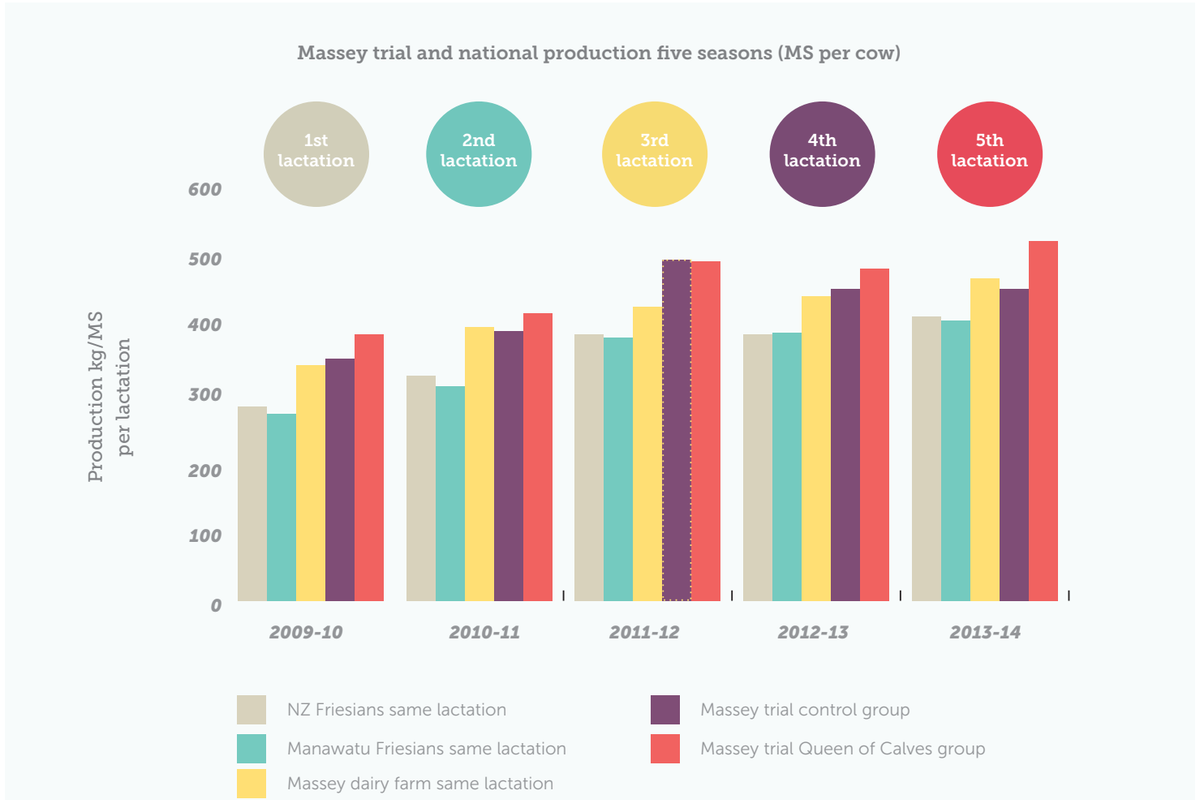


4th & 5th lactations combined represent **44%** of the 5 year milk production.

There is a **huge upside to ensuring cows remain** in the herd for more than 3 years...



Economic impacts of herds using the *Queen of Calves* programme



This graph is reproduced from the published BERL report and shows the production data collected over the five years. The graph shows how the Massey herd produced in comparison to both Manawatu and New Zealand same-age Friesians. It demonstrates that the Massey herd represented by the purple and yellow bars significantly out-performed their regional and national peers. In addition, the graph shows that the Queen of Calves group (red bar) consistently produced another 30 kilograms milk solids, than their Massey same-age peers, over each of the five lactations. (See further detailed analysis on www.heiferdevelopment.co.nz)

Queen of Calves enhances lifetime milk yield

BERL'S overall conclusion is that *Queen of Calves* works by bringing about early lean growth in calves. Their analysis shows that early lean growth in calves is associated with an 'enhanced lifetime milk-yield' of 30kgs milk solids on average per lactation in the first four lactations, and at least that increase in the fifth lactation.

In a nutshell... *Queen of Calves* works.

