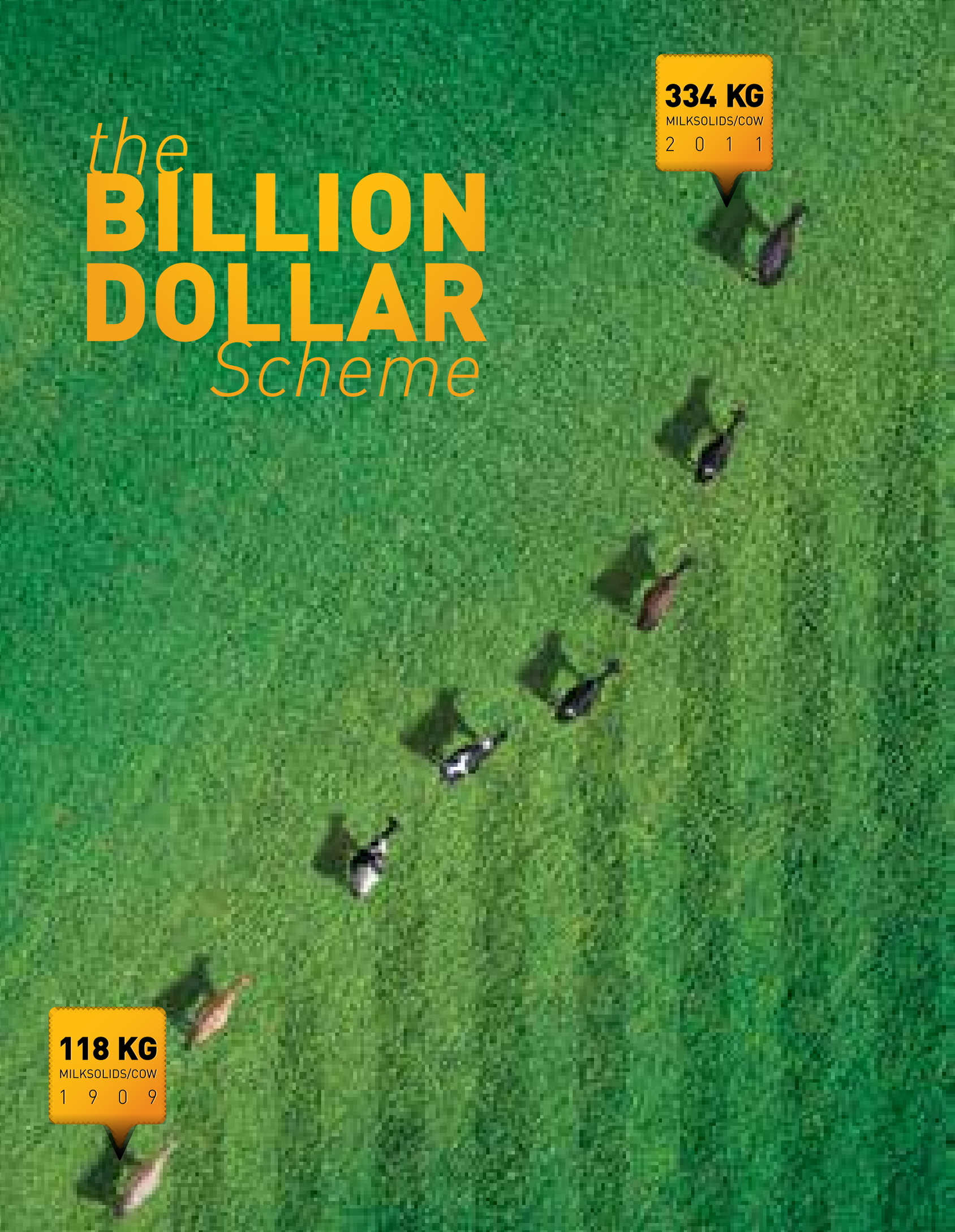

the BILLION DOLLAR *Scheme*

the BILLION DOLLAR *Scheme*

LIC's Premier Sires team of artificial breeding bulls has generated more than 17 billion dollars to the New Zealand dairy industry and economy since it began.

The Premier Sires team is responsible for siring three out of every four dairy cows being milked on New Zealand dairy farms today.

This is the story of the scheme behind the bulls — the LIC Sire Proving Scheme. It's a story of a partnership between farmers and their herd improvement co-operative, LIC.

It's a story which spans 50 years since the LIC Sire Proving Scheme was introduced in 1961, as seen through the eyes of the people involved.

Note: LIC discontinued the term 'DNA Proven' in 2012, after publication of this document.
Any reference to 'DNA Proven' in this publication should therefore be taken as referrring to bulls which are genomically selected.
LIC markets genomically selected and traditionally proven bulls in the Premier Sires Forward Pack team. - LIC, 2013.

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Dedication

In 1159, theologian and author John of Salisbury wrote:

"We are like dwarfs sitting on the shoulders of giants.
We see more, and things that are more distant, than they did,
not because our sight is superior
or because we are taller than they,
but because they raise us up,
and by their great stature add to ours."

The quote expresses the regard that today's LIC pays to the generations of farmers, scientists and staff who contributed to the Sire Proving Scheme New Zealand farmers enjoy today.

LIC's history is liberally sprinkled with the names of visionaries whose passion and dedication to profitable dairying has cast long and enduring shadows of prosperity and uniqueness to the New Zealand dairy industry. This book attempts to acknowledge them all, if not in name, then by association or in the innovation or quality they delivered.

Individually and collectively they enabled a Scheme which – at a very practical level – replaced 60,000 questionable bulls (in the 1940s) with 20 to 30 elite artifical breeding bulls per year – bulls which are responsible for siring three out of every four cows grazing on New Zealand dairy farms today.

This book is dedicated to all those who have played a part in LIC's Sire Proving Scheme over the first 50 years, and especially dedicated to five people who devoted their lives to improving the profitability and sustainability of dairy farming and whose work enabled the Scheme that this book celebrates:

OLIVE CASTLE

SIR ARTHUR WARD OBE

DR PATRICK SHANNON QSO

JEFF STICHBURY

HARVEY TEMPERO

Profiles

OLIVE CASTLE

In 1939, Olive Castle obtained a Master of Arts Degree with Honours in Mathematics from Victoria University. She worked as a mathematics teacher before accepting an invitation in 1939, from Arthur Ward, to join him as the New Zealand Dairy Board began to deliver the vision contained in the Herd Improvement Plan.

On Arthur Ward's appointment as Director of Herd Improvement in 1945, she became responsible for research. She and her assistant, Patrick Shannon, who joined the staff in 1954 and who became responsible for research when Olive retired in 1970, played a major part in bringing about the considerable number of world firsts that were established under the Herd Improvement Plan.

The Plan was to use data collected by and from the industry itself to improve the efficiency of dairying and the standard of living of New Zealand dairy farmers. This was achieved in a number of ways, including the development of progeny testing systems and other measurements of the genetic merit of dairy cattle, the establishment of an artificial breeding service and the collection of data from dairy farms to examine herd and farm management practices.

The success of these measures was dependent on the data collected and the development of procedures for using that data.

The New Zealand Society of Animal Production (NZSAP), in its nomination of Olive for Lifetime Membership, records that it was fortuitous that she was charged with delivering many of the initiatives contained within the Herd Improvement Plan. The nomination acknowledges that Olive's "achievements in this field have rarely been documented in scientific literature, mainly because she was always too busy starting work on the next problem to take time out to write up the previous one.

"Evidence of her ability is not hard to find, though, in the development of New Zealand's herd testing systems, the successful progeny testing method developed by her from AH Ward's original work, the extensive documentation of the many facets of the New Zealand dairy industry - and the success of the Dairy Board's artificial breeding service."

Olive Castle is best known, perhaps, for her challenge to the way bulls were evaluated in the 1940s. Known as the daughter-dam comparison, a bull's daughters were compared with its mother. However, this did not provide enough data and Olive suggested that a more reliable method would be achieved by comparing a bull's daughters in the herd with the average of all other animals in that herd milked in the same season. In effect this meant that all daughters of the sire could be used in the proof, removing one of the major biases of the daughter-dam comparison. Olive's model, known as contemporary comparison, also meant bulls could be tested across herds.

The New Zealand Dairy Board duly accepted Olive's solution and, over time, contemporary comparison became the norm for progeny test programmes across the world.

Olive Castle died in 1988.

SIR ARTHUR WARD

Arthur Ward was born in Yorkshire in 1906, the son of a publican and a photographer. After his father's death in 1910 and his mother's remarriage, he grew up on a farm in Yorkshire where, from an early age, he helped hand-milk the cows.

On leaving school he trained as an accountant before coming to New Zealand in 1926. Originally focused on a career in farming, he accepted a position as secretary of the Herd Testing Association in Hamilton in 1929, but very soon realised that the solution to raising the productivity of Kiwi herds lay in dairy sires, not in cows. This set him on a path to facilitate and encourage the uptake of high genetic value bulls.

This dedication saw him promoted to the New Zealand Dairy Board in Wellington, in 1936, where he was involved in the early years of sire survey — and the drafting and adoption of the Herd Improvement Plan which formalised the aim to improve the performance of the national herd.

In 1956 Arthur was appointed General Manager of the Dairy Board. Jeff Stichbury, who had joined the staff of the Herd Improvement Department in 1950 as a Consulting Officer, succeeded him as Director of Herd Improvement.

Arthur Ward left an indelible stamp on the dairy industry — from his work with sire surveys and artificial insemination, to his stewardship of the Herd Improvement Plan and his appointment of people who were to realise their – and the industry's — potential; people like Olive Castle, Pat Shannon and John (Jimmy) James to name a few.

Arthur was awarded an OBE for services to the dairy industry in 1961, and in 1965 became a life member of the New Zealand Society of Animal Production. He received a Distinguished Service Award from the New Zealand Society of Dairy Technology in 1969, the Sir Ernest Marsden Medal for Service to Science in 1975, and in 1977 the Queen's Silver Jubilee Medal. He was knighted in 1979 and had an honorary DSc conferred on him by Massey University in 1991.

He died on 1 November 1993.

DR PATRICK SHANNON

Patrick Shannon was born in Hong Kong in 1928, the second of three sons to an Irish father and Welsh mother. His father was an Inspector in the Hong Kong Police Force.

The family moved to England when Pat was around 6 or 7, settling in Liverpool. As a young adult he spent time with his Irish and Welsh families who were all farmers, sparking a lifelong fascination with dairy farming. He worked on a farm for a short while before taking up a scholarship to complete a year's course in agriculture at County Agricultural College. There he won one of two scholarships to attend Durham University.

Pat graduated, in 1952, with a degree in Agricultural Science with Honours. During his studies he learned of the herd improvement research being conducted in New Zealand by Arthur Ward, and as soon as he graduated he emigrated with a vision of working with Arthur Ward.

His first application to join the New Zealand Dairy Board coincided with Arthur Ward's absence overseas, so he obtained another laboratory role in Wellington. Twelve months later he again presented himself at the Dairy Board offices and this time Arthur Ward was there, interviewed him and appointed him to the position of Research Officer working alongside Olive Castle.

Pat Shannon was instrumental in the development of the Sire Proving Scheme, and in semen dilution techniques, many of which were world firsts. The most famous of these was Long Last Liquid (LLL). He also led the inclusion of genetic ancestry and genetic value of herdmates, basing the regression calculation on the comparison of herdmates ahead of any other dairying nation in the world.

Dr Patrick Shannon was awarded the New Zealand Science and Technology Medal in 1996, the Companion of the Queen's Service Order (QSO) in 1999, the inaugural Fonterra Dairy Excellence Lifetime Achievement Award in 2003 and the Kudos Lifetime Achievement Award in 2008. He is a Fellow of the New Zealand Institute of Agricultural Sciences and a Life Member of the New Zealand Society of Animal Production.

He is still a valued member of the LIC research team, coming into LIC's Hamilton office two days a week at the age of 83. In his honour, LIC's Hamilton laboratory complex is named the Shannon Laboratory.

JEFF STICHBURY

Jeff Stichbury grew up in Auckland and, after leaving school in 1940, worked in the office of the Auckland Farmers Freezing Company before joining the Royal New Zealand Airforce and training as a navigator. He served overseas (Canada and the United Kingdom) before returning home to study agricultural science at Massey University. He graduated with a Bachelor of Agricultural Science in 1950 and joined the New Zealand Dairy Board as a Consulting Officer.

His elevation through the ranks at the Dairy Board was nothing less than exceptional — within two years he was appointed Assistant Technical Officer and then, in 1956, stepped into Sir Arthur Ward's shoes as Director of Herd Improvement when Arthur retired. In 1980 he was appointed Assistant General Manager of the Dairy Board then, in 1984, Management Consultant to the Livestock Improvement Council and the Dairy Board.

Jeff is credited with leading the research and development of many of the significant improvements in dairy cattle breeding systems.

The development of Breeding and Production Indexes for cows ensued from the sire survey work — again ahead of any other global dairy industry.

Jeff was made an Honorary Life Member of the New Zealand Society of Animal Production (NZSAP) in 1985 for his work on the establishment of a nationwide progeny test programme and the uptake of commercial artificial breeding.

His NZSAP nomination paid tribute to his "loyalty to staff and willingness to meet and discuss issues with representatives of all groups, his basic integrity, his careful and full consideration of all the issues and his tenacity in pursuing the course of action he considered to be of most value to the dairy farmers of New Zealand."

Jeff Stichbury was a Fellow of the New Zealand Institute of Agricultural Science.

He died in 1998.

HARVEY TEMPERO

Harvey Tempero grew up on a dairy farm in Stratford, Taranaki. He graduated from Massey University in 1965 with a Bachelor in Agricultural Science. He taught at Stratford High School for two terms before joining the New Zealand Dairy Board's Herd Improvement Department as a Consulting Officer.

For 12 years, Harvey served as a Consulting Officer in the south and west of the Waikato, and then in an area which stretched from Whakatane through to Wairoa, before being appointed Sire Selection Manager — first based at Wellington and then at Newstead when the Herd Improvement Division relocated.

In 1994 Harvey was appointed Manager of the Breeding Group, a position he held until his retirement in 2001.

Speaking at that retirement function, then LIC General Manager, Glenn Whittaker, said: "Harvey's years as a Consulting Officer taught him that commercial New Zealand dairy farmers were only interested in gaining the best dollar return from their farming activities. They wanted a cow which could graze for long periods, walk to and from the milking shed without difficulty, have a good temperament, possess an udder which allowed cups to go on easily and stay on, and above all, be the most efficient converter of feed into milk solids.

"He brought a balance into breeding policies and strategies. On the one hand he had the geneticists who wanted maximum genetic gain above all else. On the other hand he had the traditional breeding industry where type and conformation were the be all and end all. He determined where the line should be between the two camps. The ongoing development growth and current day popularity of the Premier Sires programme is a tribute to his tenacity as he built on the foundations laid by those who had preceded him."

Harvey is on record saying, "One of my greatest pleasures when inspecting bull mothers was identifying what I called Clayton's cows the ones farmers didn't know they had.'

"I used to delight in telling farmers about these cows; you know, the ones which are always first in the shed, which calve and milk with no problems, have wonderful temperaments and udders and never get mastitis.

"They'd come in and go out each day and never cause any bother, and it was often only when I approached the farmer asking for them as potential bull mothers that the farmers realised just how good they were!"

Harvey retired in 2001 after 36 years with LIC.

He died in 2005.

LIC's conference centre at Newstead is named in his honour — the Tempero Centre.

Foreword

It's timely, as modern day 21st century New Zealand dairy farmers, to pause and reflect on the rich heritage of entrepreneurs, scientists and capable farmers who have developed, guided and paved our pathway for over a century. It is no accident that, combined, we have turned New Zealand's competitive advantage of soil, sun and water into pasture and animal production which is the envy of the world.

And it is no coincidence that the rapid advances in genetics enabled in the last 50 years have generated cows which, today, produce three or four times more than their forebears did.

We owe a lot to people like Olive Castle and Dr Pat Shannon who were the first in the world to design and develop a science-based breeding scheme that removed tens of thousands of negative and marginal production herd sires from the market and unleashed the opportunity to heavily use the very best ones.

It was their vision which formed the basis for a Sire Proving Scheme which saw a select group of 300 to 400 farmers selected each year for their excellent stockmanship, observation and recording skills of essential phenotypes, and for their geographical disparity representing the varied climate, geography, herd size and pasture based farming conditions that we have in New Zealand. Those farmers have been the engine room of LIC's front line product development.

This tightly managed Scheme is recognised as among the largest and most accurate, efficient and cost-effective in the world, set up to optimise genetic gain. Having said that, it's important to recognise that the Scheme has only been possible thanks to the users of LIC's artificial breeding services who have funded it to the tune of $7 to $13 million per year.

The LIC Sire Proving Scheme has enabled annual selection of "the elite from the best" akin to the All Blacks selection from the Super 15 teams. Criteria for the Sire Proving Scheme has some similarities with elite sports in that performance is the ultimate test – with dairying it's the production and non-production traits that are so important to us as farmers - but it's here that the comparison ends, because performance in dairy animals is measured and evident in genetic gain.

Genetic gain in New Zealand has steadily advanced at about 1.3-1.5% per year so it doesn't take many decades for a 250 cow herd to be as efficient as a 400 cow herd used to be. In fact, my university professor Dr Colin Holmes is quoted as saying we could not farm profitably today with the cows of the 1970s.

The Sire Proving Scheme has constantly evolved since its official launch back in 1961 and there have been some significant milestones along the way.

In 1996 the introduction of a profit index meant steady growth in production while limiting inefficient increases in live-weight; since then animal efficiency gains have been more pronounced based on a given unit of feed.

Breeding Worth has been a hugely successful measure of evaluating profit per animal and herd and most people associated with dairying today, including scientists, bankers and other service providers, recognise it is the most reliable indicator of per cow performance, animal and herd value and farm profitability.

As farmers, we owe our thanks to the dedicated Sire Proving Scheme farmers who have had to adapt to changing phenotype and genotype recording procedures over the years. We have all benefited as they proved the bulls by using semen from teams of young unproven bulls on their herds going on to milk and test the resulting daughters, not only for production, but for traits sought-after by New Zealand farmers – shed temperament, milking speed, liveweight, somatic cells and fertility to name a few.

It's a time consuming task but one most Sire Proving Scheme farmers commit to passionately because of the interest they have in genetics and because they know they are making a difference for fellow-farmers and the industry.

Until 2008 the Sire Proving Scheme 'graduated' around 10 bulls (per breed) each year, from an original team of 200-300 bulls, into LIC's flagship bull team – Premier Sires.

The Sire Proving Scheme has, for the last decade, involved three breeds (Holstein-Friesian, Jersey and KiwiCross™) covering conventional and once-a-day milking strains, and short gestation length schemes.

In 2008 one of the most exciting evolutions in dairy genetics occurred when DNA genomic science selection was harnessed to significantly enhance the Sire Proving Scheme by offering farmer members access to super elite young bulls chosen from among thousands, rather than hundreds, of their peers. The reliability of these elite young sires is about double that of parent average (ancestry) Breeding Worth.

This advance was a direct result of the large LIC investment of around $25 million, which began in 1994 with the aim of driving our on-farm profitability harder.

Genetic gain has enabled nearly two thirds of total on-farm productivity gains and, with the new generation DNA technology, is likely to lift to nearer 75%.

The Sire Proving Scheme has delivered all that it promised 50 years ago, and more. It has been a very stable platform for over 50 years for our co-operative's growth, giving us all great confidence for the future as we annually anticipate an even better team of bulls for the next crop of daughters. In essence, it is a platform of genetic sustainability for our farming businesses, our families and our industry into the future.

In closing, I often reflect on the fact that if only we had an equivalent system with our pasture varieties to match what has been achieved in dairy cattle breeding, how much better still we could be in feeding a world with nature's most amazing food.

Farming is, and has always been, a family business. Many of today's LIC shareholders can look back on a rich heritage in dairying, support of their co-operative and commitment to advances in dairy genetics. This book recognises that commitment as much as it does the individuals whose stories are recorded.

The success of the Sire Proving Scheme provides one of the most tangible examples of the value of LIC as a farmer owned co-operative - farmers working together, for the benefit of their own businesses, their families, the industry and the economy.

Stuart Bay
Dairy farmer, and LIC Chairman

Preface

Crystal ball gazing

The term 'crystal ball gazing' describes a mythical ability to read the future.

Geneticists make predictions based on huge and complex data files over multiple generations of animals, so they can give us a picture of future potential.

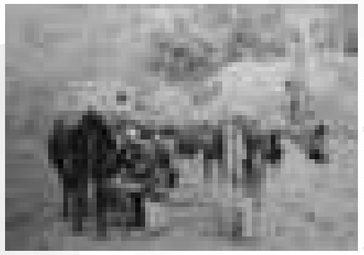
In 1943, a modelling exercise was conducted which reinforced the importance of the herd sire and suggested that, aided by commercial artificial insemination, there was potential to increase the production of herd replacements by as much as 25 lbs (11kg) of milkfat per generation (approximately 6 years), or 2kg fat per year. Those rates are being achieved by LIC today with a wider range of traits than those early researchers could even contemplate.

In 20 years time the average cow will probably be a crossbred and will produce an extra 40kg of protein, 40kg of fat and 900 litres with similar fertility and liveweight to today's cow. She will be a more efficient converter of feed into milk and will be measured for a number of new traits – possibly selected for lower methane and nitrogen output.

Historical Perspective

1814 -1960

115 years from 1814 to 1929



Photograph: Alexander Turnbull Library

A school inspector milking a cow in front of the Smith homestead. Mabel Smith is at the right. The Smith family's first home is on the left with the dairy behind it. Circa 1800s.

Photograph: Alexander Turnbull Library

A group of dairy cows fenced inside an enclosure which two men lean against. The land in the background has been cleared of trees, probably in the Stratford region. Circa 1890.

1814

Reverend Samuel Marsden lands a bull and two heifers in the Bay of Islands.

1909

First organised routine Herd Testing service by New Zealand farmers begins, supervised by the Department of Agriculture.

Ransted Bros. first test team, 1918, which averaged 12,784 lb milk, 520lb fat.

THE *DAIRY INDUSTRY* had

20 dairy factories in 1884, increasing to 200 in 1920.

Average per cow production 148 lb butterfat or 67.3 kg milkfat in 1909, increasing to 218 lb butterfat or 98.9 kg milkfat in 1929.

Photograph: Alexander Turnbull Library

PHAR LAP

New Zealand thoroughbred, Phar Lap, (1926-1932) wins the Melbourne Cup, two Cox Plates and 19 weight for age races, making him the third highest stakes winner in the world.

1922

Group herd testing established.

1924

New Zealand Dairy Board established.

WORLD WAR I

More than 100,000 New Zealand soldiers fight in World War I (1914-1918), 16,697 losing their lives.

Photograph: Alexander Turnbull Library

New Zealand World War 1 soldiers in a trench 15 yards from Turkish trenches, in Gallipoli, Turkey, 1915. Shows three unidentified men in a narrow trench dug into the ground.

1930

Photograph: Alexander Turnbull Library. Circa 1932.

THE GREAT DEPRESSION

1928-1935 grips the world

Crowd of people gathered on the steps of Parliament, Wellington, during the Great Depression.

1930

1933

First experimental artificial inseminations take place in New Zealand — largely unsuccessful.

1933-1935
First daughter-dam comparisons conducted.

1934

Research into artificial insemination begins. First trials start on 44 Waikato herds.

Artificial insemination with progeny tested bulls offered to members of the New Zealand Co-operative Herd Testing Association.

1935

Progeny testing/sire survey established.

Photograph: Alexander Turnbull Library.

NAPIER EARTHQUAKE

The Napier earthquake (1931) devastates Napier and the Hawkes Bay region killing 256 people.

Road affected by the earthquake in Hawkes Bay, February 1931.

THE *DAIRY INDUSTRY* had

400 co-operative dairy factories.

70,000 dairy farmers.

1.8 million dairy cows with average per cow production of 259 lb butterfat or 117 kg milkfat.

Rotoma dairy farm 1928

Around 60,000 mostly pedigree bulls used to generate herd replacements – Sire Survey suggests 37% (ie 41,000) of bulls being used on New Zealand dairy farms actually lower production.

Progeny testing/sire survey established.

Department of Agriculture continues research into AB, inseminating 87 of its own cows at Ruakura – 39% get in calf.

1936

Formation of the Herd Recording Council (to become the Herd Improvement Council) charged with improving the standard of the cattle in the dairy industry'.

1937

First sire evaluations based on progeny records undertaken.

1938

Research confirms that improving the standard of the national herd relies on a regular supply of high quality bulls.

Department of Agriculture continues research into commercial AB, inseminating 332 cows in the Ngarua district with 32% success rate.

GUY FAMILY MANAWATU 1937

Bryan Guy is a Director on the LIC Board and provided this photograph, taken in 1937, on his grandparent's Feilding farm at milking time. The photograph includes a number of the neighbour's children. Bryan's father, Graham, is the young boy in the front wearing the tie, and his grandmother holds Bryan's father's younger brother. His grandfather is in the back yard.

The farm milked around 20 to 25 "fairly rough shorthorn and Ayrshire cows" and milk was sold by a pint measure from the house which had a "dairy" attached to the side. The farm was inside the Feilding town boundary so the town folk would just turn up any time to get their milk.

Bryan Guy's grandfather began milking there about 1919 after WW1. The farm eventually went on to supply "Town Milk", so someone in the Guy family has milked cows every day for over 90 years.

Launch of Herd Improvement Plan.

Sire surveys begin.

1939

1940

1941

First list of proven sires published by New Zealand Dairy Board.

First naturally proven Jerseys purchased for artificial breeding.

1942

1942-1944: Three year trials begin in the Department of Agriculture's herds at Ruakura delivering average conception rates of 60%. Research extended to cows in the Matangi/Cambridge area, and to the Te Hoe and Palmerston North districts.

1943

Photograph: Alexander Turnbull Library.

WORLD WAR II

New Zealand enters World War II (1939). By the end of the war, in 1946, a total of 194,000 New Zealand men and 10,000 women have served in the armed forces at home and overseas. A total of 11,928 New Zealanders lose their lives.

Unidentified New Zealand soldiers stopping for a cup of tea, Sangro River area, Italy, 29 November, 1943.

1945

Intra-uterine method of insemination replaces the cervical method.

Sire survey and merit register published for the first time.

Commercial artificial insemination service launched to pedigree breeders enabling them to supply merit bulls to the industry.

First commercial artificial insemination (AI) pilot launched in Hamilton and Taranaki areas, achieving 74% and 61% in-calf rates (respectively).

1946

Daughter-dam comparisons changed to within-season basis.

Term 'merit sire' introduced.

1947

First production studies of stock bred from artificial insemination.

THE *DAIRY INDUSTRY* had

409 dairy processors, 40,000 dairy farmers, 1.8 million dairy cows and an average post-war herd size of 50 cows.

Average per cow production of 233 lb butterfat or 106 kg milkfat.

1302 cows artificially inseminated.

Herd Improvement Council Members, August 1949

Top Left: Dr J P James, Dr D G Edgar, L D Hickford, J L Murray, J D Steele, Miss Olive Castle, Geo Young, C R Beasley, T J Forneau, J Cookson, J W Stichbury Front Left: T G W Page, D C Lane, R A Candy, M G Hollard, F W Wyatt.

One of the most radical advances in sire proving, contemporary comparison developed by Olive Castle, is recorded in the New Zealand Dairy Board's Sire Service Register.

Daughter-mature (herdmate) cow comparison sire survey introduced.

First commercial artificial insemination service begins in Waikato and Taranaki.

New Zealand the first country in the world to use contemporary comparisons to differentiate sires. The concept was later adopted by other dairy nations around the world.

New Zealand Dairy Exporter magazine reports that commercial AI groups launched in New Zealand but shortage of proven bulls a disturbing factor.

1949

1950

Office building at the Newstead Farm, 1953.

Shayle Searle and Stan Southcombe standing in semen collection area at Newstead.

1950

New Zealand Dairy Board assumes full responsibility to develop commercial artificial insemination service.

First artificial insemination bulls purchased for proving.

First naturally proven Holstein-Friesians purchased for artificial breeding.

First deep freeze semen imported from United Kingdom.

1951

First deep frozen semen processed.

1953

First commercial AI centre established by New Zealand Dairy Board at Newstead.

1954

First naturally proven Ayrshires, unproven Holstein Friesians, Ayrshires and Angus added to the artificial breeding team.

Co-operative research begins on semen production and utilisation.

SHEEP FARMERS get 'a pound for a pound' of wool in the New Zealand wool boom, one of the greatest economic booms in the history of New Zealand.

A Romney Marsh sheep standing in a paddock of grass, circa 1950.

Photograph: Alexander Turnbull Library.

DAIRY PRODUCTS gain 10 years of unrestricted access to Britain.

THE *DAIRY INDUSTRY* had

1.9 million dairy cows with an average per cow production of 291 lb butterfat or 132 kg milkfat.

85,000 cows are artificially inseminated in 1954 increasing to 252,000 in 1957.

THE TANGIWAI DISASTER

The Wellington-Auckland night express plunges into the flooded Whangaehu River at Tangiwai on Christmas Eve 1953, killing 151 people.

1955

Jersey Glen Storm purchased as proven bull, first Jersey bull to exceed 50,000 lifetime inseminations.

Rating system for Sire Surveys introduced.

1956

First deep freeze semen imported from USA.

1957

First polled Herefords introduced to the artificial breeding team.

1958

First naturally proven, and unproven, Milking Shorthorns introduced to the artificial breeding team.

Research begins on semen dilution at Newstead.

1959

Photograph: Alexander Turnbull Library.

SIR EDMUND HILLARY and Tenzing Norgay conquer Mount Everest (1953).

Sir Edmund Hillary and Sherpa Tensing Norgay in Wellington, taken 11 August 1971.

Terling Brabazon 116 was the first imported bull to become a Premier Sire. He was purchased as a proven bull in 1958, from John Grigg of Longbeach, Ashburton.

John Grigg purchased Terling Brabazon for 1000 guineas, as a one-day-old calf, in England. He had sent his daughter to England, instructing her to buy the best.

Terling Brabazon went on to become an iconic breeding bull in New Zealand after Ted Sunckell (Jim's father) and Hector McIntosh (acting New Zealand Dairy Board Consulting Officer) visited Mr Grigg in the 1950s and persuaded him to make Terling Brabazon available to the Dairy Board Bull Team.

The bull was retired from service aged 14 years with lifetime inseminations of 21,000. Terling Brabazon is the first Holstein Friesian sire to be celebrated in LIC's Hall of Fame at Newstead.

Around 20 years later, in 1977, Holstein Friesian bull, Welburn PG Butterman, set a world record of 110,000 inseminations in a five-month period - Butterman's dam was a daughter of Terling Brabazon.

Kiteroa Mutual Mike enters progeny test, going on to be the first Holstein Friesian bull to exceed 250,000 lifetime inseminations.

ARTIFICIAL BREEDING
— beginnings

The first recorded artificial insemination (AI) took place in 1780 when Italian physiologist L Spallianzani successfully inseminated bitches, but the next phase in development of the technique did not occur until the early 1900s, in Russia, when E I Ivanoff began to develop AI techniques.

These early researchers confirmed that it was possible to collect sperm from a male animal and deposit it (with varying levels of conception rates) into a female of the same species. The dairying nations of the world were quick to see the opportunities to be gained from access to elite sires, however the science was in its infancy and the challenge was to develop processes for the collection and storage of semen, enabling the dairying nations of the world to provide their farmers with a commercial AI service.

The AB Committee 1958

Top Left: Patrick Shannon, Jeff Stitchbury, Dudley Lane, Selwyn Sheaf, A W Montgomerie, S A Southcombe.
Front Left: Dr John James, Sir Arthur Ward, R A Candy, A S Wylie, I B Gour.

The table below (published in the 30th Annual Report of New Zealand Dairy Board 1953-54) gives a global perspective of the international uptake of commercial AI (these dates predated by, in most cases, many years of research).

Country	Year commenced
Denmark	1936
USA	1939
England and Wales	1942
Sweden	1943
Holland	1945
West Germany	1945
New Zealand	1950 (trial work began in 1930s)

In New Zealand, research to lift the performance of the national herd began as early as 1927 when the Herd Testing Federation introduced a national grade calf identification scheme. This subsequently provided the basis for Arthur Ward's work, in the early 1930s, developing a method of comparing bulls on the performance of their daughters which he termed 'sire survey'.

In 1934, the Royal Commission on Dairying reinforced the importance of herd testing as a basis for improvement of the dairy industry, and the New Zealand Dairy Board took on the co-ordination and control of herd testing on a national basis under the Herd Improvement Council. The first chairman of the Herd Improvement Council was Guy Bell.

Research into artificial breeding began in 1935 when the Department of Agriculture, at the request of the New Zealand Co-operative Herd Testing Association, appointed veterinarian W (Wally) Webster to undertake an experimental programme in the Waikato.

In the 1935 season, 316 cows were inseminated; 25% became pregnant. Research then moved to the Department of Agriculture's base at Ruakura under the leadership of scientists T Blake, C Hopkirk and W Webster. One year later, in 1936, 87 cows were inseminated with a 39% in-calf rate and, in 1938, 332 cows were inseminated with a 32% conception rate.

In 1947 Alan Candy was appointed Chairman of the Herd Improvement Council, a role he maintained for 32 years.

Key foundation staff of the Herd Improvement Department were Chas Hume, who left the Herd Testing Federation to become the Council's Chief Executive, and Arthur Ward, who left his position as Secretary of the New Zealand Co-op Herd Testing Association in the Waikato, to head the Council's technical work.

The appropriately named Herd Improvement Plan of 1939, jointly funded by the Dairy Board and the Government, was instrumental in providing the impetus required towards bringing the sires of dairy stock under sire survey.

The Herd Improvement Plan addressed a need, highlighted in research, which confirmed that, of the 60,000 dairy sires in use for the cow population of 1.7 million, 28% improved production, 33% maintained production while 39% actually lowered production.

Following the Plan's release, an appointment was made, in 1939, of a man who was to become instrumental in the development of commercial AI — Dr John James.

Dr James was instrumental in the development of the intra-uterine method of insemination and he also undertook work on the collection, dilution and storage of semen.

The first list of naturally proven sires was published by the Dairy Board in 1941 and in 1943 the first of these proven bulls was purchased for artificial breeding trials.

These bulls had, in the main, been used for natural mating in only one herd and their daughters had shown up well in the herd testing records. The number of daughters involved was often quite small and the information on which the selection was based would seem quite primitive by today's standards. Nevertheless, for the times, it was an effective way of locating superior genes so they could be spread more widely.

In 1943, a review of sire survey research was undertaken by a sub-committee of the Herd Improvement Council — members included R A Candy, G C Dermer, Professor Riddet, Dr C P McMeekan, Dr W M Hamilton, C M Hume and A H Ward. The exercise confirmed that widespread use of the best

Dairy bulls purchased as naturally proven bulls

Year	Ayrshire	Holstein-Friesian	Jersey	Milking shorthorn	Total
1943-49	-	-	14	-	14
1950-59	19	22	142	2	185
1960-69	14	30	122	8	174
TOTAL	33	52	278	10	373

The number of naturally-proven bulls purchased for use in AB from 1943 to 1969, when this method of obtaining bulls was terminated.

Unproven bulls were also used as early as 1943.

Dairy bulls purchased as unproven bulls

Year	Ayrshire	Holstein-Friesian	Jersey	Milking shorthorn	Total
1943-49	-	-	13	-	13
1950-59	18	18	221	5	262

sires, through artificial breeding, had the potential to increase the production of herd replacements by as much as 25 pounds of milkfat per generation.

One of the first recorded methods for analysing sire performance was developed and refined throughout the 1940s by Arthur Ward and involved comparing the records of bull daughters with that of their dams (daughter-dam comparison).

This was, however, abandoned in 1949 due to difficulty obtaining sufficient daughter-dam pairs. It was replaced by a new procedure, known as contemporary comparison, developed by Olive Castle, a mathematician appointed to the Herd Recording Department in 1939. Her procedure (daughter-mature cow comparison) compared a bull's daughters with the average of all other animals in that herd milked in the same season. It meant all daughters could be used in the proof, thereby removing one of the major biases involved in daughter-dam comparison.

The new method also meant that bulls could be tested across herds, even when their progeny were transferred from one herd to another.

It was a breakthrough – the first use of the herd-mate comparison technique that was to dominate global dairy cattle genetic evaluations.

Research continued at Ruakura, under the direction of Dr James and, by the end of 1948, satisfactory conception rates and dilution rates were finally obtained. This opened the door to the first commercial AI service — which began in 1949 in Taranaki and the Waikato.

The Dairy Board became responsible for the commercial development of AI in 1950 with field operations carried out by the six Herd Improvement Associations. The first bulls for proving through AI were also purchased in that year. The Newstead Artificial Breeding Centre was established in 1953 and Dr James was appointed Director of Artificial Breeding in 1954.

In 1954 young Patrick Shannon joined the Dairy Board in Wellington. Over following years he worked with Dr Searle and Olive Castle on the design of a breeding scheme. The following key factors were considered —

- The proportion of inseminations to be made with unproven bulls.
- The number of unproven bulls to be tested and the number of daughters to be tested per unproven bull.
- The number of proven bulls to be used and the coverage per proven bull.
- The effect of recovering records on all and varying proportions of the daughters of unproven bulls.

The effect of these various factors was evaluated according to the effect on genetic gain.

An important finding to emerge from this work was the desirability of capturing all the records from the daughters of the unproven bulls. The previous means, of distributing young bulls alongside proven sires, had a low daughter recovery rate (in the bull's subsequent proof) and was therefore considered to be inefficient. This finding led to the introduction of the Sire Proving Scheme.

The Scheme was unique in the dairy breeding world because it required that specialised bull proving herds would be mated to unproven semen that was provided free. In return, members of the Scheme were required to herd test the resulting daughters, receiving a rebate for each heifer tested.

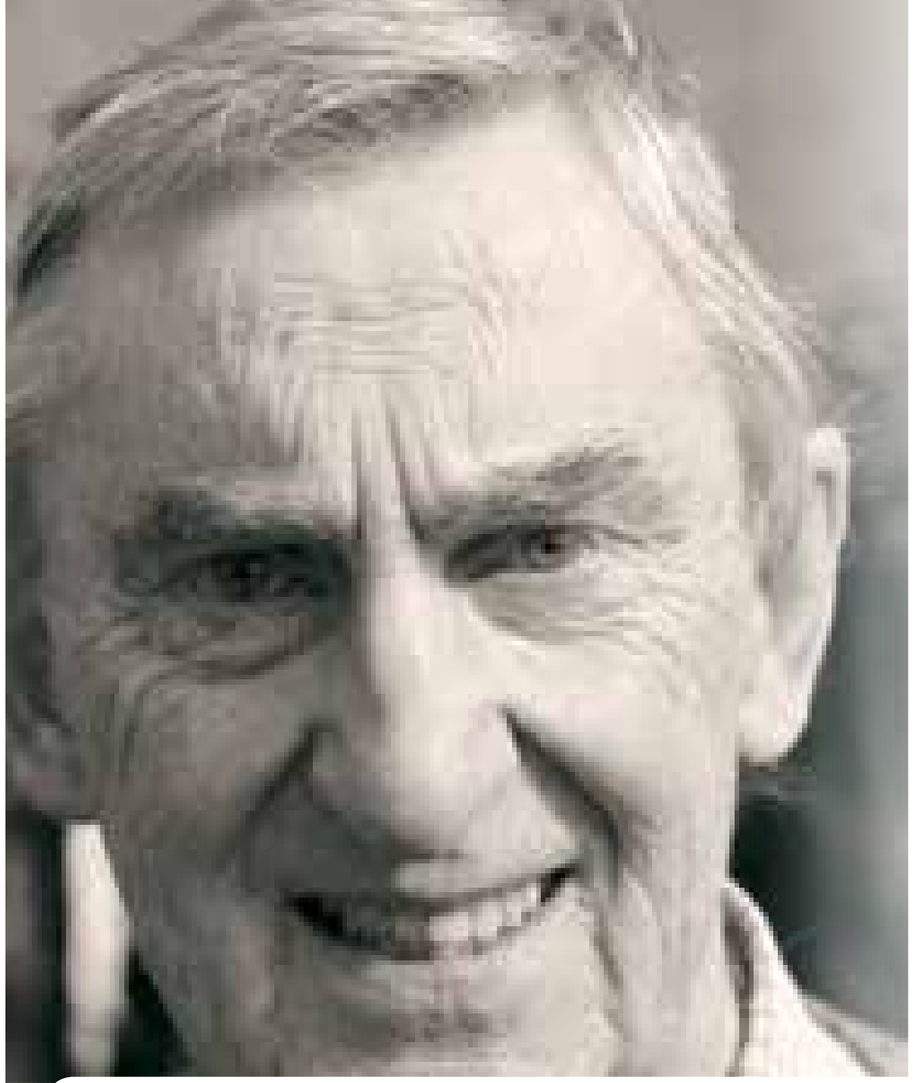
The Sire Proving Scheme was formally launched in 1961.

The table below shows the uptake of AI in New Zealand from 1943 to 1957

Season	No of cows inseminated	% in calf
1943	805	77
1944	2646	89
1945	1302	80
1946	1403	81
1947	1739	69
1948	1567	73
1949	1596	67
1950	3603	70
1951	5891	76
1952	16,748	75
1953	56,461	68
1954	85,000	
1957	252,000	

DAIRY BOARD STUD

New Zealand Dairy Board records of unproven bulls purchased in the 1950s include 544 Primary Kays Nemesis. The bull did not make the grade as a proven bull but his origins are interesting as he bears the prefix 'Primary'. This word indicates he was an offspring of a pedigree cow in the Newstead farm's decoy team.



New Zealand

— first in the world to use sire daughter comparisons

Dr Clive Dalton, co-author with Claire Rumble, of the publication ***'50 Years of Artificial Insemination and Herd Improvement in New Zealand'***, says that — prior to Olive Castle's work on daughter comparison — bulls were assessed by comparing a cow's production with that of its mother. "If genetic gain was working they'd be better than their mothers.

"Then along came Olive with her idea of contemporary comparison.

