



IFAJ Congress New Zealand 2015

agribusiness — our life, our story

14-18 October 2015



IFAJ Congress 2015

14-18 October • New Zealand

agribusiness — our life, our story

Thanks to our family of sponsors

*Dairy*NZ



Dairy for life



THE AGRICULTURAL AND MARKETING
RESEARCH AND DEVELOPMENT TRUST



Special thanks to Jim Burns, Whittakers and PickMee Apples for their support

Welcome to the IFAJ Congress 2015, and thank you for coming a long way to New Zealand to hear our agribusiness life and story. Only the Australians, with whom we have a love/hate relationship, were a short plane ride away.

All other delegates experienced what New Zealanders have long called the 'tyranny of distance' from home countries, and from export markets.

First Maori, then Europeans, sailed for weeks across the Pacific Ocean to reach these shores. Once here, they lived on seafood ('kaimoana'), birds and tubers until agriculture made colonisation possible.

Those pioneers were resourceful and they found an abundance of agricultural resources – water, soil, temperate climate, freedom from pests and diseases.

When their own food, fibre and shelter needs were met, harvesting and processing for export began, first with furs and wood, then with vegetables, fruit, wool and tallow, followed by meat and dairy foods when refrigerated shipping became available.

Of all the developed countries, New Zealand is the most reliant on the primary sector for its export earnings. While a high percentage of the people live in urban environments, it is the rural environments where our wealth is made. Farmers, orchardists, foresters and fishers all have stories to tell each other, the urban audience and listeners overseas, where lower energy input and more sustainable primary production may be considered.

The New Zealand Guild of Agricultural Journalists and Communicators is more than 50-years-old and its members have long been keen to showcase New Zealand to the IFAJ. A dedicated, hard-working committee encouraged by the Guild membership has worked for three years to bring you this Congress. Our family of



sponsors and our farming families have also embraced our initiative – thanks to you all.

Welcome to New Zealand, Aotearoa, the Land of the Long White Cloud – or as poet Rudyard Kipling once described Auckland: 'last, loneliest, loveliest, exquisite apart'. We very much hope you enjoy your stay with us before making that long journey home again.

Hugh Stringleman
Congress committee chairman

IFAJ CONGRESS 2015

Welcome to IFAJ Congress 2015 in New Zealand. It is a privilege for us to be invited by our colleagues of the New Zealand Guild of Agricultural Journalists and Communicators for the first IFAJ-Congress in this country in the history of our organisation. "Come see yourself" was written in the invitation that reached us in our home countries and many came from all parts of the world.

We have come to learn about New Zealand, its agriculture and food sector. From an island nation in a wonderful natural setting and from a big exporter of agricultural produce to almost 200 countries worldwide we can learn a lot. How can you produce world-class milk and meat far away from your main markets and be so competitive? Many among us know your produce from our supermarket shelves and are curious now to meet the people, the land behind this tasty food and listen to your story.

I am convinced that I do not need to explain the importance of a global network of agricultural journalists to New Zealanders, as they play an important role in the export markets. Our colleagues explain us that agriculture is the backbone of New Zealand.

A congress can help us understand each other better – by sharing our knowledge and our perspectives. There is no better place than

around a table with delicious food and drinks from the country to talk, debate and share our views. Let us all come away from this congress and say that we understand someone else's point of view better, but that they understand ours equally well. It is great that the master class brought colleague's from countries to New Zealand who never attended a congress before.

The world keeps changing. With IFAJ's new global mandate, we will be building bridges in places we never dreamed of years ago. As journalists we are all linked by a common curiosity, a thirst for knowledge, a desire to become better at what we do. We want to learn more about each other.

Yes, it's an exciting time to be involved in this profession and to walk part of our journey together with fantastic colleagues from all parts of the world.

On behalf of the International Federation of Agricultural Journalists, all my colleagues here present and around the world I would like to thank the congress crew for organising this unique congress in New Zealand.

Markus Rediger
President IFAJ



HAMILTON, Home of Congress 2015

Hamilton is the centre of the Waikato region, one of the main agricultural regions in New Zealand. With its lush green rolling pastures, it is a major centre of the New Zealand dairy industry, but also is an important part of the New Zealand red meat sector.

In the 1860s and 1870s most Waikato farmers had cut their farms out of the native bush, raised cattle and sheep, and grew root and grain crops. Dramatic change came in 1882 when refrigerated shipping allowed perishable goods (initially sheepmeat) to be sent to Britain, resulting in an expanding market for butter and cheese. Would-be dairy farmers snapped up large parcels of Waikato land which was ideal for cows, with high rainfall and sunshine hours, and mild winter temperatures that allowed grass to grow nearly all year round.

Electricity powered the machines that revolutionised the Waikato dairy industry. By early 1920s, the first hydro dam on the Waikato River supplied electricity to dairy farms throughout the region. Soon after, at least six dairy factories and 1000 milking machines were run by electricity.

Small dairy factories were established in Waikato from the 1880s, but successive amalgamations driven by efficiencies and modern equipment eventually led in 1919 to the formation of the New Zealand Co-operative Dairy Company, which eventually became a major player in the formation of Fonterra. Tatua and Open Country Dairy are two major players of half a dozen companies to stand outside Fonterra in the New Zealand and international markets, dealing in more niche product.

Now, the Waikato has nearly 1.4 million dairy cows, around a quarter of the national herd, and is one of four main dairying

regions, with approximately 27% of the national total. There are approximately 4040 dairy herds.

Intensive farming in Waikato initially led to environmental damage. That is actively being repaired today as the industry gains greater understanding about managing larger herds. Reducing pollution while maintaining farm profitability is a major challenge for the 21st



century and is being tackled by individual farmers, DairyNZ, Fonterra, other research bodies, and regional and local councils.

Sheep and Cattle Farming

In the late 1800s, many Waikato swamps were drained by land companies, but drainage schemes continued into the 1900s. Topdressing of peat and alluvial soils with superphosphate and lime slowly improved pasture. The replacement of Shorthorn cattle by Ayrshire, Jersey, Holstein and Friesian breeds lifted the quality of dairy herds.



On hill country and in districts distant from dairy factories, sheep and cattle farming proved more profitable. This year there are approximately 467,000 beef cattle, approximately 13% of the national total; approximately 1,754,000 sheep, totaling 6% of the national total; and 84,000 deer, approximately 8.8% of the national total. Goat and pig farming are also significant.

Equestrian and Thoroughbred Horses

From the 1950s Waikato thoroughbred horse studs, particularly those located between Hamilton and Cambridge, established a reputation for breeding champions. The notable staying power of these horses was attributed to high-quality Waikato

pastures. Famous stud stallion Sir Tristram and double Olympic equestrian event winner Charisma both came from Waikato studs.

Viticulture

Waikato has been a wine-growing region since 1901, when vineyards were established near Te Kauwhata. Vilagrad Wines at Ohaupo started in 1906 and is the oldest surviving winery in the region, still owned by the same family, with the fifth generation now very involved in the vineyard, wine-making, and restaurant.



Horticulture and Crops

Asparagus, onions, blueberries, potatoes and melons are the main horticultural crops in the region. Stone fruit, notably nectarines and peaches, and pipfruit, especially apples and pears, have also been important crops. The region also became known for growing maize to provide stock food, over a quarter of the total New Zealand crop.

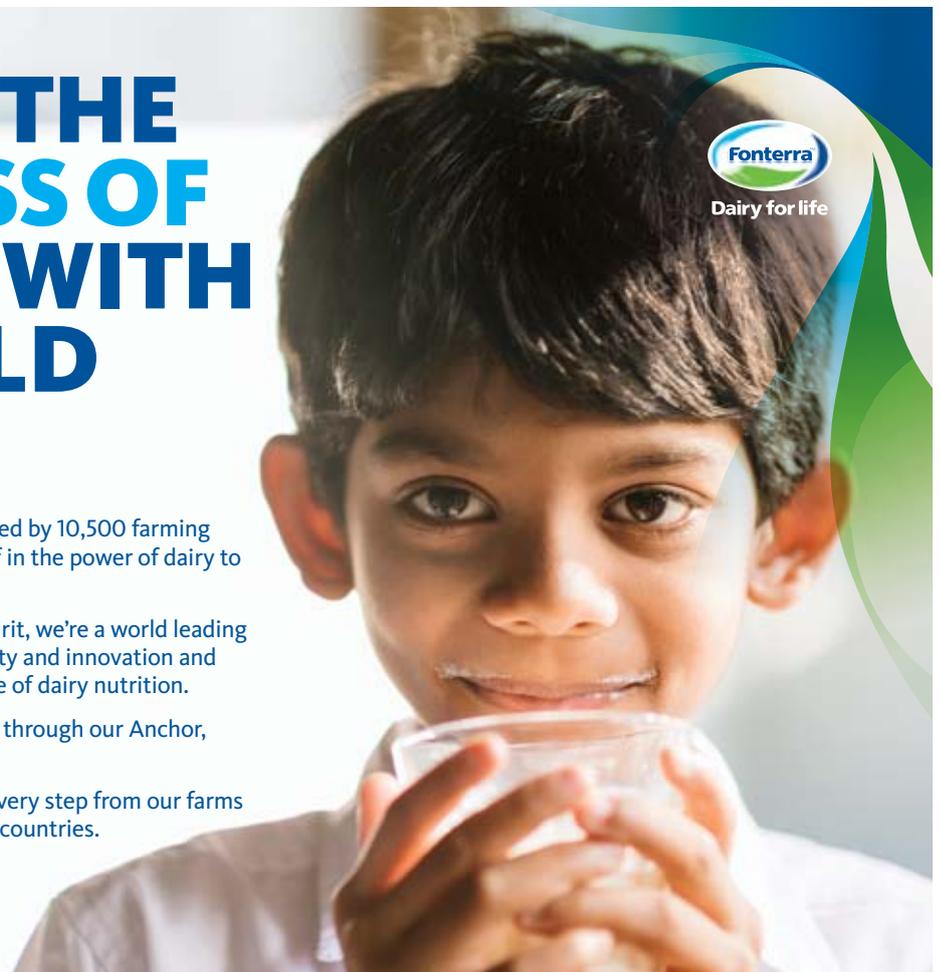
SHARING THE GOODNESS OF NZ DAIRY WITH THE WORLD

We're a global dairy nutrition company. Owned by 10,500 farming families, we're united by a fundamental belief in the power of dairy to make a difference.