95%

of the Queen of Calves cows completed three lactations*

*BERL have adopted an 85% survival figure for their economic analysis as being representative of likely commercial farm outcomes. (See further detailed analysis on www.heiferdevelopment.co.nz)

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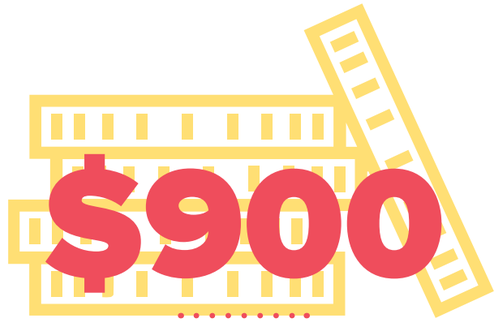
84%

of the same-age trial cows at Massey completed three lactations



more milk production per heifer on average over 5 lactations

“Here’s an opportunity for you as a business owner to get ahead; ensure your cows are reared to fully express their genetic production potential but still have your higher-producing cows surviving longer ”

Stephen Bell-Booth

CEO & developer of Queen of Calves

A more efficient milk producer

How does *Queen of Calves* work?

From day two:

The process begins at day two where *Queen of Calves* STARTER is added to milk. The probiotic in STARTER seeds the gut with billions of beneficial bacterium that assist calf health in the difficult early days when calves are at most risk.

From week three:

From the third week *Queen of Calves* FINISHER is added to milk. It strengthens the curding properties of the milk and slows the release-rate* of the stomach contents to the small intestine. This allows the calf to capture more of the energy and nutrients contained in its milk than is possible with just milk.

First 11 - 12 weeks:

One of the essential features of the programme is that the calf continues to be fed a restricted milk volume, i.e. 10-12% of birthweight – this is crucial as it drives the calf’s appetite to consume more calfmeal and fibre, which encourages rumen development and facilitates early lean growth.

The consequence of these combined factors enables the calf to become a more-efficient feed-converter producing about 10% greater daily liveweight gain during the first 11-12 weeks.

*Under a Queen of Calves programme, the timing of contents-release to the small intestine in a four-week calf was shown to be slowed by about 90 minutes. On it’s own, milk takes 4 hours 28 minutes** to process and pass through the abomasum. By adding ***Queen of Calves*** FINISHER to milk the process takes 5 hours and 58 minutes**.

**Average elapsed time under independent trial conditions (AgResearch trial, 2013)

Better-developed heifers get ahead and stay ahead

We asked farmers if they were aware of LIC's 90% of mature-liveweight-target for herd entry. There was strong understanding of that target but relatively few farmers are weighing their young stock, so most farmers are not fully aware of heifer growth before herd-entry.

Respected dairy researchers, Brownlie and McDougall have reviewed the herd-entry weights of thousands of New Zealand heifers. They discovered that the average growth achievement of New Zealand's heifers is approximately 77% of the mature weight at herd-entry.

Underweight cows play catch up

When a cow enters the herd at near mature weight, her better development enables easier transition into the herd. But more importantly, because she's not playing 'catch-up', she's able to direct her energy towards production and reproduction.

Think about all the money and time New Zealand dairy farmers spend raising herd replacements. If heifers fail to reach target liveweight and stature at the time of herd-entry, those animals are likely to be behind the pack all the way through. Underweight and smaller-stature animals will direct energy towards growth before productionand reproduction.

When the *Queen of Calves* heifers entered the dairy herd, they had achieved an 89.3% mature liveweight. The Control group entered the herd at 88.4% of mature weight.

The question facing the economists:

'Was the 58 extra kilograms in milk production over the first two lactations from the Queen of Calves heifers, an outcome of their achieving a 1% better herd-entry weight than the control group?'

The answer:

The better herd-entry weight of the treated cows did not account for the majority of their production gain.

BERL used LIC data to estimate the difference in achieving a 1% better target liveweight at herd–entry. They determined it accounted for four kilograms of the 58.