"The way it works is you have bull daughters in several herds, and compare the average of the herd with the bull daughters — ie how much better are the bull daughters than the average of the herd.

"Olive came up with the idea and she and Pat worked together to develop the scheme — ie how to get the best out of contemporary comparison, number of herds, farmers, gathering of information etc.

"In Britain they were still doing sire daughter-dam comparisons and Alan Stewart from Massey University went to work for the United Kingdom Dairy Board. He took the contemporary comparison idea with him and it became their method of sire proving — comparing each bull's daughters with their contemporaries.

"New Zealand was the first country in the world to use the contemporary comparison and this became the basis of all sire proving schemes. It all goes back to Olive Castle.

"Olive Castle was never officially recognised; she never published her idea in a scientific journal so got little recognition. She wasn't worried, however, she just wanted to help farmers.

"Now, looking back, she failed to get the recognition she deserved and, were it not for this book, would fade into the myths of time. She is, quite literally, one of New Zealand's unsung heros."

Sire Proving in the 1950s

Ian Hook

Ian Hook's invitation to begin a lifetime career in herd improvement occurred as he was milking the family herd in 1956.

He'd grown up on the family farm but wanted a career which was parallel to farming and that didn't involve milking cows. So he approached the Wellington Hawkes Bay Herd Improvement Association for a job herd testing. But the offer Artificial Breeding (AB) Manager, Fred Brooker, made to him was to become an AB Technician. He accepted and started training the next day.

Not all Herd Improvement Associations were providing an artifical insemination (AI) service in the 1950s and, until they did come on board, some veterinary clubs provided the service.

Ian Hook, 1984.

Naturally proven bulls

"There were two groups of bulls used for AI in the 1950s — naturally proven, and young unproven bulls. The price was the same for both groups and demand was growing — in fact there was a waiting list to get onto AI. People would queue to get onto the list; if they got on one year they'd have first option the year after provided they reapplied by a set date. There were massive groups — I remember working from 8 am to 8 pm, travelling huge miles, just to accommodate farmers wanting to do AI.

"It was 'bull of the day' right from the early 1950s, in both categories (this name applied until 1985 when it was rebranded Premier Sires; however many farmers still refer to 'the bull of the day'.

"Naturally proven bulls were sourced from, in the main, breeders with a varied number of daughters. In the 1940s they'd been evaluated based on a daughter-dam comparison but (thanks to Olive Castle's work) by the time I joined bulls were evaluated based on contemporary comparison, ie how their daughters compared with daughters (of various ages) of other bulls in the same herd.

"Breeders knew the Herd Improvement Associations were after good bulls and would generally let us know if they had something of interest; we'd then inspect the bull and his daughters and, if it met our criteria, agree to either lease or buy it. We used a calculation called 'difference from expectancy' so you'd know the exceptional from the average, eg a bull would be plus or minus average pounds of butterfat.

"The term 'proof' was, compared to the accuracy achieved today, a misnomer because we lacked the ability to accurately compare the production of one bull's daughters to another. For example, there was the varying maturing rate of the different breeds (Friesians taking longer than Jerseys to mature) and environmental impacts on the age correction factors where daughters were milked in tough conditions or, in a few cases, received special treatment to 'jack-up' the bull's proof. Another problem was the huge variability in lactation lengths from one farm to another — on some farms the heifers calved earlier or later and that skewed the proofs of their sires.

"The net result was that too many of the naturally proven bulls didn't live up to their promise, not performing when used in AI across many herds.

Left to right: Jeff Stichbury, John Murray and Hugh Clifford

Purple dot semen

"It was this latter problem which led to the use of young unproven bulls, because their proofs would be achieved through AI, and not from natural mating in one herd.

"Unproven bulls were in use in the early 1950s. People like Jeff Stichbury would learn about promising young bulls, inspect and purchase them.

"The semen from these young unproven sires was known as 'purple dot semen' and, as technicians, we had to ensure that one quarter of inseminations used were unproven. So while they supported it in principle, you'd find farmers would try to find all sorts of reasons why you shouldn't use it if purple dot semen was scheduled on a day when their good cows came forward.

"And even if you could get farmers to use it on that day, when the calf was born they'd say it was from a good cow by a crook bull and wouldn't keep it, so there was huge wastage of genetic material because of the perception that daughters sired by 'unproven' sires wouldn't deliver in the shed.

Sire Proving Scheme

"That was the case right up to 1961 when the Sire Proving Scheme was launched. Then, because of the conditions of membership, we were able to get by (nationally) with 5% of inseminations to unproven bulls — instead of 25% — so the genetic progress with the national herd was immediately improved and there was very efficient usage of the resources through those Sire Proving herds doing a dedicated job.

"The idea for formalised sire proving came from a Hawkes Bay dairy farmer (and a client of mine), Jim Dougherty.

"He was upset that I was going to use unproven semen on a top cow and it got him thinking. He suggested that a special group of farmers be formed who would use nothing but unproven semen across their herds and, in return, get free AI and herd testing.

"The suggestion went forward to the Wellington Hawkes Bay Herd Improvement Association which endorsed it, leading to the design of the Sire Proving Scheme.

"Farmers loved it. We were flooded with applications from farmers wanting to join the Scheme but, to be successful, they had to satisfy strict criteria. Preference was given to herds comprised of one breed which they wanted to mate 100% to the same breed.

"At that time we weren't promoting cross-breeding because the sire evaluations of the day had no way of adjusting for cross-breeding. We suspected hybrid vigour existed but didn't know how much to adjust the proofs for it.

"The rules of the Scheme grew from those first days. The concept of free AI and herd testing was attractive but because some farmers reneged on their obligations the Scheme was adjusted. Farmers had to contribute 25% of their AI fees which would be reimbursed once they completed all their obligations and had the required number of herd tests.

"All inseminations were bulk liquid in those days (Long Last Liquid, in individual straws, was not developed until the mid 1980s). We used to have 'day of collection semen', 'day after collection semen' and 'two days after collection semen'.

"In general, AI in-calf rates in the early days weren't too bad because people generally went on AI for longer periods. Standard service in Wellington/Hawke's Bay allowed for an unlimited number of inseminations for a seven or 12 week AI period — and you didn't pay extra for inseminations; you could put a cow up once, twice, four times. Our aim was to get the cow in calf as quickly as possible.

"The Herd Improvement Associations had their own charging regimes which varied from per insemination, per cow in-calf or per cow inseminated, with no extra cost for additional inseminations."

Ian Hook retired from LIC in 2005 after 50 years in herd improvement. During that time he went from being an AB technician and herd tester, to several roles with Wellington Hawkes Bay Herd Improvement Association (AB Technical Officer, Administrative Officer in charge of AI and Herd Testing, Assistant Manager and, finally, General Manager) before moving to Hamilton in 1985. There he was Field Services Controller before being appointed Services Development Manager, a role he maintained until he retired.

After his formal retirement, Ian continued to work part-time for the National Mastitis Advisory Committee before finally retiring in 2008.

No hesitation about AB for Clevedon farmer

Alec Smith, Farmer, Clevedon, Auckland

Alec Smith was one of the first farmers to adopt Artificial Breeding (AB) in the Clevedon, Auckland area.

With three neighbouring farmers, Alec formed a committee in 1952 and set out to get the people of Clevedon interested in AB.

"We divided the area up into parts to try and get enough people interested and find out which farmers would take it on.

"One lady, a Jersey breeder, was trying to tell me how it was a terrible thing, and you'd only get calves half the size, that they'd be miserable calves that would never grow.

"I had no hesitation about it, I was always a great believer in science and I would buy any scientific improvement.

"I knew the bulls were coming from pedigree herds and they were being tested at Ruakura.

"I knew we were going to get better bulls and increase the quality of our herd, and the cost never entered my mind so it can't have been too bad."

Alec moved to Clevedon from Taranaki in 1939 at the age of 17 and found it to be "a very backward place, where the roads weren't even sealed".

Before reading about AB in farming magazines and deciding to make the switch, he purchased bulls from pedigree Jersey breeders in the area.

"Natural mating was simple but the whole incentive was to get better calves, and AB seemed more responsible.

"We went from choosing our own bulls to putting our trust in the New Zealand Dairy Board. They were professionals and you knew the bulls were genuine, whereas choosing your own bulls involved a lot of guesswork.

"Sometimes the Dairy Board let you down, but by and large it was a lot better gamble than doing it yourself.

"The main thing was to increase the quality of your herd, that was the whole reason."

Alec knew the first AB technician for the area, Merv Waters, very well, and had employed Merv to work on the farm previously.

"If you were good mates with the AB technician you got the good bulls and you could choose your bulls.

"I took whatever semen he had though. There was no such thing as frozen in those days; it all came in test tubes, fresh every day.

"We'd put a black and white disc outside the shed to tell the technician if we had cows for him. Black would mean come in, and white signalled to keep driving."

Now retired, Alec still lives on the Clevedon farm, in the same house.

His son Keith has taken over management of the farm, but Alec still helps out where he can.

"I've got a good life at 91. I've been very lucky."

"We went from choosing our own bulls to putting our trust in the New Zealand Dairy Board, but they were professionals and you knew the bulls were genuine whereas choosing your own bulls involved a lot of guesswork."

RUNNING TO STAND STILL

Winston Hall
Farm Manager 1954 to 1990

Winston Hall's 36 years in bull farming began in 1954, as stockman on the New Zealand Dairy Board's Newstead farm. He became bull farm manager and the farm was home to his family until his retirement in 1990.

"There were vast changes every year as the artificial breeding (AB) service grew rapidly — we were running to stand still.

"In 1953, the Dairy Board purchased 12 acres, adjoining the Ruakura Research Institute, for farming the bulls for artificial insemination (AI), but very early on realised that more land was required and this led to the purchase of a 60 acre block at Newstead (where LIC is currently located). However, the business continued to grow so rapidly that more land was leased behind the Newstead Cemetery.

"This was before the Sire Proving Scheme. We were in a state of constant change because, as AI was a new concept to the dairy industry, we couldn't anticipate demand or the level of service which would be required to meet that.

"In a practical sense it meant we'd just finish building something, then we'd have to modify it, eg as bull numbers increased, buildings and collection facilities were extended or changed to cater for them.

"The current laboratory at Newstead was built entirely by our staff, as we had ex-builders and ex-engineering officers."

Along with others Winston was involved with picking up bulls from all over the North Island and transporting them to Newstead.

"We were lucky to have a lot of very practical people among our staff and we designed and built a lot of special bull handling equipment ourselves.

"We had very good workshop facilities, so used standard stock trucks and designed and built specialised crates for our bulls. The crates were custom made to carry six full sized bulls and had gates in them.

"In fact, everything we used needed to be made stronger than the standard stock equipment and there was quite a lot of stock movement, not just picking bulls up, but moving them between Awahuri and Newstead and the run-off at Hoe-o-Tainui.

"We also built and designed our own bull cart for transporting the bulls within the Newstead property.

"Stan Southcombe was the person behind this work. The first custom made bull cart failed as the axle wasn't strong enough for transporting the bulls across farm paddocks, so we adapted it and put heavier axles on. We also had to bolster and strengthen all the tyres and had to reinforce the tow bar — as this had fallen off the prototype. Again we were very lucky, as Graeme Baird had worked in engineering."

That early farm team was also responsible for designing and developing the pulleys that run along the overhead wires in the bull paddocks.

"The original concept for tethering bulls on lines was developed at Ruakura and we refined and improved the idea.

"The pulleys that connect to the bull chains the bulls are kept on run along wires in the bull paddocks; in the early days we adapted these pulleys from fighter plane controls.

"After the war (WWII) there was an aeroplane wrecker at Ruakura where all the fighter planes, like the Kittyhawk, were sent. That's where we sourced the bits and pieces needed to make the pulleys — all the aviation equipment was very well made and the pulley didn't really need much adapting for our purpose.

"However, once we had used all the aeroplane wrecker's stock we couldn't get anymore, so we had to look around the country for an alternative. First we tried a plastic version made in Christchurch, but with all the movement the plastic wasn't up to the job.

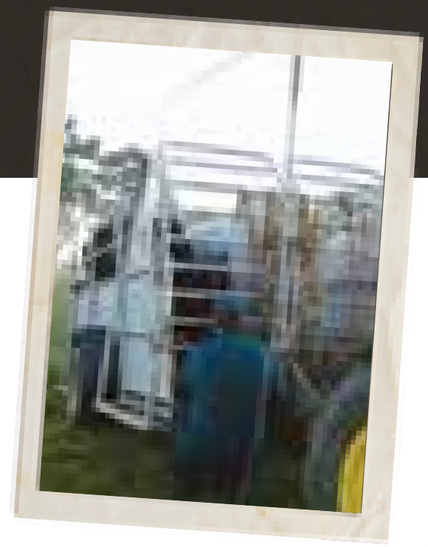
"In the end we had to ask an engineering shop to specially make them for us, using a gun metal type bronze material."

Winston, wife Judy and their four children, Philippa, Rosemary, Jennifer and Richard, lived on the Newstead farm, and Winston recalls that it was a requirement of the job for many of the staff that they lived on site and were on call.

"In the 1950s there were around nine families living at Newstead.

"When it was a full moon the bulls always livened up — and we would get call outs day and night — bulls would get themselves tangled up. Back then we didn't have hedges along the road, so at full moon in particular the bulls, for some reason, seemed to fight more, and over-excited bulls in mobs could break through even good fences and get themselves out and onto the roads.

"One particular time I remember the Police came to me at about six am to say some bulls were out – they knew they were ours because they had rings in their noses – and were currently at Silverdale, a suburb between Newstead and the central city. When I got there I found a group of two year old bulls milling around people's backyards, flattening gardens and trees.



Custom-designed bull carts enabled bulls to walk on and walk off trailers without having to walk backwards.

"One was on the porch of a state house and I'd just got hold of him by his nose ring when the occupier of the house — a woman in dressing gown and curlers — came out. I don't know who got the bigger fright — her or the bull!

"We successfully rounded them up though but, as it turned out, they weren't ours. They belonged to Ruakura who we worked with closely, so we returned them to their rightful setting.

Bull cart designed by Stan Southcombe in the 1950s — and still in use at LIC's Newstead bull farm.

"In the early days, until about 1960, all the farm staff were qualified as artificial inseminators. It was felt as we were at the semen production end we should all know how it was done at the artificial insemination end.

"We used to inseminate people's house cows, as at that time there were a lot of people living around Newstead with house cows.

"People would buy the semen and the guys would carry out the inseminations in their own time and the money they made went into the Social Fund — which, for example, helped pay for the materials needed to build the original swimming pool at Newstead — which the Dairy Board also subsidised as it was classed a water supply for use in the occasion of a fire."

Winston Hall was responsible for instigating and implementing the Newstead farm's West Block's drainage scheme and water supply.

"When we purchased the West block it was pretty run down, and there was inadequate water supply and drainage.

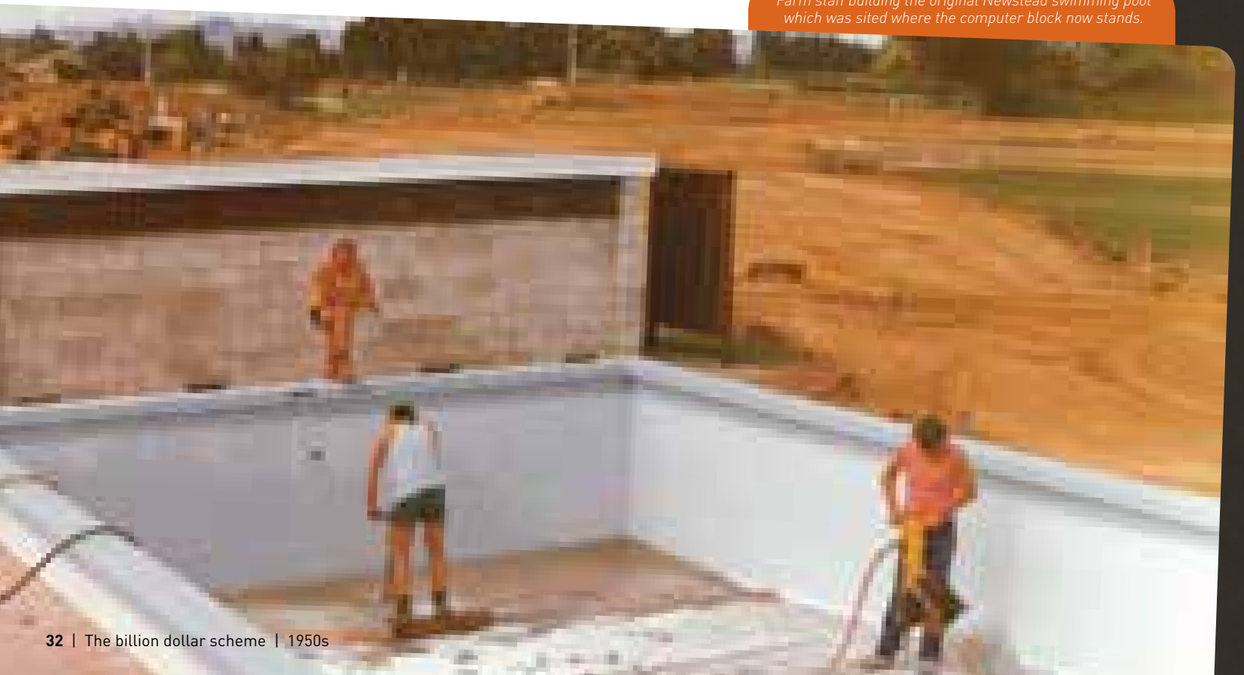
"It was the early 1980s, all the buildings were up at Newstead, and we were hit with a bout of dry weather, and the farm was rapidly running out of water. I approached the council and they agreed to provide water if we supplied the necessary pipe work.

"This involved working with the City Council, County Council, Ruakura, the Railways, Telecom, the Dairy Board and MAF engineers — underground work needed to be carried out, including putting pipes under the railway lines and under Vaile Road.

"We supplied all the material, and did some of the work — and had contractors in to dig the drains for the pipes. We did all the work to put the water supply scheme in to the West Block, and I was responsible for organising it all. It helped that I knew the mayors and the county engineer, and had done a lot of work previously with the County Engineer.

"We organised the whole thing in three weeks just before Christmas. That supply scheme formed the base of the whole rural water supply to the Newstead community."

Farm staff building the original Newstead swimming pool which was sited where the computer block now stands.



Early days of AB in Northland

Tom Wightman

Artificial Breeding Technician and Farmer.

"Artificial breeding (AB) was introduced to the Okaihau district in 1953. The idea was new to the area's dairy farmers but they welcomed the obvious choice to lift the genetic quality of their herds and accepted with a good grace the average results (by today's standards) that we achieved.

"I was their first technician and new to artificial insemination (AI). I began training at Whangarei under Graham Pratt, working with the winter milking herds. This was later followed by practical work in the field with an early calving group on the red hill sand country out of Dargaville. They were mostly returned soldiers on land settlement farms and a generous lot. One farmer, when we had finished our job, said "take the old Fergy down to the beach and dig yourselves some toheroas, which we did, and the cook at the Northern Wairoa Hotel, where we were staying, duly obliged.

"Soon the job on our own group began. There were 21 herds and I covered 50 to 60 kms per day in an old Morris Minor.

"The semen arrived from Newstead each morning at 11.30. It was a rush to cover the group before the end of evening milking. The semen arrived in test tubes with about three choices of bulls. We used long glass tubes for the job which needed to be sterilised each night.

"Everything went quite well for the first year but, unlike today, there weren't nice convenient tanker tracks to each cowshed. I remember one farmer — Len Herbert in Utakura — left a horse tied up for me to cross the river to his dairy.

"There were a lot of nice characters among the group members. I remember the Cook Bros of Rangitihua, with the most immaculate dairy set in the native trees and the most beautiful Jersey herd. Dear old Mike Stevens, ex winner of the Ahuwhenua Trophy who ran a good top unit — I never saw him when the whitebait were running. Then there was Clive Warrington, a top operator from whom I learned a lot about farming, but like all AB operators, you can't stop and talk for long.

"So the first AB season ended without too much strife — just a few who complained their cows had to wait around all day.

"All the herds were Jersey then and only Jersey semen was offered. That was really toward the end of an era as we 'home separated" and were paid on butterfat alone. Soon the tankers were collecting whole milk.

"Actually only seven of those farms are still supplying milk, but the herds have got larger and blacker and genetically better.

"At that stage I was a young bachelor who, with my brother Geoff, was developing 750 acres of low fertility land covered in scrub and gorse and rocks. The income from doing an AB round sure helped keep the wolf from the door.

"On the credit side, at that stage we qualified for a development loan ex Rural Bank at 4%.

"I now farm in the Waikato where the herd is run by the younger generation. I look at the quality of the animals and appreciate the progress made in breeding better animals.

"I admire the present system where AI bulls are carefully selected and their progeny proven with LIC's Sire Proving Scheme under purely commercial conditions with information input from the people who handle them — it's a great concept.

"Farmers owe a debt of gratitude to the people who developed AI in dairy herds and it's no surprise the New Zealand cow is so popular internationally."

IN THE LAB AND IN THE FIELD

Ken Burgess began his career in the dairy industry in 1949 at the Ruakura Research Station where he worked in different areas such as the laboratory and tending bulls being used in research programmes, including early work in artificial breeding (AB).

When Dr John James began research into a commercial AB service, Ken assisted with collection of semen, and when the New Zealand Dairy Board commercialised AB in 1953 the operation was moved to its present site at Newstead.

"The original buildings consisted of the laboratory and three staff houses – the superintendent's, Stan Southcombe, Laboratory Manager's, Paul Kneebone, (both of whom came from Ruakura) and the Farm Manager's, Winston Hall. The total staff numbered about 10.

"The following year the office block was built. (This Huntly brick building still forms part of the Newstead offices today, housing IT staff). At the same time staff numbers increased in all areas, but the working environment retained that family feeling.

"To enable fresh semen to be distributed to all the Herd Improvement Associations, collections began at 3:30am, every day from early August to December.

"In about 1957 the demand for AB increased, so extra staff were employed temporarily for the season and a number of these were students from Massey University who had just completed their agricultural degrees.

"Dr James helped develop the technique for deep freezing semen and frozen semen was used all over the country, but mainly in the South Island because the longer distances compromised the use of fresh semen.

"The processing of frozen semen was very time consuming and it would take me many hours to seal the glass ampoules over a Bunsen burner before storing them in a large cabinet filled with dry ice (frozen CO2). The dry ice arrived, by bus, from a manufacturing plant in Auckland and was also used for transporting the ampoules packed in vacuum flasks for distribution into the field.

"In later years, liquid nitrogen was introduced.

"When Pat (Dr Patrick Shannon) left Wellington and came to Newstead he was employed as the Commercial Manager, but quickly found his niche in the laboratory testing new diluents which contributed to the growth of AB in New Zealand.

Ken Burgess (left) and Lindsay Burton with 76241 Lombardi Blair and 76413 Boylans Carols Laddie (1981).

Before the Sire Proving Scheme

"The forerunner to the Sire Proving Scheme was when the Dairy Board began purchasing yearling bulls which were sons of top bulls rated on their daughters' production figures.

"Semen was collected and used in the field and the young bulls were sent to the Dairy Board's run-off property at Hoe-o-Tainui until production figures from their daughters came through.

"If the results were good enough the bulls were taken back to Newstead and used in what was then called the Merit Team."

Sometimes Ken would go out on farms to collect semen from bulls the company may have wanted to buy based on their daughters' production figures and pedigree.

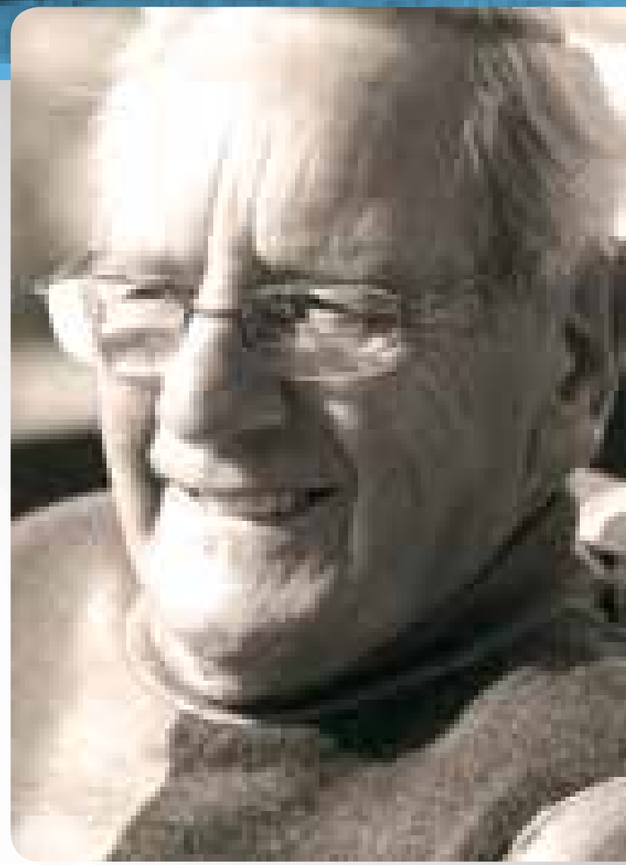
"We used a cow in season as a decoy and an AV (artificial vagina) to collect the semen. It was then taken back to the laboratory for examination and, if suitable, was frozen.

"The purchase of the bull was subject to the quality of the thawed semen.

"Some farmers also wanted to have semen frozen from their own bulls for use in their herds and this was a service we provided."

Today on LIC bull farms, steers are used as decoys, but in the 1950s and 1960s cows were used.

"Cows took a lot of breaking in and training, as naturally they will only stand when in oestrus. The decision to start using steers as decoys (early 1970s) was worth its weight in gold – it made life and the job a lot easier for the collection staff as steers would stand."



Ken Burgess retired from LIC in 1992 at the age of 60, having spent forty-two years working in the AB sector of the dairy industry.

1960

DECIMAL CURRENCY is introduced.

1960

New diluent 14G first used for semen. Full use of semen diluents developed at Newstead.

Artificial insemination reaches 500,000 cow target.

LIC launches the world's first commercial Sire Proving Scheme.

Sire Proving Scheme uses contracted herds for first time.

Sperm rate 9.4 million per dose.

In its first year, LIC's Sire Proving Scheme contributes more than $6 million to the dairy industry.

New Zealand Dairy Board establishes artificial breeding centre at Awahuri.

Greylands Galena Victor progeny tested going on to be the first Holstein Friesian bull to exceed 100,000 lifetime inseminations.

Puhinui Shonas Luck progeny tested going on to be first Jersey bull to exceed 200,000 lifetime inseminations.

1961

World first - Semen diluent Caprogen developed.

Production Ranking Test introduced.

1963

PETER SNELL
breaks the world mile record.

1960 Olympic 800-meter gold medalist Peter Snell of New Zealand crosses the finish line to win the mile race in 3:56.1, the fastest time ever run in the United States, at the Coliseum Relays. Los Angeles, California, May 19, 1962.

DENNY HULME becomes New Zealand's first (and currently only) Formula 1 World Champion.

THE *DAIRY INDUSTRY* had

168 dairy processors.

2.08 million dairy cows with average per cow production of 152 kg milkfat.

More than 1 million cows are artificially inseminated.

Photograph: Alexander Turnbull Library.

VIETNAM WAR
Around 3,500 New Zealand military personnel serve in the Vietnam War.

New Zealand soldier presented with a garland of flowers by a woman from the Vietnamese Army, Saigon, Vietnam.

1964

Traits other than Production (TOP) recorded in Sire Proving herds.

For the first time, liquid semen is stored at ambient temperature.

Computers used for the first time to process AB records.

1967

Liquid nitrogen used to store semen (instead of dry ice).

Jersey bull, **Maori Bestman**, progeny tested going on to produce lifetime inseminations of 170,000

Photograph: Alexander Turnbull Library.

WAHINE
The New Zealand inter-island ferry, Wahine, founders on Barrett Reef at the entrance to Wellington Harbour, 10 April 1968.

Herd test ranking index introduced

1968

Deep frozen semen first stored in liquid nitrogen.

Frozen semen first stored on 0.5ml plastic straws.

Holstein Friesian semen becomes the most popular breed, surpassing Jersey.

Estimated Genetic Value introduced for all bull proofs.

All cow herd mates used in comparison for first time.

In eight years since it began, Sire Proving Scheme contribution to dairy industry assessed at $330 million.

1969

DR PATRICK SHANNON

Pat Shannon joined the New Zealand Dairy Board in 1954, and worked with Olive Castle and others on concepts to improve the standard and availability of dairy sires.

The early days, and perceptions, of artificial breeding (AB) were behind them and, by 1960, around 496,000 cows, or 26% of the country's milking cows, were being artificially inseminated. A growing number of New Zealand dairy farmers recognised that, in preference to natural mating, AB –

- Raised the genetic quality of their herds and
- Provided an assurance of conception and herd health that natural mating could not. (Aside from increasing genetic value, one of the principle reasons for the introduction of AB was the elimination of bovine venereal disease from New Zealand dairy herds.)

"Access to young sires was available during the 1950s but we found that farmers would often put up inferior cows to the young bulls, and this compromised the results we got because they weren't fair comparisons of the bull's ability.

"The answer lay in incentivising farmers to use semen from young bulls — and this led to the development of the Sire Proving Scheme, with members committed to putting their whole herds to young unproven bulls in return for free semen and herd testing. A rebate was introduced to prevent them culling Sire Proving daughters.

"It was one thing to come up with the concept though, and another to put it together.

"Olive Castle, Shayle Searle (subsequently moved to Cornel University in the United States), Jeff Stichbury and I did all the progeny test design. We manually ran the calculations/algorithms and set up the distribution systems. It was all done on paper with the help of the Marchant calculator which was able to add, subtract, multiply and divide - but couldn't give you a decimal point - you had to work that out for yourself.

"It was pioneering stuff. We knew that what we were doing hadn't been done before so, in that sense, it was exciting and pioneering.

"Signing farmers up to be members of the new scheme fell to the regional Livestock Improvement Associations (LIAs).

"Those original contracts were around one page long (contrast that to today's 18+ pages), and it was surprisingly easy to sign farmers up - they were all very keen to join".

"Then it was a matter of getting the semen to them, into the cows and waiting for the daughters to be born.

"Members of the Scheme were receiving liquid at this time in test tubes, with some remote areas of the South Island receiving frozen semen because of the logistical challenges of getting liquid to them (Accessing all the farms which wanted to utilise AB was not as easy as it is today because of a variety of factors — roads, transport etc.)

"The daughters entered the herd as two year olds, as they do today, and the LIAs would collect the herd test cardboard data cards and collate the mating plan information.

"In the early 1960s, around 50 Jersey yearlings were being progeny tested (Friesians were included in the Scheme later). A proportion of these young sires were being farmed at the Farm Production Division's farm at Awahuri and a proportion at Newstead. The Newstead bulls serviced the northern part of the North Island and the Awahuri bulls serviced Wellington Hawkes Bay, Taranaki and the South Island, so each bull didn't get the national proof they do today.

"The theory was that 1000 cows in calf to Sire Proving Scheme semen, would result in 50 daughters milking as two year olds.

"The Sire Proving Scheme's primary focus was production and a Production Ranking Index was introduced in 1963.

"However, right from the start, farmers were required to assess daughters for seven characteristics of traits other than production —

- Ease of milking
- Temperament
- Susceptibility to bloat
- Susceptibility to mastitis
- Teat placement
- Jaws
- Feet

"Later this would be enhanced by the physical attributes of the animal, when the New Zealand Dairy Board introduced the Conformation Survey in the mid 1970s."

DIY, INTERNATIONAL COMPARISON AND SEMEN EXPORTS

HUGH CLIFFORD

You get the impression that Hugh Clifford doesn't do things by halves. Officially retired since 1992, it's hard to get time in his diary as his days are full with genealogy (following the pedigrees of humans rather than cows), and his passion for all things outdoors — including ornithology, tramping and conservation.

Hugh completed a degree in Agricultural Science at Massey University and, after working for seven years as a Field Representative for grain and feed merchant, Hodder and Tolley, joined the New Zealand Dairy Board as a Consulting Officer in 1961.

"I was in Wellington for a short time in the Herd Improvement Department before being stationed in my Consulting Officer district at Pukekohe. After a few months there, I was offered the job of Extension Officer in Wellington heading the Dairy Board's team of six Consulting Officers.

"Seven years later, when the Farm Production Division of the Dairy Board was formed by amalgamation of the Herd Improvement Department and the artificial breeding (AB) Service, I was appointed Assistant Director of the division.

"My boss, the Director, was Jeff Stichbury, who also came up through Consulting Officer ranks. He split the responsibilities between us, taking Administration, Research, and Extension (the Consulting Officer service) for himself. The Consulting Officer service was, I suppose, a first love for both of us, and I had seen it double in size during the time it was my responsibility. Jeff now gave me responsibility for AB, livestock selection and semen production. This might sound a bit of a change from farm advisory work but, because the Herd Improvement Department was a small organisation, I had become involved in many aspects of its work, including bull buying, the Sire Proving Scheme and so on.

"Later, when the Herd Improvement Associations merged with the Farm Production Division to form LIC, I was appointed AB Controller responsible for livestock selection, semen production and semen export.

"It was the days when demand for AB was growing rapidly and our challenge was to match that demand with quality genetics — and a quality technician service."

Demonstration of an AB collection at an early Open Day at Newstead.

"We had a couple of million dairy cows in New Zealand, but that was a tiny number compared to the tens of millions in other developed dairying countries. Surely, in that larger gene pool there must be animals superior to ours? Or had we been lucky or unlucky with the quality of the foundation stock imported to New Zealand in the early days?"

DIY

"We were training AB technicians but it was a challenge getting enough farmers prepared to commit to working as technicians for a specified number of weeks.

"A newly established genetics company, Ambreed, had introduced training so farmers could do their own artificial insemination and we needed to do the same. However, the suggestion to the Dairy Board met with a lot of resistance from the regional Livestock Improvement Associations who feared that a do-it-yourself (DIY) service would come at the cost of a defined technician service, meaning farmers wouldn't be able to get a technician when they needed one, or would be faced with an increasingly expensive technician service.

"Ian Hook was a proponent of DIY and was a very brave fellow at the time because he stepped up and managed to get his Board of Directors (Wellington/Hawke's Bay) to back him. Eventually the Dairy Board agreed to a DIY trial in the Wellington/Hawke's Bay region.

"DIY was a success; those people who wanted it eventually got it and those who didn't continued to support the technician service, so the early fears were largely unfounded."

International comparison

Today, the quality of LIC genetics is recognised world-wide. However, this was not the case before the mid-1970s.

Hugh Clifford recalls that New Zealand's position at the bottom of the world and lack of comparison with international counterparts meant "we didn't know how our national herd or AB bulls would stack up against those in the Northern Hemisphere.

"We knew the production levels of our cows were low by world standards but understood the basis for this, which essentially came down to two things — feeding regimes and the length of lactations.

"Herds in the Northern Hemisphere were mostly milked year round and cows were fed high levels of supplementary feed when necessary, so they were never short of feed. In contrast, our cows' predominantly grass-based diet meant feed supply was reliant on the weather and, when feed was short, supplies of pasture-based supplements.

"In Europe, North America and the United Kingdom, cows also weren't under the same pressure as ours to calve within a defined period of time as the herd was milked all year round. Any cow in those countries could have a full lactation no matter when she calved.

"We had a couple of million dairy cows in New Zealand, but that was a tiny number compared to the tens of millions in other developed dairying countries. Surely, in that larger gene pool there must be animals superior to ours? Or had we been lucky or unlucky with

Hugh Clifford (left) and Harvey Tempero inspecting Holstein Friesian bulls,1991.

the quality of the foundation stock imported to New Zealand in the early days?

"We had to find out how our bulls would stack up against the best in the world and the only way to do this was through international trials where like would be compared with like, eg where bull daughters would be fed, milked and compared in the same environment.

"International comparison was needed for our breeding programme to establish benchmarks which would tell us where we were. We also needed to broaden the gene pool by identifying overseas bulls that were suited to our conditions, because New Zealand, at that time, was narrowing the gene pool from which to select future sires.

"The rest of the world wasn't as interested in us, however, so we had to get out there and invite participation in any trials which met our goals.

"We had conversations with various people around the world and the Milk Marketing Board of England and Wales was open to the idea of semen exchange. They were selling semen in New Zealand, but the United Kingdom animal health regulations at the time wouldn't allow the importation of semen into Britain, and that was a problem which couldn't be overcome.

"We did get a three-way trial with Ireland and Australia, but the big one was shortly to come. We learned that the Food and Agriculture Organisation of the United Nations was conducting a strain comparison of black and white cattle from different countries and we sought involvement in that.

"The trial was to be conducted in Poland which, in those days, had a Communist regime with tight central control. Ten countries were involved, providing semen from 20 unproven black and white bulls from each country. The daughters of the bulls would be reared, mated, milked and compared on 20 large state dairy farms in Poland — all operated in a standard manner.

"We were in the right place at the right time – it was late in the day for the trial and all the countries had been selected, but one was having difficulty supplying the semen from the requisite number of bulls and they were being dropped off. We could get in if we could get semen to Poland in the short period of time that remained before the trial started.

"And being Kiwis, we got it there, earning some admiration for the ability to marshall resources (and semen) at short notice. It was a struggle because our bulls were young and only just starting to produce freezable semen. It was a tribute to our semen collection and processing staff that they managed this task in fine style.

"It was the first big international strain trial and our New Zealand Dairy Board bulls were shown to be breeding cows that produced as well as, or better than, those from other top dairying countries in the world."

"To comply with the provisions of the trial the bulls had to be randomly selected from the young black and white bulls going into progeny test in their country of origin. This was before the days when everyone had a computer on their desk or in their pocket.

"My method of making the random selection was to print the code number of each Friesian Sire Proving Scheme bull on a small slip of paper, put all the slips into a hat and mix them up. Then my children (aged about 8 and 5 years at the time) took turns at taking out a slip until the required number of slips were out (plus a few extras to replace any of the chosen bulls if they didn't produce the goods in time).

"There were progress reports from the trial at intervals, but the results were to be announced at the next committee meeting in Poland, after the daughters had finished their first lactation. I went to that meeting with a huge amount of anticipation and a healthy dose of anxiety.

"The scientist in charge of the trial, Dr Maria Stolzman, met me off the plane at Warsaw and the first thing she said to me was 'I think your New Zealand cows like it in Poland'.

"Now, all these years later, I still have an overwhelming sense of relief and pride as I recall those words.

"The New Zealand cows had done very well compared to everyone, including the Americans and Canadians who, at that time, had the top producing herds in the world.

"It was the first big international strain trial and our New Zealand Dairy Board bulls were shown to be breeding cows that produced as well as, or better than, those from other top dairying countries in the world. It was a huge satisfaction to have our colleagues in other countries recognise the achievements of our past and current Livestock Improvement staff and breeding systems. It earned us new respectability on a world stage.

"Since then, of course, there have been numerous trials which have confirmed those findings and added a lot more information on many aspects — but this early trial was extremely important because it told us, and our farmers, that we were on the right path with our breeding programme. It also meant that there was a new level of international interest in semen-sharing programmes with New Zealand, giving us the opportunity to widen the gene pool when we found other animals in the world which were better than ours.

"It also opened the door to international sales of semen."

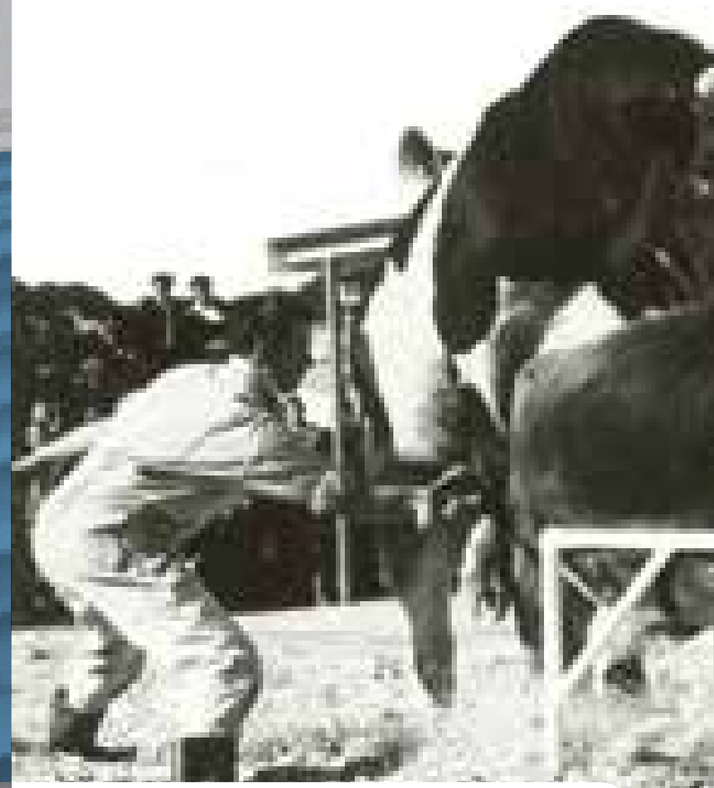
Exports

"In the days when I first became interested in semen exports there wasn't the international trade in semen that there is today, but there was an increasing interest, and because of the occasional enquiries we received, it appeared likely that market opportunities could be developed.

"The supply of semen wasn't a problem for us. Our semen production was more seasonal then, than it is today, so there was plenty of scope for producing frozen semen out of season. The aim, of course, was to generate extra income from an under-utilised resource. The growth in the New Zealand market seemed to be slowing, so another way to enlarge our market was to do so offshore. This offered the thrill of breaking new ground and starting something from virtually nothing.

"I carried out the semen export promotion and sales in the late 1960s and early 1970s and remember that, in those early days, there was a view that we shouldn't be selling to competitor suppliers of milk products on the other side of the world. Those concerns were, however, well debated and resolved, so the Dairy Board formally decided to more actively pursue export sales in 1971, making 2011 the 40th year of a planned programme of export sales."

Hugh Clifford in tramping gear, 6 December 2010, having lunch a Leitches Hut, on a tramp in the PioPio district.
Photographer: Ron Shewan



Demonstration of an AB collection at an early Open Day at Newstead.