With a can-do attitude and a collaborative spirit, we're a world leading dairy exporter – shaping the industry in quality and innovation and working to be the world's most trusted source of dairy nutrition.

We share the goodness of New Zealand dairy through our Anchor, Anlene, Annum & NZMP brands.

Dairy for life is our promise that we keep at every step from our farms to the homes of consumers in more than 140 countries. Find out how we do this www.fonterra.com



PROGRAMME

(Provisional at 1 October 2015)

WEDNESDAY 14 OCTOBER

	Registration opens	
12.30pm	Farm visit stream buses depart	Novotel, Hamilton Tainui
3.00pm	IFAJ Delegates Assembly	Novotel, Hamilton Tainui
7.00pm	Buses to Opening Night Dinner	
7.30pm	Opening Night Dinner, The Verandah Pre dinner drinks	The Verandah, Hamilton
7.35pm	Maori cultural exhibition	
8.00pm	Dinner and speakers including	
9.00pm	Hon Nathan Guy, Minister for Primary Industries	
10.30pm onwards	Buses leave for hotel	

THURSDAY 15 OCTOBER – OUR LIFE. OUR STORY

8.30am	Opening session	
8.45am	Ben Dalton, Ministry for Primary Industries	
9.30am	Jacqueline Rowarth. A Strategic Overview, Where We Are and Where We Are Going	
10.15am	Morning tea	
10.45am	Ian Proudfoot, KPMG. Future directions for Agriculture in New Zealand	
11.15am	IFAJ Awards function	
	Lunch at Novotel	
1.15pm	On buses for farm tours	Novotel Hamilton Tainui
6.30pm	Arrive at Silver Fern Farms Te Aroha meat processing plant for tour, followed by barbecue	Silver Fern Farms, Te Aroha
10.30pm	Buses leave for Hamilton CBD	

FRIDAY 16 OCTOBER – SECURING THE FUTURE

8.30am	Hon Tim Groser, Minister for Trade/Climate Change	Novotel Hamilton Tainui
9.30am	Rick Pridmore, DairyNZ. Sustainable Farming Futures	
10.15am	Morning tea	
	Talking Heads (Five concurrent sessions, short presentations on topical issues) Sessions at 10.45am, 11.30am, 12.15pm. See separate programme in Congress pack.	

1.00pm	On buses for farm tours. Lunch provided	Novotel Hamilton Tainui
6.30pm	Arrive Hobbiton for tour and dinner	Hobbiton
11.00pm	Shuttle buses start leaving for Novotel	

SATURDAY 17 OCTOBER

8.30am	Zespri, Simon Limmer, Chief Operating Officer	Novotel Hamilton Tainui
9.15am	Fonterra, CFO Lukas Paravicini and Director John Monagh	Novotel Hamilton Tainui
10.00am	Morning tea	Novotel Hamilton Tainui
10.30am	NZ Winegrowers, Jeffrey Clarke, GM Advocacy and Trade	Novotel Hamilton Tainui
11.30am	To be confirmed	Novotel Hamilton Tainui
12.15pm	On buses for farm visits. Lunch provided	Novotel Hamilton Tainui
5.30pm	Return to hotel	
7.00pm	Buses leave for Final Night Dinner	Vilagrad Winery
10.00pm	Shuttles start returning to Novotel	

SUNDAY 18 OCTOBER

8.30am	Professional development sessions – TWO	
	Waitomo Tour	
11.15am	Shuttles leave for Auckland International Airport as advised	



cutting through complexity

Ian Proudfoot

Global Head of Agribusiness,
Auckland, New Zealand
T: +64 9 367 5882
E: iproudfoot@kpmg.co.nz

David Meagher

Partner, Head of Food, Drink and
Agribusiness, Dublin, Ireland
T: +353 1 410 1847
E: david.meagher@kpmg.ie

Willy Kruh

Global Chairman, Consumer
Markets, Toronto, Canada
T: +416 777 8710
E: wkruh@kpmg.ca

kpmg.com



Copyright: © 2015 KPMG, a New Zealand partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. All rights reserved. Printed in New Zealand. KPMG and the KPMG logo are registered trademarks of KPMG International Cooperative ("KPMG International"), a Swiss entity. KPMG01409

KEYNOTE SPEAKERS

Professor Jacqueline Rowarth CNZM, CRSNZ, FNZIAHS, opening speaker

Jacqueline Rowarth is Professor of Agribusiness at University of Waikato. She has a Bachelors degree in Agricultural Science and a PhD in Soil Science from Massey University, and has worked in research, education, management and governance with Agresearch, Lincoln University, Unitec in Auckland, The University of Melbourne, Massey University, Crop and Food Research and AGMARDT. She has also been elected to leadership positions: President of the New Zealand Institute of Agricultural and Horticultural Science and President of the New Zealand Grassland Association. She is a frequent contributor to public debate in the media and speaks to industry, society and school groups whenever invited. She also teaches undergraduate and postgraduate students, and works with them on professional development. In 2008 she was awarded Companion of the New Zealand Order of Merit for services to Agricultural Science. Company.



Lukas Paravicini, Chief Financial Officer, Fonterra

Lukas joined Fonterra as CFO in 2013 after 22 years with Nestle. Most recently Lukas was General Manager for Nestle Professional Europe, before this role he held a number of senior finance positions including CFO of Nestle Brazil, Nestlé's 4th largest market, Vice President of Global Business Services and CFO of Nestle Professional, and Nestlé's globally managed Out-of-Home business. He has an in-depth understanding of dairy and has lived and worked in some of Fonterra's most strategically important markets. Lukas holds a Business & Administration degree of the University of Zurich, Switzerland and speaks five languages.



Simon Limmer, Chief Operating Officer, Zespri

Simon joined Zespri in April 2008 and was responsible for the development of global fruit production and sourcing, research and development, and grower services. As well as managing the Grower Services and Government Relations teams, in 2013 Simon was appointed as General Manager China. In late August 2014 Simon was appointed Chief Operating Officer, providing strategic leadership and integration on the supply side of the business.



Prior to this he had 14 years' international general management and business development experience with Veolia Environment, the €30 billion global leader in environmental services. His most recent role was as the Deputy Vice President/Commercial Director – Global Industrial Markets Division. Simon graduated from the University of Waikato with a Bachelor of Management Studies (Commerce/Marketing) before joining Ford Motor Company.

Nathan Guy, MP for Otaki and the Minister for Primary Industries and Racing

Nathan entered Parliament as a List MP in 2005 and was elected National's Junior Whip in 2006.

He was promoted to Senior Whip in early 2008 and retained this position following the 2008 general election when he won the Otaki seat incorporating the Kapiti and Horowhenua Districts.

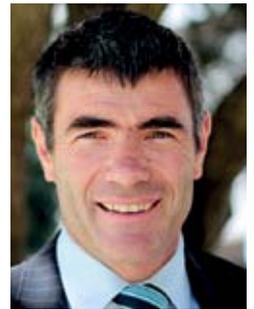
In June 2009 he was appointed as the Minister of Internal Affairs, and also served as Associate Minister of Justice, Associate Minister of Transport and the Minister responsible for the National Library and Archives New Zealand.

In 2011 Nathan won the seat of Otaki with an increased majority and was appointed to Cabinet as the Minister of Immigration, Racing, Veterans' Affairs and Associate Minister of Primary Industries. In January 2013 he became the Minister of Primary Industries, and retained the Racing portfolio.

In 2014 he again won the seat of Otaki with an increased majority and was reappointed as Minister of Primary Industries, and Minister for Racing.

Before entering Parliament, Nathan was involved in farming and local government. He served for eight years on the Horowhenua District Council and managed the family dairy farm. In 2000 he was awarded a Winston Churchill Fellowship to study beef exports to the United States.

He is married to Erica and has three children.



Rick Pridmore, DairyNZ Strategy and Investment Leader – Sustainability

Rick joined the national dairy industry body DairyNZ in 2008. He was previously chief executive of New Zealand's National Institute of Water and Atmospheric Research (NIWA).

He has worked in the New Zealand environmental science sector for more than 30 years. Before NIWA he worked as a government scientist specialising in nutrient management of lakes, rivers and estuaries.

He also has experience as a director of a number of companies.



John Monaghan, Director

John Monaghan was elected to the Fonterra Board in 2008. Prior to joining the Fonterra Board John was Chairman of the Fonterra Shareholders' Council for a three-year period.

He is also a Director of Centre Port Limited and Centre Port Properties Limited, and is a trustee of the Wairarapa Irrigation Trust and the Eketahuna Charitable Trust.

John has dairy farming interests in the Wairarapa and Otago regions.



Ian Proudfoot, Global Head of Agribusiness, KPMG

Ian joined KPMG London in 1992 having obtained a BSc in Industrial Economics from the University of Warwick. He joined KPMG Auckland in 1996 on secondment. Ian was appointed a Senior Manager in 2000 and admitted to partnership in 2004, after completing a yearlong secondment to Fonterra Co-operative Group as Group Reporting Manager. He is a Chartered Accountant and Registered Auditor.



Ian was appointed as the Global Head of Agribusiness for KPMG in 2013. He is responsible for the development of KPMG New Zealand's agribusiness sector focus group.

Ian is also the author of the KPMG Agribusiness Agenda, a series of thought leadership reports which have been produced annually since 2010 being described as one of the most comprehensive analysis of New Zealand's agri-food future. Ian recently released the latest edition of the Agenda, Volume 1 - Growing Value.

Ian has presented to audiences in New Zealand and internationally on the strategic opportunities and challenges facing agribusinesses extensively. He is considered to be one of New Zealand's leading food futurists and was rated as a leader of the pack in NZ's primary sector by Rural News for 2014, who noted "it is encouraging for the wider agribusiness sector that someone is thinking long-term and floating new ideas and concepts".

Ian attended the NZ Primary Industry Bootcamp at Stanford University in California in August 2014. Ian is also leading a project with a major NZ bank and industry partners, to develop an urban agricultural experience centre and show farm in Auckland with a goal of informing 25,000 urban kids a year about the contribution of the primary sector to NZ and the career opportunities it presents.