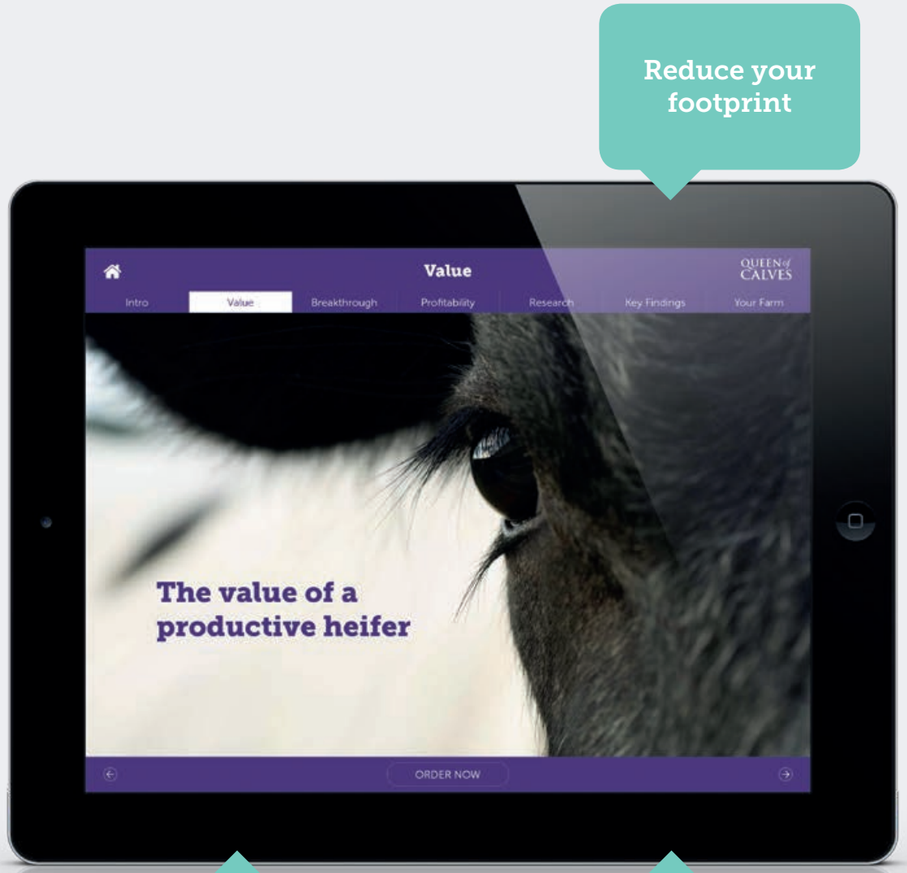
The additional 54 kilograms milk production from the better-developed heifers correlates with the findings of researchers like Soberon & Khan, van Amburgh, Margerison et al that collectively conclude that:

> The achievement of early lean growth leads to better mammary tissue development and better milk production as an adult.

Don't miss an opportunity.

The growth phase, from birth to puberty, is one the most important periods in a heifer's development. If it's missed, it cannot be compensated for after weaning.

"We have developed a product Cowculator™ to help our customers..."



Case study:

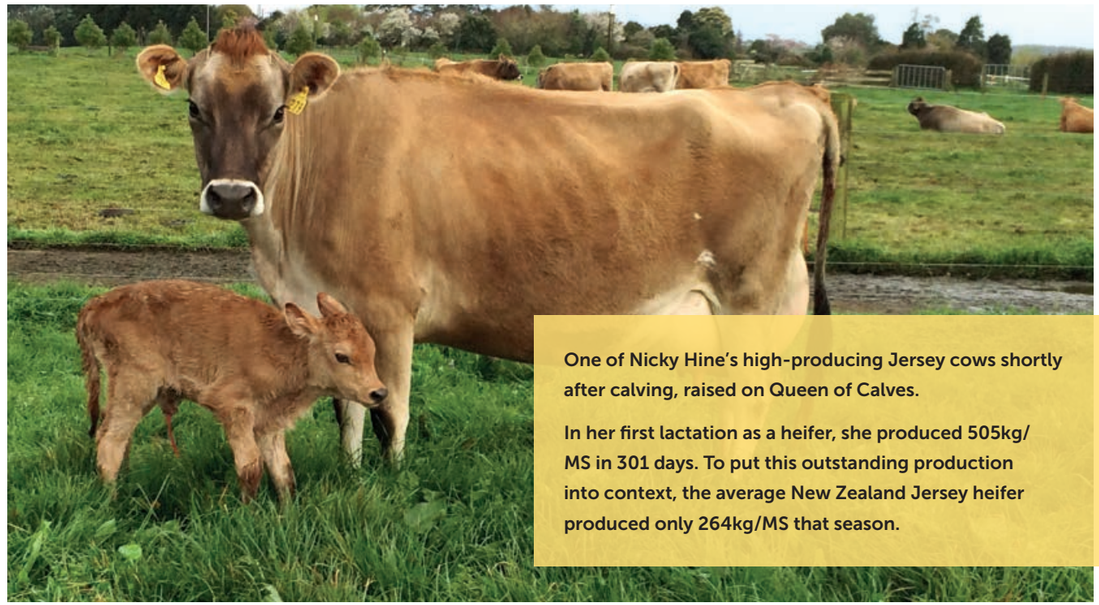
“What these photos show is a well-milked cow and a terrific udder, before and immediately after milking. How many New Zealand cows exhibit this type of mammary performance?”