TIRAU FARMERS RECALL NOVELTY OF FIRST BLACK AND WHITE CALF

LES AND GWEN SYME
DAIRY FARMERS

Les and Gwen Syme were Sire Proving Scheme members in 1976 and 1981, but their story starts in the 1960s when Les saw the first black and white calf born on his Tirau farm.

"I'll always remember seeing that black and white calf come out. It was unique and I was quite fascinated.

"There weren't many around at the time, only town milk supply herds had Friesians, but I was quite intrigued with a black and white calf so used Friesian to artificially breed (AB) one of my Jerseys."

Les took over the family farm when he left school, with 60 cows and 500 ewes on 78 hectares. The farm has now almost tripled in size.

AB had been going for a while when he joined up in the mid 1960s, after learning about it at the Young Farmers Club.

Prior to that, he purchased pedigree Jersey bulls as yearlings, using three on his herd.

"I was still interested in having the right bull for the right cow so I hand served a lot.

"I'd pick out the cows that were cycling and put them near the cowshed, and let one of the bulls out, he'd serve the cow twice, then I'd put the cow back in the paddock.

"Breeders weren't fans of AB but you get that with anything that comes in new. You'll always get the knockers, but you don't want to take too much notice of them.

"One argument was that we wouldn't get a good animal because with AB, they dilute the sperm — so you'd get weak sperm, and you'd have a weak animal, whereas with natural mating the strongest sperm gets the cow pregnant so you're gonna have a better and healthier calf.

"I didn't believe it though. A breeder can't give their top bull to every farmer, but AB can. And it simplified farming. You wouldn't want to go back to having bulls on farm."

In the two years that the Symes were Sire Proving Scheme members, they were able to grow their farm significantly. However, with the increased workload from purchasing neighbouring land and milking more cows, the Sire Proving Scheme became too much extra work.

"It was very hands on. You had to be in the cowshed, you had to know the stock and you had to keep very accurate records.

"The hard work and accurate recording required for a successful Scheme is precisely why farmers like us owe so much to fellow farmers who have Sire Proving Scheme herds.

"The Scheme kept us humble though, people would say 'only hard-up people use that', but for us it was a way of getting started, especially when we bought more land and didn't have a lot of money to spare."

Les and Gwen still own and oversee management of the Tirau farm, and Les can still be seen helping out most days.

"I enjoyed every part of farming, the variety is part of its beauty and your business is your lifestyle. I reckon that's the way it should be for everyone."

A breeder can't give their top bull to every farmer, but AB can.

Patient Cambridge farmer in Scheme for 19 years

Jim and Noeleen Todd,
Dairy Farmers

Jim and Noeleen Todd first became Sire Proving Scheme members in 1961 for just one season, but then re-joined in 1963 and stayed on for 19 years.

Jim started milking cows when he was 14, in 1941, on the family farm east of Cambridge, with a small, quiet and young Jersey herd.

Looking back, Jim prides himself on being a patient and committed farmer, taking the time to ensure everything that needed doing was done, and done the right way, no matter how long it took.

"I liked every part of farming. I had a young herd all the time and never used to keep a cow past seven years old, so I never had an old one, and I never hit a cow. I worked with my old man for years and he never hit a cow either — you'd only end up hurting yourself more than the cow. I always had plenty of patience."

Jim would wake up at 2.30 each morning to look at the cows, and whenever he took part in sport with other local farmers, they would all take a break to go check on their cows too.

He remembers other farmers in the area saying artificial breeding (AB) would never take off.

"They told me it's a waste of time, and that it would die out. I thought it was good though, and I remember one year we had every cow calve to AB except one. That was amazing, but in those days all of your returns were free anyway.

"AB was a big change, and many of the breeders went right out of business because they didn't want to adapt to it.

"I had a lot of AB technicians over the years and a lot of herd testers, and I never had any trouble with any of them."

Jim was the only Sire Proving farm in the area that he can recall.

"I'd read about it, so thought I'd try it and it was good.

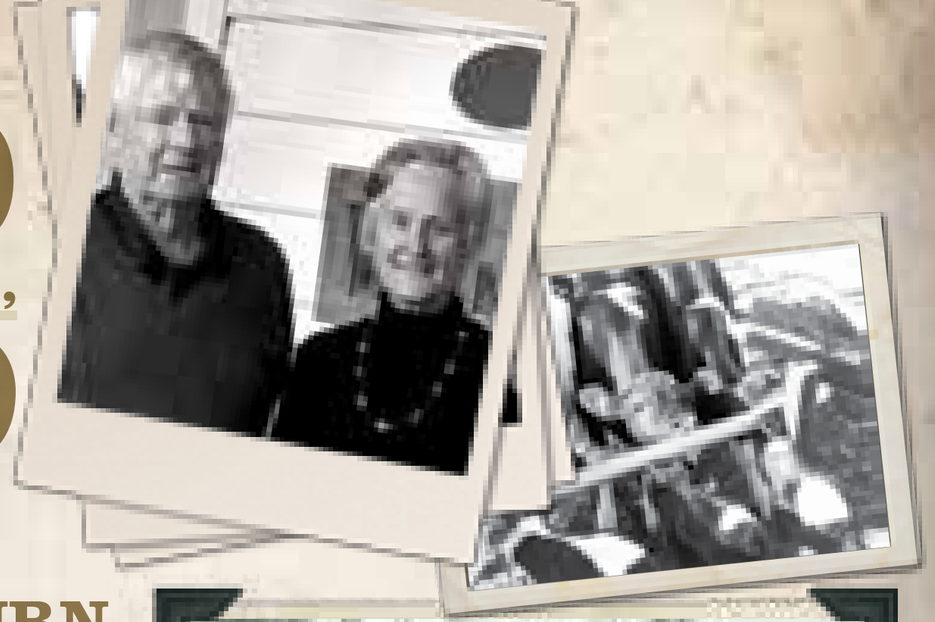
"We got the cheaper semen and got paid so much for every heifer you milked, and for testing them. Only thing I could never work out — out of all the top heifers I had, none of the bulls seemed to get into the team, which just goes to show the ones that got in were even better."

Still living on the Todd Road farm, Jim now leases the land to his son, but still helps with the odd job or two.

30 YEARS, 39 BULLS FROM WELBURN STUD

Jim and Elizabeth Sunckell

Jim Sunckell knows a thing or two about breeding bulls, after a long and illustrious career in Canterbury.



He's one of New Zealand's original dairy bull breeders, supplying a total of 39 bulls to the New Zealand Dairy Board from his family's Welburn stud at Leeston — including the well known Brando, Butterman, Victor and Bramble.

Jim's father, E C (Ted) Sunckell, established the pedigree Friesian Welburn Stud in 1946. Later it became known as E C Sunckell and Son.

The Stud played a pivotal part in making Terling Brabazon 116 available to New Zealand dairy farmers in the 1950s, and after Jim took over management in 1960 they bred their first bull for artificial breeding (AB) — Welburn TB Brando 177, by Terling Brabazon.

"It commenced a very successful partnership with the Dairy Board's AB programme lasting 30 years and supplying 39 bulls to be used.

"My father started off with four or five cows in 1946, and they were quite good but he wanted to grade up the small herd.

"I returned from Lincoln College in 1956 with a Diploma of Agriculture and it was then that I persuaded him to use artificial insemination.

"It had just started but I told him it's the way to go because you get the best bulls in the country, no matter where they are, it's proven and you know what you're getting — daughters that are better than average.

"He thought if that was the easiest way then he was quite happy. Prior to that it was a pretty 'hit and miss' business and you were basically dipping a spoon in all the genetics and you got what was there.

"You had no idea if the bull you bred or purchased was good, bad or indifferent, and you might use him for three or four years and then you'd find out that all those cows are no good, and you've gone backwards.

"That's why I was convinced, and it was the easiest way to go."

Jim recalls how dangerous grown bulls could be on the farm too.

"It's dangerous work, no question about it. I was very lucky, but I got caught once when I was wandering through the paddock, probably daydreaming, looking at the heifers.

"I got between the bull and his girlfriend I guess, and he threw me up into the air.

"Another one we bred was for the Dairy Board. I didn't like him and he didn't like me. Usually when they don't like you, they bellow and go on, but he was silent and he'd just come quietly around you.

"I went in a paddock one day and he was in the corner, he cut me off but I didn't want to run because that would encourage him, so I hurled abuse at him, backed away and did a fosbury flop over the gate.

"That was it — he went to the freezing works, and then two days later the Dairy Board rang and said they wanted him. But it was too late, obviously."

In those days, the breeder initiated the advance to the Dairy Board for supplying bulls, and decided which bull would be mated to which cow.

"If a bull calf was born, we'd notify the Dairy Board that we had one for sale, and negotiations would take place.

"It wasn't always successful but very frequently. I was always very happy to have them buy a calf and then be quite excited if the bull made the team after that."

But the sale and celebration was offside, with the Holstein Friesian Association of New Zealand.

"They bred and sold bulls for use by dairy farmers but they didn't agree with me.

"They reckoned the bulls weren't good enough but that was because AB was taking away their sale of bulls."

It didn't bother Jim though, and for the first 20 years after 1960 he had the number one or two Friesian bull in New Zealand.

"Brando was the first to make Premier Sires, and Butterman, whose dam was a daughter of Terling Brabazon, was the first bull to do 100,000 inseminations in a five-month period.

"That was pretty early in the piece, and he got a centrefold in *The Listener.* It was quite exceptional in those days.

"Our next outstanding bull was Bramble, with over 500,000 inseminations, and he was used in the Netherlands.

"To sell a bull back to where they originally came from, in the home of black and whites, was a proud achievement."

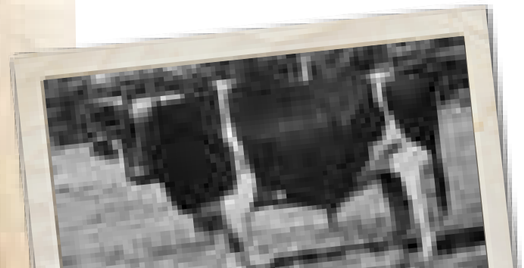
The last bull that Welburn Stud supplied to the Dairy Board was Hermes in 1990, and in 2001, Jim sold the entire herd to his son John, and moved to Akaroa to enjoy retirement.

"It was time for him to take over, he wanted to do things his way, but it's pleasing to know that the Welburn dairy herd is still contributing to the New Zealand dairy industry."

Bulls purchased from E C Sunckell and Son

— those in bold making it as proven bulls (with lifetime inseminations in brackets) —

Welburn TB Brando (79,450)
Welburn DR Bellboy
Welburn KT Lance
Welburn KT Leo
Welburn Brando Butterboy
Welburn Brando Edwin
Welburn Maestro Pat
Welburn OG Patrick
Welburn PG Beau
Welburn PG Butterman (376,953)
Welburn PG Victor (220,757)
Welburn PG Echo
Welburn GP Clem
Welburn PI Vernon
Welburn PI Vince
Welburn RD Ben
Welburn GP Bell
Welburn I Butterman
Welburn I Edward
Welburn I Hermes (180,000)
Welburn I Lustre
Welburn I Helios
Welburn T Ben
Welburn T Lucian
Welburn Baron Lucky (33,350)
Welburn PM Bramble (548,770)
Welburn BM Edwin (31,540)
Welburn BM Esteem
Welburn V Fellow
Welburn BM Editor
Welburn GP Brame
Welburn V Beau
Welburn H Hopper
Welburn SJ Hesperus
Welburn Trumpeter
Welburn Trump Lead
Welburn SS Leader
Welburn V Bellman
Welburn AV Hermes



Terling Brabazon.

Growing calves to bulls

Lloyd Reid

LIC Bull Farm Stockman/Head Stockman/Stock Supervisor, Newstead, 1956 to 1986.

Lloyd Reid was working on the Newstead farm before the Sire Proving Scheme began. When he started work at Newstead, Winston Hall was the Bull Farm Manager and Stan Southcombe the Farm Supervisor.

Lloyd and his wife Isobel lived on the Newstead farm throughout the 30 years that he worked for LIC, and both their children, Russell and Karen, were raised there.

"Before the Sire Proving Scheme LIC was farming naturally proven bulls for semen collection and proving.

"Young bulls were purchased mainly as yearlings and were kept on the farm until they were proven as five year olds. However, sometimes individual bulls would not have enough inseminations/milking daughters, so then it would take a little longer than the four to five years to get their proofs.

"My role involved looking after feeding all the bulls, grazing, drenching and weighing; I had nothing to do with collecting semen.

"So when the first Sire Proving Scheme bull calves came to the farm, I fed them and looked after them. That first year there were probably only 20 bull calves, but numbers had increased to around 150 by the time I left in 1986.

"The calves would start to come in after Christmas, most of them just over six months old. My main role was to ensure they grew/matured enough to collect semen from when they were about 12 months of age.

"I would weigh them every month and check on their health — it was important to check if any were lagging behind or in need of preferential feeding.

"It was pretty basic farming practice, and much the same as any calf rearing as far as I was concerned.

"The young bulls were bought in by the truckload, so we kept them in their regional groups to do disease testing. Each animal was identified from day one, and received a temporary number (bull code) and ear tag. After disease testing, Head Office would send us each animal's official, permanent number which they'd be tagged with.

"Once we had the disease testing results, animals were split into new groups according to their weight and breed — Friesian and Jersey, with the Ayrshire going into both Friesian and Jersey mobs.

"When you're farming bulls there is always the potential for injury to an animal through being ridden by other bulls; avoiding this is one reason we sorted the bulls according to size and weight.

"If we did see a bull being picked on we would remove him from the group and wash him down to change his smell and then reintroduce him into the group when they went onto a fresh break of grass.

"I'm pleased to say we never lost a bull and were always successful integrating the bulls into their mobs."

Lloyd Reid with his dog, Paddy 1958 — "He was a good cattle dog, he would help get the young bulls in and when working with the big bulls he was great protection. He could frighten the stroppy ones off if you were walking across the paddock.

Lloyd with Bull 2512 Eswyn Dale Principal. Purchased 1962, one of the first Sire Proving Scheme bulls. Pictured here as a 5-year-old sire (1967) he went on to become a Merit Sire (Premier Sire).

Friesians most popular dairy breed

During the late 1960s/early 1970s, it seemed that England would join the European Economic Community, potentially threatening New Zealand's dairy trade with the Northern Hemisphere. Until then, the main dairy product exported was butter but, in 1970, the New Zealand Government introduced a dairy beef subsidy in an effort to stimulate the export of dairy beef. Friesian sires qualified for the beef calf subsidy and farmers were quick to see a new source of income — leading to growth in demand for Friesian semen.

1970

JOHN WALKER
breaks the World Record for the mile with a time of 3:49.4 minutes.

1970

1971

First unregistered Jerseys and Holstein Friesian bulls used in Sire Proving Scheme.

1972

First Breed Association nominations of bulls for progeny testing.

First Charolais added to artificial breeding team.

Shamrock Grahams Jimmy progeny tested, first Holstein Friesian bull to exceed 400,000 lifetime inseminations earning him the nickname of the Six Million Dollar bull.

MOUNT EREBUS
Air New Zealand Flight 901 crashes on Mount Erebus, Antarctica, killing 257 people.

1973

Conformation Survey introduced for three year olds.

Contract mating to produce bulls for Sire Proving Scheme begins.

Conformation Survey for Sire Proving begins.

Glanton Red Dante progeny tested going on to be first Jersey bull to exceed 400,000 inseminations, lifetime inseminations of 417,112. Jersey Sire of the Century 2002.

1974

Breeding and Production Indexes replace Expected Level of Production (ELP) Ratings in Sire Surveys.

Frozen semen produced in 0.25ml plastic straws.

THE *DAIRY INDUSTRY* had

18,500 herds.

2.09 million cows with average per cow production of 138 kg milkfat.

45% of the national herd is artificially inseminated.

Photograph: Alexander Turnbull Library.

ROBERT MULDOON becomes Prime Minister.

1975

Federation of Livestock Improvement Associations formed.

DIY artificial breeding introduced by LIC.

New traits other than production reported for Sire Proving herds.

Sire Proving Scheme semen now collected and despatched from one location – Newstead.

Welburn PM Bramble progeny tested. Lifetime inseminations 548,000 first Holstein Friesian bull to exceed 500,000 lifetime inseminations.

1976

1977

Athol Famous Prefect progeny tested. Lifetime inseminations of 740,000 a record for any bull anywhere in the world.

Conformation survey extended to all Sire Proving Scheme two year olds.

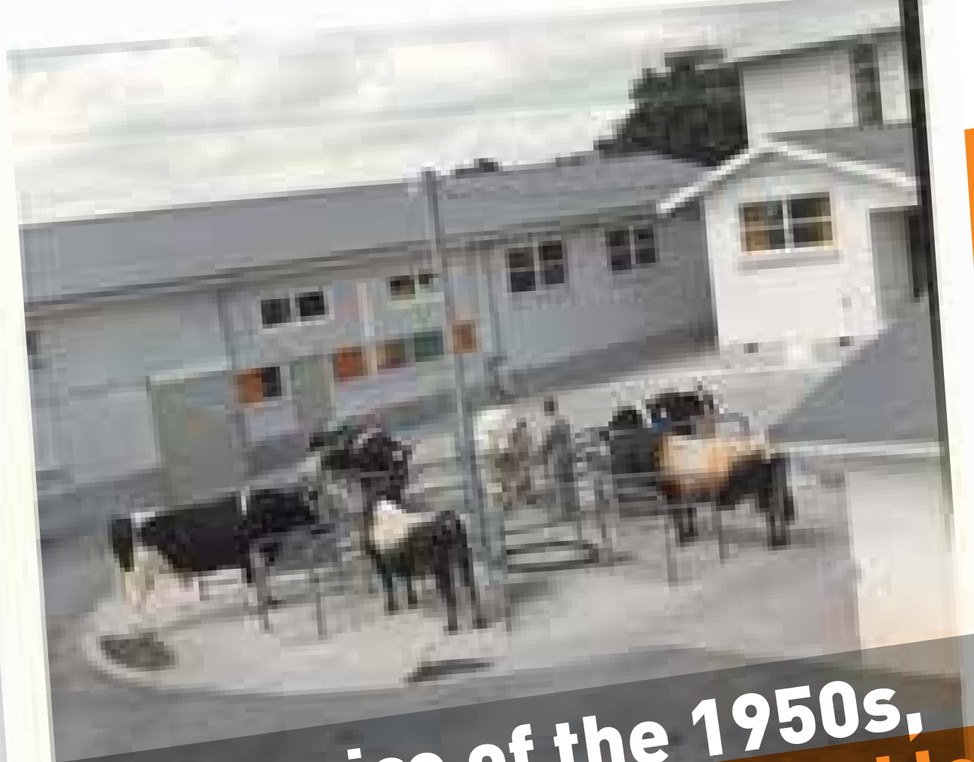
1978

Improved traits other than production reported for Sire Proving herds.

Conformation indexes introduced.

1979

COLOUR TELEVISION
is introduced (1973).



AB service of the 1950s, 1960s and 1970s world leader

JOHN MURRAY 1962 to 1998

John Murray grew up in town but says his heart was always in the country. Thanks to an extended family who owned sheep and beef farms, he spent many school holidays helping out and then, when he left school, he worked full time as a shepherd before going to Lincoln University to study agricultural science.

With a Degree in Agricultural Science under his belt, John joined the New Zealand Dairy Board as a Consulting Officer.

"The integrated, co-operative nature of the dairy industry was very appealing — everyone working towards a common goal, which was to improve the productivity and profitability of dairy farming. My job, as a Consulting Officer, was to help individual farmers reach their goals.

"I joined the Dairy Board in 1962 and from 1963 was based in Te Aroha, Eastern Waikato, as part of a 13 man team of Consultants headed by Jeff Stichbury, the Director of Herd Improvement.

"At the time, genetic improvement was constrained by a shortage of high quality young bulls, and after more than 11 years in the field, I jumped at the chance to work with Jeff Stichbury and his team at the Dairy Board in Wellington, implementing many of the improvements identified through earlier research.

"It was the start of the 1970s, the benefits of the Sire Proving Scheme, introduced in 1961, were becoming clear and it was just a matter of adding refinements."

Use of non-pedigree sires

"One of the major changes which took place early in the 1970s was the inclusion of non-pedigree bulls in the Sire Proving Scheme. The aim was to widen the pool of good quality cows from which to select the dams of potential young bulls.

"Until that point, all dams of young bulls had been pedigree registered with breed associations, with the ability to trace sire and dam back several generations. As you might expect, the suggestion that we include grade bulls in the Scheme came as a bolt from the blue for breeders and there was considerable and lengthy debate around the industry before it came to pass.

"From the Board's point of view, adding grade bulls widened the genetic pool and generated much needed diversity, but we recognised the validity of breeders' concerns.

"Grade animals had always dominated the industry and in the 1960s, for example, around 80% of 'Jersey' grade cows were sired by a Jersey bull, ineligible for inclusion in the Jersey Association herd book because of the lack of three generation pedigrees.

"The only way to win breeders over was by providing them with sound scientific data which supported the limited use of grade bulls and comparing their performance with their pedigree counterparts.

"It has to be remembered that this suggestion came in tandem with an upsurge in demand for artificial breeding (AB), bringing with it a downturn in demand for pedigree stock. This was affecting the stock and trade of breeders so, naturally, there was resistance.

"Some of that resistance centred on two basic differences in outlook — the Farm Production Division promoted Olive Castle's research which supported the comparison of a bull's daughters with all other herd mates, and the breeders' preference was absolute production results.

"Over time, breeders gradually accepted the arguments supporting comparative performance, but a small minority probably still argue for absolute production levels.

"As with all developments, however, the decision to include and increase use of grade animals followed on the heels of research which proved it would increase the rate of genetic gain in the national herd – a potential that went on to be proven in the field.

"Initially the criteria for grade bulls was as close as possible to those for pedigree bulls. In addition to the production criteria the animals had to be at least three generations pure to a single breed and meet a classification standard (unofficial) similar to those required for pedigree animals.

"The major limitation in identifying good grade animals, however, was not conformation, but genetics and production. In order to meet a minimum of three generations of a single breed the herd had to be herd tested every year. At the time, many grade herds did not herd test every year and even a single year missed meant they were ineligible to be considered because all their previous records were lost."

"The early work conducted by Olive Castle reinforced the impact of environment on production and non-production traits of dairy cows and resulted in the comparison of daughters of individual bulls with herd mates of other bulls in the same herds."

Conformation Survey

"The early work conducted by Olive Castle reinforced the impact of environment on production and non-production traits of dairy cows and resulted in the comparison of daughters of individual bulls with herd mates of other bulls in the same herds.

"It therefore seemed logical to do the same for conformation, and in the mid 1970s the Dairy Board Conformation Survey was introduced where a minimum 15-20 daughters of all young bulls would be inspected by a team of inspectors who had undergone rigorous training to ensure consistent standards were applied across the country.

"This added a physical dimension to the farmer assessment of daughter traits other than production (TOP), which had been part of the Sire Proving Scheme since it began in 1961,

"The Conformation Survey supplemented the TOP results and helped move the average more toward the desired end of the sigmoid curve.

"The intention was for Conformation Survey inspections to be undertaken by trained inspectors but that meant change because, until then, breeders considered the conformation of dairy cows to be their area of expertise. The Farm Production Division therefore worked very closely with the breed associations to ensure that standards were raised, rather than lowered, with the introduction of a national system.

"The result, however, was that — by the 1980s — the Breed Societies, LIC and the newly formed Ambreed, were applying different standards to conformation/traits other than production assessments. This was creating confusion in the field and led to a collaboration which resulted in the national Traits other than Production system, which was introduced in 1988."

Introduction of Contract Mating

"Potential bull mothers (both pedigree and grade) were, as they are today, identified through an analysis of all herds under herd test, the top cows ranked into a Top Cow Listing.

"We would contact the owners of the top cows to see if they would be interested in entering a contract mating arrangement, whereby they would agree to mate the cow to a specified AB bull and, if a male calf resulted, sell that to the Farm Production Division.

"Identifying potential bull mothers from their records wasn't enough, of course, and this was the start of field inspections undertaken by a representative of the Farm Production Division and, later, with a breeder appointed by the local Livestock Improvement Association.

"The standards we'd been using for assessing traits other than production and conformation in the daughters of our Sire Proving Scheme bulls, was applied to the selection of prospective bull mothers."

Change to animal evaluation

"The first use of the computer to record animal records occurred in 1968 and incorporated the ancestry of all stock, including herd mates. In 1973, the previous system of rating bulls and Expected Level of Production was replaced with Breeding and Production Indexes which used a base of 100 making it easier to understand."

Athol Famous Prefect

"Athol Famous Prefect was bred by well-respected breeder, J L Murray (no relation). The bull's sire and dam were acknowledged within the Holstein-Friesian Breed Association as superior animals. The bull himself looked good, as did his female offspring, and at the same time had an outstanding Breeding Index. He had everything we wanted.

"Clearly, a bull of this quality in both production and conformation was easy to sell to the industry, including many, but not all, pedigree breeders.

"Semen technology advances also allowed individual bulls to be used for record numbers of inseminations in a season. If it was possible for a bull to be a celebrity at the time, it was Athol Famous Prefect."

In summary

"All the changes in the AB service were step changes which took advantage of new research findings and technologies.

"The AB service throughout the 1950s, 1960s and 1970s was the world leader in almost every area including semen dose rates and in the use of comparative analysis of daughters and herd mates for both production and non-production traits."

In 1988, John and wife Joan moved back to Wellington, where he took up the position of Secretary and Group General Manager of Corporate Services for the New Zealand Dairy Board. He was also the Dairy Board representative on the LIC Board during the time that David Milne was chairman. He retired in 1998.

John and Joan are currently major owners of a 770 cow dairy farm at Whakamaru and he is an advocate of KiwiCross™.

Athol Famous Prefect

Owen and Margaret Thomas

SCHEME DEVELOPED A REAL INTEREST IN BREEDING FOR SOUTHLAND MEMBERS

When Oxford farmers Owen and Margaret Thomas joined the Sire Proving Scheme in 1974 they were one of only a few members scattered around the South Island.

Dairy farming wasn't common in the area and neither was the Scheme, but it worked well for them.

"Sheep farming was the in thing, and cropping, but dairy farmers were a different breed, and if you had pigs — which we did — you were even lower on the scale.

"You'd be lucky if there were half a dozen people with cows, apart from house cows. It wasn't the thing to do at all, and even the social life was geared around sheep farmers — the Christmas party would start at 3pm, and they'd wonder why you didn't go."

Like many, the Thomases joined the Scheme because it provided them with access to good genetics at a minimal cost, but it also gave them a real interest in breeding and genetics, and that's what kept them in the Scheme for 29 years.

"It was a good Scheme for us when we didn't have a lot of money, because you could get into it without outlaying large amounts of money and it was really interesting, especially picking out the bulls later and seeing if any of them made the team.

"As the old saying goes, the cream comes to the top, and the Sire Proving Scheme meant we were taking the best from the best all the time and that really showed up in our heifers.

They looked really good and we always had very quiet cows.

"The big disappointment for us was when they brought in the overseas genetics. We could see what was happening to our herd because we got those bulls first.They were still good looking heifers but they couldn't get into calf.

"When we went back to New Zealand bred bulls it came right again but it took a while and it set us back quite a long way."

The Thomases enjoyed the contact they had with the New Zealand Dairy Board, as members of the Scheme, and were delighted to be the first farm in the South Island to receive KiwiCross™ semen in 2001.

"We'd been looking for it over the years, but were told that there wasn't enough demand, so we jumped at the chance to take it when it was offered.

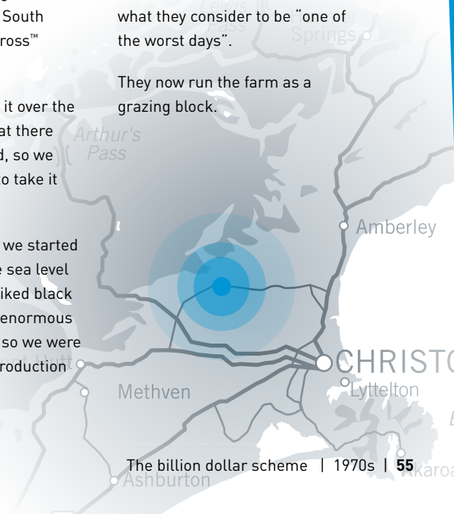
"We had Jerseys when we started but we're 1000 ft above sea level so it was too cold. We liked black cows but some can be enormous and that didn't suit us, so we were delighted about the introduction of KiwiCross™.

"We did get a bull into the Scheme once too, and that was quite good, but it didn't make it in the end because he didn't produce enough semen so that was disappointing."

Selling the bull remains a highlight for Owen and Margaret, and they enjoyed the personal touch of the Scheme, maintaining regular contact with the staff and eventually meeting many on a visit to Newstead in 2007.

Owen and Margaret reluctantly sold their herd of 300 cows on what they consider to be "one of the worst days".

They now run the farm as a grazing block.



An early advocate of crossbreeding

Peter Darby has never been a Sire Proving Scheme farmer, but he was (and is) an advocate of artificial breeding (AB) and the Scheme behind its success — and for crossbred cows.

Peter's long history with the New Zealand Dairy Board began in 1942 when, at a young age, he started working on his father's farm.

He purchased his own farm in 1960 after working for the Dairy Board as a herd tester and then, in the 1980s, he returned to work for LIC as an AB salesman in the Bombay, South Auckland area.

"I was an early advocate of crossbreeding at a time when farmers were resolutely pedigree. Twenty years later, however, I've been proven right.

"Back then it was a pretty radical idea to go away from purebred cattle but it was just that it challenged traditional practice. Most herds in the 1960s were pedigree but almost every one had (at one time or another) one or two cows that were crossbreeds which were hardy and produced really well.

"For me, going to crossbreeds made it all much simpler and standardised things - you can use a crossbred bull over the whole herd and you don't have to worry about mating to which cow."

Peter started to crossbreed his herd in the 1960s, mating one of his Jersey cows to a Friesian bull.

"We wanted to change a little bit from the Jersey to see if it would be something different, and mostly because of curiosity.

"Having kept a crossbred bull, we mated it with one or two of our favourite cows, and then we'd keep the odd calf and that's how it developed.

"It was the progeny of these bulls that out-performed the straight-bred cows."

He was able to sell this progeny to his neighbours and friends, at a good price.

"A lot of the sharemilkers were buying heifers from me, from my crossbred bulls.

"Young farmers did well out of it, and when one had his sale, his top price cow was a crossbred animal; it was his top performing cow."

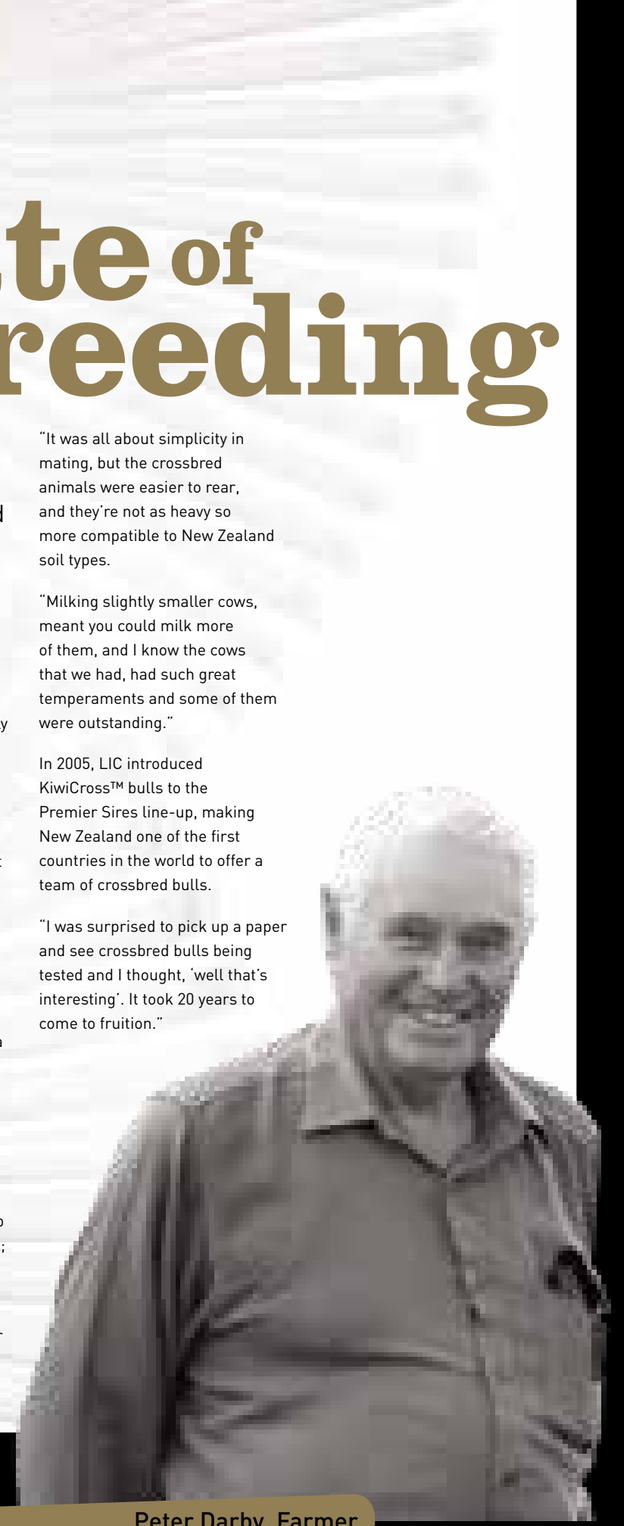
Peter found the crossbred cows were also quieter and easier to manage.

"It was all about simplicity in mating, but the crossbred animals were easier to rear, and they're not as heavy so more compatible to New Zealand soil types.

"Milking slightly smaller cows, meant you could milk more of them, and I know the cows that we had, had such great temperaments and some of them were outstanding."

In 2005, LIC introduced KiwiCross™ bulls to the Premier Sires line-up, making New Zealand one of the first countries in the world to offer a team of crossbred bulls.

"I was surprised to pick up a paper and see crossbred bulls being tested and I thought, 'well that's interesting'. It took 20 years to come to fruition."



Peter Darby, Farmer

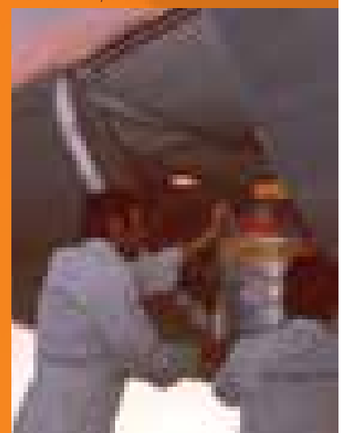
LOGISTICAL CHALLENGES OF SEMEN DESPATCH

MIKE DOUGHTY

In the 1970s and early 1980s Mike Doughty could hold up domestic flights at Hamilton Airport with a simple phone call.

Above: Don (Mac) McLean labelling test tubes.

Below: A bank of semen is loaded onto a jet at Hamilton Airport.



Former LIC staff member of 35 years, Mike Doughty, reflects on an era when personal relationships in high places held a lot of sway.

"We had a great relationship with Eagle Air to the point at which — if we were running late with a semen dispatch — I could telephone the control tower to get them to hold the plane back.

"We also had the advantage of driving up to the plane and loading our despatch box straight into the aircraft. Security was a factor, but they knew us and weren't worried about it at all. They were great days."

When Mike began at Newstead in 1969 the Cassou method of packaging semen was in its infancy.

Semen was hand-filled before being sealed in straws, then frozen in liquid nitrogen for storage. When it came to the fresh product, half the country's requirements were processed daily at Newstead with the remaining amount collected and despatched from Awahuri, near Palmerston North.

The artificial breeding (AB) product was manually filled into glass test tubes in 5, 10, 15 and 20ml quantities. The test tubes were corked and packed into a leather wallet, surrounded by a 100ml bottle of tepid water.

Tubes of Sire Proving Scheme semen could be easily identified by the addition of a coloured drawing pin stuck into the cork.

The packs of test tubes were placed in an insulated box and distributed to AB Technicians largely through use of public transport (for example, New Zealand Rail buses, Eagle Airways) or privately, by way of the Livestock Improvement Association (LIA) van.

As part of the AB Centre's obligation toward improvement, Mike recalls superintendent Adrian Rhodes chairing a crucial meeting that involved Pat Shannon, Brian Curson, Lindsay Burton and Mike himself.

"Adrian wanted to work on ideas for semen dispatch in the future. Essentially we discussed whether to continue in test tubes, or if a move to another technology was better.

"In the end it was decided to dispense with test tubes and adopt a completely new system of packaging and despatching semen.

"Our research section improved the semen technology and Long-Last Liquid (LLL) was born. We adopted the German system for automatically filling and sealing the straws, and developed our own unique transport and distribution process. The new way gave us the advantage of processing semen for the whole country at Newstead; New Zealand was divided into three sections and each section was separated into several LIA regions.

"That resulted in an equal number of technicians for the three sections. One section was processed each day, and this happened in three-day cycles."

The procedure was key to achieving the most even distribution of the top sires to all LIA regions, Mike says.

"Successfully allocating, packaging and despatching our product on time — both in the days of test tubes and LLL — was always a big challenge, but for me it was very satisfying."

Lance Wratt

Waitoa farmer DREAMED of hitting the big time with AB

When Lance Wratt first heard about Artificial Breeding (AB) he thought they were going to be millionaires, and although that didn't eventuate, he was quite pleased with the effect it had on his herd.

"It was meant to be such a great advancement and they did improve, of course, but not enough to make us millionaires.

"Before then we would buy bulls and hope we bought the best, but this was going to eliminate all that.

"They were going to prove the bulls for us so we knew we were getting the best in the country. Like everything else that was new we thought it was going to be pretty expensive, but it wasn't too bad.

"It was a convenience though. We still bought our own bulls but didn't care what they were because they were just to finish off."

With his Jersey herd of 75 cows on 118 acres, Lance was encouraged to switch to AB by the local Farm Advisors from the Piako Farm Improvement Club, of which Lance was chairman.

"They're the ones that improved farming in our area, and advised us to take on AB. They visited every month and they made a huge difference to farming.

"Cow numbers went up everywhere and everybody started to milk more.

"If we had a cow doing 300 pounds of butter fat then that was seen as a good cow, but they just went up and up from that.

"AB was a small turnover in our life; it was about advancement and we had to accept the changes, but it was a great improvement."

Lance and his wife Norma are now retired and live in Morrinsville; their son Bryan runs the farm.

Twenty six years with the Sire Proving Scheme grows farm and family

Ian Robb and his family were Sire Proving Scheme members for 26 years, from 1971, on the West Coast of the South Island.

Starting in 1971, with 100 acres of land and 80 Jersey cows, the Scheme helped them get their business off the ground.

"The Scheme was fantastic for us. We were on a developing farm and we didn't have the cash flow so we needed to rear as many young stock as we could.

"It allowed us to do everything we wanted to do — herd test the cows, grow our herd and bring in very good genetics without costing us anything.

"In fact we actually got paid, and I always argued that the Sire Proving Scheme probably paid a fair proportion of the fees for the kids to go to boarding school.

"I had absolutely no argument against the Sire Proving Scheme — I thought it was the best.

"I believed in the genetics that came out of Newstead and I knew the young bulls were out of the best possible breeding, although there was some variance.

"I would keep an eye on the bulls, to see how many of the ones we used made the team.

"Very few did, but a lot of them were very close, so when you took the average of what they ended up with, they were still better than the older bulls that would've been used for 'bull of the day', on the year they were used, so we were fine.

"I worked it out that even if we got the mainstream of bulls, the actual average of the genetics that we brought into the herd every year was slightly higher than if we used Premier Sires.

"We were maintaining good genetic improvement with these young bulls, but we were just getting a slightly bigger range."

Living in a secluded area of the South Island, the Robbs always enjoyed bringing their rising two-year-olds in once a year for Livestock Improvement to inspect.

And Ian always enjoyed the record-keeping side, although the temperament scoring could be a challenge at times.

"I was too tolerant, and would think, 'oh well she only kicked the cups off three or four times', but my son was much harder on the heifers.

"We were told that you're better to be hard than soft though, because temperament is a big reason for why cows are culled, so in the end I conceded."

Ian's farm went off the Scheme in 1997, when his sons took over the farm.

"When we finished with the Sire Proving Scheme we were milking about 350 cows and we were right up in the top five per cent of the New Zealand herd."

The Sire Proving Scheme was a very important part of it all for Ian, helping to grow the farm and family.

Ian Robb, Farmer

The story of

Glanton Red Dante

Rob Thwaites, Taranaki

Rob Thwaites is the son of the late Jim Thwaites, well known and much loved Jersey breeder and champion of the herd improvement movement. Here he tells the story of one of the Stud's most famous sires, Glanton Red Dante, and the part the Sire Proving Scheme had in the bull's success as an artificial breeding (AB) sire.

"Interestingly Dante's sire, Linmore Red Royal, was a very good bull — but he was only proven in a one-herd situation.

"A guy named Buster Brookes on the West Coast of the South Island owned him (Linmore Red Royal was originally a Taranaki bull, but Brookes had bought him as a yearling bull before taking him south), so he was in a fairly isolated part of the country.

"But Dad was a Jersey New Zealand classifier, which I suppose these days is the equivalent of a traits other than production (TOP) inspector. He had an exceptional eye for a good animal – and Dante's story is a great example of this.

"While classifying on the West Coast, Dad saw a bull and its daughters that were really impressive. After negotiating over the course of about six months, he bought Red Royal as a nine-year-old.

"We used him naturally for about a year, and then took semen off him. By this stage he was 11 and we really thought that was the end of his productive life as a bull.

But another breeder offered to buy him and he kept producing a lot of semen until he was 13.

"All we really bought him for was to use him for a couple of seasons on our herd alone. In that time, Linmore Red Royal was mated to Dante's dam.

"On the female side, Dante's dam descended from the Brookdale Stud (Manutahi, Taranaki).