Hon Tim Groser, Minister of Trade; Minister Responsible for Climate Change Issues

Tim was born in Perth, Scotland and came to New Zealand with his parents in 1958. After completing his education at Victoria University where he obtained First Class Honours, he served as a policy advisor in a number of key Departments including Treasury, Ministry of Foreign Affairs and Trade, and the Prime Minister's Advisory Group.



Tim is regarded as one of the world's leading experts on international trade.

He has served New Zealand with distinction in a number of capacities, including being New Zealand's Chief Negotiator in the GATT Uruguay Round, the Round that brought agriculture into the system of world trade rules for the first time, and has been instrumental in helping to develop the Global Research Alliance on greenhouse gas emissions.

Before being elected to Parliament in 2005, Tim was New Zealand's Ambassador to the World Trade Organization (WTO), and Chair of Agriculture Negotiations for the WTO.

Jeffrey Clarke, General Manager Advocacy & General Counsel, New Zealand Winegrowers

Jeffrey Clarke was appointed General Manager Advocacy & General Counsel of New Zealand Winegrowers in 2014. New Zealand Winegrowers is the national organisation for New Zealand's grape and wine sector and was established in March 2002 as a joint initiative of the New Zealand Grape Growers Council, representing the interests of New Zealand's independent grapegrowers, and the Wine Institute of New Zealand, representing New Zealand wineries.



The organisation currently has approximately 850 grower members and 700 winery members.

New Zealand is renowned for producing distinctive, premium wines, and Jeffrey is responsible for ensuring that growers and wineries are able to produce, market and sell their wines competitively around the world.

His role covers international trade, government relations, regulation, standards, intellectual property and providing information to members. He is also responsible for leading the provision of all legal advice to New Zealand Winegrowers.

Before moving into the world of wine, Jeffrey spent over 20 years working as a lawyer and advocate for top firms in New Zealand, New York, and London, managing the legal department of a major State Owned energy company, and representing New Zealand in Paris at the OECD and the International Energy Agency.

Ben Dalton, Deputy Director General Sector Partnerships and Programme, Ministry for Primary Industries

Ben was raised in Otago and is of Ngapuhi, Ngati Porou and Irish descent. He has been the owner/operator of a portable sawmill, renovated houses and established a private training establishment. He was Chief Executive for Te Runanga a Iwi O Ngapuhi for two separate terms.



During his Wellington career he has been Chief Executive of the Crown Forestry Rental Trust, and Deputy Chief Executive at the Ministry for Fisheries.

His current role is Deputy Director General of the Ministry for Primary Industries with responsibility for Sector Partnerships and Programmes.

He has operational responsibility for the Crown's non-regulatory interventions for increasing primary sector productivity. These include the Primary Growth Partnership Fund, Sustainable Farming Fund, Aquaculture Unit, Irrigation Acceleration Fund and Maori Agribusiness programme.

He has served on both the Northland and Wellington Rugby League boards and remains involved in community development projects in Kaikohe. He has an MBA from the University of Auckland, and is a graduate of the Senior Executive Programme at Columbia University.

Red Meat Sector, Speaker to be confirmed.

FARM VISIT PROGRAMME

WEDNESDAY 14 OCTOBER

General (1)

McGrath Nurseries: specialist development nursery for new fruit species – works with several organisations in Europe and North America. Also intellectual property managers.

www.mcgrathnurseries.co.nz

Livestock Improvement Corporation: New Zealand genetics co-operative aiming for \$1b revenue.

www.lic.co.nz

General (2)

Charlie Lea: rural entrepreneur. Sheep and beef farm, ecological spray business, nursery, riparian planters and advisers, etc.

www.cambrileaweedspraying.co.nz

Simcro: global animal health delivery systems company.

www.simcro.com

THURSDAY 15 OCTOBER

Red Meat

Roxborough Farm: Sheep and beef farmer Lloyd Watkins on making the change to farming without subsidies.

Oraka Deer Park: owned by veterinarian Ian Scott, who also farms dairy cattle, forestry and maize as well as a small on-farm tourist business on a cluster of neighbouring properties.

www.oraka-deer.co.nz

Dairy

John Fisher: robotic milking pioneer. Adapting the technology to a New Zealand pastoral-based setting.

Tracy and Wynn Brown: maximising production while minimising footprint on their dairy operation.

www.dairynz.co.nz/news/latest-news/raising-the-future-herd

Horticulture

Pick Mee Apples: apple grower and exporter. Joint venture between two long-established family companies. Growing new varieties including Smitten, Pink Lady and KIKU.

www.pickmee.co.nz

Balle Brothers: a large family-owned market gardening company operating over nine farms throughout New Zealand. Export and domestic markets.

www.ballebros.co.nz

Science and Technology

Gallaghers: Iconic international farm solutions developer with large export markets for a diverse range of products.

www.gallagher.co.nz

Ligar Polymers: high-tech company specialising in contaminant extraction from agricultural processing and development of targeted microscopic polymers for wide range of industrial and agricultural applications.

www.ligarpolymers.com

General

Fonterra: tour of the huge Te Rapa dairy production facility.

www.fonterra.com/nz/en/about/our%2Blocations/newzealand/te%2Brapa/te%2Brapa

Cambridge Stud: home of the world-famous breeder Sir Patrick Hogan and some of New Zealand's most successful horses.

www.cambridgestud.co.nz

FRIDAY 16 OCTOBER

Red Meat

Wayne Derrick: specialist calf rearer (inc Wagyu).

Middle Earth farming: the Alexander's sheep and beef farm. The home farm of Hobbiton. A 1250-acre traditional sheep and beef farm running approximately 3000 sheep and 300 Angus.

www.ardg.co.nz/craig-alexander

Dairy

Fonterra: tour of the huge Te Rapa dairy production facility.

www.fonterra.com/nz/en/about/our%2Blocations/newzealand/te%2Brapa/te%2Brapa

Sue and David Fish: balancing multi-ownership. The Fish's own three farms and two support blocks for calf-rearing and maize.

adf.farmonline.com.au/news/magazine/farm-business/general/nz-business-success/2717422.aspx

Horticulture

Vilagrad vineyard: old world winemaking meets new world. Established by Croatian immigrants five generations ago, this is one of the oldest vineyards in New Zealand. It is still producing the traditional port and sherries from 100-year-old vines, while the younger generation has established new products from new stock.

www.vilagradwines.co.nz

BBC Technologies: Blueberry grower and developer and exporter of berry sorting, filling and packaging technology.

www.bbctechnologies.com/about-us

Science and Technology

An afternoon with **Plant & Food Research** at its research orchards: Dr David Pattemore on alternative pollination research and Dr Peter Schaare on bio-engineering for orchards.

General

Gallaghers: Iconic international farm solutions developer with large export markets for a diverse range of products.

www.gallagher.co.nz

Pushing the traditional NZ seasonal production system at Dan Hinton's dairy farm.

SATURDAY 17 OCTOBER

Red Meat

Lake Farm: Former IT pioneer Colin Brown's boutique beef farm where he pursues his search for the perfect steak.

lakefarmbeef.co.nz/wp-content/uploads/2011/02/que5_ruralfinal.pdf

Plasnewyd farm with Rob Taylor: specialist export lamb finisher

Dairy

The **Meyer Cheese** story. Dutch immigrant family that has become New Zealand's champion gouda makers for the last two years. Milk their own cows to ensure supply. The cheese is hand-made.

www.meyer-cheese.co.nz

Innovation with Fonterra: staying ahead of the competition in product and process.

Horticulture

McGrath Nurseries: specialist development nursery for new fruit species – works with several organisations in Europe and North America. Also intellectual property managers. www.mcgrathnurseries.co.nz

Whitehall Fruitpackers: visit an kiwifruit orchard growing the iconic New Zealand export.

Science and Technology

CRV Ambreed: visit the breeder's new cutting-edge facility in Hamilton. www.crv4all.co.nz

Pastoral 21: Pastoral 21 Next Generation Dairy Systems is a five-year farm programme that aims to provide proven, profitable, simple, adoption-ready systems that lift production and reduce nutrient loss. Visit **Scott Farm** in Hamilton where DairyNZ and AgResearch will explain the project.

This will be reinforced by a session with AgResearch's **Dr Warren King** (on NZ's pasture resource – a critical part of NZ's export success story with an estimated farm-gate value exceeding \$12 billion per year – and the science and technology developed to protect and enhance that, inc endophytes, pest control, etc) and **Dr Stewart Ledgard** on carbon foot-printing and life cycle analysis research.

www.dairynz.co.nz/what-we-do/research/key-projects/pastoral-21/http://www.agresearch.co.nz/people/dr-warren-king-2/http://www.agresearch.co.nz/people/dr-stewart-ledgard-2/

General

Maungatautiri: visit 'Sanctuary Mountain', a eco-island surrounded by, and co-existing with, intensive and extensive farmland. Many of New Zealand's iconic bird species are here.

www.maungatrust.org

Farming in harmony with the bush – Bill Garland on his Rahiri farm. Bill shares a border with Maungatautiri and is a founder of it. Rahiri's lamb is on exclusive contract to Wholefoods supermarkets in the USA, and the majority of the beef is for the U.S. hamburger market.

www.waikatoregion.govt.nz/Environment/Natural-resources/Biodiversity/Forest-fragments/Forest-fragment-ca



Introduction

What do New Zealand's pastoral, horticultural, forestry and aquaculture industries have to offer other countries, especially those in temperate zones?

The answer is, a great deal.

- Primary sectors in other countries are looking for answers to resource depletion, climate change, urbanisation and environmental degradation.
- New Zealand farmers, orchardists and foresters and their supporting agribusiness companies have developed management regimes, products, varieties and equipment to help with problems being experienced elsewhere on the planet.
- We are the world's largest exporter of dairy products, sheepmeats, deer products and kiwifruit and also export large volumes of wood, beef, wool, apples, wine and seafood.
- These product streams have reputations for the highest quality and food safety. The production methods are quality assured and sustainable to satisfy demand for ever more discerning consumers.

Where?

New Zealand is in the south-west corner of the Pacific Ocean between latitudes 34 and 47 degrees south. Our closest neighbour, Australia, is 1600kms to the west across the Tasman Sea. Both countries were first charted by Dutch explorer Abel Tasman and British naval captain James Cook.