Nicky Hine

Respected Jersey cattle breeder, Taranaki

Nicky Hine is a Queen of Calves fan.

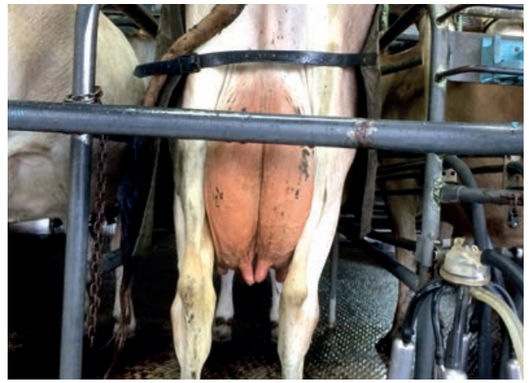
Based in North Taranaki, she’s raised nearly all of her heifer replacements on Queen of Calves since 2009.



One of Nicky Hine’s high-producing Jersey cows shortly after calving, raised on Queen of Calves.

In her first lactation as a heifer, she produced 505kg/MS in 301 days. To put this outstanding production into context, the average New Zealand Jersey heifer produced only 264kg/MS that season.

Close up of the pictured cow’s udder before milking



Same cow, immediately after the same milking

Environmental Footprint

What risk to your business does your farm's environmental footprint currently represent? How can you mitigate it?

You have two options:

A) Either maintain your productivity whilst reducing the environmental footprint, or...

B) Increase your productivity whilst maintaining your current footprint

Work within your Regional Council Nutrient Cap

BERL's analysis shows that on average the Queen of Calves trial group of heifers produced an increase of 30 kilograms more milk solids, per lactation, in the first five lactations. This more efficient milk production shows the potential to reduce a farm's footprint by 13% while maintaining total farm milk solids production.

Adopting the Queen of Calves nutrition programme potentially provides you with another tool to work within your Regional Council nutrient cap and meet your production needs. For some dairy farms, this breakthrough in more efficient milk production could enable a marginal farm to remain as a profitable enterprise.

Reduce your herd by

13%

while maintaining total farm milk solids production

Control your cost of production

We can't control a volatile payout environment. What we can control is our cost of production. One of your fixed costs is rearing replacements. Cows that produce milk more efficiently increase your profit. It's a balance between production and productivity, resulting in efficiency.

Raise higher producing cows

We believe the BERL findings support the use of Queen of Calves to rear heifers that become higher producing cows that survive longer. This will make your farming operation less susceptible to payout volatility.

What does this mean in $NZD for a 400 cow New Zealand farm? Remember:

- 95% of the 'Queen of Calves' cows completed a third lactation
- Only 62% of New Zealand's dairy cows complete a third lactation

The economists produced an economic model based on a 400-cow New Zealand farm. Adopting a conservative 85% survival figure through to the end of the third lactation, they forecast that from an annual, one-off calf-rearing investment of $6,789, total savings plus revenue to be $51,750 over three lactations assuming $6 payout. This is an annual savings plus revenue to investment cost ratio of approximately 30:1, or if straight cash flow is your thing, cash in: $34,560, cash out: $6,789 giving a ratio of 5:1.

The economics backs the science. Queen of Calves is an effective and financially viable nutrition programme for your dairy farm.

A final word...

I believe the difference between a good and great heifer is getting the genetics, nutrition and nurturing right, and to produce the type of growth that enables better milk production and survivability.

As a country we have invested millions of dollars in genetics. But it's time to move to the next level. It's not just the breeding; it's the feeding, especially the critical early feeding period that counts.

Stephen Bell-Booth, CEO Bell-Booth Ltd & developer of Queen of Calves

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