"When Dad first became a pedigree breeder in the early 1950s, the owner of the Brookdale Stud, Gordon Scown (grandfather of highly-acclaimed New Zealand rowers Rebecca Scown and Sonia Waddell), offered Dad the pick of his in-calf heifers, for two years running.

Dairy Board Consulting Officer K W Pow (left) and D M Johnston discuss dairy cow conformation with Jim Thwaites (right).

Rob and Allison Thwaites.

"It was a gift, a very generous offer. But Scown's condition was that Dad wasn't allowed any information — he had to pick on sight.

"This was another example of Dad's wonderful eye for an animal because the first in-calf heifer he picked was out of the best cow Scown ever owned.

"That animal was the great-grand dam of Red Dante. The following year Jim also picked a heifer out of Scown's top cow."

So in the early days the top cows in the Glanton Stud herd descended from the two heifers gifted by Scown and picked by Jim.

"Dante was born many years later, but was not the result of a contract mating.

"In those days, the New Zealand Jersey Breeders Association was allowed to put, I think, three bulls into LIC's Sire Proving Scheme. So Dad nominated Dante to the Association to go to LIC.

"If it were not for the Sire Proving Scheme a massive opportunity for the dairy industry would have been lost.

"I think one of the great things about Dante was that, at the time he was proven, Jerseys needed a good bull to come through. They had gone long enough without a top bull and Dante had good type traits, good temperament, and good production. He was definitely an all-round bull."

As a breeder Rob believes the Sire Proving Scheme and Premier Sires have always gone "hand-in-hand."

"We weren't part of the Sire Proving Scheme ourselves but we were one of the early pedigree breeders to use Premier Sires.

"Originally fellow breeders looked at us sideways — the pedigree farmers at that stage were probably more type oriented.

"Admittedly, there was a stage early on when production was the only thing, but we realised that within the LIC movement TOP was taking on more importance; there was an acknowledgement that temperament was pretty important.

"As breeders going down the Premier Sires route, Dad and I were driven by economics.

"Profitability was most definitely the motive, so it wasn't hard for us to do — because even though we were pedigree breeders first-and-foremost, we were certainly commercial dairy farmers.

"The Sire Proving Scheme gave farmers and the artificial breeding industry enormous confidence, Without the commitment of Scheme members, you wouldn't have had Premier Sires — the two things are so inter-related.

"In my experience, the farmers in the Sire Proving Scheme have always been fantastically dedicated to what they are doing — sure they have a financial incentive, but the ones I've met were really focused on what they were doing."

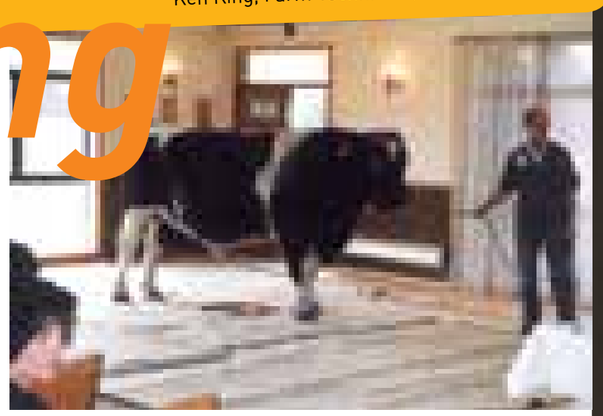
Footnote:

In 2002 Glanton Red Dante was named 'Bull of the Century' by the New Zealand Jersey Breeders Association, having chalked up 414,000 artificial inseminations.

Jim Thwaites died in 2007 aged 83. His wife Betty still lives at Glanton Stud, and is actively involved in the community. Rob says his parents got immense pleasure seeing Dante daughters milking in every country of the world with a Jersey population (about 20 countries).

The art of splicing

Ken King, Farm Technician, 1974-2003



"Splicing rope is a time-consuming, good wet day job, and it requires strong hands," says the now retired Ken King.

LIC bull farms use a lot of rope during the training and handling of young bulls and for leading the bulls during semen collection. When lengths of rope are cut, the ends are spliced to prevent it unraveling — but when Ken joined the Sire Proving Scheme farm in 1974 he had never spliced rope before.

"But I soon learned, thanks to Tom Green, a fellow stockman at the time."

For the first 12 years on the Newstead farm, Ken, along with other stockmen, looked after all the Sire Proving Scheme bulls, which at this time could be in paddocks anywhere on the farm property — including leased land on the other side of State Highway 26.

"Accessing this land meant driving the bulls across the main highway, so all hands were needed to keep an eye out for traffic and, if necessary, stop vehicles. I'm happy to say, none ever got away on us."

Holstein Friesian Premier Sire bull, Athol Famous Prefect — which set a world record as the first Holstein Friesian bull to exceed 700,000 lifetime inseminations was Ken's favorite bull. He fondly recalls that the bull's exceptionally quiet temperament allowed a very special staff celebration for the bull's 13th birthday.

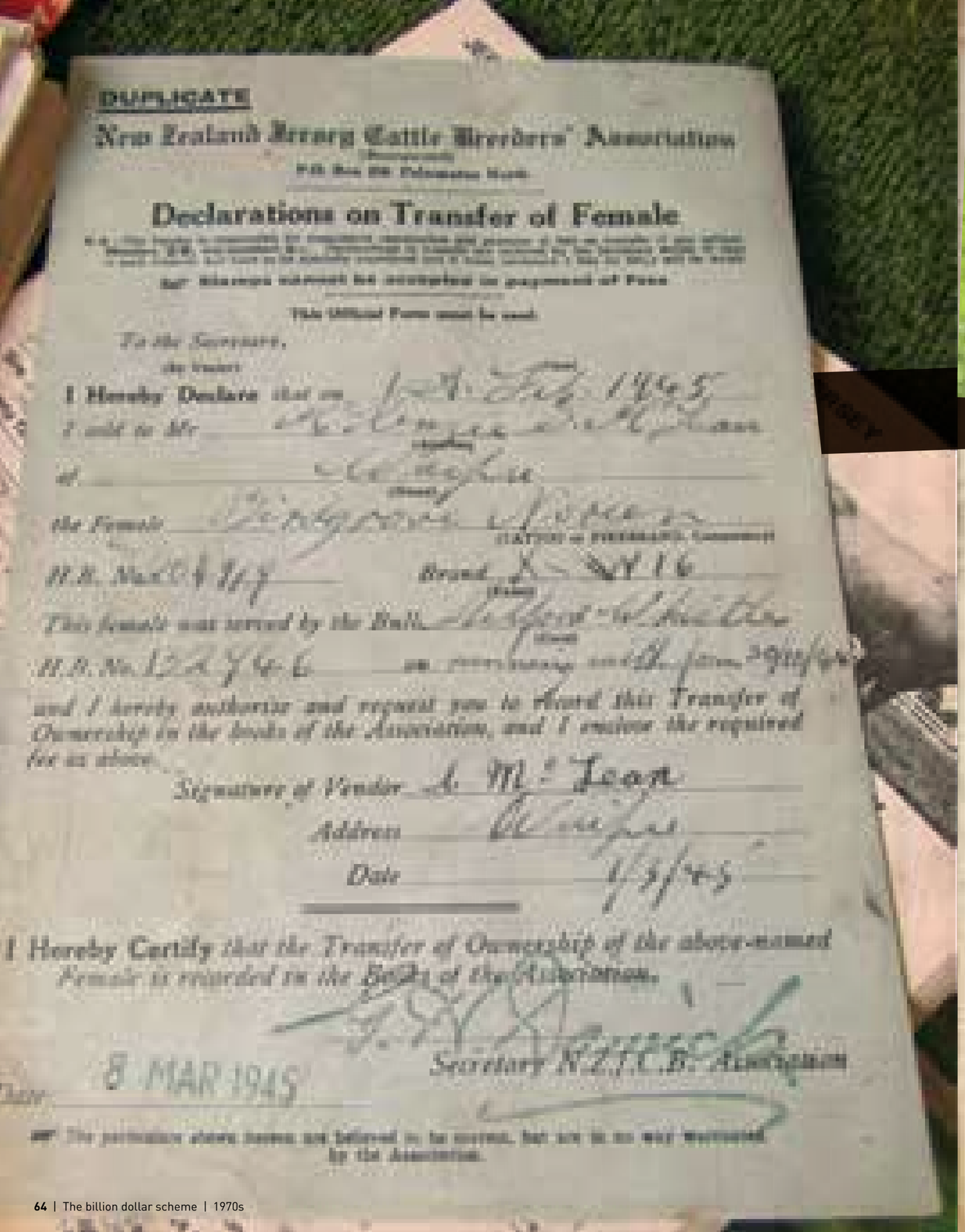
"Morning tea — including a cake for Prefect — was laid out in the staff cafeteria and the bull walked in there, with all the staff, as though he'd done it every day of his life. "He did, however, leave a small memento on the floor ..... "

Ken was one of those rare people who not only knew each bull by his number, but also by name. He says farming bulls comes down to common sense.

"The bulls know what's going on, there's a routine, there's a process and the bulls know it — the bulls have a respect for you and you for them."

Staff celebration
Ken King leads Athol Famous Prefect into the Newstead cafeteria on the occasion of the bull's 13th birthday.

Farm team. Summer 2000/2001
Back Row L to R: Bill Smith, Murray Gopperth, Wayne Walsdorf, Dennis Crean, Allan Marsh, Harvey Tempero, Rob Simpson, Lance Pettigrew and Terry Madden
Front Row: Cliff Harris, Noel Mayston, Ken King, Reon Parker, Neville Crafar, Rod Bowie, Aaron Chapman and Louis Meyer


DUPLICATE

New Zealand Jersey Cattle Breeders' Association

P.O. Box 28 Palmerston North

Declarations on Transfer of Female

Stamps cannot be accepted in payment of Fees

This Official Form must be used.

To the Secretary,

I Hereby Declare that on 1st Feb 1945

I sold to Mr [illegible]

of [illegible]

the Female [illegible]

H.B. No. [illegible] Breed [illegible]

This female was served by the Bull [illegible]

H.B. No. [illegible] on [illegible]

and I hereby authorise and request you to Record this Transfer of Ownership in the books of the Association, and I enclose the required fee as above.

Signature of Vendor A. M. Lean

Address [illegible]

Date 1/3/45

I Hereby Certify that the Transfer of Ownership of the above-named Female is recorded in the Books of the Association.

Secretary N.Z.J.C.B. Association

Date 8 MAR 1945

The particulars above named are believed to be correct, but are in no way warranted by the Association.

Lachie McLean, dairy farmer, Northland

"THE COW ALWAYS THINKS SHE'S RIGHT"

Kenzie McLean

Waipu dairy farmer Lachie McLean thinks back fondly on his father, McKenzie, supplying bulls to Livestock Improvement back in the 1960s and 1970s and the excitement when its staff visited the property just over the Brynderwyn Hills.

Former general manager, Jeff Stichbury, whom he remembers as "a lovely man", and Harvey Tempero came to Birdgrove Jersey Stud a number of times.

While he describes his father, known as Kenzie, as very unassuming, his father's perfectly kept herd records, stored in the attic of the 100-year-old family homestead which Lachie now lives in, demonstrate his devotion to the breed and its advancement.

"He was one of the first farmers into herd-testing and belonged to Livestock Improvement's Northland branch, helping to organising artificial breeding (AB) technicians and herd-testers in the Waipu area."

Kenzie's most famous bull was Birdgrove Brakenbury, who gained his second name from the surname of one of Lachie's friends who often stayed with the family.

The bull appeared in Livestock Improvement catalogues throughout the 1970s.

"My father was surprised he went as far as he did."

The bull's mother, Birdgrove Sherry caused considerable concern, when she once went missing from the herd during a prolonged drought while in calf with Birdgrove Brakenbury

"We searched the riverbanks but couldn't find her."

But she was eventually spotted a few months later from one of the back points of the farm, deep in gorse on a neighbouring property owned by a cousin. Although she was dry when she rejoined the herd, the following spring she produced her famous son.

Lachie's father went on to contract some of his cows to Livestock Improvement bulls, with staff coming north to inspect the animals for type.

Although he showed stock in his early days of farming, he then found his time taken up running a hay baling contracting business around the local area. He featured on the front cover of *The Farmer* in February 1962.

Kenzie's grandfather, John, arrived in Waipu in the 1850s, coming from Scotland via Nova Scotia as part of the well known migration, where his 90 acres of land was bought for 10 shillings an acre.

Kenzie's father, McAulay, started the Jersey pedigree stud in 1924, gaining the registration brand X and making the 50 cows he milked the 24th registered Jersey herd in New Zealand.

When Kenzie took over, he boosted the numbers to between 100-110, with their pedigrees still all written out by hand.

Although Lachie maintains the family tradition of "all Jerseys", he stopped keeping stud records when details were computerised in the mid-1990s.

"I did it with Dad's blessing before he died."

His father was an innovative farmer in other ways — one of the first rotary dairies with 17 sets of cups was built on the farm in 1976.

Lachie, 58, now runs 130 cows, bringing around 25 replacements into the herd every year.

With the lighter weight of the Jersey's and the long history of breeding on the fully developed property, he is still amongst the top milk solids per hectare in the Waipu district.

After 40 seasons he's "milked cows longer than anyone in the area" but finds it therapeutic, and often remembers his father's advice.

"The cow always thinks she's right."

Four decades

with

'the littlies'

Rod Bowie, Farm Technician 1968 to 2010

Rod Bowie spent more than four decades working on the LIC Bull Farms at Newstead, and for the most part worked with the "littlies" in the Sire Proving Scheme. Rod joined LIC as a farm hand in 1968 and became a full time member of the LIC Bull Farm Team in 1969.

"In the early days we only had around 100 young bulls — about a third of the number we had in 2010. There were three mobs, one of Holstein Friesians (19%), one of Jersey (80%) and a group of Ayrshire (1%) bulls. We didn't have as much land, and leased some from the Council.

"In those days the Sire Proving Scheme was a very manual process — on the farm and in the office. All the Artificial Breeding (AB) Technician dockets came to me, I would then add them up and consolidate the information into one book. This would give me the information I'd need to work out which bulls to roster and bring in for collection.

Summer haze
Rod Bowie feeding out hay

"I'd list each bull, how many inseminations were required each day and match the bull number to the batch number. It was a running total, as we were only allowed a certain number of inseminations from each bull so the total number needed would reduce each time that bull was collected and an insemination performed. Today, computers do the calculations.

"Of course we weren't serving the whole of New Zealand from Hamilton at that time, just the upper North Island Herd Improvement Associations — Northland, Waikato and the Bay of Plenty.

"Semen dilution wasn't then what it is today, which meant we had to collect more bulls. As we were serving half the country, we'd collect maybe 20 young bulls on a big day from all three breeds and it all went out as liquid semen."

One thing that hasn't changed over four decades, is the handling and training of young bulls.

"Training starts as soon as they come to Newstead as calves. We bring them in and get them used to being handled and spend time stroking and talking to them; then we teach them how to be led on a rope."

Rod was involved in picking up young bulls.

"Again this is done in much the same way today as it was when I first joined the Sire Proving Scheme team — the Livestock Selection staff would make up a list of farmers and where we needed to pick up young bulls from, then we'd sit down and work out our pick- up runs and time schedule. In later years, the bull farm administrator would work these out for us and give us the lists."

After more than 40 years of working with thousands of LIC sires, Rod says there are four that will always hold a special place in his heart — Holstein Friesian sires: SRD Dawsons Belvedere (1,235,000 inseminations), Tangimati AP President (830,000 inseminations), Windermere Perfect Max (294,000 inseminations) and Kingsmill PA Walesa (1,268,000 inseminations).

"Over the years I did a lot of collections with a lot of bulls, but those four were my favorites. They stood out because of their personalities, each was easy to handle and very friendly. They were like pets, I could put my arm around their necks and give them a cuddle — each of them had a very mellow, calm, character.

SRD Dawsons Belvedere holds a special place in Rod's heart.

Opposite page image: Until the mid-1970s, cows were used as decoys. Then, to avoid unwanted pregnancies and minimise risk of venereal disease, steers were used.

One thing that hasn't changed over four decades, is the handling and training of young bulls.

1980

MARK TODD AND CHARISMA
win Gold in the Three Day Event at the 1984 Los Angeles Olympic Games and then again in 1988, at the Seoul Olympics.

1980

Development of national database begins.

World first — dialysis used to improve frozen semen quality.

1981

Danish Jersey bulls used in Sire Proving Scheme to compare genetic merit between countries.

1982

New Zealand Dairy Board Herd Improvement section relocated from Wellington to Newstead — named Dairy Herd Improvement Centre.

Easier calving Holstein Friesians available.

Sire Proving Scheme delivers an estimated increased milkfat production of 25 kg per cow.

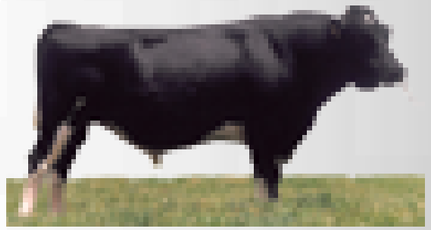
Tangimati AP President progeny tested, first Holstein Friesian bull to exceed 750,000 lifetime inseminations.

1983

Brightwater DC Carl progeny tested, 411,066 lifetime inseminations.

1984

Pajak Sheik Atlas progeny tested, 525,000 lifetime inseminations.



Deed of Establishment signed by New Zealand Dairy Board combining the six Livestock Improvement Associations with the Board's Farm Production Division to form a single structure which would henceforth be known as the Livestock Improvement Division of the New Zealand Dairy Board.

Photograph: Alexander Turnbull Library.

DAVID LANGE
becomes Prime Minister.

THE *DAIRY INDUSTRY* had

15,806 dairy farmers.

2.2 million cows with average per cow production of 152 kg milkfat.

54% (or 1.1 million) of cows are artificially inseminated.

1985

Sire Proving Scheme expanded to include 70,000 cows.

Traits other than Production inspections start replacing the Dairy Board Conformation Survey.

Three generation pedigrees for contract mating cow inspection and bull purchasing produced by hand.

National database becomes operational.

In 15 years since it began, the Sire Proving Scheme is estimated to have contributed $2 billion to the dairy industry.

1986

1987 RUGBY WORLD CUP
The All Blacks win the inaugural Rugby World Cup.

Photograph: Alexander Turnbull Library.

All Black captain David Kirk with the Webb Ellis Cup at Eden Park, Auckland.

RAINBOW WARRIOR
The Rainbow Warrior is bombed by French agents and sinks in Auckland Harbour.

1989

Judds Admiral enters Sire Proving Scheme, going on to be first Jersey bull to exceed 500,000 lifetime inseminations. Lifetime inseminations of 510,000.

First year for all liquid semen in Long Last form. Three day semen despatch begins.

Semen utilisation increases substantially. Sperm rate 1 million per dose, compared to 1961 when it was 9.4 million per dose.

1987

Payment and Protein Breeding Indexes calculated.

National Traits other than Production (TOP) introduced.

Total Breeding Index calculated.

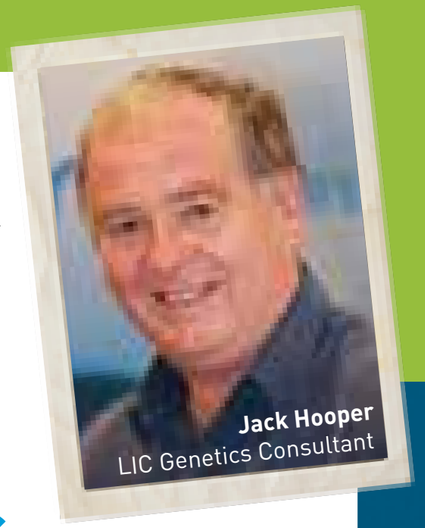
Further rationalisation of structure results in the formation of Livestock Improvement, a wholly owned subsidiary of the New Zealand Dairy Board.

World first - Long Last Liquid semen developed by Dr Patrick Shannon.

Dr Patrick Shannon and Brian Curson.

GENETIC PROGRESS THROUGH THE '80s

1980 to present day



The Dairy Board's Consulting Officer service, in the 1970s and 1980s, was the training ground for a number of the people who went on to influence the shape of genetic progress — people like Harvey Tempero, John Murray, Hugh Clifford, Jeff Stichbury, Rob Jackson, Jack Hooper and David Sellars.

Jack Hooper, now a Consultant with LIC's Genetics Group, recalls that their background ensured they had an empathy with farmers. "We could put herd improvement into a farm management context in a practical way and, at the time, we were the voice of herd improvement.

"I was working as a Consultant but had a special interest in genetics and had included papers on production in sheep, beef and dairy as part of my degree at Massey. John Murray knew this and, when the Livestock Selection Manager, Harvey Tempero, was unable to transfer to Hamilton along with the rest of the team, asked me if I'd consider becoming Acting Livestock Selection Manager in a temporary capacity until Harvey was able to pick up the role.

"The opportunity was too good to miss. As it turned out Harvey's transfer was delayed for six months and when he arrived I was offered the position of Livestock Selection Supervisor.

Harvey Tempero

"In many ways Harvey's arrival heralded the end of the honeymoon and one of my first assignments was to manually calculate the sire proofs of two bulls, Ngaio Crisscross Prince and Ngaio Crisscross Herald.

"The bulls had been bred by Jim Montgomerie, and one was owned by LIC and the other by Ambreed. Ngaio Crisscross Prince's proof was up while Ngaio Crisscross Herald's was going down and, despite a lot of debate, the reason wasn't clear. Computer records were available at the time, but Harvey wanted me to go through all the bulls' herd test records and other data manually.

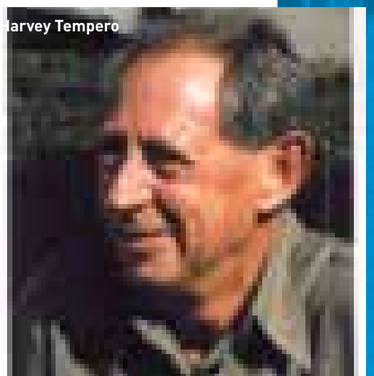
"It was incredibly frustrating and time-consuming but, in retrospect, was one of the most valuable things I've ever done because it gave me a very deep understanding of how sire proofs are calculated — the factors that influence them; in other words the basis of our whole progeny test programme.

"We found out the reason one bull's proof varied was that its daughters did more production than the other's because they were in better herds."

In the 1980s sire proofs were calculated once a year and released in June when all the previous year's herd testing information had been calculated. There was an unofficial mid season run which was indicative only.

Jack recalls the strong customer driven focus Harvey Tempero brought to Livestock Selection.

"We were managing the breeding scheme on behalf of the Industry not ourselves. He was intensely devoted to improving genetic gain, finding better ways to do things and wasn't slow to challenge convention if there was a better way of doing things."


Harvey Tempero


David Sellars

LIC Genetics Consultant, David Sellars, worked alongside Harvey and recalls —

"Harvey was an inspirational leader, and an excellent teacher of the principles of genetics. He was a farmers' man, always seeing things through their eyes in preference to a corporate approach. This sometimes got him offside with the number-crunchers.

"He stuck resolutely to the scientific principles behind the issue at hand and always considered things objectively. There were times when he got into some great debates with the proponents of the fashion of the day, if their views were not supported by the science.

"Harvey was not beyond using subterfuge for the benefit of the industry. For example in the 1980s when directors were telling LIC to move heavily towards overseas genetics, and Harvey didn't believe this was in the best interests of the industry, he carried out their wishes to an extent which was nowhere near the level they wanted. The stand he took protected our industry, largely, from significant infertility issues which would have ensued had he complied with instructions!

"LIC got the opportunity in December one year to supply cattle to repopulate Moorepark Research Station in Ireland. However, the request came around Christmas so Harvey's team selected cows for a programme of superovulation which enabled them to produce and ship elite embryos by March, on time. Those genetics went on to prove themselves ideal for Irish conditions but, had Harvey not been in charge, we might have missed the opportunity and had a summer holiday instead."

Overseas genetics

Harvey's dedication came to the fore in the late 1970s/early 1980s when a farmer groundswell began to use more North American bloodlines in the LIC breeding programme.

"In those days we didn't have the individual country conversion programmes from Interbull that we do today or a Fertility Breeding Value so all the hype and demand was based on stories of record volumes and protein being achieved by farmers in North America. Without evidence to the contrary, our farmers wanted access to those genetics.

"Harvey, Jeff Stichbury and I weren't in favour of using North American Holstein, because we suspected there could be issues with fertility and suitability to New Zealand farming conditions. But farmers demanded it and, with mounting industry momentum including pressure from the Board of Directors, we commenced importing semen for contract mating.

"Harvey was determined to limit usage, however, and settled on around 50% of young bulls being by overseas sires with no New Zealand proof.

"Our concerns were subsequently confirmed by the Strain Trial but, in the early '80s, there wasn't the will to do such a complex trial when faced with compelling and emotive evidence that these overseas genetics would do so much good for our industry.

"The first semen imported was Puget Sound Sheik, father of Pajak Sheik Atlas, and the bull was used widely in contract mating, breeding something like 40 sons in that first year.

"The first hint of something going wrong was when, during the contract mating of Puget Sound Sheik, we also generated heifer calves and decided to do a yearling contract on them to see how well they performed.

"When we came to mate those yearlings we found there was a higher percentage than we expected which didn't calve as two-year-olds. That was the first bit of evidence that alerted us to the fact that our original reservations might be confirmed.

"The initial genetic conversions of the North American sires were very high — leaving our bulls for dead — but this perception was turned around when the daughters of these bulls were milked in New Zealand herds alongside daughters of New Zealand bulls farmed under pasture based systems. The assumed genetic superiority just wasn't there.

"The Strain Trial, conducted in 1999, gave the first real comparison between North American and Kiwi genetics, replacing emotive arguments with statistics. In short, our genetics were the best in the world for New Zealand conditions — hands down."

Open days at the Newstead complex drew large crowds of farmers each year. Here Harvey Tempero explains the rationale behind Premier Sires.

Traits other than Production

A national standard for Traits other than Production (TOP) was introduced during the 1980s, replacing the Conformation Survey and Jack recalls he and Harvey Tempero were among the first to be assessed and appointed TOP Inspectors.

"With Conformation Surveys you'd look at a cow and give it a score as to whether you believed it was good or bad. TOP, however, meant you apply a linear scoring, with a scale from 1 to 9, representing the biological extremes, eg rump angle — giving an objective, consistent appraisal of each animal.

"At the time LIC, Ambreed and the Breed Societies were all applying different weightings to traits and farmers needed consistency. This led to a collaboration which saw a first meeting of all the parties at the farm of Bill Montgomerie in the Waikato.

"I remember putting that first cow up and asking everyone to describe it as opposed to what we'd done previously — say whether it was good or bad in respect of all the aspects of conformation.

"It was new thinking, but provided the uniformity that the industry needed, and resulted in the training of TOP inspectors and a national TOP system."

Looking back

"When I look back on the history of the Sire Proving Scheme, the 1980s was a period of consolidation — the benefits from contract mating schemes, improved Sire Proving Scheme administration, computerisation, national Traits other than Production etc, were starting to flow.

The 1980s was a time where we worked very closely with the industry to demonstrate the importance of within-herd comparisons as they applied equally to both production and conformation. A great deal of time was spent with Breed Society inspectors appointed to assist us with the Sire Proving Scheme conformation inspections.

"LIC Board members including Jim Thwaites, John Murray and David Bay were part of inspection teams alongside LIC staff. It was a privilege to work with these industry leaders."

National Traits other than Production, introduced in 1987, records the following traits:

- Adaptability to milking
- Shed temperament
- Milking speed
- Overall opinion
- Weight
- Stature
- Capacity
- Rump angle
- Rump width
- Legs
- Udder support
- Front udder
- Rear udder
- Front teat placement
- Rear teat placement
- Udder overall
- Dairy conformation

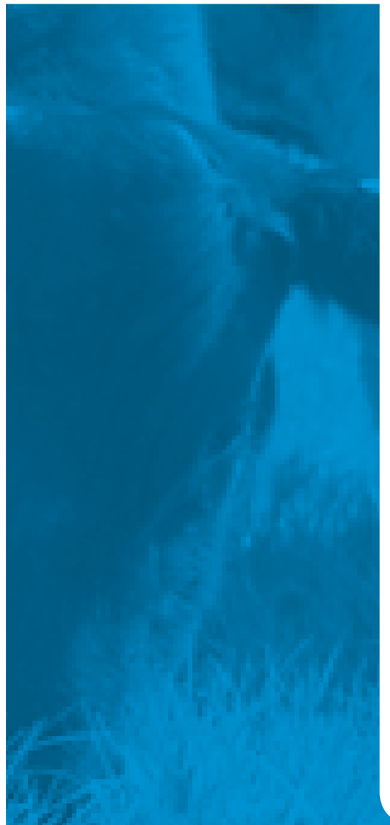
ARTIFICIAL BREEDING — BEYOND CATTLE

Jack Hooper recalls that artificial breeding and semen technologies applied — for a short time — to other animal species.

"We used to collect angora rabbits, using an artificial vagina the size of a thimble, during the late 1970s/ early 1980s when there was a peak in demand for angora fibre.

"We also collected goats at Newstead and sheep and dogs at Awahuri. I remember the days when they'd collect goats; there'd be a certain aroma in the air and the farm technicians weren't allowed to go into the cafeteria!"

Clockwise: Dr Pat Shannon, Tony Rumball, Harold Skjervold from Norway, Dr Brian Wickham, Hugh Clifford and Jeff Stichbury. Harold was a world renown geneticist and the photograph was taken during a rare visit to New Zealand, and LIC, to discuss genetics.



Research trials

Several significant research trials took place during the 1980s, including:

MOET

The aim of the trial was to increase the rate of genetic gain for the Sire Proving Scheme through Multiple Ovulation Embryo Transfer (MOET).

Previously, LIC issued three straws of semen for each contract mating cow to breed bull calves — MOET, however, raised the potential to be more selective by reducing the number of contract mating cows needed to generate a bull calf.

The trial involved LIC and Animal Breeding Services selecting 12 cows for an Embryo Transfer (ET) programme to generate multiple embryos which would, in turn, generate bull calves.

Using ET over cows in early lactation provided logistical difficulties but the practice has become common place.

CANZ Trial

The Canadian and New Zealand (CANZ) Trial was a semen exchange programme with Canada looking to identify whether there were genotype by environment interactions, eg was the top bull in Canada going to be the top bull in New Zealand?

The results proved there was a significant genotype by environment interaction and confirmed that bulls did not necessarily rank in the same order across the two production systems — ie Canadian and New Zealand.

LIC then imported semen from the top 20 Canadian bulls and inseminated half the daughters in a New Zealand herd – the other half were inseminated with 20 top LIC bulls. The trial was replicated in Canada.

The results of those matings supported LIC continuing to import the top four or five bulls from Canada for use as a team.

CANZ, in conjunction with the University of British Colombia, showed us that there were genotype by environment interactions that mean bulls that rank one way in their home country will rank differently in another country, individually — but as a team you'd have gains and losses which, in the end, balance each other out.

High/Low Breeding Index Trials

Trials were held at Ruakura and Massey involving the development of two herds — one high Breeding Index, the other low Breeding Index, to establish if Breeding Index or genetic merit contributed to overall farm profitability.

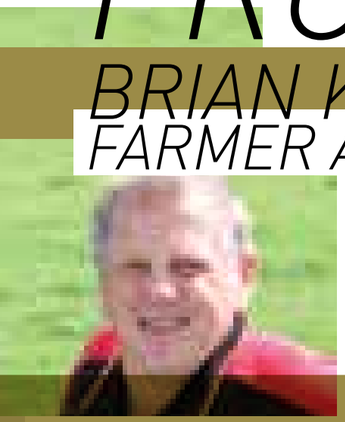
Overseas semen exchange trials

Several exchanges of semen were conducted with Ireland, Australia and Denmark to introduce the best of overseas genetics into the Sire Proving Scheme to see how well their progeny performed in New Zealand.

The need for these exchanges is no longer required, thanks to Interbull, which converts sire proofs from all member nations into one comprehensive listing of all artificial breeding bulls.

THE INTRODUCTION OF TRAITS OTHER THAN PRODUCTION

BRIAN KNUTSON, FARMER AND TOP CLASSIFIER



Brian Knutson was made Patron of Holstein Friesian New Zealand in 2010, when the Association celebrated its centennial.

He was a Holstein Friesian New Zealand Senior Judge from 1970-2001 and Classifier for 25 years, a Holstein Friesian New Zealand Councillor for 15 years. During his time he held the positions of Chairman of the Classification Committee, Vice President and President from 1987-89. Brian was also the Chairman of the NZ Dairy Breeds Federation and a member of the Dairy Breeds Advisory Committee (1997-98).

Brian was awarded an Honorary Life Membership of the Association and served for almost 25 years as a member of the panel overseeing the Holstein Friesian Classification workshops and certification of all TOP inspectors.

TOP workshop Katikati, 1985.

Founder and owner of the Ranui Stud in Otorohanga (King Country), Brian Knutson had, until he retired a few years ago (2006), been milking cows for 49 years. He was also on the Committee that introduced the Traits other than Production (TOP) system.

Brian was the Holstein Friesian New Zealand representative (and Chairperson of the NZ Dairy Breeds Federation) who, along with representatives from all the artificial breeding (AB) companies and Breed Societies, collectively agreed and introduced the TOP system of scoring conformation traits of dairy cows in 1987.

"The TOP system of linear scoring conformation traits for dairy cows is today practically the same as it was when originally set up more than 25 years ago. There has been the odd tweak to the way individual traits are scored, and the system moved to an electronic platform in 2003.

"I was a member of the Holstein Friesian Association and became a Classifier (of conformation of pedigree animals for the Holstein Friesian Association) and that's how I got involved in TOP.

"The TOP Committee first began meeting and discussing the establishment of a national standard to score all commercial dairy cows in 1985/86.

"Members on the national TOP Committee included Brian Wickham from Livestock Improvement, Tom Wallace from Ambreed, Owen Rountree from the Ayrshire Association, and Brian Carter from Jersey New Zealand.

"I was the Holstein Friesian representative to the NZ Dairy Breeds Federation and their representative on the TOP Committee. Until this time Breed Societies, Livestock Improvement and Ambreed all had different ways of assessing how 'good' a cow was – there was confusion in the market place and the industry needed a national system which described a cow in a linear fashion, so it was an objective not subjective, appraisal of the animal."

Those early meetings were held every two or three months and the TOP method of scoring and assessing dairy cows was "built brick by brick".

"Holstein Friesian New Zealand stepped out of the TOP system for one year as the Association wasn't happy with some of the weightings on various traits and found it hard to accept things like liveweight. Some members had difficulty accepting the weightings that constituted the calculation of Breeding Worth (BW)."

During Process

"Once, while on farm and working on the TOP system, we decided that some of us would go behind a wall, and one person would call out the TOP scores. The people behind the wall would draw, on a piece of paper, a picture of the cow based on the TOP scores to describe it.

"While it was a good way of testing the standards, the first time we tried this method the resulting cows didn't look too good so we knew it still needed work.

"As we got better with our TOP descriptions, we also produced improved pictures of the cows."

Farmer Perspective

"Generally, farmers were very comfortable with the introduction of the TOP system and they could see the benefits it provided the industry. Pedigree breeders really had no problems with TOP - it was the information going into BW that the Breed Societies had problems with, and the weightings on traits. Some members pulled out of classification for a few years, but most are back on board now.

"I believed in the TOP System and worked hard to get other farmers involved and to understand the long term benefits.

"As a result of TOP, cow conformation and two-year-olds today are streets ahead of those 20 years ago. There has been a steady improvement in the type traits within commercial herds."

Artificial Breeding (AB)

"AB has provided the industry with a cow that has continued to improve throughout the generations thus ensuring the farmer has every opportunity to improve their herd.

"Without AB, the industry would be struggling today with herds that lacked genetic gain. We have people like the late John Murray and the late Jeff Stitchbury to thank for their forward thinking vision, enabling the herd we see today."

The Sire Proving Scheme

"The Sire Proving Scheme with the inclusion of TOP data has made a major contribution to the dairy industry by increasing the rate of genetic gain across the national herd."

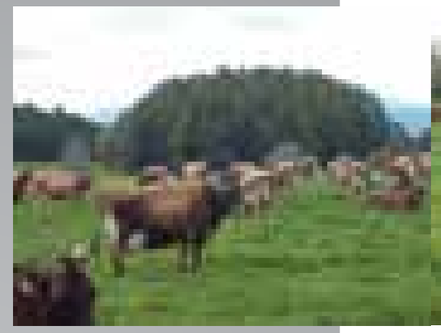
"Without AB, the industry would be struggling today with herds that lacked genetic gain. We have people like the late John Murray and the late Jeff Stitchbury to thank for their forward thinking vision, enabling the herd we see today."

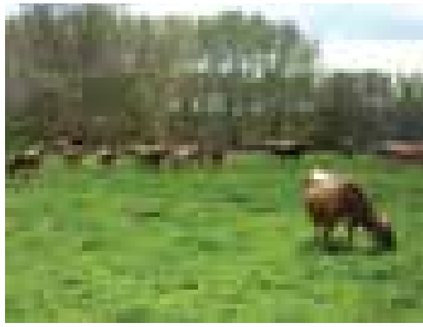
The word Holstein was added to Friesian in 1984, before this they were simply called Friesian cows.

"The breed in the early days was called Friesian, and this was appropriate as most of the bloodlines were imported from Holland.

"However, it was resolved to add Holstein to the name in 1984 as by then this was a truer reflection of what the cows were, since they now also included American bloodlines.

"The name Holstein Friesian describes the New Zealand cow well – the black and white cow we have now is better than the Friesian, and I don't see the name changing for the foreseeable future."





BREEDING PASSIONATE ABOUT DAIRYING

Jack Mockford

DAIRY FARMER AND JERSEY BREEDER, TE AWAMUTU, WAIKATO

In 1951, 19 year old Jack Mockford left the family farm in Sussex, England and came to New Zealand as a ten pound pom. He left behind a family farm where his father "in progressive experimental terms" started using Artificial Breeding (AB) a few years earlier and had been getting cows in calf to his special shorthorn bulls.

The technician was known as the bull with the bowler hat. And he operated 'green' (without a glove) and was available from the Milk Marketing Board daily.

"We were leading the pack, as most farmers at that time, weren't using artificial breeding, and generally borrowed the neighbour's bull."

Jack came to New Zealand because he wanted to milk cows on his own farm, something he could never do in England.

"I was interested in breeding, and after I arrived in New Zealand I knew I'd never leave."

Jack arrived in New Zealand in 1951 with 50 pounds — a parting present from his father — and was employed, under a two year New Zealand Government contract to work on a dairy farm.

"I began working on Herman Foche's Te Awamutu pedigree Jersey Taruna Stud, as a stockman for his sharemilker, Alec Pearson — who was also establishing his own pedigree stud.

Herman was pleased to have Jack's previous experience with AB and machine milking.

"That year (1951) the Taruna Stud had a dispersal sale where the average sale price was 21 pounds for each animal — which was roughly equal to my monthly salary!"

At that time around 99% of the herds in the Te Awamutu area were Jersey with a few mixed shorthorn herds.

"The local Jersey Club and the New Zealand Jersey Breed Association at the time were resistant to the introduction of AB as there were concerns it would affect their very profitable bull sales, and would spoil the national herd.

"Herman Foche and his sharemilker were enlightened farmers, however. They were passionate about Jerseys, herd tested and knew that AB opened up new bloodlines which would strengthen their herds."

After 12 months in New Zealand, Jack encouraged his UK based younger brother, Ralph, who was out of a job at the time, to join him in New Zealand. In 1952 Ralph arrived in the Waikato and secured work on a neighbouring farm.

About a year later, when their father realised neither of his sons would return to the UK, Jack and Ralph's parents and sister also emigrated to New Zealand.

In 1953 the brothers borrowed £3000 from their father, bought their first herd and went 50:50 sharemilking at Waikeria. A mark of the brothers' success was that they were able to repay their father in three years, at a rate of £1000 a year.

In 1954 Jack became involved with the Herd Improvement Association as a Testing Member and some years later as a Committee member, and started using AB.

"Today, as a result of the Sire Proving Scheme, AB and, more recently, DNA, all our herd, even the heifers, have very good temperament and good conformation — I wish it had been like that when I was young, but breeding for the right traits takes many, many years, and it is a very long and arduous journey.

"As a Jersey breeder I was considered a bit of a rebel and wasn't considered acceptable to become a classifier or a judge.

"I was always very pro herd improvement and AB, and in those early days spent a lot of time with Jeff Stichbury and Harvey Tempero, later as a director."

Jack would spend hours at farmer meetings trying to convince breeders of the necessity for policies for AB and bull selection "to lift the breeding index.

"New Zealand farmers, via their cooperative herd improvement societies, adopted AB quicker than their UK counterparts and the quality set by the LIC bull buying team was consistent, if at times controversial (because they selected bulls from different breeders).

"The contribution the Sire Proving Scheme, its farmers, and the contract mating cows have made to the New Zealand dairy industry is massive in the long term.

"The farmers involved, year on year in the Sire Proving Scheme, deserve the highest praise. By doing what they have; we have higher producing dairy cows that are, I would say, 20% to 30% more capacious today and massively more productive than they ever have been. Jersey cows have also become much more aggressive graziers — mine, for example, over the years, have gone from grazing only at the bottom of the hill, to going to the top!

"The improvement in genetic gain by Breeding Index (BI) and Breeding Worth (BW) and the advances we have seen in the dairy national herd didn't happen by accident.

"And while I don't know how you'd measure this, I also know that in my lifetime cows have become more intelligent — I jokingly used to blame Harvey Tempero for this, much to his amusement!

"I remember visiting a farm with Harvey Tempero where I met a farmer, Terry Spraggs (Pirongia), who was a devotee of the Sire Proving Scheme. His entire herd were daughters of Sire Proving bulls and it was a huge accolade to his farming skills, and to the quality of the stock, that one of his cows was selected for contract mating."