The land mass of New Zealand is long and narrow, roughly north and south, being 1600km long and only 450km wide at the widest

point. It stretches from the sub-tropical Northland to the distinctly colder Southland and the two land masses are named in English (somewhat unimaginatively) North Island and South Island. The official alternative Maori names are more poetic – Te Ika-A-Maui and Te Waipounamu, translated the fish of Maui and the waters of greenstone (jade), respectively.

Topography

Only one-quarter of the land area of New Zealand is lower than 200m above sea level, so hills and snow-capped mountains dominate much of the landscape. A high mountain range, called the Southern Alps, runs the length of the South Island and a central volcanic plateau and mountain ranges through the North Island have a big influence on the weather patterns. The prevailing westerly trade winds act in the uplands to produce wet zones to the west and dry zones to the east, plus a variety of alpine, hill country, down country, desert, forest and river plain areas, all with their own styles of agriculture. Half of New Zealand is classified as steep, 20% moderately hilly and only 30% rolling or flat.

Climate

Because of its location, topography and 15,000km of coastline, New Zealand has a temperate "westerly maritime" climate. Annual rainfall ranges from 300mm in the dry easterly regions to over 8000mm in the wettest areas of the south-west. Although there are sharp regional contrasts, climatic extremes are rare, making the climate ideally suited to pastoral farming, horticulture and forestry. The weather comes from a procession of anticyclones from the south-west mostly, bringing warm clear skies in the summer and cold and frosty conditions in the winter.

Frontal rainfall is from the west and south-west, across the Tasman Sea, with occasional ex-tropical cyclones moving down on the country from the north. The mix of anticyclones and depressions produce a variable weather pattern, modified by the topography and aspect of any particular farming location. For example, warm wet air arrives on the West Coast of the South Island, hits the Southern Alps barrier and rises, and when cooled it releases moisture as copious rain or snow. To the east of the alps a rain shadow is created and the Canterbury Plains and part of Central Otago receive very low annual rainfall, with periodic warm 'fohn' winds. In the North Island, the influence of the uplands on the prevailing winds is less pronounced, and most regions receive between 600mm and 1500mm of rainfall annually.

Because of the temperate climate, few farming regions are covered with snow for any length of time and pasture grows almost all year round in the north and for eight or nine months of the year in the south. The mean annual sea level temperature varies from 15°C in the north to 9°C in the south. Day-time temperatures during the summer range between 15°C and 30°C and zero to 15° in the winter. Plant, animal, fruit and tree growth rates respond readily to the equable temperatures and regular fall of rain.

Land Use

The total land area is 27.1 million hectares, or 270,100 square kilometres, comparable to the British Isles and Japan. However, the population is considerably less than those countries because NZ has only 4.5m people. It is 205th on the list of 240 countries or territories in the world by population density, highest to lowest, with 17 people to every square kilometre. Australia has five times the population and a density of only 3 people/sq km.



B+LNZ exists to serve farmers and the future of sheep and beef farming. Our purpose is to 'help farmers make informed business decisions and promote their collective interests'.

Working for...

- Confidence** (Icon: hand pointing up)
- Profitability** (Icon: dollar sign)
- Productivity** (Icon: bar chart)

beef+lamb
new zealand

0800 BEEFLAMB (0800 233 352)
WWW.BEEFLAMBNZ.COM
BY FARMERS. FOR FARMERS

Farming based mainly on ryegrass and clover mixed swards extends over 13.5m ha, just under half of the total land mass. The tally has reduced in recent times as previously cleared and developed land for mainly sheep farming has been allowed to revert to scrub, woody weeds and indigenous trees, either for carbon credits or because stocking with sheep was no longer economic. The opposite trend has been further intensification by way of irrigation, conversion to dairy farming or urbanisation. All-grass feeding of livestock has also been supplemented with forages like lucerne (alfalfa), plantain, chicory, cereals and maize, usually called summer crops. Further south, winter cropping is also more popular, providing animals with turnips, brassicas and fodder beets.

Sheep and beef farming extends over the largest portion of farmed land (10m ha) followed by dairying (2.5m ha) and the rest deer and goat farming and horticulture. In 2014 there were 30m sheep (with 25m lambs born during the year), 6.7m dairy cattle (with 3.8m calves born), 3.7m beef cattle (800,000 calves born), approximately one million deer (370,000 fawns born), 285,000 pigs including 30,000 breeding sows, and about 30,000ha under fruit trees and vines.

Unique development

New Zealand is unique among developed countries for its reliance on the export of pastoral products, wood, fruit and fish for some 60% of its export earnings. In the mid-20th century New Zealand was renowned for having 20 times sheep as people, but that ratio has now fallen to around 6.66 breeding sheep per person. The numbers of dairy cows have increased considerably over the past decade and now substantially outnumber the human population of 4.5m.

The overwhelming impression of New Zealand to visitors is of a green and pleasant land, surrounded by sea and covered with either pastures, native trees or exotic forests. Large numbers of grazing animals can be seen from the road, confined behind wire fences. At first glance the travellers may not realise how much time and effort has gone into creating and maintaining the farmland, its pastoral productivity and the commercial or private forests. Land owners often also fence off and conserve native bush areas to regenerate mature trees and the under-storey, and control the introduced pests and weeds, to encourage the re-establishment of native bird populations.

New Zealand land owners, during over 150 years of farming and forestry experience, devised well-adapted and appropriate management systems to work with the soils, climate, plants, trees and animals for the purpose of primary production. In the main, these systems are lower-technology and not energy-intensive. Following the initial major environmental change from native bush cover to pasture or plantation, which required a huge pioneering effort, the New Zealand pastoralism that developed is now low-input, environmentally-friendly and sustainable. Increasingly, fertiliser applications, animal stocking rates, harvesting methods and the use of water resources are adapted to make low impacts on the modified ecosystem and to maintain product yields indefinitely.

The ambition of the most successful farmers is one of sustainability: "To leave the land for the next generation in a similar or better condition than I found it."

Chapter two

New Zealand farmers, horticulturists and foresters have always relied upon a steady stream of technological improvements, either home-made or imported from research centres and other countries. The soil, climate, topography and markets have often demanded innovative solutions. The development of export industries also required organisation, research and development.

The main drivers have been:

- **Survival:** The First New Zealanders, calling themselves Maori, immigrated in large ocean-going canoes from countries further northwards in the Pacific Ocean 700 years ago. They brought with them five crops: kumara, taro, yam, gourd and paper mulberry. Only the kumara, or sweet potato, is still grown commercially today. For the most part, Maori ate fish, birds, root crops and edible parts of native plants. They did introduce small dogs, they called kuri, which were used for protein, skins and fur. There were no other ground dwelling mammals until the coming of Europeans, in the 18th century, who brought sheep, cattle, pigs, goats, rats, rabbits and many other European animals.

During the 19th century Maori and European farmers transplanted British farming practices into the newly settled land, by removing the forest cover and planting crops, pastures and fruit and nut trees. Maori were successful with this new agriculture and established most of the market gardens to feed the European settlers and even exported food to Australia. As more and more land was cleared and brought into production, settlers satisfied the needs of their families and began to look for export opportunities. The first major export product was native timber, followed by wool. Sheep numbers expanded quickly, so that by 1881 there were 13 million sheep on farms, mostly Merino imported from Australia, although British long-woolled breeds like Lincoln and Leicester were crossed with Merino during the mid-1800s.

- **Productivity:** From 1882 onwards refrigerated shipping expanded the exporting options of farmers into meat and dairy products. But initial soil fertility, due to organic matter and the ash from scrub burning, was declining and productivity falling. In 1892 the NZ government amalgamated some smaller agricultural and research services into one Department of Agriculture, which became a big benefit to farmers and growers to have a source of expert advice on the quality and quantity of production. Among its first recommendations were the introduction of improved grasses and cereal varieties and the use of phosphate fertilisers to boost clover growth in the swards. In turn, clover "fixed" nitrogen from the air in its rhizobia (root nodules) and boosted grass growth without having to apply nitrogenous fertilisers.

NZ pastoral agriculture is based on the ryegrass and white clover association in a mixed sward to provide good levels of metabolisable energy for grazing livestock. In most regions of the country (neither too hot in summer or too cold in winter) the ryegrass/clover mix grows all year round, providing an average of 7-10 tonnes/ha/year of grazeable dry matter. When growth exceeds animal demands the surplus can be cut, dried and baled as hay or ensiled green as conserved fodder for colder months, droughts or floods.

- **Marketing:** The origins of big primary industries involved the development in the late 19th century of co-operative forms of processing, exporting, and marketing and sometimes importing co-operatives for essential inputs like fertiliser and fuel. Farmers themselves were the shareholders of these companies and received annual dividends or price rebates on the services provided by the co-operatives.

They often started small and localised and then as transport routes grew the co-operatives amalgamated for greater effectiveness and efficiencies. The requirements for dealing with large purchasers overseas, like armies and governments, and the need for marketing to foreign consumers and liaising with importers, fostered industry-wide bodies called 'producer boards'. Established by government legislation these were also nominally owned by farmers and orchardists (producers), who paid annual levies by deduction from their export revenues and farm gate payments, and elected directors

from their ranks representing wards or electorates. There was a Wool Board, a Meat Board, a Dairy Board, a Wheat Board, an Apple and Pear Marketing Board and a Kiwifruit Marketing Board, plus a large number of smaller producer organisations funded by 'commodity levies'; the government-permitted compulsory charges on all volumes of a product or crop, either exported or domestically sold.

The bigger producer boards had legislated powers of compulsory acquisition of export produce, whereby stocks of wool or frozen meat could be accumulated in the expectation of better world prices in the future. The Government had used acquisition powers most successfully during World Wars One and Two to commandeer wool, meat and dairy products for the NZ armed forces and their Allies, especially Great Britain.

It transferred those powers of market intervention to the main producer boards along with the reserve funds that had accumulated to be used for price support activities but these arrangement backfired when used for commercial reasons in the 1970s and 80s. Farm gate prices were subsidised but stockpiled produce devalued or became unsalable. In the mid-1980s, as part of economic reforms, the intervention powers were stripped from the producer boards, the government stopped underwriting subsidies and repealed a large number of regulations governing conduct of primary industries. Policies relating to the transport of goods, prices for domestic consumers and importation of goods like motor vehicles and agricultural machinery, were deregulated.