When TOP started

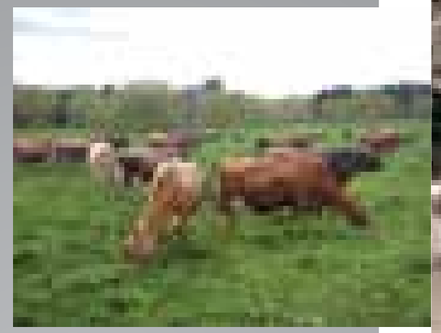
When Traits other than Production (TOP) started Jack was an LIC Director (Auckland) and so was Jim Thwaites in Taranaki.

"Jim was his own man and I liked and respected him. He asked me to become a TOP inspector — this really alienated me from the Jersey breeders of Te Awamutu, because they strongly believed that expertise in the conformation of dairy cows belonged to the breed advisors, and I hadn't been a judge or a breed classifier.

"Until TOP came in, of course, animals were classified on 'type' — what you liked — and TOP was an analytical way of assessing a cow's attributes for performance.

"It was a real change from how it had been and there were quite a few pedigree breeders who didn't accept a linear standard for assessing an animal regardless of breed, as TOP did."

"The farmers involved, year on year in the Sire Proving Scheme, deserve the highest praise. By doing what they have, we have higher producing dairy cows that are, I would say, 20% to 30% more capacious today and massively more productive than they ever have been."



SLOPING RUMPS

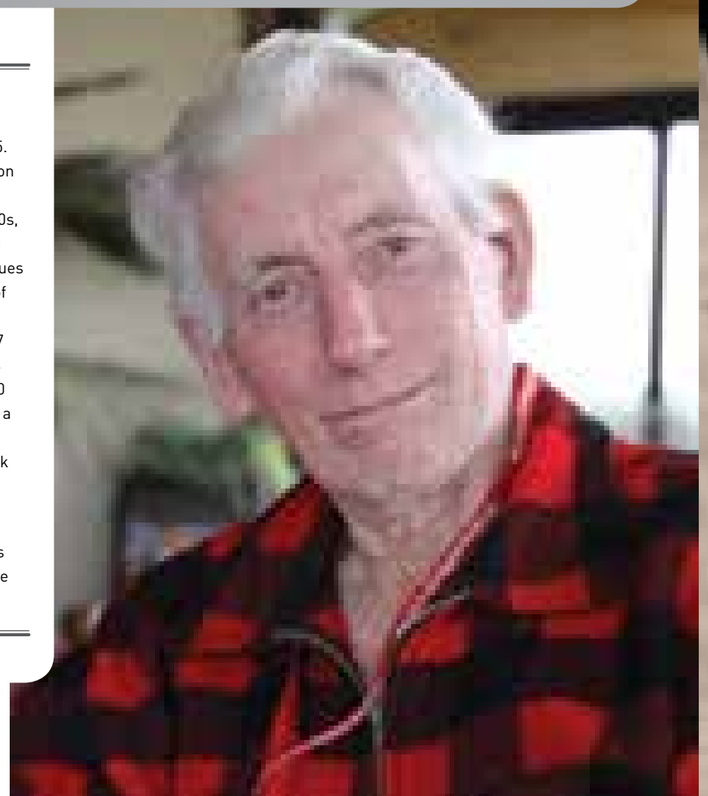
Jack Mockford recalls that some of the early stock generated by AB raised the ire of breeders — no more so than animals with sloping rumps.

"I remember going to a clearance sale at Leamington and you could tell the herd improvement AB heifers by the shape of the rump.

"At the time there were two camps — the breed societies liked animals with straight backs with no drop-off on the rump, whereas vets liked the slope because it helped the uterus drain after calving.

"Herd improvement was somewhere in the middle.

"As it turned out, the vets were right — but for a different reason — as cows with the traditional straight backs tended to end up with weak loins and their conformation only made the AB technician's job harder."



Jack and wife Margaret still live on the run-off they purchased from Margaret's parents in 1995. The day-to-day farming operation is owned and run by their son Allan, but despite being in his 80s, Jack's passion for breeding and genetics remains and he continues to look after the breeding side of things — their herd's Breeding Worth (BW) is more than BW127 and this season (2011) Jack has 21 contract matings with LIC (10 heifers and 11 cows). Margaret, a former MINDA field officer, still does some of the recording work and tag ordering.

Jack was a member of the Auckland LIC Board of Directors and was a TOP inspector until he retired in 1991.

International *perspective*

Jake Chardon (past CEO Holland Genetics)

Jake Chardon was involved in herd improvement in the Netherlands from 1983 as CEO of one of the country's three Artifical Insemination (AI) cooperatives. When they combined into one organisation, Holland Genetics, Jake was appointed its CEO.

Now resident in New Zealand and working as a consultant to LIC, Jake recalls that the development of LIC's Sire Proving Scheme was not done in isolation to the rest of the global industry.

"The demographics of each country and the culture of its dairy industry influenced the style of sire proving programme.

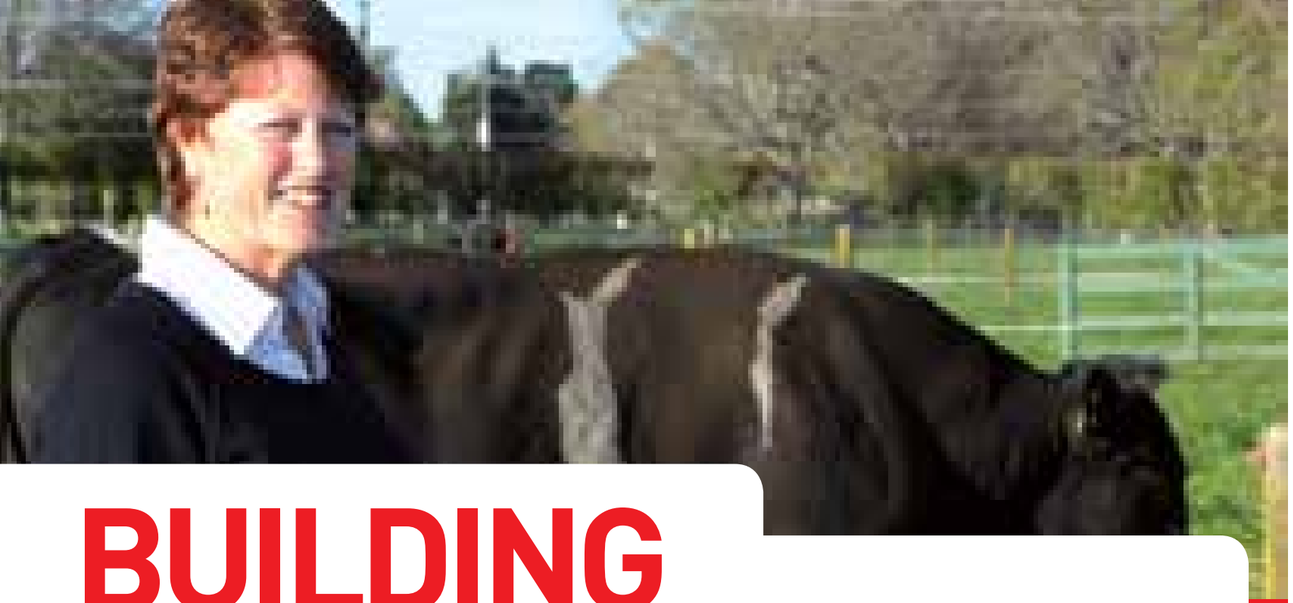
"Each country's system aimed at a similar outcome — proven sires — but each approached it differently.

"In New Zealand, there was a defined number of sire proving herds, whereas in Holland, where average herd size was 35 to 40 cows, all members of the cooperative were required to mate all second-calvers to young sires.

"In contrast with New Zealand where the cost of young sire semen was discounted to members of the scheme, in Holland the semen was provided free to cooperative members with a bonus paid for the first lactation of the resulting calves."

Jake recalls that the LIC system of sire selection and sire proving attracted worldwide admiration because, "it wasn't based on JUST emotion, it was based on science. It was very straight-forward and economic, designed to deliver the animals farmers needed to be profitable.

"At Holland Genetics we loved to work with LIC because they had that scientific view of dairy cattle breeding."



BUILDING RELATIONSHIPS

Ann Scott Sire Proving Scheme Administrator, 1982 to 2011

A Wellington city girl, with no dairying experience, Ann Scott joined the New Zealand Dairy Board in January 1981 as receptionist for the Farm Production Division. One year later she was appointed Administrator of the Sire Proving Scheme and, in January 1982, made the move north to Newstead, along with other members of the Farm Production Division — Harvey Tempero, Jeff Stichbury, Hugh Clifford, John Murray, Graeme O'Neil, Susan Andrew, Lynn Jessop, Rosie Finch and Brian Wickham.

Before she stepped into the Sire Proving Scheme Administrator role, Ann worked with Three Generation Pedigrees (3GPs).

"Producing a 3GP in those days was very manual compared to today. Then it required research of the dams and sires from the registry books and microfiche, typing these onto A3 paper and then gluing on the bull pictures. Today a 3GP is produced, from the database, at the push of a button.

"It was also difficult, in the 1980s, to undertake statistical analysis of what was being achieved through Sire Proving. Our objective was the same as it is today, to ensure we had enough daughters for a bull's proof, but in the days pre-computer we didn't even know if Sire Proving Scheme members were achieving the required number of daughters for Scheme bulls.

"It came down to a high degree of trust - with no reports to work with we had to trust our members were doing what was required to generate the necessary information for bull proofs."

Until 1986 records were limited, and the only information, kept on a card system, was the number of years Sire Proving Scheme farmers were enrolled in the Scheme.

"Then came the wow factor — in 1986 our section was given a computer. We shared it between four staff and this enabled us to punch all Sire Proving Scheme members' contracts into the system, going as far back as 1980. This enabled us, for the first time, to link into farmer records of calvings and heifer calf replacements on the database.

"Once we had computers we were able to see if contract requirements were being met. We were able to add statistics, analyse results and look at individual

"Then came the wow factor — in 1986 our section was given a computer. We shared it between four staff and this enabled us to punch all Sire Proving Scheme members' contracts into the system, going as far back as 1980. This enabled us, for the first time, to link into farmer records of calvings and heifer calf replacements on the database."

Ann Scott, Richard Spelman, Greg Marshall, Harvey Tempero.

member's contracts. The increased visibility meant that if we had any concerns or questions we could telephone our members and talk to them.

"That's when the Scheme, for me, took on a personal element because I got to know the farmers really well — and then, when I finally had a chance to go out on farm with Traits other than Production (TOP) Inspectors, I was able to put a face with the voice, which was great.

"Computerisation of TOP inspections, however, means I no longer get the opportunity to get out on farm and mix with our farmer members, but the bond remains through opportunities like the annual Sire Proving Scheme Farmer of the Year Award and Breeders Day.

"Friendships with many of our long standing members go back 20 or more years — people like Owen and Margaret Thomas, John and Pauline Wheeler, David and Maureen Clegg, David and Sue Kowalewski, John and Jeanette Tootell, Sharron and Alan Davie-Martin, to name but a few. Special people; special job; a privilege to work with them.

"The members have such passion and loyalty to the Scheme, as do the Livestock Selection Team at LIC — together farmers and LIC have made Premier Sires the product it is today."

Sticking with the Scheme

David and Lois Gibbins, longest serving members of the Sire Proving Scheme

Taranaki couple, David and Lois Gibbins are the longest serving Sire Proving Scheme members in the country.

Their contribution and dedication was formally acknowledged at a special launch of the 50-year Sire Proving Scheme celebrations, at the National Fieldays in Mystery Creek, in June 2011.

However, the Gibbins initially became members of the Scheme almost by default when they began working as 50:50 sharemilkers on their Inglewood farm in 1982.

"When we first started farming we went straight into 50/50 sharemilking. We bought the complete herd from the farm owner. He had been using Sire Proving Scheme genetics over his herd for two years.

"I remember discussing the Sire Proving Scheme with him when we talked about buying the herd and other farming stuff. After he had explained the Scheme, he asked if we wanted to continue with it and we said yes."

Initially the couple saw the Sire Proving Scheme as a way to help grow their herd and achieve their aspiration of farm ownership. As time went on, however, their appreciation of the value of what they personally gained from the record keeping, herd testing and increased rate of genetic gain in their herd, coupled with the pride in what their efforts were helping to deliver for their fellow dairy farmers and the New Zealand dairy industry, meant they never considered leaving the Sire Proving Scheme.

After seven years as sharemilkers, David and Lois purchased the farm in 1989 and after 30 years on the same property, have raised four children, Benjamin, John, Latham and Jasmine, built their farming business (average 55,000kg/MS) and grown their herd to 185 Jerseys on 80 hectares (60 hectare milking platform with a 20 hectare run-off).

"When we first bought the herd we purchased 204 cows to calve and consistently aimed to milk 200 cows all season for many seasons (it's only in the last four seasons that we have dropped the stocking rate to 185).

"We liked the idea of a rebate for our heifers and reasonably priced semen. The reason we stayed with the Scheme is because it just gets better and better.

"We have always had a good selection of bulls used in our herd that have gone on to become Premier Sires and we have always got good heifers.

"Now with the DNA bulls we are seeing even better bulls coming through as the Sire Proving Scheme tests the validity of DNA, and we are getting an even better selection of high BW bulls to start with."

"The Scheme has been pretty consistent — we had our role to play and others had theirs — and it's of huge value and interest for us to be involved in what's going on to improve the rate of genetic gain in the national herd.

"One significant change in recent times has been the ability to DNA profile your herd. Accuracy has always been an issue, matching claves to dams, but with DNA we are now sure we are keeping the correct replacement heifers.

"Accuracy, no matter how thorough or careful you think you are, is always a challenge — mismothering happens.

"Being members of the Sire Proving Scheme you certainly don't lose anything, the figures stack up, you gain. We keep all our heifer calves each year — between 45 and 50 — and the herd averages BW84 and PW86.

"We have never really had any management issues or badly behaved cows and though there is a bit of extra work involved with scoring for Traits other than Production, weighing and Herd Testing, it's been win win for us.

"We really get to know our heifers, and have never had one we couldn't milk, in fact our heifers are generally quite quiet."

The Gibbons believe key attributes to being good members of the Sire Proving Scheme include good stockmanship, accuracy with records, and patience.

"People working for you may not be as accurate as you are, for example, at calving time, — they may not 'get' the importance of what you're doing and the need for absolute attention to detail. It's therefore important that Sire Proving Scheme members make sure staff are well trained and understand the importance of what we're doing.

"It's important you like what you are doing, that you are observant and that when you look at your heifers you don't just see another cow, but your Sire Proving Scheme heifer."

"The Scheme has been pretty consistent — we had our role to play and others had theirs — and it's of huge value and interest for us to be involved in what's going on to improve the rate of genetic gain in the national herd."

Paul Finch

Sire Proving Scheme farmer,
Canterbury, 1981 to 2007

CANTERBURY FARMER ***PROUD*** *TO BE PART OF SCHEME*

Paul Finch first became hooked on the Sire Proving Scheme in 1981 when, as a 50/50 sharemilker in Canterbury, he started his 26-year membership of the Scheme.

"I probably chose to sign up for the same reason as most people — the cost benefits — but I quickly developed an interest in what I was doing, for myself and the industry, in trying to improve the genetic base.

"I was pretty co-operative driven and that's what the Scheme is — members do the work and get the cheaper costs. They're doing it for everyone else who uses Premier Sires so there's got to be a cost benefit for the work they do.

"I got hooked and carried on through my 20-odd years but in my view the whole concept is pretty reliable, even though I possibly only ended up with a few daughters from bulls that got into Premier Sires, they can still be a very good bull but not make the team.

"Back then you were pretty much treated like a leper if you were in the Scheme, compared to those that used Premier Sires, because it was seen as the poor option, but mainly out of ignorance.

"They didn't realise it was just as good, and I was proud to be a part of it.

"There was a period where we didn't get the advances they wanted with overseas genetics, but they tried, and I certainly wouldn't have been able to go through the herd and say which were from overseas genetics.

"It was one of the things we had to contend with but I had no problems with what happened.

"But I wasn't a pedigree breeder, I was more commercial and I was hard on culling cows. If a heifer didn't perform she went, simple as that."

Paul was awarded Sire Proving Farmer of the Year in 1999 and now, as an LIC Customer Relationship Manager (CRM) in Ashburton, he remains a strong advocate of the Sire Proving Scheme, but says it's not suitable for all farmers.

"Many of the farms and herds in my area are too big for successful participation in the Scheme, for example. I won't sign up farms and farmers unless I'm sure they are suitable.

"If people are just in it to save money, and that's their sole reason then they shouldn't be there. They should want to help the industry, and have good recording because that's a big part of the Scheme's success."

The Sire Proving Scheme is second to none in his view.

"I've always been reasonably one-eyed about LIC. There are a few things in LIC that make it what it is, and the Sire Proving Scheme is key, but to have that you've got to have a database and a herd testing service.

"Without those three things we wouldn't have daughter proven bulls. It is the backbone of farming as we know it today."

Scoring for the Sire Proving Scheme

Des Alexander, *Jersey Breeder and TOP Inspector, Taranaki.*

Taranaki Jersey breeders, Des and Nyla Alexander, started their dairying career in 1961, as 50/50 sharemilkers in Hawera. After five years sharemilking, they purchased their first farm at Inglewood. Eleven years later, in 1977 they purchased a 73 ha farm in Dudley Road, Inglewood. The same farm is now run and owned by their son Greg and his wife Carolyn who have grown the farm to 127 ha and are currently milking 340 cows.

With the sale of the dairy farm, Des and Nyla purchased a 40 ha property in Bell Block (Taranaki) in 1991 and now rear and run dairy beef.

Des joined the New Zealand Jersey Association in 1964 and was a member of the Livestock Improvement Taranaki Board for 12 years (1982-1994), during which time he was certified as a Traits other than Production (TOP) Inspector. He was also a Jersey New Zealand Councillor for six years from 2002.

Traits Other than Production (TOP)

"The Jersey breed society got involved in Traits other than Production (TOP) in the late 1980s and this is when I first became involved with the Sire Proving Scheme.

"I was elected onto the Livestock Improvement Board (Taranaki) and when TOP was introduced I was certified as an Inspector.

"I wasn't involved directly with the Sire Proving Scheme, but as a TOP Inspector was involved with TOP scoring, looking at contract cows, Sire Proving Scheme heifers, and buying bull mothers.

"I would go onto farms to assess/score Sire Proving Scheme daughters for TOP. In addition we would also be collecting farmer experience on adaptability to milking, shed temperament, milking speed and overall opinion.

"Bulls were selected for the Premier Sires team based on this information and their daughters' herd testing results.

"In the early days we would score seven or eight parts of the cow to describe it; now there are around 17 traits in the TOP assessment.

"TOP linear scoring has contributed a tremendous amount; it means all cows are taken into consideration, whether they are from pedigree breeders or commercial farmers when bull buying for the Sire Proving Scheme."

1970s, Inglewood Jersey Cattle Club Annual Show. Des Alexander is presented with the Champion Trophy by Mrs Oma Locke.

The Sire Proving Scheme

"When the Sire Proving Scheme began in the 1960s bulls were only purchased from breeders and commercial farmers who kept good identification records.

"At that time Scheme bulls were used mainly by sharemilkers, as a reasonably priced way of getting cows in calf.

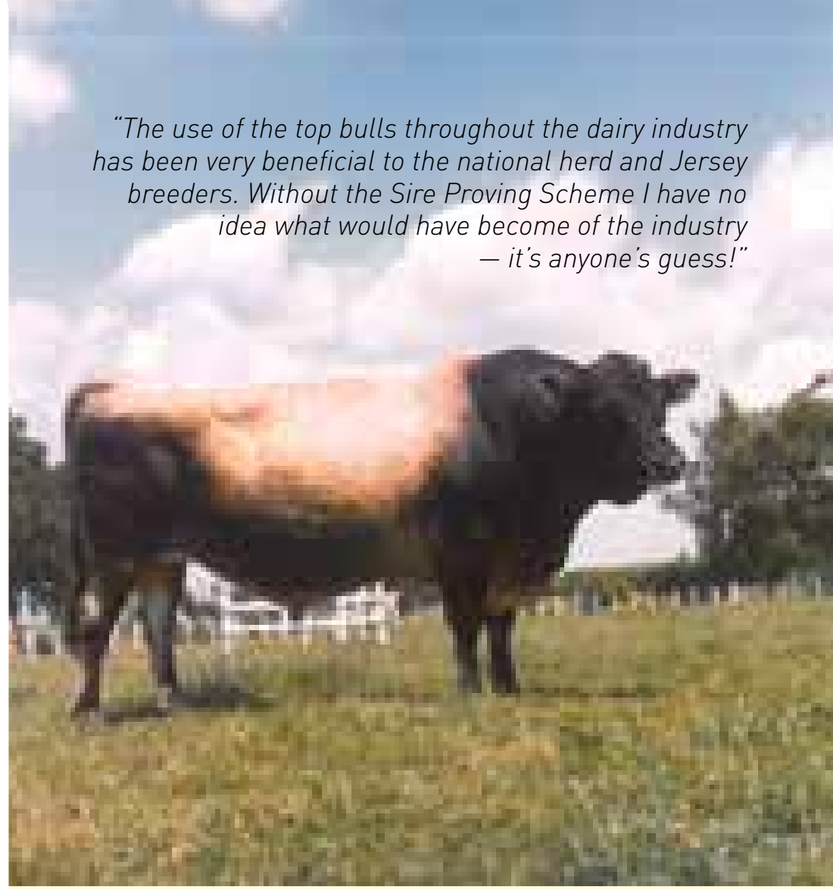
"The use of the top bulls throughout the dairy industry has been very beneficial to the national herd and Jersey breeders. Without the Sire Proving Scheme I have no idea what would have become of the industry — it's anyone's guess!

"The best Jersey bull to come through the Sire Proving Scheme, in my opinion, has to be Glanton Red Dante, but other bulls to come forward with distinction include Maori Bestman and Judds Admiral, all of which nationally have made a significant contribution, not only in production, but conformation and the way their daughters milk.

"And through their sons and daughters the Premier Sires team has contributed an enormous amount to the national herd. The Scheme also used overseas bulls which have added strength to the genetics of the national herd.

"Through the Sire Proving Scheme, daughters become available and are contracted for mating. This is ongoing and continues to help accelerate the rate of genetic gain."

"The use of the top bulls throughout the dairy industry has been very beneficial to the national herd and Jersey breeders. Without the Sire Proving Scheme I have no idea what would have become of the industry — it's anyone's guess!"

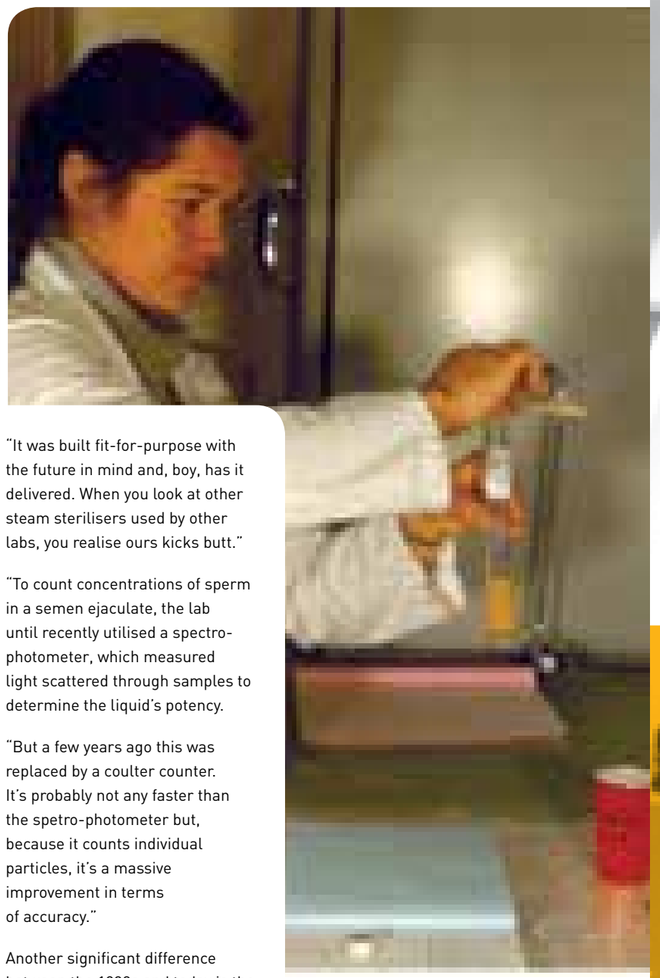


Maori Bestman (above) and Judds Admiral (below)

OPTIMISER MAKES LIFE SIMPLER –

BUT A BLACK BOX IS STILL A BLACK BOX.

SUSAN PAUL,
LABORATORY SUPERVISOR



A young Susan Paul at work in the Newstead lab.

Susan Paul has been working in LIC's semen processing laboratory for nearly 30 years, and contrasts the technology available today with the manual processes used in the 1980s.

"In the 1980s, when I first started, we'd start work at 4.30am, and we'd just keep on working until all the bulls were collected. Then we'd go over to the LIC cafeteria and the lab and farm staff would all have a cooked breakfast together.

"It was a kind of de-brief, because we'd talk about how the morning run had gone. Then we'd go back to our jobs, finish off some administration work, and prepare for the following day."

The demands of the job were exhausting. "It was so full-on for those few hours in the morning — there was a lot of pressure on both farm and lab staff. In the lab we'd constantly be doing calculations to make sure what was being produced was correct for the day."

One factor that has not changed since the 1980s was the laboratory facility itself.

"It's only now that it's probably getting a bit cramped. But there's little doubt it's stood the test of time. It was designed by staff of the day and it's done its job superbly.

"It was beautifully appointed. For example, the benchtops — Corian of Du Pont — were top-of-the-range; at $1000 per metre they were incredibly expensive, especially when you think about what that kind of money was worth back then. But the benchtops have proven their worth and stood the test of time.

"Then there's the double-door autoclave (a steam steriliser for all laboratory glassware). It was purchased in the 1980s and admittedly it's since had a few new parts, but it's still going strong.

"It was built fit-for-purpose with the future in mind and, boy, has it delivered. When you look at other steam sterilisers used by other labs, you realise ours kicks butt."

"To count concentrations of sperm in a semen ejaculate, the lab until recently utilised a spectro-photometer, which measured light scattered through samples to determine the liquid's potency.

"But a few years ago this was replaced by a coulter counter. It's probably not any faster than the spetro-photometer but, because it counts individual particles, it's a massive improvement in terms of accuracy."

Another significant difference between the 1980s and today is the way Sire Proving Scheme semen is allocated to farms throughout New Zealand.

"Sometimes you just can't beat the human touch."

"The job of allocation used to take me hours and hours and hours. I used to do it all pretty much through my knowledge of the bulls and what the Sire Proving Scheme requirements of the day were."

As technologies progressed so too did the sophistication of Sire Proving Scheme processes. By the early 2000s LIC had developed what was essentially a computer algorithm, designed specifically to allocate straws automatically.

At this point, Susan plants her tongue firmly in cheek: "Our IT (Information Technology) people dreamed up the nice name for it — the Optimiser - but to me it's still a black box."

In its first year of operation The Optimiser was closely monitored. Allocations were looked over by Susan before they went out: "I had to hold its hand to ensure everything ran ok."

Today Susan still monitors the black box — "just to be sure. I'll know if a bull has been replaced, or if there's been any issue that the computer just can't pick up.

"Sometimes you just can't beat the human touch."

1990

Photograph: Alexander Turnbull Library.

SIR PETER BLAKE
and his crew, aboard Steinlager II, win the Volvo Ocean Race (1990).

1990

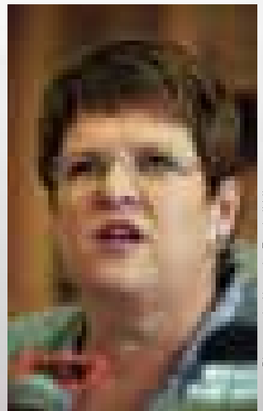
Half-brother Holstein Friesians **SD Dawsons Belvedere** and **Kingsmill PA Walesa** progeny tested, first equal in reaching 1 million inseminations and going on to lifetime inseminations of 1,235,000 and 1,268,000 respectively.

50 millionth dose of bovine semen produced at Newstead.

1991

Jim Bolger becomes Prime Minister (1990) and, on retirement (1997), is replaced by New Zealand's first woman Prime Minister,

JENNY SHIPLEY.



Photograph: Alexander Turnbull Library.

30 January 1999. Prime Minister Jenny Shipley speaking at a press conference about a Cabinet reshuffle.

1993

LIC and Holland Genetics form alliance to progeny test bulls, undertake research and development, and provide a semen agency.

Van der Fits Fjord progeny tested. World record for lifetime inseminations by a Jersey bull of 659,000, still highest use Jersey bull and still a world record (in 2011).

First crop of Holland Genetics/LIC joint venture bulls born.

DNA parentage verification of all Sire Proving Scheme bulls begins.

Sire Proving Scheme daughters now weighed annually as two year olds.

1994

Delta NLD Gerris-ET, imported from Holland Genetics as an embryo, begins progeny testing. Production curbed by semen production issues, Gerris went on to be a sire of seven bulls which graduated to the Premier Sires team, including one of the 'stars' of the late 2000s, MacFarlanes Dauntless.

1995

SRB Collins Royal Hugo progeny tested, youngest bull in world to achieve 500,000 inseminations (as a five-year-old after 2 seasons), youngest bull in world to achieve 1 million inseminations (as a seven-year-old over 4 seasons). Third Premier Sire to achieve 1 million inseminations. Highest use Premier Sire bull of any breed. 1,300,000 lifetime inseminations.

THE *DAIRY INDUSTRY* had

13 dairy companies.

14,736 herds.

2.9 million dairy cows with average per cow production of 283 kg milksolids.

A record 2 million cows (or 79% of the national herd) are artificially inseminated.

1996

Sire Proving Scheme increases from 155 to 235 bulls per annum involving 105,000 cows.

New Animal Evaluation system introduced to improve selection accuracy and rate of genetic gain.

Breeding Worth (BW) for both sires and cows introduced, superseding Total Breeding Index (BI) for sires.

Across breed animal evaluation introduced – world first. Production Worth, Lactation Worth and BW fully comparable for all breeds and crosses.

1997

LIC AB Technicians first use ***DataMATE,*** handheld computer to record inseminations.

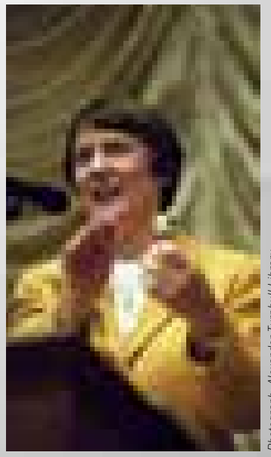
Caprogen concentrate field trialled.

MINDA launched.

MINDA
ANIMAL MANAGEMENT INFORMATION

HELEN CLARK
speaking at a Grey Power meeting, Southward Car Museum, Paraparaumu.

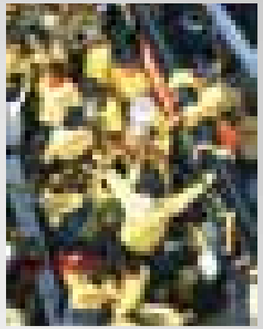
Helen Clark's fifth Labour Government is sworn into power (1999).



Photograph: Alexander Turnbull Library.

TEAM NEW ZEALAND
wins the America's Cup.

View of New Zealand crew victorious on deck of Black Magic yacht while docked at crowded port after winning competition, San Diego.



1998

Caprogen concentrate introduced.

All progeny test daughters confirmed to sire by DNA analysis.

Last year of Ayrshire progeny testing.

1999

For the first time, semen is available from small team of unproven crossbred bulls.

The LIC Hall of Fame, recognising the pre-eminent bulls in dairy industry artificial breeding, is opened.

Breeding scheme for short gestation length bulls begins (first contract matings).

LIC one of the first organisations in the world to use marker assisted selection for milk production traits to pre-select bulls for the Sire Proving Scheme.

NEW frontiers
— overseas genetics, world records and product differentiation

By the start of the 1990s, interest in overseas genetics was building, and farmers wanted the protein production and cow conformation being achieved in northern hemisphere herds.

The message was coming through loud and clear from our farmers — they wanted overseas genetics, and our job was to apply Kiwi ingenuity to the varied levels of data around the bulls, and make the best selections we could."

It was the days before the single listing of international bulls that today's Interbull provides, which meant breeding companies had to make sire selections based on country-by-country equations. LIC Breeding Manager, Allan McPherson, recalls that presented unique challenges.

"There was a very small subset of bulls which had progeny and proofs in more than one country. The conversion equations were better than nothing but less reliable than we would have liked.

Allan McPherson
LIC Breeding Manager

Delta NLD Gerris ET

"For example, if there was a bull we were interested in from the United States, we could only determine whether he was of interest to us by assessing him on the United States conversion equation to New Zealand; and then we would have another bull from another country and would have to assess him on his country's conversion equation to New Zealand. This variability meant you were never on the same level from one country to the other and were always looking at different equations.

"New Zealand wasn't the only country faced with this problem, however, and the need for one central calculation and repository of sire information lead to Interbull introducing enhanced evaluation procedures in the mid 1990s. At last there was one listing for bulls across all countries, giving us more reliability and confidence in a single set of figures.

"Our desire to provide farmers with the genetics they wanted was balanced with awareness that there would be a genotype by environment interaction. We had some real concerns about fertility, as the overseas herds many bulls were proven in were milked year round, and were not under the reproductive pressure of our seasonal industry.

"Harvey Tempero and I were outspoken in counselling a middle-of-the-road approach — we felt the balance needed to be set at around 50% overseas to New Zealand genetics, but had to apply a scientific logic behind this before we were able to persuade farmers that this was the right approach.

"There wasn't a Fertility Breeding Value in those days, but we had to ensure that any bulls we brought in added, rather than detracted, from our breeding programme. In hindsight, we brought some bulls in that were better than New Zealand bulls but also brought some in which, with the data we have at our disposal today, we wouldn't consider now.

"There are also numerous recent examples of overseas bulls which, even though bred in completely different production systems environments with no emphasis on fertility, have good fertility Breeding Values in New Zealand.

"Overall, the importation of overseas genetics increased the diversity of the gene pool in this country, adding much needed new bloodlines.

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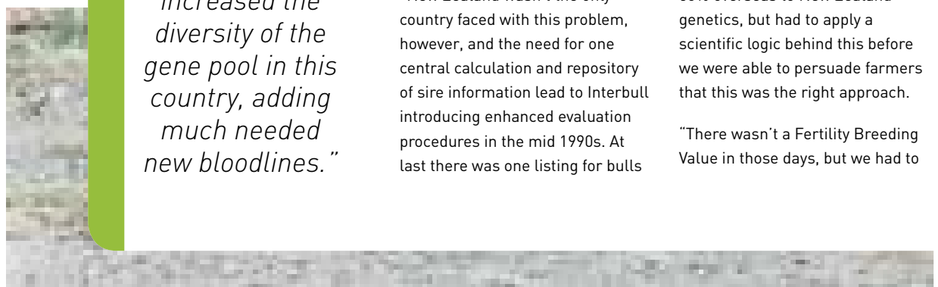


Embryo importation programme

"The 1990s also saw a concerted effort applied to importing embryos (Holstein Friesian and Jersey) as a way of accelerating genetic improvement. In the main, these came through the joint venture established with Holland Genetics, with genetics sourced from the United States and Europe.

"It was a means of bringing in 100% overseas genetics (sire and dam) and gave us access to bloodlines which were not marketed in New Zealand.

"Our five year alliance with Holland Genetics began in 1993 and led to the importation of a number of embryos, including one which was to become a spectacular sire of sires, Delta NLD Gerris-ET.

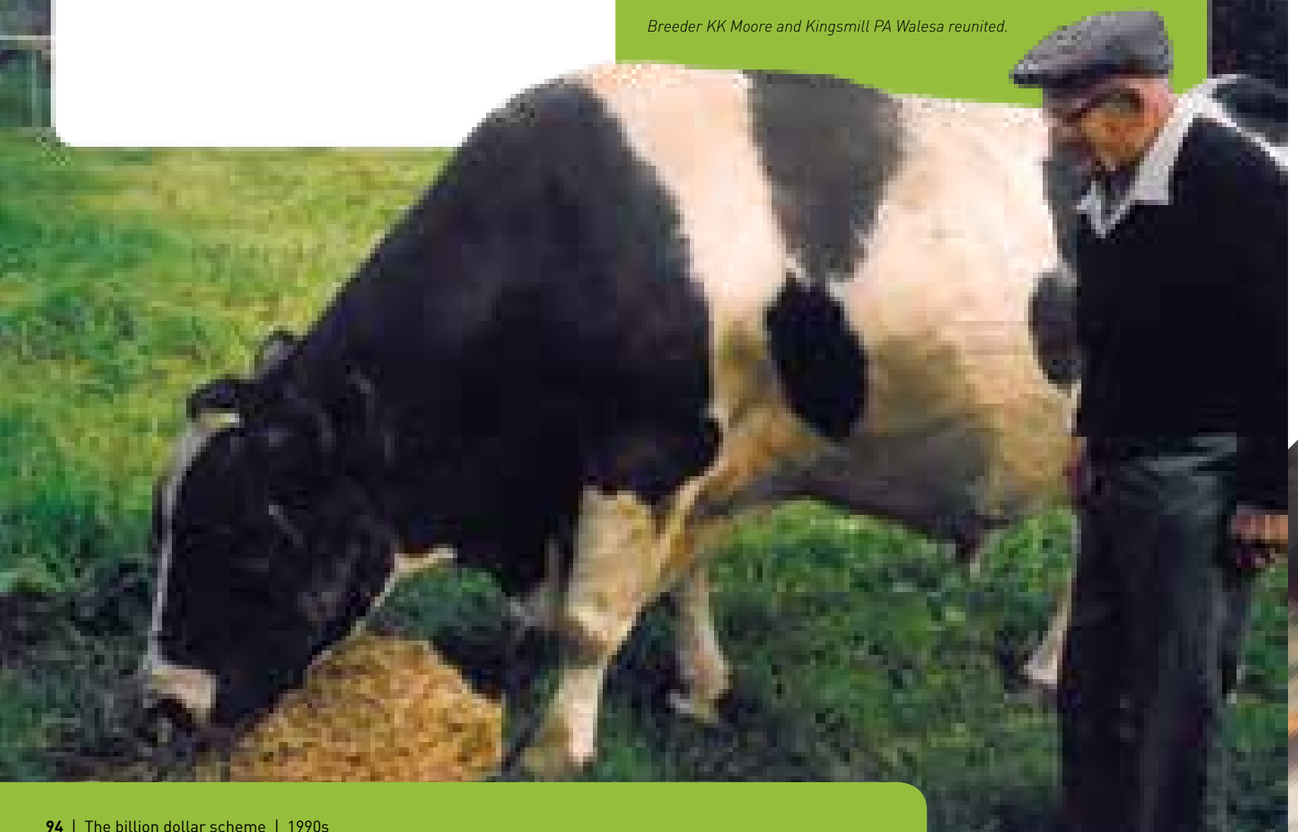
"By the time we got through the 1990s and into the 2000s the percentage of overseas bulls was starting to track away and it has been this way for sometime. If you look at Interbull listings today, overseas bulls struggle to get into the top 100 which is largely dominated by New Zealand bulls — and that is due to the relative uniqueness of our selection objectives and Breeding Worth index.

"What the overseas bulls did was provide us with an infusion of genes; the best genes have survived and circulate within the female population. We are utilising those in today's breeding programmes.

World records

"Here at home, our bulls were, by the mid 1990s, pushing through the million straw mark — first Holstein Friesian half-brothers Kingsmill PA Walesa and SRD Dawsons Belvedere and, at the close of the decade, SRB Collins Royal Hugo. And in the Jersey ranks we had some spectacular bulls like Judds Admiral, the first Jersey bull, to exceed 500,000 inseminations, and Van der Fits Fjord which set a world record for a Jersey bull with 659,000 lifetime inseminations."

A very small number of elite bulls have, over the years, been returned to their breeders and Kingsmill PA Walesa was one. This photograph shows breeder, KK Moore, welcoming Walesa home.



Breeder KK Moore and Kingsmill PA Walesa reunited.

Size and make-up of the Sire Proving Scheme

The 1990s began and ended with three breeds represented in the Sire Proving Scheme – albeit different breeds.

At the start of the 1990s, the Scheme included Holstein Friesian, Jersey and Ayrshire — at the end, Ayrshire had gone, their spot filled with KiwiCross™.

"We'd been progeny testing around 10 Ayrshires a year in the Scheme until 1996 when the new Animal Model was introduced. Its across breed evaluations confirmed that the Ayrshire breed wasn't ranking as highly as the Holstein Friesian and Jersey.

"This, and the fact that the cost of Ayrshire progeny testing was largely being subsidised by the other breeds, resulted in an agreement with the Ayrshire Association which saw them take on responsibility for progeny testing Ayrshires.

"LIC continues to work with the Ayrshire Association on various aspects of their breeding programme, ranging from help with selection decisions (cows for contract mating and bull calves for possible purchase) and marketing of Ayrshire semen through Alpha Nominated.

"Development of a KiwiCross™ breeding programme was initiated in the late 1990s and quickly made an impact when a bull from the second intake, Scotts Northsea, headed off the All Breeds section of the Ranking of Active Sires List in the mid 2000s.

"Fuelled by work conducted by our Research and Development team, the size of the Sire Proving Scheme was increased from 155 bulls in the mid 1990s to 235 bulls and at the end of the decade, increased again to 300."

Forward Pack

"The introduction of three-weekly Animal Evaluation runs, alongside the Animal Model in 1996 allowed us — for the first time — to identify elite bulls based on part-lactation information. Previously, Animal Evaluation runs had been performed only once or twice a year and had never been available in time to adjust selections prior to spring mating.

"The ability to bring great four-year-old bulls to market presented a significant opportunity to advance genetic gain. They were known as Forward Pack bulls and the concept still remains in Premier Sires today, 15 years after its inception.

Short Gestation Length

"The success story that the Short Gestation Length programme has been, began in the late 1990s enabling us to market a bull today which has a Breeding Value of minus 16 days or, in other words, more than a week less than the traditional gestation length.

"That type of innovation adds huge value to our farmers, enabling them to tighten their calving pattern without the need for interventions."

Accolades

In the late 1990s, LIC formally instituted two very appropriate accolades for its AB programme — the LIC Hall of Fame, and the Sire Proving Scheme Farmer of the Year Award.

The former, established at LIC's Head Office at Newstead, celebrates the pre-eminent bulls that have featured in more than 55 years of AB and is a source of interest for visitors from around New Zealand and the world.

The Sire Proving Scheme Farmer of the Year Award was also initiated in the late 1990s to acknowledge and celebrate the dedication essential to a world-leading Sire Proving Scheme.

The start of the DNA age

LIC began its multi-million dollar investment into biotechnology during the 1990s.

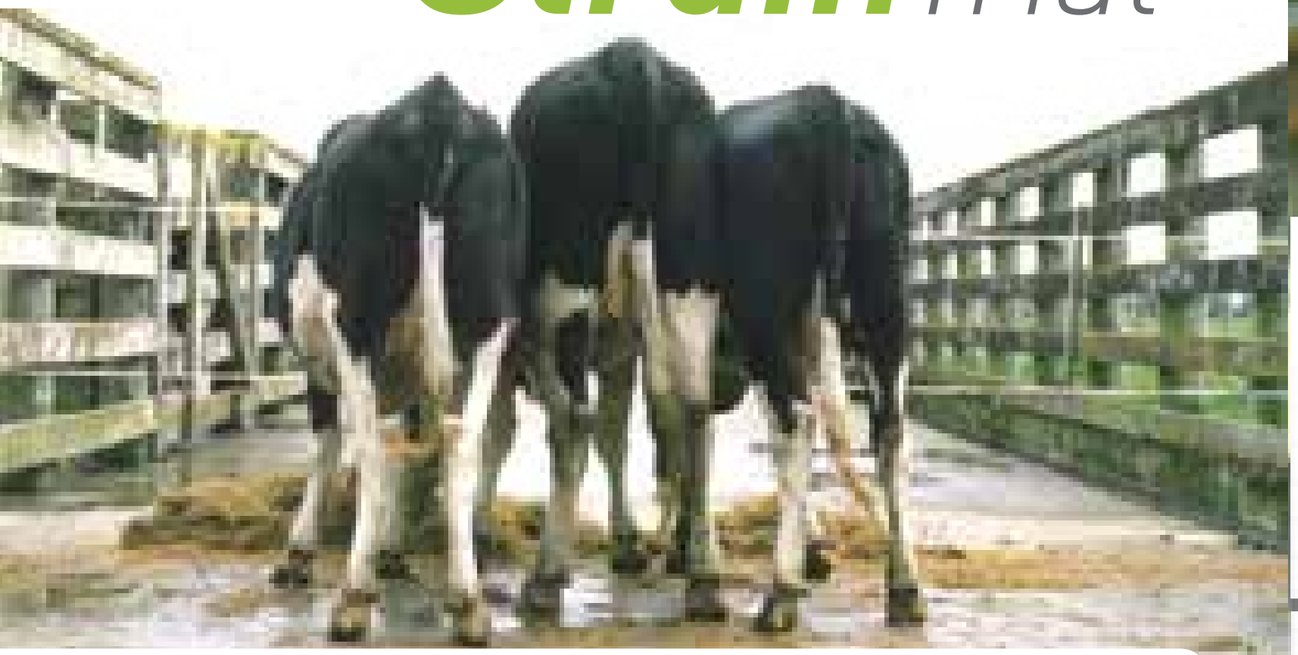
"We started thinking about DNA because of the advances which were being made in that area — Marker Assisted Selection was being investigated by a number of countries and breeding programmes and we needed to keep pace.

"The initial work on Marker Assisted Selection has evolved into today's Genomic Selection programme."

DNA based genetic defect testing of bulls, initially for BLAD and Citrullinaemia, began in the early 1990s, with further defects being added over ensuing years as they have been identified via modern technology.

"The random parentage testing of young bulls using blood typing gave way to bulls being parentage tested using DNA profiling. It is fair to say that today's GeneMark business had its beginnings in LIC's Livestock Selection section when a two year programme of blanket DNA parentage validation of a bull's daughters to sire was conducted in the 1994 and 1995 Sire Proving Scheme."

International **Strain** Trial



One of the most significant research trials into dairy genetics began in the late 1990s — the International Strain Trial.

In 1998 two trials were started to compare how New Zealand Holstein Friesian and North American Holstein cows performed in various environments. One trial was based in New Zealand under the supervision of Massey University and Dexcel (now DairyNZ), the other in Ireland at Moorepark under the supervision of Teagasc.

New Zealand/LIC high genetic merit cows were used in both the Moorepark and Dexcel trials. These cows were generated from suitable parents found in an extensive search of LIC's database. Potential dams that had pedigrees of predominantly New Zealand breeding were identified and mated to high Breeding Worth sires to generate a group of calves that had a genetic background of at least 87.5% New Zealand/LIC genetics.

The first daughters were born in 1999, known as the NZ90s strain in both the Irish and New Zealand trials.

A high production 'overseas' strain was also generated in a similar manner in both countries.

Three heifers from the Dexcel Strain Trial showing the difference in size at 22 months, from left NZ70, NA90 (North American) and NZ90. The noticeable thing about the animals is that the NA90 heifer is much taller than the two New Zealand animals, with the NZ70 the shortest.

Result summary

The trials found that Holstein cows
(of predominantly New Zealand/LIC ancestry)

- Produce more milk in terms of both volume and milksolids under low-feed conditions;
- Had superior fertility — measured by the six week in-calf rate and the overall empty rate; and
- Were more profitable when compared to cows of North American origin in pasture-based farming systems typical of those found in Ireland and New Zealand.

The New Zealand based trial also recreated cows typical of those being milked in the 1970s (NZ70) for comparative purposes — quite an achievement to do and only possible because of the genetic archive initiated by Harvey Tempero all those years earlier.

DATA ACCURACY *paramount*

Dr Richard Spelman, LIC's General Manager of Research and Development, joined LIC and began working on the Sire Proving Scheme in 1991.

Initially Richard's role was to ensure LIC's bull team, sold through Premier Sires, was of high quality for farmers — "to achieve this we were highly dependent on the Sire Proving Scheme, because it provided us with the information needed to make sure those bulls were of superior quality.

"One of the key aspects of the Sire Proving Scheme is accuracy of data. Some farmers are better at recording than others and we wanted to make sure the better farmers were in the Sire Proving Scheme.

"Farmers entered the Sire Proving Scheme for a variety of reasons — one of them being cheaper semen. However, we rely on farmers doing the job well. In the early 1990s some did and some didn't.

"Year on year we rely on our farmers for the collection of good data. It's important that farmers coming into the Scheme see the value in their contribution — this lessens turnover and means an improved quality of data."

LIC continues to acknowledge the value that the Sire Proving Scheme farmers have brought to the industry over the past 50 years.

"Dedicated Sire Proving Scheme herds generate data from animals dispersed across the industry/country — without these herds it would be very difficult to generate that amount of data accurately and then genetically link it into the rest of the national herd.

"One real benefit of the Scheme is its efficiency. Farmers involved in the Sire Proving Scheme sign up to herd test four times a year, measure Traits other than Production (TOP) and liveweight and condition scoring measures are taken — we know when and where the semen goes and roughly how many daughters will result from those inseminations. The resulting daughters provide herd test information."

Incorrect parentage is an issue even within Sire Proving Scheme herds.

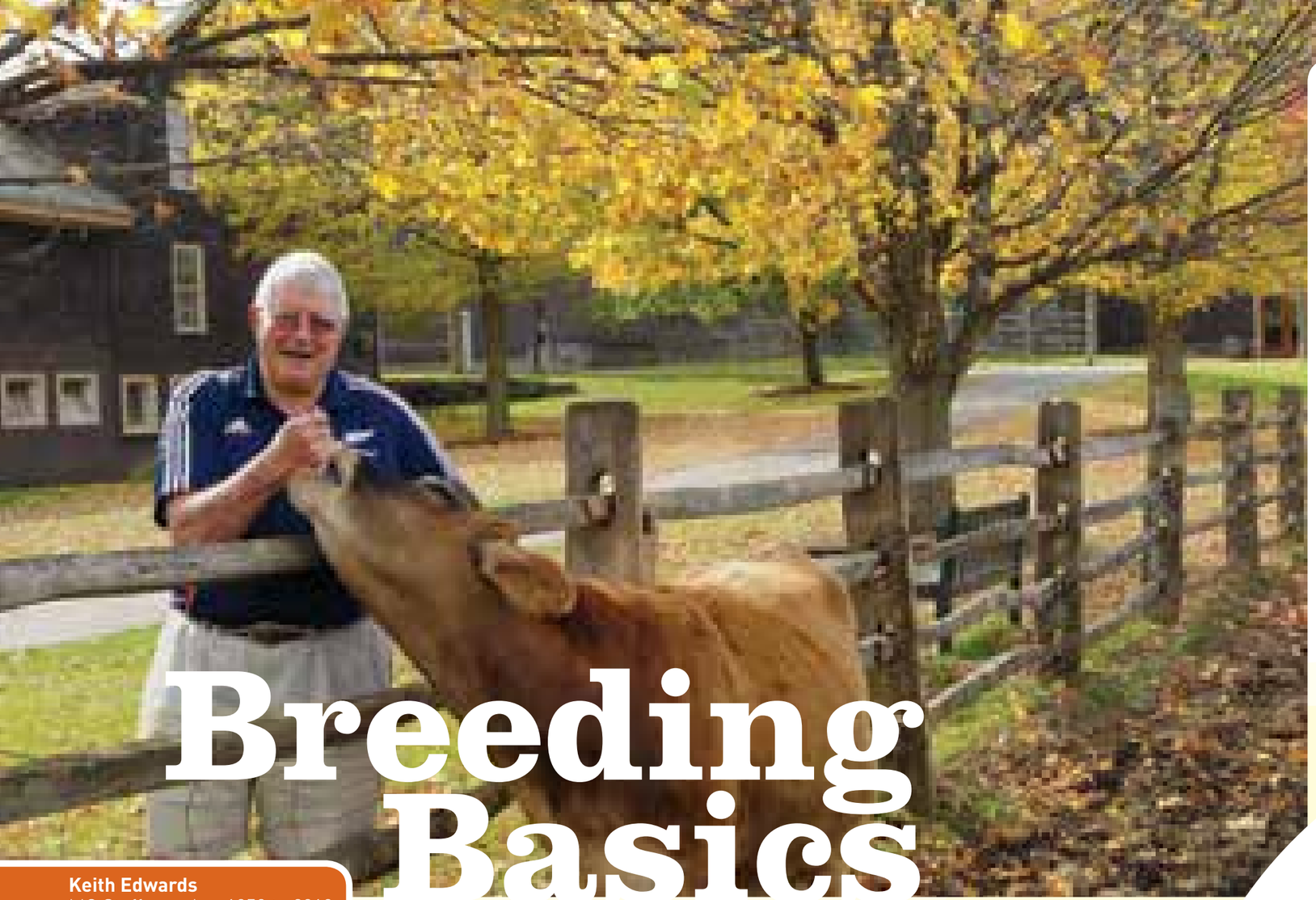
"The scheme has about a 15% mismatch, compared to misidentification rates in commercial herds nationally which can be 25% or higher, and of course this does affect data accuracy.

"So we needed a tool to measure how good farmers were at bringing through Sire Proving Scheme daughters and how good they were at recording the information.

"In the mid to late 1990s and again in 2010, a large number of Sire Proving Scheme herds were parentage tested. The results showed that misidentification rates among Scheme members did not really change during this period, remaining at between 12% and 15%.

"Herds are getting larger and more cows are calving in one day in both Sire Proving Scheme and commercial herds, therefore the misidentification rates will probably increase.

"In the next few years I expect parentage testing will be undertaken on all Sire Proving Scheme herds, which will result in a higher degree of accuracy."



Breeding Basics

Keith Edwards
LIC Staff member 1959 to 2010

Keith Edwards is perhaps best known as an LIC District Manager and avid promoter of the Sire Proving Scheme.

His knowledge is evident in the 'Breeding Basics' presentation he developed for farmer seminars across the Nelson Marlborough region (and beyond).

In his own words, the Sire Proving Scheme is the foundation for the whole LIC artificial breeding structure.

He should know; his history with herd improvement predates the Sire Proving Scheme.

"I was born and bred on a pedigree Jersey dairy farm at Horsham Downs in the Waikato. In 1960 I trained as an artificial breeding (AB) technician for Auckland Herd Improvement and got a job at the Dairy Board's bull farm at Newstead training and handling yearling bulls that were to be used in spring mating.

"I moved to Nelson in 1964 and was responsible for provision of all AB services (employing, training and supervision of AB technicians) for the top end of the South Island.

"In 1980 my role changed to that of Regional Officer for South Island Herd Improvement, responsible for all Livestock Improvement services for the Northern area of the South Island, from Christchurch to Greymouth, north.

"I retired as a District Manager in 2006 and was then involved, until 2010, in staff training and support for the Nelson Herd Testing Weigh station, completing 50 years with LIC.

Working alongside farmers

"My rewards and joys working over the years in herd improvement have been to see our services bring success to ordinary, everyday dairy farmers. These farmer successes have been varied, from seeing a non-recorded herd being fully recorded several generations later, to farmers winning Sharemilker of the Year or Best Recorded Herd.

"But the biggest thrill was to make an appointment with one of these farmers and take LIC people like Allan McPherson, Wayne Reynolds or Graham Morris to see potential contract 'bull mothers'. In itself, this is a reflection of a farmer with exceptional herd records, high Breeding Worth animals and full use of the basic herd improvement services on that farm.

"But the ultimate is to have a Premier Sires Bull bred by one of your farmers.

"My experience with farmers overseas and in New Zealand, combined with having worked with LIC from the farm through semen processing and insemination, convinced me that the Sire Proving Scheme is the absolute foundation for Premier Sires. I've seen the benefits on farms all over the country. It delivers.

"I call myself the 'dad' of Holstein Friesian sire, Brightwater Carl, as I carried out the insemination which resulted in Carl. This gave me a special interest in the bull and I followed his 'career' closely.

Breeding basics

"I've always been passionate about genetics and, when I was a District Manager, I developed a presentation for farmers called 'Breeding Basics" which explained the rationale behind the Sire Proving Scheme.

"I'd give presentations around my region, but also spoke to farmers in other regions, and always found a high degree of interest in how simple it is for a farmer to improve the production of his or her herd.

"Thanks to the forward thinking of all the visionaries who have been part of New Zealand's herd improvement movement, farmers are now able to make rapid genetic progress in their herds by following a simple formula — use a team of high BW, elite bulls, and cull the poorest performing cows through the Production Worth index.

"This will not only deliver rewards in the milk vat, but also in the economics of the farm and the value of the herd.

"What we are talking about, both here and overseas, is that the LIC indexes which are generated as a result of its Sire Proving Scheme, are 'rock solid', they are the result of unbiased animal and production information gathered by people who have no stake in the success or failure of the testing of these sires. That is a very important aspect.

"My knowledge and my belief in the system come from the fact that I worked under the old 'Purple Dot' system, trained yearling bulls, collected their semen, inseminated the first Sire Proving Scheme animals in 1961, was involved with numerous Sire Proving Scheme herds and contract mating, and then saw the resulting Premier Sires team and the quality they left on farms all over New Zealand — and the world.

"I've been privileged to be part of most phases of the process and can vouch for its thoroughness, its integrity and the value it delivers."

"I call myself the 'dad' of Holstein Friesian sire, Brightwater Carl, as I carried out the insemination which resulted in Carl. This gave me a special interest in the bull and I followed his 'career' closely.

LOOKS LIKE AN IGLOO, FEELS LIKE AN IGLOO

Noel Mayston's career with LIC began in 1991, when he joined the farm team as a farm technician.

LIC has two bull farms in Hamilton — one adjacent to its Head Office where the Premier Sires team is grazed, known as the Centre, and another at Vaile Road, where young bulls are trained and collected.

The collection barn at Vaile Road is known as Scott Base because, during the winter, "the barn is very cold, covered in ice, looks like an igloo and feels like an igloo."

In 1993 Noel began working with the Sire Proving Scheme bulls on Vaile Road.

"I was responsible for grazing and farm management for the young bulls — in those days we had 150 bulls in the Sire Proving Scheme and Rod Bowie and Don McKnight were running the farm operations side of the Scheme, so my main job was farm management.

"When Don McKnight left as Sire Proving Scheme Supervisor in November 1995 to become an LIC District Manager, I took on the role of Supervisor responsible for the coordination of semen collections, training of the young bulls and staff management."

NOEL MAYSTON

1991 TO PRESENT DAY

One barn all bulls

"In those early days LIC only had one collection barn at the Centre where all the bulls, proven and young, were collected. There were no training or collection facilities at the Vaile Road property which meant, on a daily basis, we had to get about 30 young bulls to the Centre.

"There were only two ways to do this – either via bull cart behind the tractor four to six times a day — which was very resource and time hungry or drive them down the road in a mob — which presented all sorts of logistical challenges, not least of all traffic control.

"To say it was challenging is putting it mildly! The bulls would have to be at the Centre the night before they were rostered for collection and kept in pens adjacent to the collection barn overnight.

"At that time we only had three pens out the back of the barn and we had a single row drafting shoot along the wall to bring the younger Sire Proving Scheme bulls into the collection barn.

"Half the barn was used for collecting Premier Sires and the other half for Sire Proving Scheme collections. Collections would happen at the same time, the team looking after the big fellas (Premier Sires) would collect them, and we would collect the Sire Proving Scheme bulls. However, both teams would help each other out when needed.

"Sire Proving Scheme bulls were then returned to Vaile Road again, either by cart or down the race and road as a mob.

"This meant if we had a bad collection, for example semen quality was not high enough, or we failed to collect semen from any of the Sire Proving Scheme bulls we had rostered for collection, we would need to go to Vaile Road, draft other animals on the reserve roster list and bring them to Newstead.

"Moving the young guys from Vaile Road to the Centre continued until the early 2000s when the size of the Sire Proving Scheme increased from 150 to 300 bulls, and the logistics of collecting young and proven bulls in the same complex became impossible.

"So in 2003 we built a purpose designed collection barn at Vaile Road."

"Scott Base is where we introduce the bulls to being handled and where they learn to trust people. In many ways training a bull is very similar to breaking in a horse."

Scott Base

"The collection barn at Vaile Road was built by Cook and Galloway Construction, with a lot of help from the farm team. The principle of the design is based on a rotary cow shed.

"The design of the facility is revolutionary and owes its origins to Don McKnight and Graham Baird who put their heads together a few years earlier and came up with the ideal barn design.

"The barn layout incorporates a ring of 36 individual pens with, what is essentially a drafting race at the back, making it easy to draft bulls out of their grazing mobs so they're on their own awaiting collection

"Scott Base is where we introduce the bulls to being handled and where they learn to trust people. In many ways training a bull is very similar to breaking in a horse.

"The pens at Scott Base are specially designed for young bulls and have an internal safety frame that prevents the bulls moving around too much while they're getting used to wearing halters and being handled.

"Scott Base pens are also 600mm shorter than those for proven bulls at the Centre because the young bulls are much smaller.

"The new Sire Proving Scheme collection barn brought an end to the daily movements of bulls up and down Vaile Road to the Centre — but it introduced a new challenge, because now we had to get their semen to the Newstead laboratory without compromising its quality.

"At first we'd send semen by van in its undiluted state to the lab at Newstead in a test-tube contained within a warmed beaker in a hot box or incubator. The trip took less than five minutes.

"About three years ago, however, we added our own small laboratory to the Sire Proving Scheme collection barn, so initial checks and dilution can be done on site by Susan Paul, the Laboratory Supervisor. The semen is then delivered by van to Newstead."

Training Sire Proving Scheme bulls

Training of young bulls has changed a bit in the last few years.

"It can take a long time to train a Sire Proving Scheme bull for collecting semen, particularly as some are shyer than others and each year we'd get a few non-servers that we couldn't get semen from.

"So we revamped our training regime and began handling the bulls much earlier in their lives. They'd come in, have halters fitted and get used to being handled.

"This early handling has a large bearing on how well the bulls collect. For example, we had no non servers last year.

"This human/animal bonding is good for everyone. On any day you've got quite a few bulls and men in the barn together and we're all there to do a job, so building trust with the animal certainly enables that."

TEA-TOWELS

Progeny Test Supervisor, Noel Mayston.

"You're always having to think of innovative ways to get the best out of an animal. With shy bulls, for example, they'd often become distracted by things happening around them, so we tried using blinkers to block out any side vision as they do with racehorses.

"They worked to a certain extent but then, a few years ago, we tried using a tea-towel tucked into the halter to cover just the left eye (the side the bull is led on) and it worked! The bulls settled down and were confident to be collected.

"We no longer use blinkers, as tea towels do the trick!"

PERFECT **Prefect** DISHES UP 12 OF THE BEST

Mike Parsons, inaugural Sire Proving Scheme Farmer of the Year, 1997

Patea-based former SPS member Mike Parsons — who nowadays has a sharemilker on farm — first joined the Sire Proving Scheme in 1984, carrying on in his father's footsteps from the previous decade. In 1997 Mike was named the inaugural Sire Proving Scheme Farmer of the Year.

Nowadays Mike has a sharemilker on farm, but he still takes a keen interest in the farm environment and the welfare of the animals.

"Dad originally joined the Scheme when times were tough and he was wanting to increase herd numbers. But I had enough understanding of population genetics to see that there was nothing to lose by continuing in the Scheme.

"It was the Dairy Board Sire Proving Scheme in those days... you were part of a co-operative and it was as much about giving back as it was taking from it. In other words, there was everything to gain from getting the semen from the latest young sires, and from keeping accurate records. It wasn't about getting artificial breeding done for next to no cost."

Mike's farming efforts are today focused on the reconstruction of natural ecosystems within the farm, and the impact of farming on such areas.

Typical of many Sire Proving Scheme farmers, Mike is proud of what he achieved through his 13-year membership and looks back fondly on his involvement.

"I'm pretty sure I had the most Prefect daughters of any herd in New Zealand at one stage — around 12."

After Athol Famous Prefect's daughters were proven through the Sire Proving Scheme, the sire went on to become the most outstanding LIC Holstein Friesian bull of the 1980s — his name and reputation are still revered in breeding circles the world-over.

"I was also lucky enough to have six daughters from Lombardi Blair but it was just the luck of the draw. After that I went about five years without any daughters of sires that made it into the Premier Sires teams."

Winning the inaugural Sire Proving Scheme Farmer of the Year award in 1997 is an accolade Mike brushes off with more than a hint of modesty.

"I felt a bit of a fraud in the sense that I'd just sold my herd to my sharemilker, Michael Schrader, the year before.

"He carried on with Sire Proving for the entire time he was on my farm (nine years), and I was pleased to see that. He was a fine stockman, a hard worker, a good record keeper, and most of all he looked after the cows well."

Mike says those characteristics came to define what it took to be a good Sire Proving Scheme farmer.

"Being a member encourages — in fact it demands — more attention to your stock, from good heat detection to calving.

"In the first years in the Scheme you may not realise the significance of correct identification but you soon realise its importance.

"On occasions I would tag a calf late at night. It didn't matter if it wasn't out of its mother properly or if it was a bull or a heifer... I just wanted to make sure that, if there were going to be 20 calves born that night, they were all identified to the right mother straight away."

Being involved in the Sire Proving Scheme perked Mike's interest in LIC, and he ended up being a member of the local board.

"John Lynskey (a well-known Taranaki dairy farmer and former long-term LIC board member) came on while I was there. We had a good understanding of LIC politics and where the organisation was headed. Our chairman at the time, Jim Thwaites, was disappointed I didn't stay on longer."

Mike looks back on senior LIC staff such as Harvey Tempero and Jack Hooper with a good deal of fondness.

"I would really look forward to them coming around to do the traits-other-than-production assessments. That was one of the most exciting parts of being in the Scheme, because the people involved came to your farm and followed through on those detailed assessments.

"Despite their busy schedule they were extremely patient and good listeners.

"There was a culture of taking notice of what Sire Proving Scheme members thought and it started from the top, thanks to people like Harvey."

Wayne and Raewyn Reynolds with their son, Kieran

Dream job
as Livestock Analyst

Wayne Reynolds took on his dream job as a livestock analyst in 1992 after being interested in genetics from a young age.

"My father was very interested in breeding, and I guess it rubbed off on me because I always had an exercise book and he'd tell me which cow calved that day so I could record it for myself.

"It was my dream job to be an analyst."

Wayne's role involved monitoring the efficiency of the Sire Proving Scheme, liaising with staff and members, collating the data required for Premier Sires selection and stimulating extra demand as the Scheme went through a time of significant growth.

"We were reaping the benefits from the database being setup in the 1980s and the level of recording was going up exponentially.

"This drove up the selection intensity of bull mothers and the new Animal Model technology (1996) also made selections more accurate — with one index (Breeding Worth) for both cows and bulls, so the information was more reliable.

"The Sire Proving Scheme was very well established by then, with strong policies and procedures in place, and a great team effort across all parts of LIC.

"Everyone worked very efficiently — from the team working with the young bulls, to semen processing and despatch. The operational procedures were well designed and managed by passionate people, and the District Manager team (now known as Customer Relationship Managers) played an essential role in selecting the right people to be part of the Sire Proving Scheme."

Wayne was involved in a review of the Scheme in 1997, which resulted in a range of initiatives now cemented in Sire Proving Scheme history, including long service awards, the Newstead Hall of Fame, and the Farmer of the Year Award to highlight the good practices of the very elite members.

"We reviewed the scheme in 1997, but it was so well designed that only minor changes were required.

"The Farmer of the Year Award acknowledges how conscientious the Sire Proving Scheme members are, so fellow farmers can have confidence in the accuracy of the proofs generated by these members' herds.

"It is also a great motivator for other Sire Proving Scheme members."

In 1999 Wayne's role changed to concentrate more on inspecting and purchasing bull calves for the Sire Proving Scheme, and he recalls one farmer's surprise at getting paid for a bull.

"I priced the bull using our standard rates of the time and when the farmer reacted with surprise I thought he must have felt insulted by the offer.

"It turned out the honour of having a calf taken for LIC's Sire Proving Scheme was reward enough for him."

Wayne returned to dairy farming and self-employment later in 1999, but the Scheme remains close to his heart. He was a member for two years — largely because of the return on investment.

He is now aiming to drive his herd Breeding Worth into the top one percent, with a target of supplying his own bulls to the Sire Proving Scheme.

WAYNE REYNOLDS
Farmer (previously LIC Sire Analyst 1992 -1999)

"The Farmer of the Year Award acknowledges how conscientious the Sire Proving Scheme members are, so fellow farmers can have confidence in the accuracy of the proofs generated by these members' herds."

2000

2000

Holstein Friesian bull **SRB Collins Royal Hugo** creates a world record as the youngest bull to achieve 500,000 inseminations.

First year of KiwiCross™ progeny testing.

Longevity Breeding Values supersede Survival Breeding Values.

Calving Difficulty Breeding Value introduced for all artificial breeding sires.

For the first time Short Gestation Length bull semen is available.

Organic bovine semen (frozen) available.

WILLIE APIATA becomes the first New Zealander since World War II to be awarded a Victoria Cross for bravery under fire during the Afghanistan conflict.

2001

Automated inbreeding protection added to DataMATE.

KiwiCross™ **Scotts Northsea** progeny tested, generating record number of inseminations in one year for a KiwiCross™ bull at 184,000, and lifetime inseminations of 783,019.

Cow fertility Breeding Values published for all artificial breeding sires.

Launch of Short Gestation Length progeny test programme.

Sire Proving Scheme increases from 235 to 300 bulls.

Liquid KiwiCross™ semen used for progeny testing.

2002

Following the deregulation of the New Zealand dairy industry, Livestock Improvement becomes a farmer owned user co-operative.

Fertility Breeding Value introduced.

DataMATE software includes management of recessive genes.

For the first time, LIC Artificial Breeding Technician service averages 3000+ inseminations per technician per year.

Fonterra-owned ViaLactia and LIC join forces to form boviQuest to further research into biotechnology.

LIC licensed to commercialise first two boviQuest production gene discoveries, Optimum and Quantum.

The Sire Proving Scheme 'Black Box' optimises rostering of Premier Sires to reduce inbreeding alarms.

2003

Traits other than Production (TOP) electronic hand held units launched.

2004

Sire Proving Scheme semen despatch and daughter spread program created.

Holstein Friesian Strain Trial, comparing 1970s New Zealand Holstein Friesian genetics with current day and United States Holstein Friesian genetics, completed.

Launch of Discovery Project, a joint venture between LIC and Holstein Friesian New Zealand, to identify potential bull dams and breed bulls for the Sire Proving Scheme.

Launch of JerseyJet, a joint venture with Jersey New Zealand, to identify potential bull dams and breed bulls for the Sire Proving Scheme.

First KiwiCross™ bulls named for Forward Pack Premier Sires team.

THE *DAIRY INDUSTRY* had

4 dairy companies operating in New Zealand.

4.5 million cows with average per cow production of 325 kg milksolids.

75% of the national herd is artificially inseminated.

More than 3 million artificial inseminations are conducted each season.

LIC sets a world record for processing and despatching 100,000 straws of dairy cattle semen in one day.

JOHN KEY
National Party Leader and Prime Minister of New Zealand. National party becomes Government (2008), re-elected in 2011.

2007

New Zealand Test Day Model animal evaluations introduced.

Sexed semen trials begin.

Somatic Cell Breeding Value introduced.

Mobility Breeding Value developed to help identify artificial breeding bulls whose progeny will be resistant to lameness.

Once-a-Day progeny test programme launched.

2005

2008

DNA Proven teams launched.

Sire Proving Scheme bulls selected using genomic information.

Scotts Northsea is the first KiwiCross™ bull, inducted to the LIC Hall of Fame.

Whinlea Kai Ebell is the first cow to be inducted to the LIC Hall of Fame. First bull dam to have four Premier Sires sons in any single year (2005).

2009

Three out of every four cows in New Zealand sired by an LIC bull.

Sire Proving Scheme decreases from 300 bulls to 160 as a result of genomic selection.

Premier Sires team contributes $30 million to New Zealand economy each year, a total of $17 billion since AB began in the 1950s.

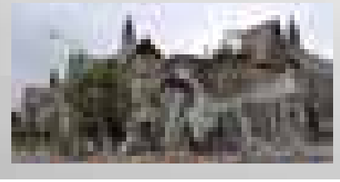
2010

For the first time, yearlings are marketed in the Premier Sires and Alpha DNA teams, as well as the Sire Proving Scheme.

50 years of the LIC Sire Proving Scheme celebrated at National Fieldays in Hamilton. A total of 8942 Holstein Friesian, Jersey, KiwiCross™ and Ayrshire bulls have been progeny tested in 3748 Sire Proving Scheme herds.

2011

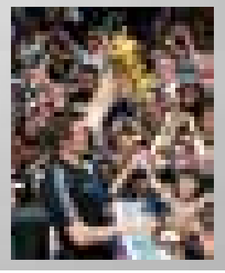
CHRISTCHURCH is hit by two devastating earthquakes (4 September 2010 and 22 February 2011) resulting in loss of life and widespread damage.



The old Normal School Building on the corner of Montreal and Kilmore streets collapses.

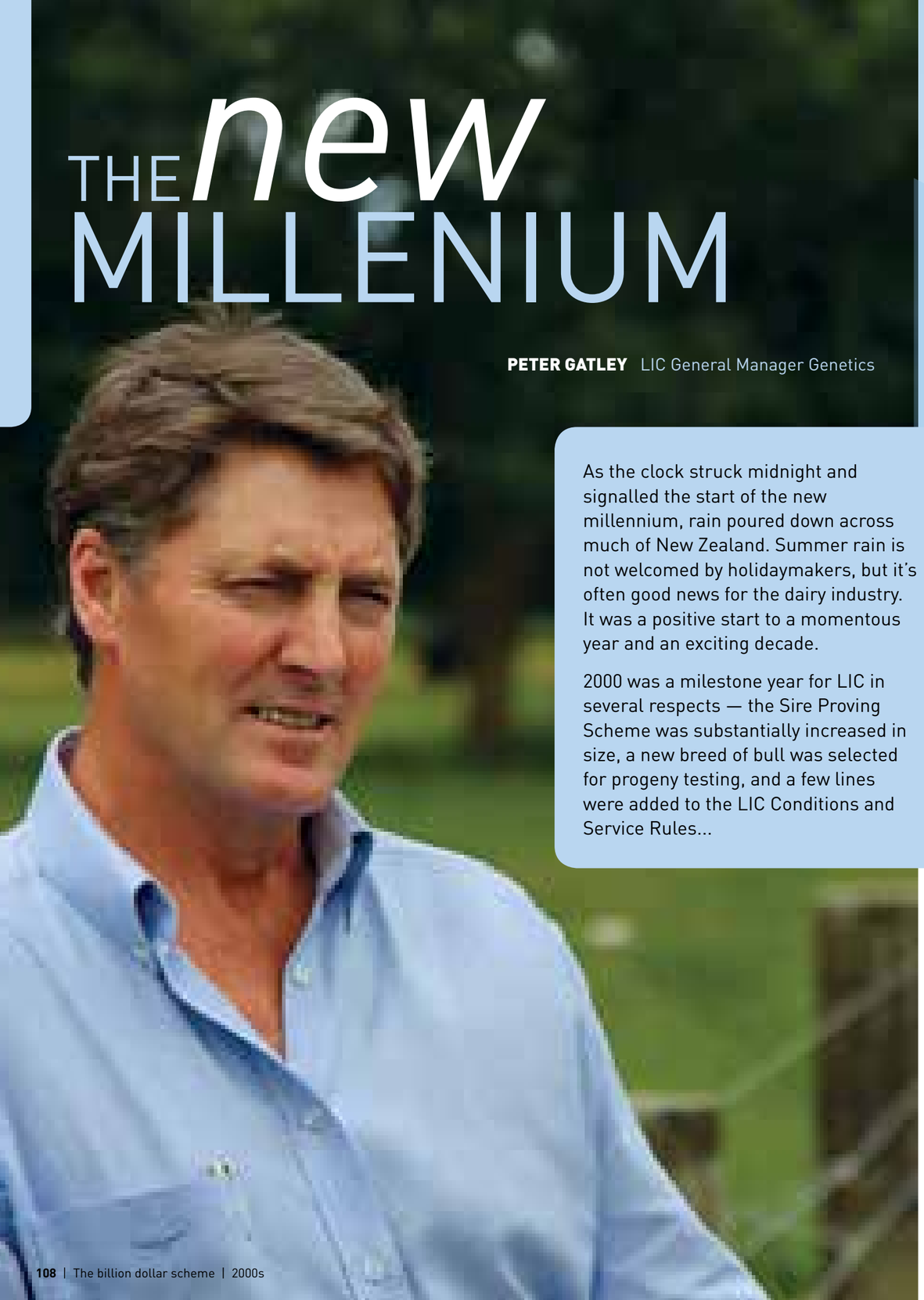
NEW ZEALAND'S ALL BLACKS win the Rugby World Cup.

Richie McCaw holds aloft the Webb-Ellis Gold Cup as winners of the Rugby World Cup tournament, New Zealand.



THE *new* MILLENIUM

PETER GATLEY LIC General Manager Genetics



As the clock struck midnight and signalled the start of the new millennium, rain poured down across much of New Zealand. Summer rain is not welcomed by holidaymakers, but it's often good news for the dairy industry. It was a positive start to a momentous year and an exciting decade.

2000 was a milestone year for LIC in several respects — the Sire Proving Scheme was substantially increased in size, a new breed of bull was selected for progeny testing, and a few lines were added to the LIC Conditions and Service Rules...

Clause 62

There were 78 clauses in the service contract that year, and a new one appeared at number 62. It became known as Clause 62, and to this day, it still occupies that space. Clause 62 stipulated that the male offspring of LIC bulls could not be used for AI without a license agreement from LIC. Similar clauses were commonplace in agriculture, and used routinely by plant, pig and poultry breeders. The concept was, however, a world-first in dairy cattle breeding, and it created a furore that continued for the rest of the year.

The activities of the typical commercial farmer were unaffected by Clause 62, and most were not particularly concerned about the matter. Of those who took an interest, many could see why the action was necessary. Many bull breeders though, were outraged. A Breeders Forum was established, there were letters to the Editor of every farming publication, there were articles, and numerous meetings with breed association members and Liaison Farmer groups. There were phone calls, personal letters, emails, and extensive lobbying of anyone thought able to influence the outcome of the dispute.

We fully expected strong opposition from the breeders, but there was a lot at stake.

The co-operative principle

LIC's view was founded on a simple co-operative principle — that every farmer ultimately benefits from genetic improvement of the national herd, and every farmer ought to contribute to it. The contribution can be in the form of dollars or data.

Every farmer using Premier Sires ("bull of the day") or buying semen out of the catalogue contributes financially to the system. Sire Proving Scheme farmers contribute information. The system had worked very well for 40 years, but the stakes were being raised as the threats heightened. In those days, prior to the Dairy Industry Restructuring Act, LIC was still run in the style of a traditional industry-good non-profit co-operative, and its Board of Directors decided that action needed to be taken to ensure the viability of the system into the future. There were several reasons for this.

Biotechnology

At that point the whole world was starting to recognise the potential benefits of biotechnology. The Dairy Board had just committed to spending $100 million of farmer money on gene discovery research in a joint venture with LIC. This was an extension of work begun by LIC in 1994, at that stage in collaboration with Holland Genetics (now CRV).

"...every farmer ultimately benefits from genetic improvement of the national herd, and every farmer ought to contribute to it."

In those days, gene discovery was a brave new frontier, and in dairy cattle genetics internationally, it was largely the preserve of government or regulated industry funding. In this respect our joint venture initiative was groundbreaking and very bold.

One of the world's leading researchers in genomics, Dr Curt Van Tassell of the United States Department of Agriculture (USDA), recently made the observation that "coming to the table offering access to money and semen (for genotyping) after the project has demonstrated success is not equivalent to stepping up to bat before the project demonstrated the value of the technology".

LIC was prepared to accept the risk because it was, and is, a farmer-owned co-operative with a long-term vision focused on farmer benefit rather than purely commercial outcomes on normal (short) commercial timeframes.

The reason why LIC has moved from the non-profit business model to a commercial approach is simply that it is more effective and more efficient. It encourages innovation and drives down cost.

When Clause 62 was introduced in the year 2000, the critics said they would accept the need for it in the event that biotechnology delivered evaluations on young bulls. The Bull Breeders Forum recorded this view in its own meeting minutes.

The time has arrived. Thanks to biotechnology there is now no longer such a thing as an unproven bull at LIC. Before bulls are old enough to produce semen they are "DNA Proven". Biotechnology is now the foundation of every LIC bull's proof.

LIC does not distinguish between the method by which the proof is generated in considering whether to protect the investment. Likewise, most plant breeders use conventional selection methods but still make use of the Plant Variety Rights Act. Software developers use conventional coding to create new products that are copyright. Engineering firms use patents to protect their developments constructed from conventional materials.

Market stagnation and price freeze, higher costs and new risks

At the turn of the century LIC faced some big decisions in a difficult market environment. The late 1990s were not easy for dairy farmers, and the AB market had actually reduced in size two years in a row. In response to the plight of farmers, the LIC Board of Directors passed a resolution in 1997 stipulating no price increases in LIC core products for five years.

At the same time our scientists calculated that the industry would benefit from increasing the number of bulls progeny tested from 235 to 300 per annum, but this would come at a huge cost and take years to deliver the first graduates. It was hard enough to fund these developments, but the risk was compounded by the appearance of a new genetics company founded on the concept of free-riding on LIC's Research and Development expenditure.

Liberty Genetics was formed in 1998 with the intention of using progeny tested bulls from other companies to produce high ancestry young sires with which to secure their own market share. Bulls would be owned and raised by breeders, semen collection would be contracted, and with virtually no investment in capital or product development, semen would be sold at marginal prices to undercut LIC and other companies whose investments provide the genetic gain. The potential for disaster was clear. Farmers may be tempted to opt out of the co-operative system that benefited all. Some did just that.

Regardless of Clause 62, because the entire national herd improves at the same annual rate as Premier Sires (about 10 Breeding Worth points each year), so do the Liberty bull teams. All Clause 62 does is put four years between the availability of the latest proven genetics from LIC, and the reappearance of their genes in the Liberty teams. Without Clause 62 the gap would be just two years and the entire system would be at risk for the benefit of a few individuals.

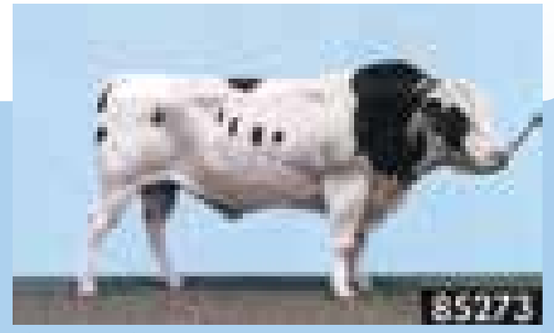
Throughout the year 2000 there were claims and counter-claims about the ultimate impact of Clause 62. By 2001 the media had moved on to other subjects, commercial farmers were busy doing what commercial farmers do, and both Ambreed and Liberty Genetics had their own version of Clause 62 in their respective service rules.

All was quiet on the battlefront for a decade before matters were brought to a head by the re-importation of LIC semen from Australia in the mistaken belief that this would absolve responsibility for contractual obligations.

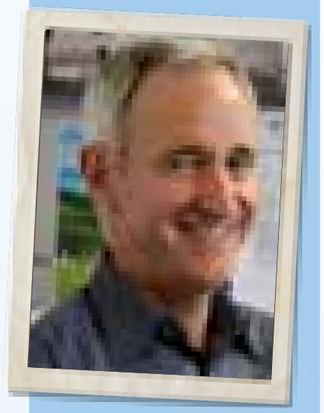
High noon in the High Court

When Liberty announced their 2011 bull teams, a dozen bulls were promoted as sons of LIC's Mint Edition, Frostman and Rockhard. Our demand that the bulls be withdrawn was ignored and we successfully sought an injunction in the High Court removing the bulls from sale pending a full trial. The Judge at the injunction hearing agreed with our view that semen was "supplied by LIC" regardless of whether it had passed through the hands of third parties, so we were surprised that the defendants chose to contest the case.