New Zealand farmers and growers went cold turkey on regulations and subsidies, having them removed completely, which was an experience that provided lessons for other still-regulated primary industries. Essentially, a country of fewer than five million people, only 5% of whom were involved in agriculture, could not afford to subsidise the production of food and fibre sufficient to feed and clothe up to 50 million people worldwide. Much larger populations, with huge domestic markets, might more sustainably subsidise parts of the primary sector for public policy reasons, but that approach has been abandoned in New Zealand.

- **Profitability:** When price supports were removed from NZ agriculture farmers had to restructure their operations, cease expanding production, reduce borrowings, amalgamate and sometimes sell their holdings and aim to be more profitable. A transition which was forecast to take two or three years actually took more than a decade and real profitability did not return to sheep, cattle and dairy farming until the millennium, around 2000-01, when the NZ dollar fell to only US40c.

However farmers did have a reservoir of research results and industry organisations including Crown Research Institutes (AgResearch, Plant and Food Research), the Ministry for Primary Industries, DairyNZ, Livestock Improvement Corporation, Beef+Lamb New Zealand, Zespri (kiwifruit), Lincoln and Massey Universities and Federated Farmers. These continued to promote productivity and efficiency gains through applied research and technology transfer. Numerous options were available to improve dry matter and energy in pastoral grasses, legumes and herbs, build irrigation schemes, and lift animal performance through better genetics and animal health products, intensive grazing and farm management. A strong theme running through NZ agricultural development is the interaction between scientists and producers.

On-farm trials, demonstration farms, field days and conferences are all used to spread the messages for improvement and for scientists to ask what farmers really need. Much technological advancement is based on low-cost options, such as new pasture varieties, so that farmers will apply the tools being offered. Official encouragement of high-cost, labour-intensive methods is almost unheard of, such that

NZ has one of the lowest rates of agricultural mechanisation in the developed world.

- **Sustainability:** In 1992 the NZ government restructured public science activities into Crown Research Institutes, partly to introduce user-pays research and development. Farmer levy themselves through industry-representative bodies and the money is contracted out to the crown science providers in competition with universities and some privately run organisations. R&D funding for pure science, often called 'blue sky' research still comes from the government's Public Good Science Fund, but that too is partly contestable between science providers.

This is all part of the national drive to sustainability in primary production because if farmers pay they will then direct the search, take an interest in the process and value and adopt the outcomes. These days, recommendations may well be directed towards improving the quality of produce, even at the expense of lower yields, rather than the productivity per hectare. Sustainability also puts more emphasis on the maintenance and possible enhancement of natural values and resources, such as water quality, soil structure, biomass, air quality and landscape values. The removal of the bush cover in the 19th and early 20th centuries is now being addressed with tree regrowth, native tree planting, stock exclusion fencing, pest management and riparian protection zones.



Pasture-based farming systems

New Zealand farmers have at their disposal a wide range of pasture species to utilise for livestock grazing. They may also harvest and store as silage and hay for later use. Research and selection pressure have resulted in a range of highly productive and well-adapted grasses, legumes and herbs, often grown in site-specific combinations for maximum dry matter production and energy levels. Since the coming of Europeans to New Zealand nearly 10 million hectares of grassland have been established that was originally native forest, scrub, fern or native tussocks.

Originally the pioneers replaced native land cover with low-producing grasses such as cocksfoot, timothy, fescues, bluegrass, dogstail and browntop. They would survive in poor soil fertility, but it was not possible to run more than one sheep to the acre and a few house cows. Greater productivity was found in ryegrasses and clovers, fertilised with affordable sources of phosphate from the Pacific Islands.

For the past century New Zealand has led the world in combining grasses and legumes in the same sward, in a symbiotic relationship that greatly benefits grazing animals. Latterly, different improved grasses, legumes, grazing herbs and forage brassicas have been bred here or imported, trialled and then made available to New Zealand farmers.

These are sown in more complex mixtures to extend seasonal growth, help minimise weed invasion, provide more energy and a more varied diet for ruminants.

The basic unit in agriculture is the family-owned farm, run by family members with or without paid employees. Machinery ownership on farm is kept low by European or North American standards, with many pasture renewal, fodder harvest, spraying and fertilising, crop establishment and harvesting tasks performed by rural contractors. It has been estimated that the energy requirements per unit of protein produced in New Zealand pastoral agriculture are only half to one-third of those in the United Kingdom and Europe.

- **Ryegrasses:** Perennial ryegrass (*Lolium perenne*) is the most dominant temperate grass in New Zealand because it grows well in a variety of average-to-good soil fertilities, easy to establish and forms compatible mixes with white clover and other pasture species. It also tolerates intensive grazing, establishes rapidly and has a high level of persistence. New Zealand soils are naturally low in phosphate (P) and nitrogen (N). To lift phosphate levels, superphosphate fertiliser and its blends are widely used, spread by trucks or by air. Usually potassium (K) and sulphur (S) are also added and any mineral deficiencies addressed in the fertiliser mixes. Nitrogen is fixed by the rhizobia associated with clover roots and becomes available to ryegrass plants in the same sward. Nitrogenous fertilisers like urea and di-ammonium phosphate are also used to boost grass growth.

- **White clover:** White clover (*Trifolium repens*) is a productive and persistent legume for New Zealand pastures for high-energy livestock feed and nitrogen fixation (from the air) to the benefit of other plants in the pasture sward. It establishes well from seed and spreads through the pasture via stolons and can regenerate after treading damage or pest attack. The process of biological fixation of nitrogen is calculated to be worth hundreds of millions of dollars annually to New Zealand farmers. As much as 350kg/ha/year or N can be fixed, depending on the percentage of clover in the pasture and its growth rate. If all 10 m ha of New Zealand pasture contained 20% clover, then some two million tonnes of atmospheric nitrogen would be fixed annually into the soil/plant/animal systems. In the northern hemisphere clover has not been encouraged for pastures because nitrogenous fertilisers are readily available and winters are much colder.

- **All-grass wintering:** When the seasonality of pasture production does not match the livestock demands, options need to be considered for manipulating the environment (fertiliser and irrigation), altering pasture supply through grazing management, feeding supplements such as silage and hay, or growing species with different seasonal patterns.

Most livestock farms in New Zealand use feed conservation methods including hay-making and silage, either in pits or bags to prevent aerobic bacteria spoilage. Feeding out this conserved feed in winter, or in very dry summers when lack of moisture has stopped pasture growth, enables animals to be kept outdoors. When the grazing patterns, the numbers of animals, and the feeding of conserved fodder are all controlled to keep animals outdoors 365 days of the year, it is called 'all-grass wintering'.

That means no cereal-based supplementary feeding or housing of animals. Feed plans and budgets, variable stocking rates and grazing management techniques are used by farmers in the same way a manufacturer would plan staff numbers, materials and outputs. Different feed options for animals are calculated for comparison on the basis of cents per kilogram of dry matter to ensure cost-effective farming.

Through most of the history of New Zealand farming of sheep, dairy cattle, beef cattle, deer, and goats, it has not been profitable

to use high-energy feed sources and farm housing, so lower-cost standing pasture and conserved fodder has been necessary.

- **Pasture utilisation:** A key technique, incorporating several technologies, for managing pastures, controlling access by livestock to prevent spoilage and lifting overall productivity, is to subdivide paddocks with permanent or temporary fencing. Smaller allowances of pasture, worked out on the basis of kilograms of dry matter per animal per day, perhaps grazed for a limited number of hours, will spread out the feed during winter.

Power fencing for temporary intensive subdivision limits the wastage under the feet of animals. Carefully conserved 'banks' of feed are apportioned out to animals by moving them into new paddocks each day or two days and/or dividing paddocks into 'breaks' of new feed. That is in contrast to 'set-stocking' a lower number of animals in larger paddocks for the whole winter, not moving them, and allowing them to roam to find their preferred feed. Intensification is also used to lift the numbers of animals and their growth rates on specialty crops like turnips and brassicas.

Pasture varieties, fodder crops, farm management techniques and equipment have all been developed in New Zealand for lifting the productivity of pastoral agriculture. These are now sold and taught around the world.

Pasture-based dairying

New Zealand is the largest producer of internationally-traded dairy products from 12,000 dairy farms and a total milking herd of five million cows and an average herd size of 420 cows. National annual production is 24 billion litres and the average production per herd is 1.8 million litres a season.

The typical milk production curve is strongly seasonal, beginning slowly at calving in late winter and early spring (mostly in August) and rising to a peak daily output over 20 litres per cow in late spring



Gallagher
Powering Smarter Farms

At Gallagher, everything we do is aimed at making farm life easier and more profitable - it's what we do best.

With over 75 years of experience in the farming industry and a renowned reputation for ground breaking innovation, Gallagher lead the way in Electric Fencing, Weighing and EID and Water Monitoring solutions.



www.gallagher.com



(late October) and then gradually falling through summer to end when the cows are dried off in May. Cows then spend six to eight weeks during winter and the period of lowest grass growth in late pregnancy without milking before calving and the start of the cycle again. In New Zealand this is called dairy farming to the grass production curve.

However, pasture growth usually out-strips the cow stocking rate and the ability of milking cows to eat all the available grass for several weeks in spring. That is when paddocks are 'closed up' to let pasture lengthen, then cut or reaped, after which the fallen grass is mechanically picked up and trucked to concrete or earth-wall bunkers, where it is compacted by tractor, provided with some additives, covered over and left to mature as silage. It is then fed out again with feeder wagons at times of pasture shortage, often late summer or during winter.

Dairy farmers can maintain and prolong milk production by feeding the home-grown silage. This style of dairy farming is called all-grass farming and this is the cheapest way of producing milk. After grass silage the next most popular and cheapest supplementary feeding system is maize silage, being green chopped maize crop (plant and cobs) grown over summer and harvested during the autumn and stored in pits in the same way as grass silage.

Economics

The New Zealand dairy industry exports 95% of all the products its processors make from milk, because it cannot consume all the output and has developed the international markets over 150 years. About three-quarters of all milk is dried and made into milk powder and New Zealand exports half of all internationally-traded whole milk powder (WMP).

Since the mid-1980s there have been no export subsidies or milk price supports and therefore New Zealand dairy farmers receive



only what the international markets are prepared to pay for dairy commodities – milk powders, butter, cheese, casein and others. In practice they receive about half the export receipts, the other half going in transport, processing and marketing costs.