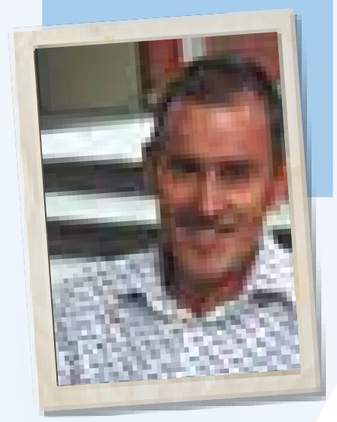
Balsoms Taylor



Rogers Roy



Allan McPherson



Bevin Harris

The trial took place in October 2011 and Liberty attempted to distance itself from the re-importation by claiming it was carried out by a group of breeders called the NZ Dairy Breeders Partnership (NZDBP). Liberty witnesses however were confronted by evidence that Liberty had organised, ordered and paid for the semen. It was admitted, under cross examination. that a story had been concocted to mislead the LIC Australia Manager into providing vital information to enable shippers to complete the necessary documentation, and that a request was made some time later for invoices, already received by and paid by Liberty, to be re-issued in the name of the NZDBP which appeared to be simply an informal entity created for the purpose of obscuring the facts.

With these and various other matters laid bare, it was not a surprise that the Liberty Board sought urgent settlement to avoid a formal judgement from the Court, and we subsequently agreed to terms which included the permanent removal of the bulls, and a small contribution to LIC legal costs.

The LSI index and Project Pipeline

When I joined LIC in 1992 I found a lot of people with a keen determination to do the best for the industry, even if some of their attitudes could be seen as somewhat paternalistic. The very first Breeding Operations Group meeting I attended was a tense affair as some scientists took a firm view on the inclusion of bulls that were not favoured by those who spent much of their time a bit closer to the customer. And so it was that we endured bulls such as Rogers Roy (white), Balsoms Taylor (the Holstein Friesian with black feet), and Wapiti (the Jersey with the short jaw).

We all accept that there was a time when LIC, with the best of intentions, placed too little weight on Traits Other than Production (TOP). The udder traits in particular weren't flash.

Things have changed. The team selection meetings I have the honour of chairing are relaxed interchanges where, after input from all concerned, it is rarely that we fail to reach a unanimous conclusion.

Put simply, all now recognise that no bull team is much use if the customer is unhappy with it and looking for something else. Ian Hook can be content in his retirement knowing that his protestations on behalf of the customer were eventually heard; his "radical" views did take root and have flourished.

It's fair to say that by the late 1990s, real progress had been made in striking the right balance in the breeding goal. In 2002 Allan McPherson and his Bull Acquisition Managers formalised this in our own index, the Livestock Selection Index (LSI). With great respect for the Breeding Worth (BW) index and all of the science and economics that underpin it, we concluded that it alone was not an adequate formula on which to base heavy investment in a bull breeding programme intent on more fully satisfying market requirements. To create the LSI, the traits of BW were re-weighted, with a notable lift in the emphasis on the Fertility Breeding Value, itself a relative newcomer having been introduced only the year prior.

In 2004 we ran Project Pipeline, an effort to quantify farmer preference using a nifty computer programme developed by Dr Bevin Harris. This enabled individual farmers to select and weight their own traits of preference, but cunningly forced them to confront the reality of genetics. Everything is a trade-off. The more you want of one trait, the less progress is made in the others.

The result of Project Pipeline was only modest changes to the LSI because it captured, in a different form, the learnings that we had already accumulated in the school of hard knocks out in the marketplace.

Customer feedback came in many forms, and one incident springs to mind. When a young Les Keeper joined the company as Product Manager Premier Sires during the 1990s he brought an unshakable belief in the team concept, and an intense distrust of the imported Holstein genetics that were flavour of the decade. He did a great job for "bull of the day", but his sense of humour occasionally got him into trouble. At a farmer meeting in the Rahotu Hall in Taranaki a farmer stood up to complain about the temperament of his two-year olds. "Look at these knuckles" he cried, holding his gnarly hands pleadingly in front of him. "Shows you how far we've come" retorted Les, "you should see my mother's knuckles!". A good laugh was had by all (bar one), and although the aggrieved farmer wasn't amused, he can be satisfied that he got his message across.

"...no bull team is much use if the customer is unhappy with it and looking for something else."

Do it once, do it right

Reaching agreement on the breeding goal for the typical commercial dairying operation was a major milestone for LIC, and indeed for the industry when you consider that LIC breeds three of every four replacements in the national herd. But what if a farmer wanted to radically depart from tradition and milk just once-a-day (OAD)?

Interest in OAD milking was sparked by farmlet trials carried out by Dexcel in Taranaki (2004-2006) which demonstrated the potential for respectable per-hectare production to be achieved. In short, the per-cow production drop could be partially offset by increasing stocking rate. The net shortfall in Milksolids production could then be compensated to varying degrees by other factors to protect the bottom line.

I was aware of this concept having been proved by a number of commercial farmers and was fascinated by the potential. I was also mindful that there was clear genetic variation among the cows in suitability for OAD, and therefore the opportunity to drive genetic gain. Part of the appeal of the whole concept is that it doesn't demand new capital spending in machinery, buildings or other depreciating investments, or increased spend on labour — quite the opposite in fact. What would be useful though, would be a purpose-built cow.

We were faced with a chicken and egg situation. The OAD market size certainly didn't warrant a dedicated progeny test programme, but if we ran one, would the market grow? We did supply semen from Sire Proving Scheme bulls to OAD herds for a couple of years, but poor daughter recovery in OAD herds stopped us from achieving meaningful results. We were also conscious that our OAD Index was highly correlated with BW, so the marginal gains would be very limited. On top of these considerations was the fact that most OAD herds were using our AB service anyway, so in the absence of outside funding, there was no commercial justification.

It became clear that a number of farmers, advisors and researchers had accumulated a significant amount of information that would better equip any farmer wishing to take the plunge. I resolved to bring them together under the banner of a National OAD Milking Conference, and set about organising the event which was held over two days in the LIC Tempero Centre in April 2007, and attended by a capacity crowd of about 200 paying participants. Presentations covered all manner of issues including milk production, reproductive performance, animal welfare, social impacts, mastitis and somatic cell count, animal health, financial performance, and of course, genetics.

The positive response to the conference raised expectations of dramatic increase in participation, but the payout surged upward and it seemed that interest in OAD took a back seat to chasing the last kilogram of Milksolids.

"At the time of writing, November 2011, we are witnessing the ascension of a new ruler, as KiwiCross™ 508077 Howies Checkpoint has leapt over three-year All Breeds champion (Holstein Friesian) 105038 Mint Edition to take a lead of 35 BW at 287/72 (Animal Evaluation run 12/11/11)."

Then in 2009, when the boom was predicted to become bust on the back of a $4.55 payout forecast, many farmers felt they were fighting for survival and the time wasn't right to take the OAD plunge.

It is interesting to consider that a move to OAD can be made virtually overnight with just a few more cows (to partially offset the per-cow reduction in output) and a change in routine. The net impact on production for the farm may be a drop of 10-15%, and virtually every other variable contributes positively to offset this, and in some cases more than compensate, so that there is sometimes a net financial benefit. There are reduced cost items ranging from dairy detergents to race maintenance. For some herds at certain thresholds there is the potential to run with fewer staff. There are cases where this has, in turn, led to the opportunity to rent out the farm cottage. Other savings are made because some jobs, which would otherwise be contracted, are carried out by existing staff.

One factor often overlooked in assessing the top line impact on Milksolids production is the lift in component percentage which reduces the volume charge. This might be worth say $30 per cow, but if you have 500 of them it's another $15,000 offset.

Many of the positives are individually difficult to measure, but will ultimately be evident on the bottom line. Cows in better condition leading to improved animal health and reproductive performance. Less genetic wastage. Higher cull cow prices.

Then there are the social issues which are not easily quantified in dollar terms — fewer hours worked, less stress, more leisure time, more varied work, more flexible working hours. This highlights the fact that, while dairy farmers are easily categorised as some of the nation's hardest workers, many do not put a high value on their own time, and for some the extraordinary effort they make is a badge of pride and a source of satisfaction in itself.

Whenever someone speaks with enthusiasm for OAD, there will be those who perceive an argument for it to become the industry standard. This should not be the case. Suitability for OAD will have a lot to do with the size, shape and topography of a farm, as well as the personal objectives of the farmer, however current trends in herd size and land amalgamation are creating opportunities for OAD. More herds are at threshold levels where OAD offers specific advantages such as enabling the management of more cows than otherwise would be possible as a family-run business. The purchase of neighbouring property, sometimes for conversion, can present the chance to make greater use of existing capital investments in plant and equipment by simultaneously running OAD and twice-a-day (TAD) herds.

This all sounds positive but in reality uptake has seemingly reached a plateau at a low level. The number of herds on whole-lactation OAD has been static at about 300 for the past few years. Many have the experience of five or six or more lactations and knowledge is shared via a discussion group organised by Colin Holmes, retired Professor from Massey University and well known stalwart of pasture-based farming. It seems to me that OAD offers the potential for a considerable range of benefits at relatively low risk. Why then the lack of growth in uptake?

Over several years I have developed personal views on the reasons for this. Firstly, although to a lesser extent than in many offshore dairy industries, farmers are heavily focused on gross production per-cow or per-hectare, rather than productivity or profitability. In New Zealand, to a large extent, there is a TAD milking paradigm. Secondly, for the very reason that OAD involves lower inputs, there is no multi-pronged marketing machine to promote it in the way that the supplementary feeding industry has driven uptake of the option that sits at the other end of the continuum. I remain convinced that the industry has not yet captured the potential to optimise the relationship between OAD and TAD milking.

A new breed of bull

The same June 2000 Board meeting that approved the expansion of the Sire Proving Scheme from 235 to 300 bulls p.a. was presented with a proposal to commit to a bold new initiative in progeny testing bulls that did not fit the description of any of the established breeds. The crossbred, or "Kiwi cow" was already firmly established at about 20% of the national herd, and some farmers were calling for a crossbred bull to simplify mating management by avoiding the need to make decisions on the breed for each insemination.

We had another interest in the concept. It was becoming obvious that the proportion of Kiwi cows in the elite category was growing, and of course these could not be

Peter Gatley and Bull Farm Manager, Dave Hale, inspecting LIC's latest record breaking Daughter Proven bull, Howie's Checkpoint with a BW of 287.

Howies Checkpoint

Scotts Northsea

used as bull mothers of straight-bred bulls. Only by creating a crossbred bull team could we access this exciting gene pool.

When the Breeding Operations Group met to discuss this option, it was clear that there was much curiosity and certainly some excitement at the prospect, but in the back of many minds was the fact that no genetics company in the world had made such a commitment before, and that if the graduates weren't accepted in substantial volume by the market, we could not easily back out as there would be a five-year pipeline of bulls coming ready or not. There was a long pause in the discussion. I asked "who thinks we shouldn't do it?" More silence. "Then let's do it". Everyone seemed relieved that the decision was made.

One of the frustrating things about the dairy cattle genetics business, especially when dependent on progeny testing, is the time lag to see results from breeding decisions. Typically there is a five year lag between purchase of a young bull and marketing him as a proven sire. Then there are another three years till daughters appear in the milking herd, and many of them will be there for 8, 9, 10 or more years. To put this in perspective, some of the cows milking today, in 2011, are daughters of bulls that were contract mated in the year I began with LIC, in 1992. This year's contracts will put daughters into herds and some of them will be there in 2030!

With the KiwiCross, we needn't have worried. By the time we put the first Premier Sires team into the market in 2005, Sire Proving Scheme farmers had already reported very positively about the lively and robust calves that reared easily and milked just like the other Kiwi cows that were already the darlings of the dairy industry.

In the first year of use, KiwiCross™ (we had secured a Trade Mark for the brand-name) accounted for 14% of the inseminations, and in subsequent years, 19%, 22%, 26%, 30%, and 32%. This was particularly remarkable in that, although we had some luck in finding 501038 Scotts Northsea in the first crop of graduates, there was daylight between him and number two, and we had to wait five years for a successor to his throne.

At the time of writing, Decemeber 2011, we are witnessing the ascension of a new ruler, as KiwiCross™ 508077 Howies Checkpoint has leapt over three-year All Breeds champion (Holstein Friesian) 105038 Mint Edition to take a lead of 57 BW at 309/77 (Animal Evaluation run 10/12/11).

Today Kiwi cows account for more than 60% of heifer replacements, making the breed the clear favourite of New Zealand dairy farmers, and so the KiwiCross™ bulls are filling a vital need. As herds get larger, and many of the largest are heavily cross-bred, the simplicity of the breeding option is increasingly valued. As for those Sire Analysts, try telling them they can't use most of the cows on the Top Cow List!

The long and the short of it

The seasonal pasture-based farming system that underpins New Zealand's competitive advantage in milk production demands genetic solutions that we cannot source elsewhere. For example, cows must calve in synch with the grass growth curve in spring, or they cease to be of value. What then for those conceiving late in the season?

The answer used to be induction of pregnancy pre-term, resulting in the loss of the calf, but lactation underway earlier than otherwise would be the case. This practice has now been deemed by the industry to be unacceptable, and other solutions must be found.

What if we could create pregnancies in late cows that would naturally be shorter? We knew there was genetic variation in gestation length, so selection should be possible, but how much progress could we make and how long would it take?

Dr Anne Winkleman

What we did know was that a single trait selection programme was possible as there would be no need to retain the offspring as replacements, and that this use of "terminal" sires would confer other advantages. For example, if we could identify suitable bulls, we could use them heavily without concern about inbreeding or genetic diversity. Also, if we achieved a usefully short gestation period, we could replicate the genes without the need for an expensive ongoing programme.

I was aware that our Research and Development team had carried out some data analysis on the trait previously and I went straight to Dr Anne Winkleman with one question in particular. "What is the heritability of gestation length?".

After a brief pause Anne replied. "About 0.48 I think", but being a scientist she was immediately uncomfortable with the vagueness of this response and went to her files for verification. I knew she would be on the money and I'd heard enough. If 48% of the observed variation is due to genetic factors, this is exciting. We needed to model a programme to predict the gain we could make, and we did just that.

The first crop of bulls progeny tested in 2001 confirmed that we had a long way to go. The best had BVs of about -5 days, meaning that just half of this would be captured by the farmer as half the genes would come from the cow.

Today we have bulls with BVs of -16 days, so farmers can be confident of bringing forward late cows by more than a week. No one can predict how far we can take this project, but we are determined to find out. What we do know is that we have seen many cows calve more than two weeks early and deliver healthy offspring. If this could be achieved consistently, the value to the industry would be huge.

It is now more than a decade since we began the Gestation Length Proving Scheme, and we have stuck with the plan, but we have also kept looking for a shortcut. One idea that captured the imagination of many was the Yak project.

We had searched hard for bovines with naturally shorter gestation, and had tried the likes of the Lowline Angus with disappointing results. The Yak (Bos grunniens) had been crossed with dairy cattle (Bos taurus) in Asia for the purpose of improving milk production, and there was some data indicating shorter gestation. We located some Yaks in a small inbred herd in the South Island and collected some semen which we inseminated into dairy cows. Gestation length results were spectacular, averaging more than two weeks shorter than normal, but conception rates were appalling.

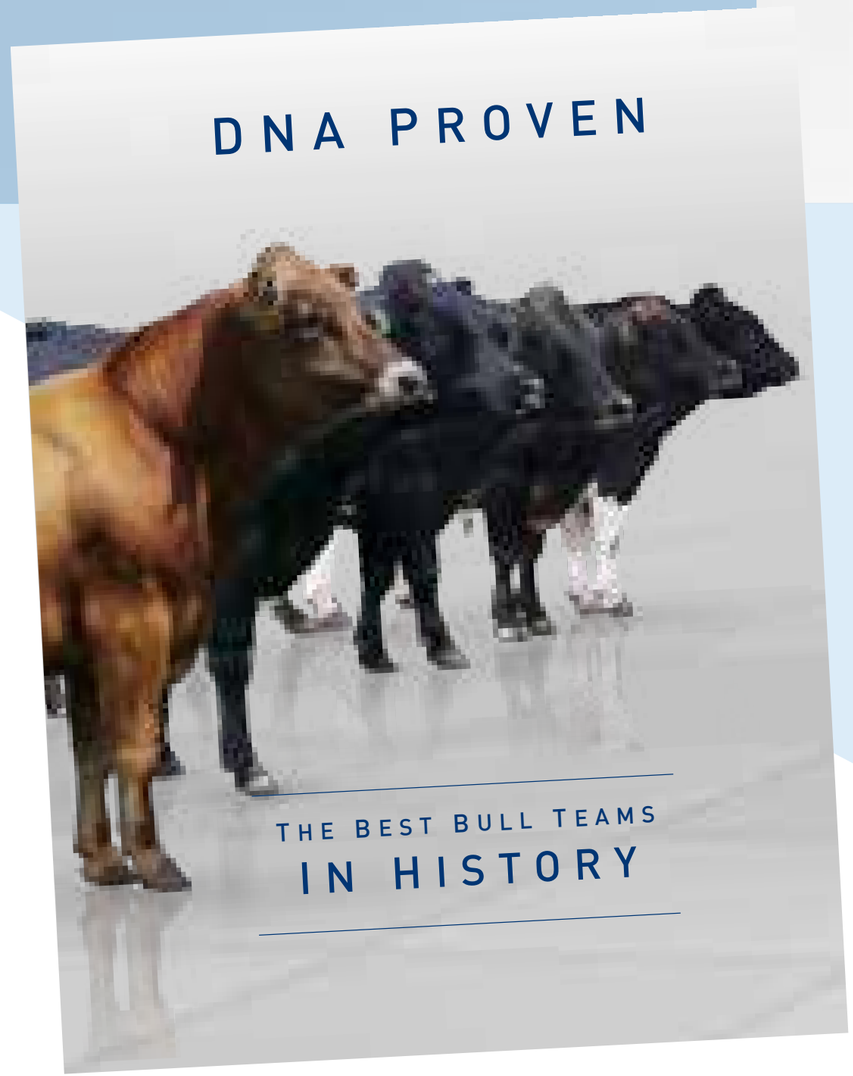
Despite our best efforts, which have included the purchase of Yak bulls in the USA in an attempt to find genetically healthy specimens, we appear to have hit biological hurdles in semen quantity and quality, as well as conception rate. The Yak "shortcut" looks like a deadend road, but we can be satisfied that we have kept an open mind on all possible solutions.

Gene discovery

During the 1990s, the expectation was that we could discover individual genes responsible for quantifiable differences in specific traits, and that by combining the additive effects of these genes, we could pre-select strong prospects for progeny testing. With enough genes we could potentially justify widespread use of bulls as yearlings rather than at five years old, shortening the generation interval and lifting the rate of genetic gain.

This approach, known as Marker Assisted Selection (MAS) was the subject of numerous initiatives worldwide, and our own joint venture with Holland Genetics and the University of Líege in Belgium achieved notable success. In 2001 we lodged an application for the first ever milk production gene to be patented, called DGAT by the scientists, and subsequently named the Quantum gene. Securing the IP around this gene was a significant milestone, but the discovery was of more technical than commercial significance. The science was sound, but the individual gene explained only a small proportion of the genetic variation in protein and milkfat production, amounting to just a few kilograms

Yak/dairy cow cross



"We will supply more than one million inseminations by "DNA Proven" bulls this spring, and we are confident that they are indeed, (as the advertising says) "the best bull teams in history".

per lactation. Shortly afterward, another similar gene was located and its effect quantified. It was called GHR and renamed the Optimum gene.

These discoveries, the granting of patents, and subsequent licensing arrangements (to multinational giant Merial) provided "proof of concept" in commercialising genetic IP, but we were a long way from a positive return on investment in either financial or industry-good terms. It was to be late in the decade before the breakthrough would be made.

Genomics

In 2001, the seminal paper on genomics was written by Professor Theodorus Meuwissen (et al). It theorised that, when DNA technology had advanced sufficiently, it may be possible to use sophisticated computational analysis to link the pattern of "SNPs" (pronounced "snips", and referring to variations in the DNA code) observed in animals with progeny tests, to those found in unproven animals, and thus provide an early estimate of genetic merit.

On the back of rapid advances fuelled mainly by the human genome project, the cattle genome was sequenced in 2004 and by 2007 it was possible to confirm 50,000 SNPs for individual animals at a cost that was justifiable.

Our Research and Development team was confident that, in the following year, 2008, we could supply a team of young sires directly to the market, for widespread use, based on the addition of this "genomic evaluation" to the traditional ancestry information. The commercial genomic era was indeed launched in 2008, with LIC being right at the forefront.

Harvey Tempero

Richard Spelman

It is now widely agreed globally that genomics is the biggest advance in genetics since the invention of AI. This statement is justified by the fact that nothing else has the capacity to have the same positive impact on the annual rate of genetic gain. In 2010, Dr Peter Amer, an independent scientist working on behalf of NZ Animal Evaluation Ltd, calculated that the industry value of genetic gain could potentially climb from $300m p.a. (NPV) in the recent past, to around $480m p.a. Clearly this technology is expected to add billions of dollars to the New Zealand dairy industry in the foreseeable future.

It is important to consider that each genomic "tool" is specific to the bloodlines examined during its development, and the management environment in which those animals were farmed. Put simply, our Holstein Friesian analysis would be of little direct use for selecting Holsteins in Wisconsin, and likewise, the impressive progress made by the USDA cannot be usefully employed for direct selection of New Zealand sires for seasonal pasture-based dairying. In addition there are breed differences to consider.

It is a source of great pride that we have been able to keep pace with the big centrally-funded research projects offshore because of several key factors. The essential DNA archive is available to us because of the foresight of individuals such as Harvey Tempero who decided, in another age (by the early 1980s), that LIC should retain semen samples from every progeny tested bull, good, bad or indifferent. They could scarcely have known how it would one day be used, but intuitively they knew that it would derive value for the dairy industry.

The initial momentum and financial support for the journey came from our Board of Directors who, in 1994, encouraged our science team to take the first steps on this long road. Researchers such as Dr Richard Spelman were quick to recognise the potential and devoted many years to developing the knowledge necessary to drive the project, and to assemble a team with the requisite skills.

The genomic adventure is still in its infancy, and the road is not smooth, but lessons learned in 2008 and 2009 resulted in useful improvements being applied in 2010, and refined in 2011. We will supply more than one million inseminations by "DNA Proven" bulls this spring, and we are confident that they are indeed, (as the advertising says) "the best bull teams in history".

Reflection

It has indeed been a momentous decade in the history of herd improvement. Genomic technology is advancing rapidly but the Sire Proving Scheme still provides the essential foundation on which genetic progress is built.

At LIC there is no such thing anymore as an "unproven bull", as every calf accepted is already DNA screened, but the proof is in the progeny and the Sire Proving Scheme will continue to play a vital role as far ahead as we can see.

It is an honour to have had the opportunity to be part of this organisation and to work alongside those who really have made a difference in the New Zealand dairy industry.

PETER GATLEY
December 2011

Perspectives

Mark Dewdney, LIC CEO and Sire Proving Scheme Member

LIC CEO, Mark Dewdney, and his wife Vicki own a dairy farm at Morrinsville. The farm is run by a Manager but Mark takes a close interest in the farm taking every opportunity to get out and do a farm walk.

Today the KiwiCross™ herd is 100% Premier Sires, but historically it's been a nominated herd and cow records reflect some of the best sires which have been used in the country — both LIC and CRV Ambreed. The herd is in the top 2% to 3% genetically in New Zealand. So why did Mark decide to join the Sire Proving Scheme two years ago?

"I understand and believe in the importance of genetic gain — not only to my farming business, but for the farming businesses of our customers and shareholders, and for future generations of dairy farmers.

"I've got a very good herd and wanted to make their genetics available to help improve genetics for all New Zealand dairy farmers.

"I've always been very interested in the records side of my farm, and enjoy being a member of a small group of farmers who are the first in the country to use young elite bulls. It's exciting watching their progress and seeing which bulls come through.

"Not surprisingly, since I'm CEO of LIC, I use most of our services, but even if I wasn't in this role I'd still use our AB, belong to the Sire Proving Scheme, herd test, DNA parentage verify all my animals, weigh young animals etc.

"How good is the Sire Proving Scheme? Ask any farmer from any country in the world, and they'll tell you LIC cows milk better, on grass, than anything else, and are more fertile — and if you feed them supplements, they'll respond as well as any."

Multi-million dollar investment in sire proving

Mark Dewdney, LIC CEO

Proving artificial breeding sires is an extremely costly business — whether by traditional means, or genomics.

"Each year LIC invests around $12 to $13 million in sire proving. The introduction of genomics meant we traditionally prove fewer bulls but the costs remain the same as the 'savings' we make pays for the cost of genotyping.

"It's an investment which delivers unparalleled returns to our shareholders and to the dairy industry.

"It's been estimated that, since the Sire Proving Scheme began in 1961, our proven bulls have contributed around $17 billion dollars to the New Zealand economy.

"Those figures are impressive, but represent the physical impact proven bulls have had on the make-up of New Zealand herds, with LIC bulls responsible for siring three out of every four dairy cows grazing on Kiwi farms.

"Notwithstanding that return to the industry, the Sire Proving Scheme is regularly reviewed to ensure it's as cost effective as possible.

"The LIC Sire Proving Scheme is a concentrated scheme, which means we have a defined number of members who mate all their cows to Sire Proving Scheme bulls. However, we have considered whether a dispersed scheme, where a larger number of farmers mate around 10% or 15% of their herds to Sire Proving Scheme bulls, would be more efficient.

"Each time the review has been conducted, the conclusion has confirmed the structure agreed by the people who launched the Sire Proving Scheme back in 1961 — that a concentrated scheme ensures that all bulls receive a reliable progeny test so they can be marketed with confidence.

"That concentrated scheme delivers the best result to the cooperative, to our shareholders and to the dairy industry."

LAB Insights

Scott Ballinger,
Artificial Breeding Manager, 2005 to present day

"World wide, very little research has been done into the fertility rates of semen from young bulls because demand for young bulls has never been high."

With the extra information provided by DNA and the resulting reduction in the number of bulls collected for Sire Proving, one could assume that processing semen has become a lot easier.

Not so, says Artificial Breeding Manager, Scott Ballinger.

"It sounds like it would be easier but the total number of straws processed and despatched domestically from LIC each year didn't change; it is still about five million.

"There's a lot of complexity to ensure we get a good spread of inseminations across the country to generate between 70 and 75 daughters from every bull in multiple herds of different sizes in every region. So how much we deliver, the quality and when we deliver, is paramount.

"With Premier Sire bulls we know their genetic worth, so we collect and process as much semen as possible.

"When it comes to Sire Proving Scheme bulls, however, we don't know how good they are, so we collect lots of small amounts of semen from Scheme bulls which will be used in Sire Proving herds around New Zealand.

"These herds are located in a variety of regions and terrains to ensure that the final proofs give us confidence that the bulls which ultimately earn Premier Sire status will sire commercial daughters for farmers all over New Zealand."

Laboratory staff have been integral to allocating semen accurately for the Sire Proving Scheme for 25 years, especially Susan Paul.

"In 2003/04 the 'Sire Proving Scheme Black Box' was introduced. It's an information technology (IT) tool that looks at the number of doses collected on any day from all bulls, then looks at the expected daughters across the country and (following the Sire Proving Scheme business rules), allocates semen for the next day. Until the Black Box was introduced, the calculation was done manually."

Over the years the number of Sire Proving Scheme straws despatched in a season has varied, from a peak of 290,000 in 2007 to 120,000 in 2010.

"World wide, very little research has been done into the fertility rates of semen from young bulls because demand for young bulls has never been high. Accordingly, we ensure that all doses (straws) of semen from Sire Proving Scheme bulls go out at higher concentration rates than the Premier Sires, whose fertility is known.

"Premier Sires Long Last Liquid (LLL) has about 1.25 million cells per straw, but Sire Proving Scheme straws contain about twice that amount — around 2.5 million cells per straw.

"We also use Sire Proving Scheme LLL on specific days to maximise non-return rates (Premier Sires LLL can be used over three days). We place extra focus on the young bulls to ensure semen remains at the same high quality as our proven bulls.

"The quality of ejaculate is also more variable in younger bulls, so a lot of work is done before the LLL season starts. Young bulls are brought in frequently for semen evaluation to determine when they are capable or mature enough to produce quality sperm.

"We need to ensure we have a certain quantity of frozen straws and also genetic insurance stock to meet any future contract mating needs.

"The farm team starts collecting Sire Proving Scheme bulls mid winter."

From the bull to the straw:

Semen processing begins the minute sperm is collected from the bull —

- Initial semen quality is checked as soon as it comes into the laboratory, the percentage of live healthy sperm is calculated along with motility (motility checks sperm speed and the ability for sperm to swim in a straight line).

  LIC's quality criteria requires that a minimum of 70% of sperm need to be alive and normal and seven out of 10 sperm must be able to swim well in a straight line.
- The sample is also checked for abnormal sperm, or morphology, for example a bent tail will affect the sperm's ability to travel and an abnormal head could affect fertility.
- Once semen collection passes initial quality control checks, the sample is put through a particle counting machine which calculates how many million sperm are contained in each millilitre of raw semen.
- A diluent is then added to the concentrated sample. The diluent follows a secret recipe, one of the ingredients of which is egg yolk, and the solution is prepared using a precise formula.
- The diluted semen is placed in a cooling draw where it is slowly brought down to a temperature of five degrees Celsius before it can be put into straws.

Susan Paul carries out an initial semen quality check as soon as it comes into the laboratory.

Animal Evaluation *evolutions*

Rachel Wood, Manager Animal Evaluation Unit

In the late 1960s/early 1970s the Breeding Index (BI) and Production Index (PI) were first introduced. These replaced what was then known as "Sire Rating" for sires, and the "Difference from Expected Level of Production" for cows.

These newer indexes only considered milkfat, because most farmers were paid for butterfat kilograms, and milk, for town milk suppliers. BI and PI were expressed on a percentage scale with 100 referring to a fixed base date of 1960. These evaluations were estimated from a within herd comparison and did not correct for the breed of animal, nor the genetic level of the herd. There were several other limitations to this model, but it was the best available at the time.

Over time there was a trend towards increased market returns from protein products and recognition that the water content of milk was a significant cost. Further modifications were made, resulting in two different evaluation systems for bulls and cows.

Payment Breeding and Total Breeding Index

Around the mid 1980s a 'Payment Breeding Index' (PBI) for sires was introduced. This index incorporated the three production traits and replaced BI for sires.

A couple of years later, a total merit index, named Total Breeding Index (TBI), was established with the 1987/88 sire evaluation. Again this index was developed for sires only, but now included efficiency, management and conformation traits in addition to production traits (ie TBI = Payment BI + economic Breeding Values of functional traits).

Consequently, the New Zealand dairy industry had two indexes available for sires in the late 1980s — PBI and TBI. Total Breeding Index was the first index to attempt to measure net farm income and indicate a bull's genetic merit for farm profitability.

The objective for the development of the TBI was firstly, to provide information about the economic effects of a sire's breeding value for a particular trait; and secondly, to provide a comprehensive ranking of sires including all traits influencing the selection objective.

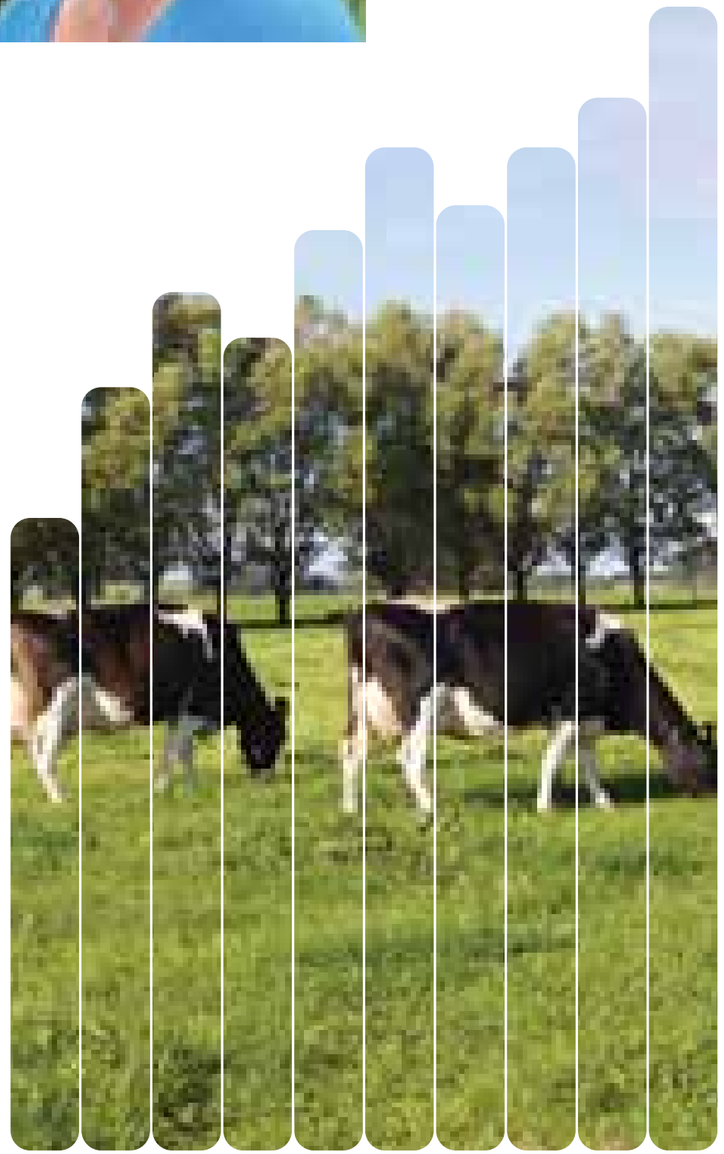
In 1989, with the industry adaptation of a payment system for milk volume, milkfat and protein, modifications were made to the cow evaluation system to replicate an index similar to sire PBI.

The main benefits of this new system for cows were:

- Improved stage of lactation curve correction factors;
- Use of contemporary groups in BI and PI computation;
- Improved procedure for calculating PI;
- Better methods of handling genetic trends across ages; and
- Inclusion of the three production traits (milkfat, milk volume and protein).

Both systems, the sire TBI and cow BI and PI, used the Selection Index method, which incorporated information from parents and progeny for bulls, and parents and performance for cows.

The objective for the development of the Total Breeding Index was firstly, to provide information about the economic effects of a sire's breeding value for a particular trait; and secondly, to provide a comprehensive ranking of sires including all traits influencing the selection objective.



Animal Model

During 1993 to 1996, the methods used to calculate all breeding indexes in New Zealand underwent a major review, resulting in the introduction of the Animal Model in 1996.

The Animal Model provided several major technical advantages over previous systems of evaluation. These included:

- Using records from all known genetic relationships, both ancestry and progeny, in calculating an animal's evaluation.
- Providing an across breed evaluation.
- Allowing simultaneous sire and dam evaluations ie new information on any animal is immediately included in the evaluations of all its relatives and vice versa.
- Accounting for preferential mating; eg a sire will not receive extra advantage from its daughters simply because it has been mated to above-average cows.
- Improved method of combining individual test-day records into estimates of production for the complete lactation (270 day yield deviation).

These characteristics ensure every evaluation is based on the most accurate and up-to-date information available. The increased accuracy in generating genetic evaluations using this method resulted in improved genetic gains.

Bill Montgomerie was Manager of the Animal Evaluation Unit for ten years and was instrumental in fostering widespread understanding of the need for, and methods of, animal evaluation. His farmer perspective gave him a rare ability to translate complex data into simple, objective information which farmers could understand and act on.

New Zealand Test Day Model

In February 2007, the New Zealand Test Day Model for the dairy production traits was established. Test Day Model refers to the practice of directly analysing the cow's production performance records for all individual herd test days, rather than combining test day performance records into whole-of-lactation records as a pre-processing step.

This new evaluation system also took account of genetic differences between cows and bulls for maturity rate and for lactation persistency.

These improvements resulted in more stable proofs for artificial breeding bulls during the first half of the dairy season. More reliable proofs are generated as performance records become available.

Farmers didn't accept BI for some years. It was science and farmers are very cautious about new technology — they didn't initially accept that it was a measure of the profitability of a cow.

BW challenged
in the Courts

In the early 2000s, a group of predominantly breeder dairy farmers, known as the Concerned Dairymen's Association (CDA), initiated a class action against New Zealand Dairy Board and Livestock Improvement claiming that the Animal Evaluation model, introduced in 1996, had detrimentally affected its members' businesses. The CDA was joined in its action by two semen marketing companies, Levels Gentech and Brenco Livestock.

In 2003 the High Court found overwhelmingly in favour of the Dairy Board and Livestock Improvement dismissing all seven classes of action.

In his Judgement, Justice Wild said

"I accept that the AES (animal evaluation system), upon its introduction in 1996, was bold and innovative, representing 'cutting edge' or pioneering science. So also were Darwin's theory of evolution and Einstein's theory of relativity when first advanced

"But the evidence in this case has demonstrated that every aspect of the Animal Evaluation System has been expertly designed and checked before implementation, and that all had sound scientific backing" (Para 307 Judgment of Wild J, Para 307).

The CDA subsequently appealed the Judgment but, in 2005, the Court of Appeal found in favour of the earlier Judgment.

Genetic Gain
EXPLAINED

David Sellars, LIC Genetics Consultant

The rate of genetic gain for any trait, in any species, is explained by the Breeders Equation:

$$\text{Genetic Gain} = \frac{\text{Selection Intensity} \times \text{Heritability} \times \text{Phenotypic variation} \times \text{Accuracy of Selection}}{\text{Generation Interval}}$$

Therefore, to increase the rate of genetic gain, the breeder will seek to influence the five variables, increasing those above the line, and decreasing the generation interval.

The equation follows simple rules of arithmetic. For example;

$2 = \frac{12}{6}$ $4 = \frac{12}{3}$

Therefore, if the generation interval is halved, the rate of genetic gain will double.

Selection intensity is increased when the few animals used for breeding are selected from much larger populations. Breeding AB bulls from a few hundred of the best cows out of the 4.5 million that we have, is very intense selection on the dam side. Mating 4.5 million cows with around 150 AB bulls is very intensive selection on the sire side.

Heritability is the amount of the phenotypic variation that is controlled by the genetics. The more genetic control there is for a trait the greater the potential gain. Gestation length has the highest heritability we work with, 0.5. The heritability of fertility (defined as the expectation of calving in the first 42 days of the herds calving period) is only 0.03, meaning most of the phenotypic variation is due to factors other than the genetics.

Phenotypic Variation. There has to be range in a trait in order to exploit the desirable end. For example, all cows have four legs so we cannot breed a five-legged cow. There is no phenotypic variation in the number of legs. By comparison, the phenotypic variation for protein production is large, so we can select high-ranking sires and dams and achieve genetic progress for this trait.

Accuracy refers to the extent to which the measure we use represents the trait in question. For example, a bull's Calving Difficulty BV is based on the % of assisted births in his daughters when they are first-calving heifers. This is considered more accurate as a measure of Calving Difficulty than, say, average birth weight of his calves.

The one item we seek to minimise to increase genetic gain is:

Generation interval is shortened by breeding with young animals. For example, if we only use progeny tested bulls as sires of sons, they will be at least five years old. By using genomic selection we are now using some bulls for contract mating as yearlings.

by David Sellars, LIC Genetics Consultant

How can a young bull *be better than its parents?*

Each young bull receives half its DNA from its mother and half from its father. Each cell of a cow contains a quantity of DNA. DNA can be described as the instruction manual for the animal.

In order to produce an egg in the ovary of the cow, the DNA quantity is halved. This is so that when the egg is fertilised by the bull (whose sperm also has half the normal quantity of DNA), the resultant embryo from the combining of these two halves has the full quantity of DNA.

The process of halving the DNA, which occurs in both the ovary of the cow and the testes of the bull, is where genetic variation occurs. Along the DNA are genes that code positively or negatively for aspects (traits) of importance (eg. protein) to today's farmers.

The variation comes from which half of the cow's totality of DNA ends up in the egg that was fertilised.

Did the particular half in the egg contain an "above average" sample of genes of importance, or a below average sample? The same principle applies in the testes to the production of sperm.

The bull that is genetically superior to its parents is the bull that, by chance, happened to get an above average sample of genes from its two parents.

These are the ones that the Sire Proving Scheme seeks to identify, and that go on to become Premier Sires.

The bull that is genetically superior to its parents is the bull that, by chance, happened to get an above average sample of genes from its two parents.

Why is it necessary to "Sire Prove" a bull?

A dairy bull needs to be proven because dairy farmers are paid for milk and bulls don't provide milk. With other farmed animals, for example beef, the male animal provides the end product ie beef as does the female. This is called a performance test. With dairy, however, because the sire does not produce milk, its daughters have to be milked so that its genetic ability as a sire can be assessed and compared with others to identify animals that are extraordinary, or elite.

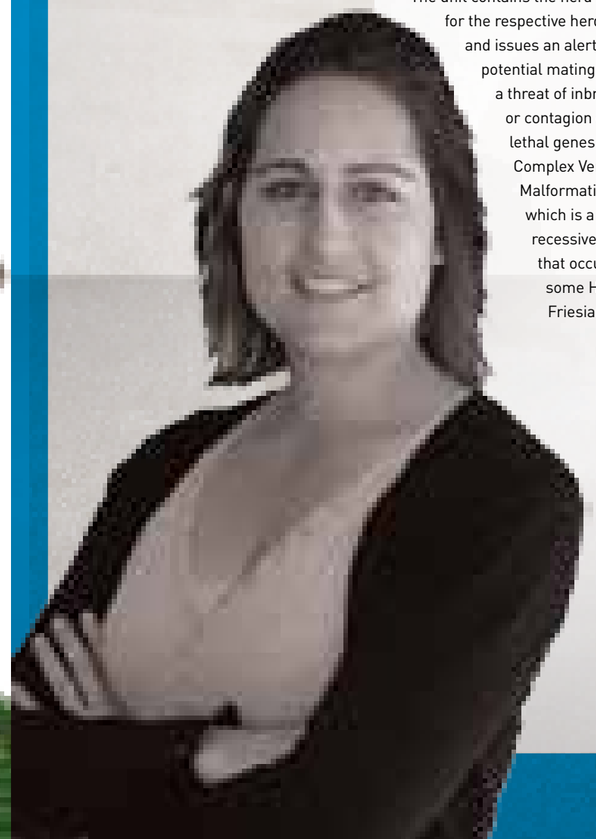
In practice within the Sire Proving Scheme, each bull sires a crop of around 80 daughters and their production is compared (along with other attributes of importance) with the daughters of other sires within the herd.