There are about 40 dairy processing plants dispersed around the country and a tanker fleet consisting of over 500 trucks and trailers (40-50 tonnes gross laden with milk) must work round the clock (three shifts of drivers) during the spring to bring in more than 100m litres of milk a day. The herds on farms are commonly milked twice a day, beginning the first milking around 4-5am and the second around 3-4pm, although a growing number are milked once a day and a few three times in 48 hours.

The peak milk intake of more than 100m litres must be processed within 24 hours, entailing all dairy plants working round the clock, because that inflow cannot be stored in liquid form as it would quickly overwhelm storage facilities. WMP is liquid milk reduced to one-twelfth of its weight because one kilogram of milk (one

WE GET CLOSER TO WHAT MATTERS.

farmersweekly.co.nz

The home of New Zealand's best-read farming publication, *NZ Farmers Weekly*, supported in print and online by *Country-Wide* and *NZ Dairy Exporter*.

The place to go for the best balance of independent news, opinion, market intelligence and farm management information.



©2014 IFAJ

Powered by **NZX** Agri

litre) contains around 80 grams of solids – protein, fat and lactose. Therefore one day's peak milk intake can be reduced to about 8000 tonnes of milk powder, or some other commodity, which can be dry stored, sold and exported in containers on ships.

The development of the New Zealand dairy industry was driven by these factors of liquid milk production, processing storage and transport in non-perishable forms after refrigerated shipping was invented in the 1880s. In order to be able to sell milk after providing for his family, calves and pigs, a farmer had to mechanically separate cream and take it in churns to a butter or cheese-making factory. Firstly private, then co-operatively owned dairy plants sprang up in all dairying districts, peaking at over 300 in the early part of the 20th century.

The Great Depression followed by two world wars drove the dairy industry into self-reliance through farmer co-operative ownership with government backing, albeit dependent on Great Britain to buy almost everything that was exported. Better roads and tanker trucks took over from horses, carts and cream churns, collecting whole milk from refrigerated vats on farms and ushering in milk powder processing. The huge powder driers were expensive to build but more efficient to run and the widely-dispersed small butter and cheese-making plants began to rationalise in a sequence of co-operative mergers. Milk powder could also be stored and transported without refrigeration, opening up many more markets in tropical latitudes where dairy cows are not farmed.

Centralised processing also made economic the fractionation of smaller milk components like casein (protein), lactose (sugar), colostrum (enzymes) and their derivatives, which could be sold as food additives for very high prices per tonne. The entry of Britain into the European Common Market in the 1970s forced diversification of dairy markets, including bartering with the old Soviet Union – butter for cars and tractors. The New Zealand Dairy Board, often likened to a state-owned trading organisation, had a near monopoly on all dairy exporting. It was actually farmer-owned, established by government in the 1920s, and it operated a payments pooling system to return the export revenue, less costs, back to the dairy co-operatives. The board would make a price forecast at the beginning of the season and the co-operatives would pay perhaps half of that price to farmers each month, according to the volume of their milk production, as an 'advance'.

Many months later, when all the season's production had been sold, co-operatives and farmers would receive 'wash-up' or 'top-up' payments. Therefore in theory, despite minor differences according to milk composition, every dairy farmer eventually received the same price for milk as every other farmer. Small variations in milk payments reflected the relative efficiencies of the co-operatives in turning milk into a selection of commodities, the technology employed, the labour needed and the distances its tankers had to travel. Some co-operatives grew bigger and swallowed up smaller ones until the late 1990s when New Zealand had two dominant and opposing co-operatives and a handful of smaller, regionalised or specialised ones.

Fonterra

After approval votes by dairy farmers and enabling legislation, Fonterra Co-operative Group was formed in 2001 by the merger of two big processing co-operatives (NZ Dairy Group and Kiwi Co-operative Dairies) and the marketer Dairy Board. Fonterra has grown to be the fourth-largest dairy company in the world, employing 16,000 people and active on the ground in NZ, Australia, Chile, Venezuela, Brazil, China, USA, Europe, North Africa, Asia, the Middle East and Sri Lanka, and selling to 140 countries. The legislation ensured that other processors can establish and collect their own milk but have the benefit of guaranteed access to Fonterra's raw milk

at a fair and transparent price to supplement their supplies. When it began in business Fonterra collected 95% of all New Zealand milk – now collects 85%. The other major processors, in order, are Open Country Dairy (privately owned), Westland Milk (farmer co-operative), Synlait (overseas-owned), Tatua Co-operative (farmer-owned), Miraka (Maori-owned) and Oceania Dairy (overseas-owned). Fonterra is also the second-largest dairy processor in Australia and the largest in Chile (Soprole) and Sri Lanka (Fonterra Brands Lanka). The legislation also provides for open entry and exit to and from Fonterra for dairy farms, which may leave the company without penalty if they want to supply another processor and rejoin if necessary. In 2012 Fonterra shareholders approved a Trading Among Farmers share structure under which they must own the number of supply shares appropriate to the rolling three-year average of their milk production (one share for every one kilogram of milksolids or approximately 12 litres of milk produced in a season). They can only sell those shares to another co-operative member through an electronic share trading platform and must quit all shares within three years of ceasing dairy farming. The market thus sets the share price and the number of supply shares on issue approximates to Fonterra's annual milk intake. Currently 1.6 billion shares are issued and the market capitalisation is around \$7.5b.



In the recent record-breaking financial year for high dairy prices and New Zealand milk production, 2013-14, Fonterra collected 1.58b kilograms of milksolids (18b litres) and earned total revenue of NZ\$22b, of which it paid \$13.5b to its 10,500 farmer-shareholders. That was an average production of 150,000kg/herd and \$1.3m milk income/farm. However, the next season, 2014-15, per farm milk income dropped to \$660,000 and the current season, 2015-16, the farm gate 'advance' milk price is even lower. Fonterra is a modern or hybrid farmer-owned processing co-operative with a market-set share price, some outside investor equity and an output that includes some value-added goods like retail-ready liquid milks, cultured foods and specialty cheeses with a majority of dairy commodities. It is not, however, predominantly a fast-moving consumer goods company like Nestle, Danone, Kraft or Kerry, with whom it is often compared.

The best beef from grass

In New Zealand beef cattle are raised on a diet of fresh pasture without the need to provide grain-based supplements or livestock housing. The temperate climate means that cattle are able to forage for pasture most of the year-round, perhaps with additional purpose-grown crops like beets, brassicas and herbs. After a foundation herd based on the Durham dual-purpose breed (meat and milk) imported from England in the early 1800s, the Aberdeen Angus and the Hereford breeds were introduced in the mid 1800s and now form the base breeding herd of one million cows. Because beef cattle are farmed mainly on hill country similar to the native Scotland for the Angus breed, cows are bred to be moderate in size, good foragers and able to get in calf and give birth unaided. Most breeding is

done by herd bulls run with the cows over the mating season and not by artificial insemination. When the cow herd has been mated the cows are pregnancy tested and verified in-calf, and the bulls are removed from cow contact and left alone or in small groups of bulls to recuperate. The calving performance for the beef cow herd is around 90% of calves weaned to cows mated and a cow will have at least four calvings in her lifetime, sometimes eight to 10. All of the male calves born that are not considered high enough standard to be kept entire as bulls for future breeding are castrated after weaning to become steers, which are more docile and carry more beef on their carcasses. All female calves are kept separately in mobs of heifers and the best 25% selected as breeding cows of the future, mated with a bull at either one or two years of age (maiden mating) and begin producing one calf per year as long as she is sound. The other 75% of heifer calves are finished for slaughter at around two years of age, primarily for beef on the domestic market. Because one in every four heifers is retained, the herd replaces itself every four or five years (allowing for natural deaths). By making annual pre-mating decisions to use bulls of different breeds or with more desirable frame, fertility or carcass characteristics, coupled with the longer-term cow herd replacement cycle, the farmer follows a breeding policy. He or she selects those cows that best conform to the direction of the policy and attends bull



sales to buy the bulls that have the best breeding values (computer-generated from herd records) and/or eye appeal. To maximise the beef production from a herd the best cows are usually mated with bulls of the same breed (usually Angus or Hereford) to generate the pure-bred replacement heifers and any stud bulls, which are the cream of the crop. The lesser quality cows may be mated with bulls of another breed to produce cross-bred steers and heifers, which grow faster because of hybrid vigour.

After more than a century of either Angus or Hereford line-breeding, and occasional cross-breeding, export prices for prime beef began to rise in the 1970s as Asian-Pacific markets opened up, and beef industry innovators sourced what was called 'exotic' breeds of cattle from Europe, North America and Australia. In the main, these new breeds (like Charolais, Simmental, Limousin, South Devon, Belgian Blue, Murray Grey) offered bigger muscles, higher beef-to-bone yields, more maternal milk, greater fertility or distinctive coat markings, for recognition and branding. But their pure-bred cows were not able to improve upon the abilities of Angus and Hereford cattle to survive and thrive on hill country pastures in all weathers. So the exotic breeds became mostly used as 'terminal' sires, those not expected to breed replacement cows for the herd but only progeny for slaughter, to be terminated. Even to have a ready supply of good exotic bulls from which to select for cross-breeding it is necessary to have pure-bred herds of each breed and these are farmed by

stud breeders, enthusiasts for one breed or another. The stud cattle section of the beef industry is very competitive as bulls gain better production figures and performance characteristics, as fashions for different traits come and go and breed supporters enter carcass and steak-of-origin competitions. Breeders also take cattle to agricultural shows where they are judged in beauty parades.

At present there are 3.6 million beef cattle in New Zealand, 1 million breeding cows, their younger replacements and the non-breeding animals still growing and putting on weight before slaughter. The beef industry also includes a large contribution from the dairy industry, being mainly bulls from Holstein-Friesian dairy cows, unwanted as breeding bulls by dairy farmers, being finished over about two years to slaughter weights and the production of lean bull beef, used for blending or manufacturing into beef patties for hamburgers. All unwanted dairy cows at the end of their milk-production years also go to slaughter for processing or manufacturing beef. In addition to 1 million beef steers and heifers slaughtered annually about 1 million dairy and beef cows and 500,000 dairy-beef bulls are slaughtered. The beef cattle produce prime or table beef for hotels, restaurants and home consumption, and the dairy-origin beef is mostly exported to the United States and Asian countries as manufacturing beef to make beef patties.

New Zealand beef cattle farmer Harry Wier, from the aptly named district of Bulls, is credited with developing a 'Technosystem' of managing dairy-beef bulls on the farm to maximise their weight gains and minimise their antisocial behaviour. In the US this had been done with hormone therapy, often called 'implants' in the ear or beneath the skin, but New Zealand farmers and the meat exporters were reluctant to use chemical means when our beef is marketed on clean, green pasture-only inputs. Wier found that keeping bulls in small groups (less than 20) and moving them on to top quality fresh pasture each day would keep them quiet and promote weight gains. He devised the Technosystem combination of permanent and moveable electric fencing to subdivide paddocks down to half or one hectare 'cells' and the means to quickly move cattle onto a new cell every day. They spend their time eating and sleeping and not fighting and digging holes. The electric fencing technology was also developed in New Zealand (see chapter 8).

New Zealand does not have and has never had some of the worst contagious cattle diseases, like foot-and-mouth disease, bovine spongiform encephalopathy (BSE) and blue tongue, which means preferential access to beef markets for New Zealand products and freedom from trade disruption when outbreaks occur. New Zealand grass-fed beef contains a healthy balance of fatty acids, high iron and zinc levels and fat coverings that can be trimmed off before cooking and eating, rather than intrinsic fat, usually called intramuscular fat or marbling, that comes from feeding cattle grain.

Leading Lamb and Wool Producer

For nearly 200 years New Zealand has been synonymous with sheep farming, using five distinct sheep production systems:

- Premium fine wool production.
- Mid-micron wool production.
- Dual-purpose sheep for strong wool production and lamb production.
- Intensive lamb finishing for meat production.
- Sheep milking for dairy foods.

New Zealand is the world's leading lamb meat producer and strong wool producer and has a marked reputation for fine and mid-micron wool production for use in clothing. The country has 20 million breeding ewes and 30 million sheep of all types and ages, including the ewes, spread over 25,000 sheep and beef farms. Total

sheep numbers have fallen 25% in the past decade and are less than half the level reached in the 1970s and 80s, when the government encouraged land clearance and farm intensification in order to maximise lamb, beef and wool exports. The removal of incentives and subsidies, poor lamb and wool prices and the growing dairy industry have all reduced the national flock size considerably. But genetics improvements and farm management gains have ensured that the smaller 20m ewe flock produces as much lamb meat by weight as the much-larger flock did in the past.

History

The first sheep imported in the early 19th century came from Australia; these were Merinos, which produce the finest and whitest wool for knitwear, active wear and men's suits. The breed is now confined to the South Island high country, a type of rangeland that tends to be dry, as well as cold in the winter and hot in the summer. Farmers with Merinos get the majority of their income from wool and sheep operations that are often combined with the farming of Red Deer or Elk/Wapiti and their crosses as another livestock species. To improve on their animal health and wool qualities, Merinos were crossed with English Leicesters and Lincolns to produce medium-woolled New Zealand Halfbreds and Corriedales, which grew bigger lambs. Breeding sheep of those derivatives were exported to Australia and Latin America where they are now a major sheep type in Argentina and Uruguay. The mid-micron (medium) wool is used for knitwear.

In the mid to late 19th century New Zealand sheep farmers went back to England for hardy, fertile sheep breeds to suit higher rainfall districts, selecting the Romney Marsh, Border Leicester and the Down breeds. They were also more suitable for lamb production, had footrot resistance and produced a strong, water-repellent fleece with fibre in the 30-40 micron range compared with Merinos at 15-28 and mid-micron from 24-32 micron. The Romney came to dominate



hill country sheep farming in New Zealand with good survivability and lambing rates. Variations such as Coopworth and Perendale, were introduced through cross-breeding to emphasise easy-care shepherding and more hardiness and fertility. The export of strong wool for carpets and furnishing textiles was for several decades in the early 20th century NZ's largest export category, with a reputation for sound, white, bright, long-staple wool that was more easily processed and dyed. Fashion has swung away from woollen carpets to synthetic fibres, made from petrochemicals, so prices for New Zealand strong wool have languished for some time. Fortunately the Romney-type sheep breeds are dual-purpose animals, producing lambs as well as wool. They can be readily crossed with Suffolk, Down, Dorset and Hampshire breeds, using what is called terminal sires, to produce bigger lambs more quickly. Those lambs would not be used for breeding, all being sent off farm for slaughter at weights between 35-45kg live, 17-20kg carcasses.

From the 1980s onwards European sheep breeds like the East



Creating ground breaking solutions that make farming lives easier and more profitable.



Friesian, Texel and the Finn were imported to boost ewe fertility, take lambing percentages towards 200%, provide more ewe milk for the lambs and de-emphasise strong wool production because more lamb meat production was much more profitable than wool production. A lambing percentage of 200% means a ewe has twin lambs and suckles them both until they are successfully weaned and feed themselves on grass. A flock lambing percentage of 150% would mean three lambs for every two ewes, on average; in other words a mix of singles and twins. Ewes can also have three and sometimes four lambs but they are dramatically less successful in rearing triplets or quads, often neglecting or rejecting one or two, which then have to be 'mothered' on to another ewe that has lost her lamb(s) or bottle-fed.

Lean lamb

NZ specialises in producing medium-sized, lean lambs that only feed on ewe milk followed by pasture, herbs or specialist crops. The annual crop of lambs is 120% of the ewe numbers, around 24m lambs, of which 20m are reared and then slaughtered for meat production, most of it exported. For farmers the most profitable lambs are those which survive at birth, bond quickly with their mothers, suckle well and get the most high-energy milk, are weaned successfully on to pasture without a growth check, do not require expensive animal health treatments and make liveweight gains between 200g and 400g a day up to the target slaughter weights mentioned above. They will also have high meat-to-bone ratios with good muscle (meat) development, especially in the hind quarters (legs) and racks (ribs). More than 90% of export lambs are further processed into cuts before shipment and the meat sent either chilled or frozen, by sea or by airfreight. In Europe, North American and Asian markets, New Zealand lamb has the highest reputation for quality and a large proportion of lamb goes to hotels, restaurants and other food service outlets. The attributes of New Zealand lamb include low fat cover and intramuscular fat content, nil chemical residues, tenderness and versatility for cooking. Grass-fed lamb also contains high levels of the cancer-fighting conjugated linoleic acid and a favourable balance of poly-unsaturated fats, leading to "good" cholesterol.

Wool

New Zealand sheep produce 165,000 tonnes of wool annually, which is shorn by seasonal workers organised in shearing 'gangs' by contractors, to visit the farm and shear all 30 million sheep once or twice a year. The wool is baled in the shearing shed (about 180kg/bale) and trucked to store. The majority of wool is sold by auction or private treaty and scoured before being exported to woollen mills in China and Europe. Scouring removes the wool grease, called lanolin, and washes the wool before processing into yarn. The New Zealand

sheep average over 5kg/head of wool either in long staples up to 20cm (shorn once a year) or shorter lengths (when shorn twice a year). Different lengths, fibre thickness, crimp and colour combine to produce more than 100 descriptions of wool, most of them now objectively measured. Samples of the wool inside bales are taken and tested before sale, so that sellers and buyers know what they are discussing. The reputation for quality enjoyed by New Zealand wool comes from a combination of factors: clean, weed-free pastures and low vegetable matter contamination, careful shearing and wool handling, including good animal welfare, top-quality scouring, accurate description of the types and blends, long staples, lack of yellow colour (yolk), no black fibres and freedom from faults which might result in broken fibres.

Hill country farming

The principles of hill country sheep farming in New Zealand include low inputs and easy-care sheep, mostly unsheltered. This style has been adapted from northern England and Scotland, where shepherding is more hands-on. The New Zealand version has larger numbers of sheep per labour unit, greatly assisted by the work of sheep dogs and handling yards. The sheep are self-sufficient, unsupervised during lambing, hardy and active lambs, good mothering abilities, low rates of animal remedies, selection for natural resistance to disease problems like internal and external parasites, facial eczema, footrot and fly-strike, annual culling for unsoundness and infertility, and the use of visible ear tags for identification.

Horticultural paradise

Before the Europeans arrived, New Zealand Maori grew four main crops they had imported from the Pacific Island from which they came. They were kumara (sweet potato), taro, hue (bottle gourd) and uwhi (yam). The knowledge gained by growing and storing the produce in the cooler climate prepared them for transition from subsistence gardening to commercial agriculture when the European population grew. They quickly adopted domestic livestock like pigs and chickens, new crops and iron tools. Between 1830 and 1850 Maori agriculture expanded considerably such that most of the food produced was sold by Maori growers and traders to Europeans, including wheat and flour they milled themselves. Maori were New Zealand's first horticultural exporters, sending flax and potatoes across to Australia. But the move into individual land titles, disputes that led to the Maori Wars and subsequent confiscation of tribal lands arrested the development of commercial Maori agriculture.

Europeans bought many horticultural species and varieties within species to their new land; apples, pears, berries, stone fruit and a range of root and leaf vegetables. These grew well in newly cultivated soil with nutrients from ash and the first attempt at phosphate fertiliser from bird droppings or guano. The temperate climate zone, reliable rainfall and the absence of pests and diseases meant that horticultural crops flourished and the colony was largely self-sufficient in its food needs. Entrepreneurs and scientists also looked around the world in other temperate and subtropical countries for new fruits, crops and trees. For example kiwifruit came from China and was first commercialised in New Zealand, avocados came from Mexico and more exotic fruits like tamarillos, feijoa, guavas, cherimoya and passionfruit came from South America. The diversity of horticulture is now a strength for New Zealand, as products are sent to more than 120 countries and the horticulture sector is the fourth-biggest export earner.

New Zealand is two large islands in the South Pacific thousands of kilometres from any neighbours. It is relatively free from pests and diseases that plague fruits and vegetables grown on much larger continents. The biological isolation also raises opportunities





for selective importations of biological controls for existing pests and diseases, when done successfully remove the need for chemical or physical control methods. New Zealand has an international reputation for producing safe, high quality produce because growers have proactively set up initiatives demanding accountability and environmental best practice.