In practice within the Sire Proving Scheme, each bull sires a crop of around 80 daughters...

Technology advances during the 2000s

Amy Horrell *Sire Proving Scheme Manager 2010-2011*

The eleven years from 2000 to 2011 saw a flurry of activity as technology advances hit the world and LIC. Many of these advances were captured in LIC's Sire Proving Scheme and include —



Inbreeding control

Since artificial breeding (AB) began more than 50 years ago, geneticists have been aware of the potential for inbreeding — ie for a bull to be mated with a close relation — but until 2000 management was achieved by closely monitoring the makeup of the Premier Sires team.

In the year 2000, however, LIC introduced DataMATE, a hand held computer that LIC technicians use to record information about every insemination that they carry out.

The unit contains the herd records for the respective herd and issues an alert if a potential mating poses a threat of inbreeding or contagion of legal lethal genes (like Complex Vertebral Malformation which is a recessive gene that occurs in some Holstein Friesians).

Electronic recording of Traits Other than Production

In 2003 LIC introduced an electronic hand held computer to record Traits Other than Production (TOP) scores, reducing the incidence of human error and speeding up transfer of this information to the LIC Database.

Size of the Sire Proving Scheme

The size of the Sire Proving Scheme reduced in members in 2008 through the introduction of genomic selection. Member numbers decreased from 329 to 118 due to refinement of the bull teams and a small decrease in the numbers of daughters which were required per bull.

It was a difficult decision, as all members of the Sire Proving Scheme are exceptional farmers. The reduction in member size was acheived by analysing how well our farmers carried out their farm management practices and how successfully they met every requirement of the Scheme contract.

The smaller Sire Proving Scheme which resulted, is a group of farmers who are exceptionally well-organised, keep excellent data records, milk twice a day, have no winter mobs, use an AB technician and manage mating and calving well. DNA parentage is required on herds that used dairy Short Gestation Length semen and in herds that have more than 700 cows because of the potential for increased mis-mothering.

The 2008 year also saw the introduction of a requirement to record the level of calving assistance on every calving in a Sire Proving Scheme herd. The results speak for themselves in the higher breeding value reliabilities achieved for the 2008 code bulls and onwards.

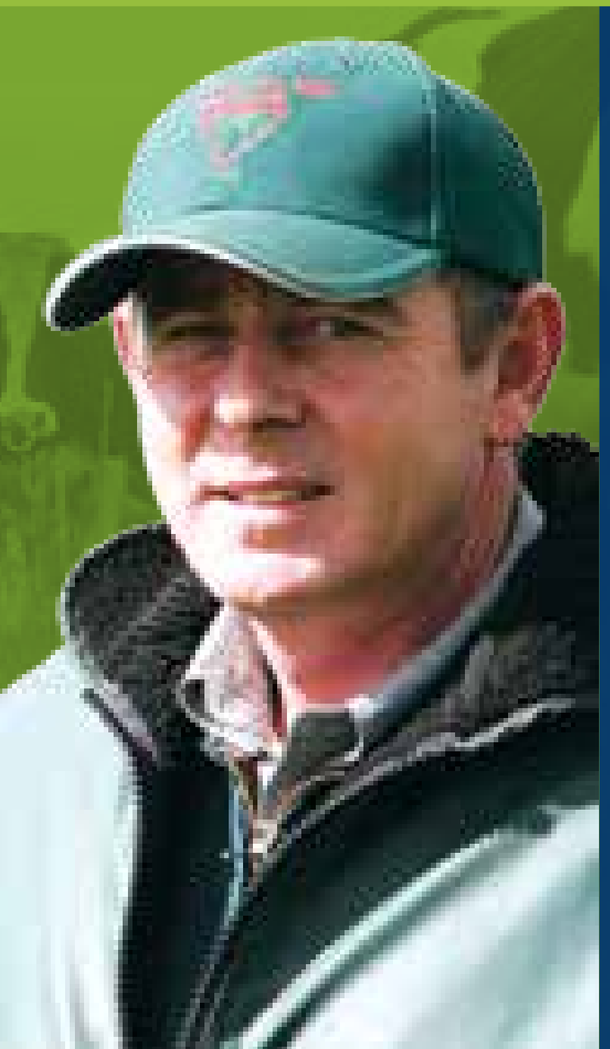
Genotyping of Sire Proving Scheme daughters

For the first time, particular age groups of Sire Proving Scheme daughters began to be sampled and genotyped across a 50,000 SNP panel in 2010. This is being undertaken to bolster the reference population used for genomic selection. This is now an annual process and the resulting information improves the reliability of sire Breeding Values.

The size of the Sire Proving Scheme reduced in members in 2008 through the introduction of genomic selection.

DAVE HALE
LIC Bull Farms Manager
2005 to present day

FARMING BULLS FOR SEMEN PRODUCTION



For nearly a decade Dave Hale managed Te Akau Stud (North Waikato), a 1500 acre (607 ha) property farming dairy beef bulls, sheep and an ever expanding thoroughbred racehorse pre-training operation.

"The only real similarity to managing a beef bull farm and LIC's bull farms, is achieving optimal growth rates in young bulls.

Managing LIC bull farms is a unique role, not only as there are three different farms spread between the Manawatu and Waikato, but also because of the intensive labour requirement for semen collection.

"To state the obvious, we weren't collecting semen from the 1200 odd beef bulls, hence we didn't have to handle and train bulls for semen collection.

"Bull farming at LIC requires many skills and most can only be learned 'on the job' as there is no school that teaches the bull handling expertise required for semen collection.

"Training young bulls is quite unique and needs a lot of patience, trust and handling. This training prepares the bulls for semen collection for the rest of their time at LIC.

"Bull farming for beef production is quite different, bulls would be run in mobs of anywhere from 50 to 150 depending on their age and time of year.

"For all our stock work on a beef and sheep farm we used horses and dogs — as opposed to the operation here. At LIC the farm is set up almost identically to that of a dairy farm. We have lots of small paddocks with central races.

"We have mobs of no more than 20 young bulls on average — these numbers reduce as bulls get older until finally they become 'singles' at which time they live in paddocks on their own to further minimise risk of injury.

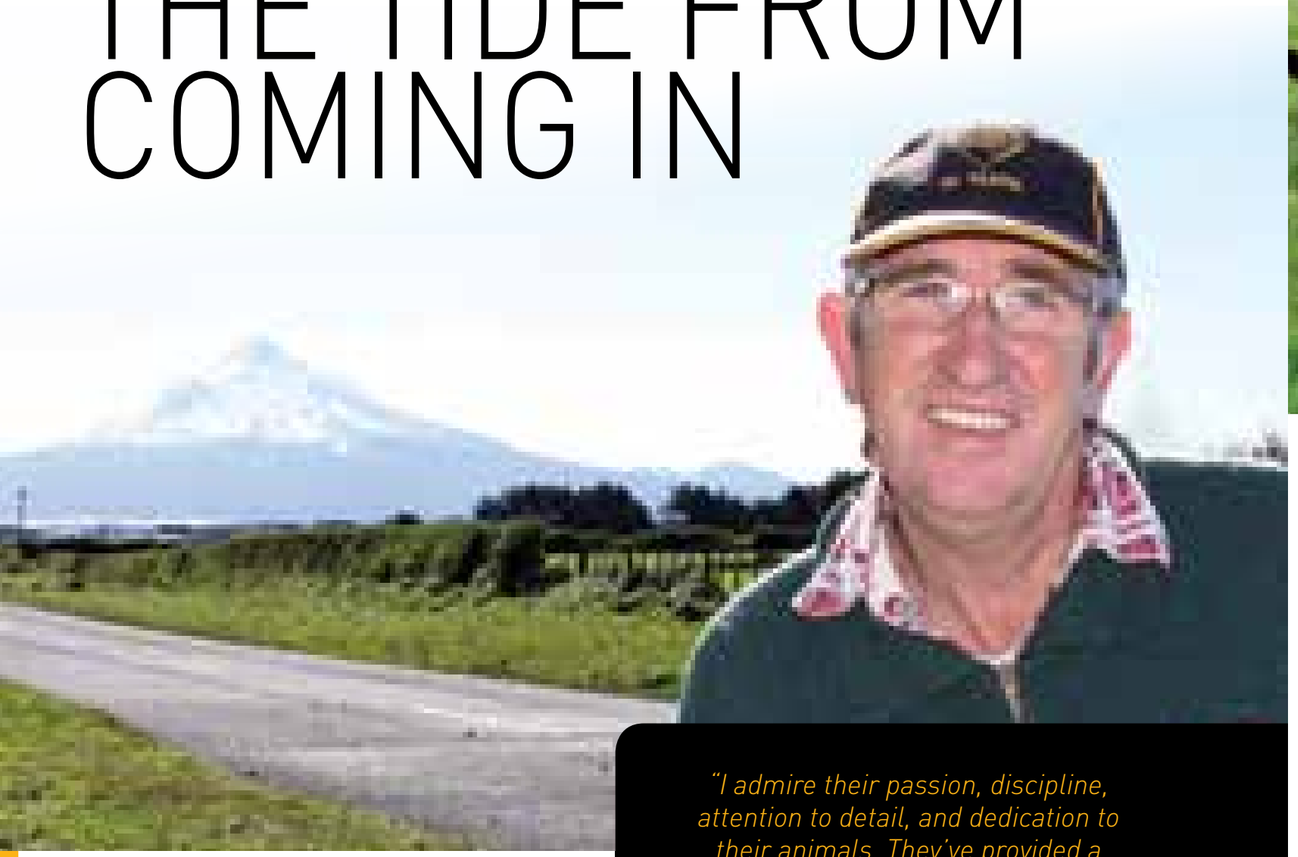
"All stock work is done on quad motorbikes, or tractors for difficult bulls — we have no dogs."

Growth rates influence maturity, and maturity influences semen production, so when the young bulls arrive at LIC the aim is to grow them as fast as possible.

"All LIC bulls arrive as weaned calves in December and January and remain with LIC for the rest of their lives, ending when they are of no further use to the dairy industry nationally or internationally. All winter supplements are made on farm, and during the winter months or during droughts silage and/or hay is fed daily to supplement their diet.

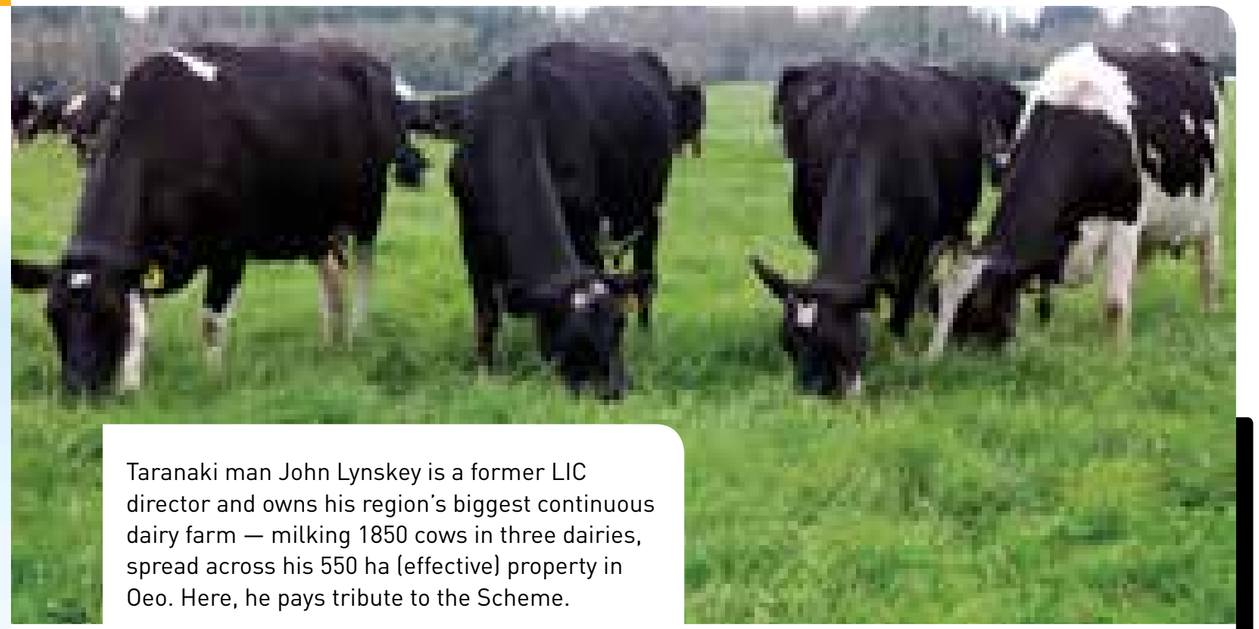
"Bull farming at LIC requires many skills and most can only be learned 'on the job' as there is no school that teaches the bull handling expertise required for semen collection."

YOU CAN'T STOP THE TIDE FROM COMING IN



John Lynskey 2000s to present day

"I admire their passion, discipline, attention to detail, and dedication to their animals. They've provided a sterling service to the industry."



Taranaki man John Lynskey is a former LIC director and owns his region's biggest continuous dairy farm — milking 1850 cows in three dairies, spread across his 550 ha (effective) property in Oeo. Here, he pays tribute to the Scheme.

After 35 years in the dairy industry, John Lynskey's experience is vast:

- As a dairy farmer he's been privileged to observe or embrace various changes to on-farm systems, technologies, and trends.
- As a former LIC director (of 24 years), his influence on the direction and governance of the dairy farmer-owned co-operative has been significant; being a board member has given him a unique insight into the strategies and objectives that make the organisation tick.
- And as a breeder of Lynskey's Doyle, John knows first-hand what it takes to breed a bull that's good enough to make the Premier Sires team.

So he's in a good position to make some informed observations about the Sire Proving Scheme and those who belong to it.

"I admire their passion, discipline, attention to detail, and dedication to their animals. They've provided a sterling service to the industry.

"I've been quite lucky to travel around the world and see different systems, and ours is by far the best.

"Because of the scale of farms in New Zealand, there's been no inclination to sway the figures, or to manipulate records to make them look good. Overseas there can be a lot of money at stake, but the Sire Proving Scheme has a genuinely industry-good focus.

"Most mothers of bulls come out of commercial herds now. They're cows that many of the owners know are good – but the farmer is perhaps unaware of their potential significance, and the influence they can have on the rest of the cow population in New Zealand.

"LIC notifies farmers that they are interested in their cow, arrange a contract, and away we go from there. We know, therefore, that the bull calves don't move a lot compared to other countries where there is a lot of variation, and that gives our Sire Proving Scheme farmers a good deal of certainty.

"The days of problematic bloat in New Zealand are almost gone, thanks to what had been achieved through the Scheme.

"And over time I think we'll be able to sort out issues such as facial eczema; as technology goes on.

"The focus on traits other than production is also a good example of what had been achieved through the Scheme.

"I look at today and it's probably easier breaking in 400 heifers than it was breaking in 25 heifers when I first started farming 35 years ago. The Sire Proving Scheme has done such an awesome job. I have so much confidence in the young bulls that are used today.

"And with genomics, in time, the young bulls are only going to get better.

"Like all things in business, however, the Scheme will need to adapt to changes in market conditions.

"Once the market has confidence in DNA, it'll take over. Then LIC will be able to go in to the general bovine population and just pull out any animal and check them for conformation etc.

"Every major dairy country in the world is embracing this technology, and there's little doubt it's going to work. You can't stop the tide from coming in."

Sire Proving in the family

David and Sue Kowalewski, Dairy Farmers

The Kowalewski family — left to right: Kate Gilmour, Jason, baby Conrad, Carl, Shey, Bianca, Talia, Paul, Sue and David.

Four generations of Kowalewskis have farmed in the same area in Taranaki (Beaconsfield Road) and David Kowalewski and wife Sue have built their home on the site of the original homestead where David was born.

Today David and Sue, winners of the 2006 Sire Proving Scheme Farmers of the Year, and their three sons (Carl, Paul and Jason) continue to farm.

Carl and wife Shey, also Sire Proving Scheme farmers, purchased a farm at Riverlea this year — and were winners of the 2003/2004 New Zealand Dairy Industry Farm Managers of the Year and the 2004 winners of the Fonterra Westpac Dairy Excellence Awards national title for farm managers.

Paul and wife Talia are equity partners and manage the 230 hectare (effective) family farm along with youngest son, Jason, an LIC Artificial Breeding Technician, who also lives on the farm with partner Kate and their son Conrad.

David purchased the family farm from his uncle in 1971. He joined the Sire Proving Scheme in 1985 and his 400 cows continue to be a Sire Proving Scheme herd.

"Ten years ago I nearly left the Scheme when LIC began importing American and Dutch genetics which were producing big calves. Out of 600 cows we had to assist 60 to 70 with calving and had to get up through the night to check on the animals.

"Last year out of 600 cows I could count on one hand the number of assisted calvings — and they were breach. Now the calves are smaller we don't have calving problems and life is a lot easier.

"Being in the Sire Proving Scheme means we are three or four years ahead of the industry and I don't feel we are taking any risks. With the progress that has been made with science in the last six or seven years, I can't understand why anyone wouldn't want to be a Sire Proving Scheme member."

This year the Kowalewskis have reduced their herd size from 650-700 cows to 600.

"The biggest problem we have with the Sire Proving Scheme is we find the requirement to keep 20% of heifer calves to be replacements in the herd is too high. We don't always want to bring 120 animals into the herd — the cows are producing so well, we find it hard to cull.

"This is never an issue when you want to expand, but now we are consolidating it is difficult."

Every year the Kowalewskis rear all their heifers, about 200 calves, selling the lowest Breeding Worth animals and keeping the top ones.

The genetic merit of the herd is above the Taranaki average of about 74 Breeding Worth (BW); it was 81 BW for the whole herd and 92 Production Worth, and the calves born this year have averaged 130 BW.

"We probably used 21 bulls this year so any risk is quite spread. The only potential risks we can see would be temperament and colour."

One of the family's dams, cow 51, has been contract mated every year for the past seven but has never had a bull calf. They have had a number of contract matings over the years and one of their bull calves, Kimbo, was purchased by LIC in 2010. They have also had many of their cows feature in Premier Sires and Alpha catalogues.

"You are not disadvantaged by being in the Sire Proving Scheme," says Carl, who bought his farm in December 2010 and signed up to be a Sire Proving Scheme member.

"When you're starting out it definitely helps having cheaper semen and getting genetics three years in advance.

"The major change I have seen during my involvement with the Scheme through the family farm was the calves 10 years ago were a lot bigger. Despite the calving difficulty, there was a benefit as the bull calves were more in demand for selling."

"Now all the bulls are genomically tested, the variations among bulls are not going to be great, so if you have a good herd you are increasing genetic merit.

"With the progress that has been made with science in the last six or seven years, I can't understand why anyone wouldn't want to be a Sire Proving Scheme member."

Spruced up and in Mint condition

105038 Fairmont Mint Edition was paraded at the 2010 LIC Premier Sires Breeders' Day. Before strutting his stuff in front of hundreds of people, the country's top ranked bull was given the full spa treatment, pedicure, ear trim and power-shower before being paraded — well when your favourite pastime is rolling in mud you're bound to get a bit dirty behind the ears!

Breeders Day

Breeders' Day is a very special day on LIC's calendar because it celebrates the farmers who achieve what many describe as the pinnacle of their careers — breeding a bull good enough to be a member of LIC's Premier Sires team of artificial breeding bulls.

The need for a day which reunites breeders with their bulls, and celebrates their achievement, was formalised in the mid 1990s with this annual event.

Breeders Day is held in May each year. The breeders of the bulls that entered the Premier Sires in that season, along with their families, are invited to come to LIC's base in Hamilton where they are treated to a parade of the bulls. They are also presented with a special framed photograph of their bull, and get to meet and talk with senior management, the people behind the Sire Proving Scheme and the farm team.

In a country that boasts more than four million dairy cows, these farmers have the distinction of owning some of the very best cows — cows which are the dams of the bulls responsible for more than three million inseminations in 2010.

Breeding a bull good enough for the Premier Sires team is a huge feat — one that only 3% of dairy farmers (or 1 in 300) ever achieve.

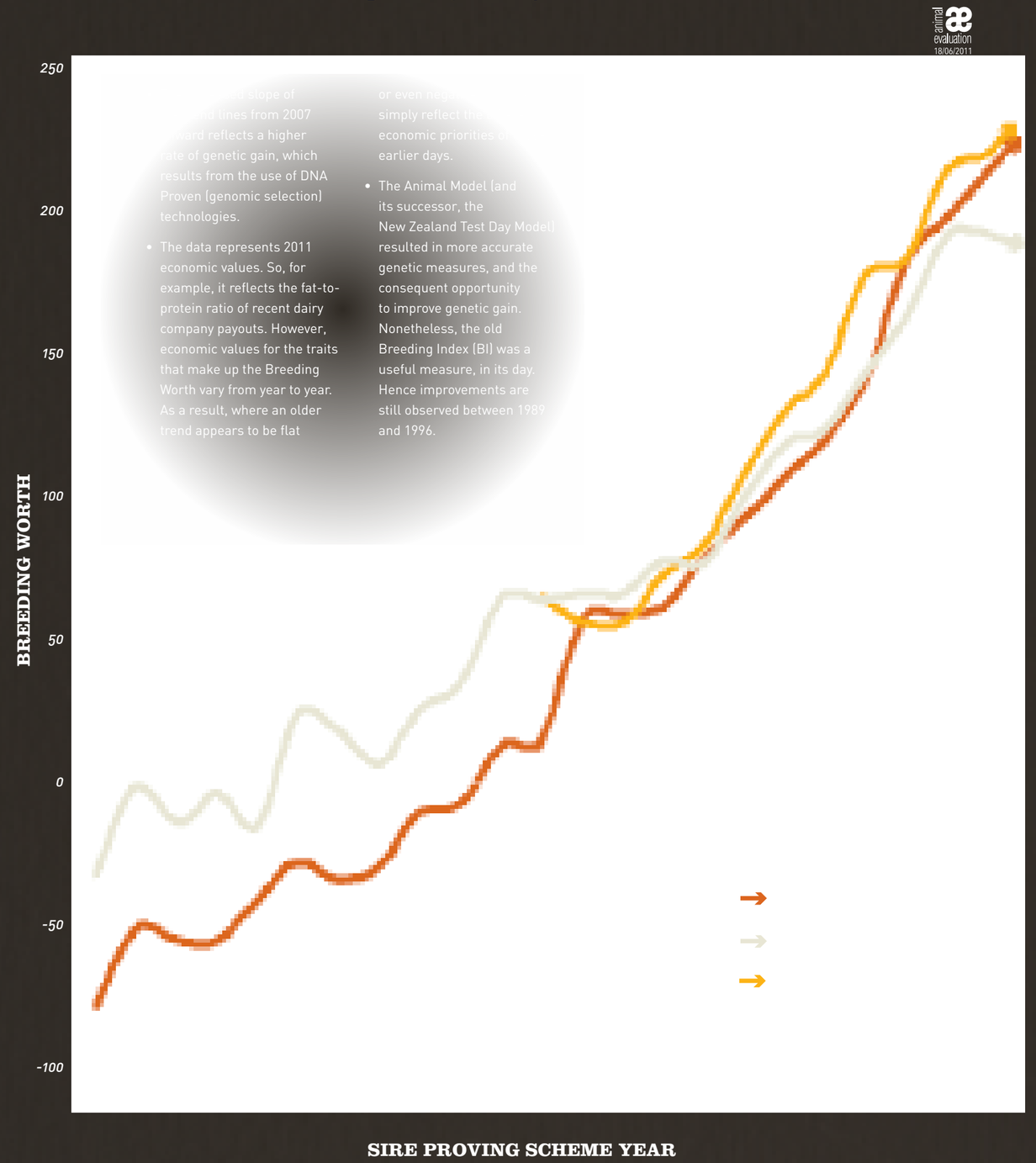
The contribution of the Premier Sires team to the New Zealand economy is conservatively estimated to be in the region of 17 billion dollars and its net present value around 300 million dollars each year — and growing.

Breeders Day symbolises a unique partnership between breeders and LIC — a partnership which, year on year, puts money in the pockets of farmers who use LIC semen and which ensures the continued profitability of pastoral dairy farming,

Genetic trend of the Sire Proving Scheme

Sire Proving Scheme genetic trend

Breeding Worth (February 2011 Economic Values)



slope of
lines from 2007
ward reflects a higher
ate of genetic gain, which
results from the use of DNA
Proven (genomic selection)
technologies.

- The data represents 2011 economic values. So, for example, it reflects the fat-to-protein ratio of recent dairy company payouts. However, economic values for the traits that make up the Breeding Worth vary from year to year. As a result, where an older trend appears to be flat or even neg
simply reflect the
economic priorities
earlier days.
- The Animal Model (and its successor, the New Zealand Test Day Model) resulted in more accurate genetic measures, and the consequent opportunity to improve genetic gain. Nonetheless, the old Breeding Index (BI) was a useful measure, in its day. Hence improvements are still observed between 1989 and 1996.

Sire Proving Scheme Farmer of the Year Award

The Sire Proving Scheme Farmer of the Year competition was launched in 1997 to recognise the excellence and commitment that members apply to the Scheme.

Nominations come from LIC Customer Relationship Managers based on the following criteria.

General

- The member must be a member of the Sire Proving Scheme
- Interest in Sire Proving Scheme (eg following progress of emerging bulls, keeping extra records for own interest)
- Commitment to accurately identifying new sires for Premier Sires
- Response to supplying extra information when required
- Relationship with local LIC staff
- Overall level of stockmanship in relation to soil type, climate etc (recording, stock and pasture management)
- Standing in local area (respected as a good stock person, record keeper etc)
- Other involvement with LIC (eg as AB technician, discussion group etc) or other contests (eg local sharemilker of the year etc).

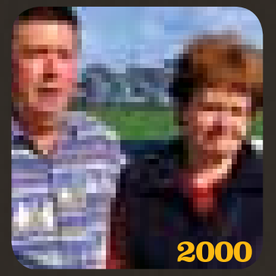
Final judging is carried out by a panel of LIC Sire Proving Scheme staff based on

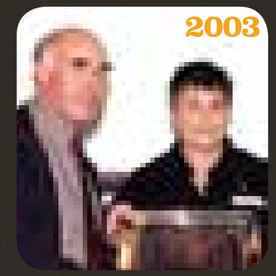
- Incoming heifer percentage (greater than 20%)
- Consistent achievement of targets
- Losses from identification (assessed as difference between calf and heifer %)
- Response to surveys (eg lameness, condition score drying off) and requests for extra information (eg weighing)
- DNA parentage results (where applicable)
- Check calvings, taggings, birth assistance codes
- Synchrony percentages
- Herd tested four times, AM and PM
- Ancestry percentage
- Mating statistics
- Relationship with Sire Proving Scheme staff (if applicable)

Long Service Members

Membership Years	Name
29	David and Lois Gibbins
26	David and Sue Kowalewski (and family)
26	Bill and Sherrilyn Kirk
26	Roger and Annie Jones
26	Ian Robb
25	Owen and Margaret Thomas
25	David and Maureen Clegg
23	John H Freer
23	Matthew and Makaia Campbell
23	John and Pauline Wheeler
22	Rocksolid Family Trust Ltd — Calvin and Linda Yates
22	Grant and Louise Simpson
22	Peter and Dianna Morrison
22	Estate of G Walker — Tom
22	David Renall
21	Paul and Rose Finch
25	BJ McFall
21	Henderson Farms — Ted and Corrine Henderson
21	Hikunui Farm Ltd (Glen Rowe)
21	Wickford Downs Ltd (Colin and Fran Jackson)
21	Graham and Tracey Fisher
20	Matthew and Sue Weake
20	Leo and Nel Schrader
20	John and Michelle Foster
20	John and Jeanette Tootell
20	Rojac Ltd (Rod and Jacqui McPherson)
20	Alan and Debbie Giles
20	John Massey
20	Dean and Catherine Murray

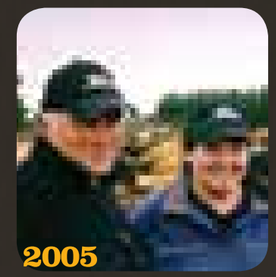
Roll of Honour

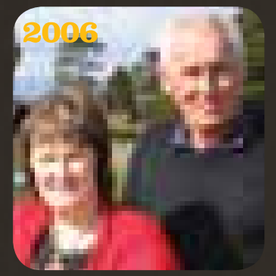


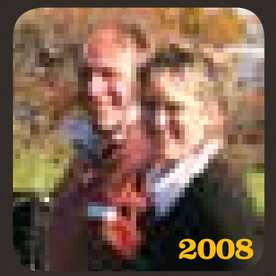


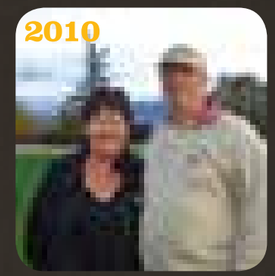
WINNERS OF THE SIRE PROVING SCHEME FARMER OF THE YEAR

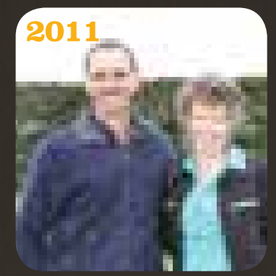
Year	Name	Location
1997	Mike Parsons	Patea
1998	John and Sandra Shewan	Hamilton
1999	Paul and Rose Finch	Ashburton
2000	Brian and Jenny Barnett	Ngatea
2000	Callum and Lyn Coubrough	Mangakino
2001	Hamish and Doreen Anderson	Stirling
2003	David and Maureen Clegg	Palmerston North
2004	Glen and Rosemarie Reichardt	Rotorua
2005	John and Jeanette Tootell	Palmerston North
2006	David and Sue Kowalewski	Stratford
2007	Max and Marie Doelman	Taupiri
2008	Anne and Will Nettlingham	Te Puke
2009	Wendy and Bryan Anderson	Hamilton
2010	Sharron and Alan Davie-Martin	Culverden
2011	Gary and Joyce Voogt	Otorohanga











LIC Breeding Scheme

Each cycle of the LIC breeding scheme is initiated on an annual basis but takes many years to eventually achieve completion of progeny test results.

Year –1 Set up mating

Bull Acquisition staff begin each cycle by capitalising on the immense value offered by the LIC Database. For each breed programme (Holstein Friesian, Jersey and KiwiCross™) 20,000 female animals are extracted in descending genetic merit order from the Database for further analysis. After meeting stringent selection criteria, the initial 60,000 animals are reduced to 3,000.

Written approaches are made in December to the owners of these animals expressing LIC's interest in considering their animals for the Contract Mating Scheme the following spring season.

Many of the selected animals are yearlings or rising two-year-olds. The remainder are in-milk cows. Visits are conducted from January-March to undertake on-farm Traits Other than Production (TOP) inspections of 750 of them. A proportion of these cows will not pass this inspection and will no longer be of interest.

Final selections for the Contract Mating Scheme are usually made towards the end of each season (May) once most herds have completed herd testing. Many animals not previously selected in December are given consideration. 4,000 female animals (50% heifers and 50% cows) are offered contracts each year based on genetic merit.

Sires used in the Contract Mating Scheme are also selected on the same basis, and are typically young genomically evaluated sires. A limited number of matings to progeny tested (Daughter Proven) bulls are undertaken, particularly if the owner has no desire to use young sires. Sire allocation to individual animals utilises the Optimiser software (which is similar to CustoMate). The Optimiser produces the optimal mix of mating combinations across the entire Contract Mating Scheme, including minimum threshold levels for selected traits, and allows control of inbreeding, not only in the progeny being generated, but also the degree of relatedness to the likely future female population (important in the case of bull progeny).

Contract Mating Scheme agreements, detailing sire and dam mating combinations and general terms and conditions, are typically mailed to owners in June. Contracts automatically expire if not signed and returned within two months.

Year 0 bull-calves born

To supplement the bull calves expected to be born through the Contract Mating Scheme, bull acquisition staff return to the Database to extract 30,000 matings performed by farmers outside of contractual arrangements (eg Premier Sires, Alpha). Using the same stringent selection criteria applied to the Contract Mating Scheme, 3,000 uncontracted pregnancies are selected, and written approaches are made to the owners prior to calving expressing LIC's interest in considering any resultant bull calves.for purchase.

The Contract Mating Scheme typically produces 60%, and non-contract approaches 40%, of the 2150 young bulls initially considered for purchase. Offers directly from farmers at calving time may also be given consideration.

The young bulls and their dams are progressively tissue sampled and DNA extracted and despatched for genomic screening on the 50,000 SNP panel at GeneSeek, USA. The resultant genotypes are utilised by LIC in an internal genomic evaluation run to produce Genomic Worth for young bull selection purposes and to provide initial parentage verification.

The initial 2150 candidates will at this stage (November) be dramatically reduced to a shortlist of only 200 bulls that warrant further consideration. On-farm inspection of these young bulls and their dams follows, with some candidates dropping out due to physical conformation.

Further parentage, disease and genetic testing (A2, CVM, BLAD and Citrullinaemia) is performed, which again may rule out a small number of candidates. A final group of 185 bulls will eventually be purchased.

Farmers are able to sell their bull calves to LIC on a royalty option consisting of an initial payment followed by an amount per lifetime insemination (New Zealand) and straws exported. Alternatively, they can be offered an Outright Purchase option, supplemented by another one-off payment should the bull be subsequently selected for further use by Premier Sires, Alpha or International.

Upon arrival at Newstead in December–January, another tissue sample is taken from the young bulls for DNA profiling, to confirm that the bull which has arrived is the same as the one from which the first sample was taken for genomic screening.

Year 1 Yearling bulls go to Sire Proving Scheme member herds during AB

As the bulls approach yearling stage, they are re-ranked on the basis of current genetic merit and undergo further physical inspections and semen quality evaluations. A small number of bulls will be rejected at this stage. Of the remaining bulls, 160 will be allocated places in the Sire Proving Scheme — 70 Holstein Friesian, 45 Jersey and 45 KiwiCross™.

Herds with excellent records and well organised/sound management practices are evaluated for potential membership of the Sire Proving Scheme.

Suitability of past and potential new Sire Proving Scheme members occurs January-July, with all new members interviewed. A particular number of cows/yearlings must be signed up to be mated to Sire Proving Scheme to ensure enough resulting daughters are produced throughout New Zealand to generate a reliable, robust, complete and accurate sire proof.

Sire Proving Scheme members must mate 90% of their herd to Sire Proving Scheme bulls (using LIC's AB technician service) to ensure they can bring through 20% of their herd size milking as two year olds in three years time.

Every 21 days, Premier Sires Daughter Proven semen is sent as "marker semen" to ensure a good genetic link is maintained with commercial herds. The 160 Sire Proving bulls are sent out to members at specific allocations to ensure LIC has the correct number of daughters being created in various herds and locations throughout the country.

Sire Proving Scheme inseminations take place during spring, in a small number (215) of highly selected member herds*, with a target of generating 70 daughters per bull. At the same time the most elite of the intake will also be utilised in the Contract Mating Scheme to breed the next generation of young bulls, as well being used for Premier Sires (DNA Proven) and Alpha.

(*Sire Proving Scheme membership provides farmers with high Breeding Worth genetics at relatively low cost. The main financial advantages for members of the Scheme include a significantly reduced AB fee, a payment of a rebate for eligible daughters and additional MINDA reports/extra information).

Year 2 Sire Proving Scheme daughters born

Time for the young bulls to kick back and relax, unless of course they are in the highest echelon still considered elite enough for use in Premier Sires (DNA Proven), Alpha or International teams in which case they have more work to do.

The first daughters are born in Sire Proving Scheme member herds. Year two of the Sire Proving Scheme contract requires calving assist codes to be recorded against every calving in Sire Proving Scheme member herds and any defects to be reported.

Enough heifer calves are reared to ensure 20% of the herd are milking as two-year-olds in two years time. Other than this, calving recording is the same as any other commercial herd.

Year 3 Sire Proving Scheme daughters mated

The first daughters are mated in Sire Proving Scheme member herds.

Year 4 Sire Proving Scheme daughters calve/TOP/ herd test

The first daughters calve in Sire Proving Scheme member herds. This initiates the flow of progeny information into the Sire Proving Scheme ranging from Production traits (via Herd Testing), Traits Other than Production ie TOP (via farmer and Breed Society Inspector assessments) and Liveweight and condition scoring (via Asure Quality weighing). This data evaluates how favourable the sire is in comparison with the other sires proven in the same year, and enables the bull to be ranked on Breeding Worth.

Farmers access their line of two-year-olds (on a 1-9 scale) as they enter the milking herd for the first time on four management traits - the heifer's adaptability to milking, its milking speed, temperament and the farmer's overall opinion of that animal. A qualified Traits Other than Production inspector assesses 13 body conformation traits on Sire Proving Scheme heifers, also recording any daughter trait comments.

Sire Proving Scheme members must milk their entire herd Twice a Day (TAD) and herd test four times a year, twice a day — mornings and nights.

Where early lactation information suggests the bull has sufficient genetic merit, it may be considered for inclusion in the Premier Sires (Daughter Proven) Forward Pack team.

Year 5 Sire Proving Scheme contract complete

The Sire Proving Scheme member contract ends after the last herd test. In May members are paid, according to whether they had a Herd Test assist or not, per animal brought through with a complete suite of production and non-production data. If a member does not bring through 20% of their herd with all the data, a per animal penalty is applied for each animal not brought through.

The Sire Proving Scheme member must sign a contract each year to be a member of the Scheme, so at any time could have four contracts which are current.

Bulls are progressively culled as further daughter information becomes available throughout the season. Only the best bulls remain as candidates for selection considered by LIC's bull acquisition team as prospective bull dams.

Cycle Completion

The LIC breeding scheme cycle is completed at various stages as daughters generated through use in Sire Proving Scheme, Premier Sires or Alpha are identified on the Database, and in turn may be

LIC Breeding Scheme for 2011 Sire Proving Scheme bulls

Overview of bulls proven each year through LIC's Sire Proving Scheme from 1961 to 2010

	Ayrshire	Holstein Friesian	Jersey	KiwiCross	Total
1961	8	26	143	-	177
1962	10	19	99	-	128
1963	8	21	96	-	125
1964	10	25	87	-	122
1965	9	26	92	-	127
1966	9	28	100	-	137
1967	11	33	107	-	151
1968	6	46	117	-	169
1969	5	65	92	-	162
1970	6	83	85	-	174
1971	5	88	74	-	167
1972	4	92	77	-	173
1973	3	91	75	-	169
1974	5	85	87	-	177
1975	4	72	72	-	148
1976	6	68	74	-	148
1977	5	71	68	-	144
1978	6	70	70	-	146
1979	6	71	72	-	149
1980	4	66	71	-	141
1981	5	69	74	-	148
1982	5	75	62	-	142
1983	6	84	60	-	150
1984	6	85	62	-	153
1985	7	88	58	-	153
1986	5	72	43	-	120
1987	2	65	39	-	106
1988	4	81	49	-	134
1989	7	89	51	-	147
1990	5	91	53	-	149
1991	8	95	56	-	159
1992	8	99	56	-	163
1993	8	95	52	-	155
1994	9	95	55	-	159
1995	7	118	63	-	188
1996	7	140	85	-	232
1997	8	145	100	-	253
1998	8	143	82	-	233
1999	-	148	87	-	235
2000	-	135	79	19	233
2001	-	144	84	56	284
2002	-	147	86	60	293
2003	-	150	84	58	292
2004	-	147	89	58	294
2005	-	139	84	75	298
2006	-	140	85	76	301
2007	-	139	85	75	299
2008	-	50	35	30	115
2009	-	70	45	45	160
2010	-	70	45	45	160
Totals	**245**	**4354**	**3746**	**597**	**8942**

Postscript

Normally, as author, I would preface a book with an overview of what is coming for the reader. But having finally finished this mammoth piece of work, in conjunction with my normal job, a postscript is much more appropriate.

The style of this book is unusual because it does not seek to present a formal chronicle of the development of artificial breeding. It is, as it says at the start, a collection of memories of some of the people who lived it.

The majority of these people are humble individuals who didn't feel they had a story to tell, who had to be cajoled to share their memories but who, once started, provided such a rich tapestry which, interwoven with the stories of others and the timeline, built this history of artificial breeding in New Zealand.

The research and insights leaves me with a deep regard for the people who have formed this industry, this technology. Sure, they have worked hand-in-hand with farmers but, in the main, they are people who have no stake in farming, in agriculture. Most came from, and returned to, urban environments — but their bequest to the dairy industry has been manifest.

The people who share their memories in this book represent the hundreds of people who have had the privilege to work in partnership with dairy farmers over the years.

Their far-sighted vision, passion and talent for making it happen is nothing short of spectacular. Their dedication to helping farmers become more profitable was not driven from a selfish intent, but because they knew they could make a difference, and they did. Sure, they got paid to do a job but at the end of the day, they and their families' fortunes were not embedded in farming.

To an individual, these people love the dairy industry; the farmers, the animals, the land, the purpose. They contributed various segments of their lives to it, and left it all the richer for their presence. Their footsteps are everywhere.

I am in awe of what they did — and I hope readers get some sense of that contribution as they muse through these pages. It's a legacy which passes on, almost unseen, to each new crop of people who work with and for LIC.

Clare Bayly

Editor and
LIC Communications Manager

Credits

Dr Clive Dalton, co-author with Claire Rumble, *50 Years of Artificial Insemination and Herd Improvement in New Zealand*.

Author and Editor
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Pat Shannon leaving work November 2011

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