Horticulture New Zealand is the peak industry organisation that

works alongside many other industry groups such as: asparagus, avocados, blackcurrants, blueberries, boysenberries, citrus, buttercup squash, feijoas, fresh tomatoes, kiwiberry, kiwifruit, nashi, onions, passionfruit, persimmons, pipfruit, potatoes, processed vegetables, strawberries, summer-fruit, tamarillos and vegetables. In the year to June 2014 the horticulture sector produced \$7 billion worth of produce, of which \$3.5 billion was exported. The area of land used by the horticulture sector in New Zealand was 123,000ha. Wine was the largest horticultural export industry, with \$1.3 billion, followed by kiwifruit at \$930 million and apples at \$536 million. Potatoes, onions, peas and squash are the largest vegetable exporting industries, either fresh or processed.

Wine has grown from a domestic-only industry to become the export leader in just 25 years and in the past decade it has added \$1 billion to annual horticultural sector export earnings. In addition domestic wine sales are more than \$750 million, making total annual

sales by the industry over \$2 billion. Australia was the number one export destination for wine, avocados, potatoes, kiwifruit and processed vegetables, taking approximately one-fifth of all export volume. Fruit, vegetables and flowers were exported to 124 countries and the main five export regions were Australia, Japan, UK and Ireland, Continental Europe and North America. Over 300,000 tonnes of sauvignon blanc grapes were grown, almost 10 times the weight of the next biggest grape variety, pinot noir. The Marlborough region grew 75% of all grapes.

The kiwifruit industry has more than doubled its production in the past 15 years, from under 50 million tray equivalents to over 100 million. However its expansion received a severe check with the outbreak of *Pseudomonas syringae* pv. *Actinidiae* (Psa) disease from 2010 onwards, which preferentially attacked the gold variety. Orchard hygiene measures and the introduction of semi-resistant gold varieties have arrested the threat from Psa disease and export volumes are increasing again. The biggest export market is Japan, followed by Europe and then China. There are over 2000 growers and 11,000 canopy hectares.

The apple and pear industry has over 900 registered export orchards and they produced 311,000 tonnes from 8500ha in 2014. Around 60% of the apple crop is exported, 12% consumed domestically and the rest processed. The first exported apples were in the 1890s, to Great Britain. Commercial orchards became concentrated in regions of the country with winter chill followed by high sunlight hours in summer, Hawke's Bay, Nelson and Central Otago. Government researchers began selecting and crossing improved cultivars from the 1930s onwards and New Zealand has introduced apple varieties that have become leading world sellers: Gala (Delicious X Cox's Orange), Royal Gala, Braeburn, Fuji, and more recently, Jazz and Envy. New Zealand also developed types of tree training and orchard management that delivered more sunlight to the fruit, increased yields and made picking easier. Grading, packing

SILVER FERN FARMS

PLATE TO PASTURE

OUR PLATE TO PASTURE STRATEGY DRIVES US

Our market focused plate to pasture strategy is focused on creating value by listening and responding to the needs of consumers in markets around the globe. The Silver Fern Farms brand tells the story of the land, the farmers in our co-operative and the care taken at every point in the process of creating inspirational food. Through our story we are building a growing following of loyal, high-end consumers.

www.silverfernfarms.com

100% MADE OF NEW ZEALAND



and storage has been automated by New Zealand machinery companies that sell their technology around the world (Compac) and apples and pears can be kept in controlled atmosphere storage for the long shipping times to markets and to ensure fresh fruit on the domestic market all year round.

New Zealand developed the Recognised Seasonal Employer programme in 2009 which enables New Zealand horticulture and viticulture producers to bring workers from the Pacific Islands to work at peak times when there are not enough Kiwi workers or travellers available to do jobs such as picking, packing and pruning. The migrant worker scheme has been very successful and is described by the World Bank as 'best practice' for a foreign worker scheme. The RSE programme has given much needed income to Pacific Island communities, developed individual worker skills and has given New Zealand's horticulture employers considerable security from which they could build their businesses. The RSE scheme has been one of the major contributors to increased profitability in the industry in the last five years.

Innovation

New Zealand agriculture and horticulture has outstanding stories of innovation that have led to new industries, new food products and new farming methods, many of which have spread around the world. The majority are connected with grazing management with the emphasis now swinging towards environmental care and farming sustainability.

Deer farming

A century after several species of deer were introduced to New Zealand for game hunting, they had become a pest of bush land and high country, eating the understorey plants and contributing towards soil erosion. The government paid deer cullers to live in wilderness areas and try to keep the population controlled. They lived on venison and along with recreational hunters prized the gamey red meat for its taste, texture and leanness. The post-war opening up of remote 'back country' by vehicles, jet boats (invented by a New Zealand farmer) to navigate shallow waters, fixed-wing aircraft and helicopters enabled shooters to get to more deer and for the carcasses to be retrieved, skinned and chilled before the meat deteriorated. Export markets developed for the game meat, mainly Germany with its tradition of eating wild deer. But the success of the helicopters and their aerial shooters led to shortages of venison and in the 1970s a pioneering group of high country farmers began to believe that wild deer could be domesticated, kept behind high fences, fed on grass pastures and bred for meat yield and antler size. Along with venison there were valuable by-products like velvet and leather. The helicopter gun-ships turned to aerial capture with nets to retrieve live deer. One-way gates and traps were also erected next to bush to lure deer behind farm fences. Red deer, in particular,

quickly adapted to paddock life, thriving on their new pastures. The government had to approve deer farming, because they were classed as noxious animals, and now more than 2000 farms have some high fencing and deer as livestock. Gates, raceways, yards and deer handling facilities were all developed to enable farming of the notoriously flighty species. Unlike the management of cattle and sheep, farm dogs are of no use; deer have to be enclosed in dark buildings with high solid walls for animal health treatments and sorting. All of the deer handling technology that followed the pioneering domestication of deer in New Zealand is now used elsewhere in the world. Farm-raised venison is a very high quality, tender, lean red meat mainly consumed in hotels and restaurants.

Power fencing

First developed in the 1930s, power fencing requires an energiser, earthing system and conducting fencing materials like wire and polywire together with insulators. Bill Gallagher is credited with adapting a coil from a vehicle and creating the first energiser, leading to the foundation of the world-wide company that bears his name (Gallagher Group, Hamilton, New Zealand). A major improvement by Doug Phillips was to add a capacitor, which extended the effective range of one powered fence from a few hundred metres to kilometres. Since they do not need to provide a heavy physical barrier, electric fences can be built much more cheaply than traditional fences.

They need fewer posts and wires, and require less labour to put up. Although the system works on high voltage, it also has a low amperage, and the way the current pulses makes it safe for humans, even though they can receive a shock. Animals learn to avoid the fence and therefore to stay inside their enclosure. Polywires or tapes can be stored in a roll and run out quickly, suspended on insulated posts or standards, so that an animal-proof barrier can be erected in minutes rather than hours. As mentioned in chapter 5, the concept of 'break-feeding' and cellular paddock systems became widespread because of cheaper, more portable and quickly erected power fences to subdivide paddocks of pasture or crops down to small units, often enough for just one day's feeding for the groups of livestock. It lifted the utilisation of the feed and prevented animals trampling or spoiling the feed that was ahead of them.

Grazing pressure is delivered on smaller land areas for shorter time periods. Pastures are not allowed to become rank and lose usefulness. Animals eat more high-energy pasture to increase production and profit. Tighter subdivisions mean longer 'rotations', the number of days before animals need to return to the same patch of ground, allowing more time for grass to recover and grow again. The key is obtaining the optimum leaf length for higher nutrition. Instead of putting time and labour into cropping, fodder harvesting and caring for housed animals, farmers shift the electric fencing and the groups of animals each day. They have less capital tied up in buildings and machinery, which reduces the financial risk and results in more sustainable, environmentally friendly farming.

Follow-on technologies

The added emphasis on pasture quantity and quality resulted in careful measuring and allocation at the farm level, using rising plate meters (for the length of grass) and computer programmes to calculate the feed intakes and return periods. Grazing at the optimum time for leaf mass and feed energy is followed by timely removal of livestock so that the chewed-down grasses have enough photosynthetic power to grow again quickly, not letting weeds take over. Regular rainfall or irrigation also plays a big part, along with small quantities of nitrogen fertilisers widely spread. Then animals are regularly weighed to make sure they are gaining weight quickly and getting the feed they need, or the milk output of the

individual cow is metered in the stalls on a daily basis. Farmers can split livestock into groups with higher feed needs, or priority needs, like pregnancy. Individual animal electronic identification is now compulsory for all cattle and deer and becoming widely used by stud sheep breeders.

All aspects of farm measurement and management have been computerised, leading to predictive 'what if?' use of data to select from available pathways. New Zealand sheep, beef cattle, dairy cattle and deer farmers spend a lot of time moving animals through their yards, administering animal health treatments, recording weights and body conditions and making mating and management decisions, assisted by software. That has led to some of the most advanced and user-friendly 'real' situation computer programmes, which are being sold around the world, translated into other languages and adapted for local farming conditions.

Clean water and sustainability

Consumers in developed countries are increasingly concerned

that their foods, fibres and fuels come from sustainable farming models that do not degrade water sources, use fossil fuels, deplete soils and nutrients and produce waste streams. New Zealand has one of the world's highest reserves of renewable fresh water per person and takes just 1.2% of that water annually, half of it for irrigation. It also has one of the highest percentages of renewable electricity generation, from hydro-electric power stations. Increasing emphasis is being placed on avoiding and remedying water nitrate contamination from livestock and cropping, especially in iconic lakes and rivers.

Pasture production is inherently low-energy and sustainable but ruminants do produce large volumes of methane, a high-order greenhouse gas. New Zealand researchers lead the United Nations Climate Change efforts to mitigate enteric methane.

Hill country farmers also use livestock grazing methods, slope stabilisation and tree planting to combat soil erosion, but this is a young, steep country geologically still being actively weathered by wind and rain.

PRIMARY SECTOR FOCUS

A snapshot of New Zealand's primary industries

TOTAL PRIMARY SECTOR EXPORTS

\$NZ million, year ended June

Sector	2014	2015
Arable	228	177
Dairy	17,791	14,052
Forestry	5,199	4,683
Horticulture	3,795	4,173
Meat and Wool	8,162	9,005
Seafood	1,500	1,563
Other	1,677	2,090
Total	38,352	35,742

77%

of New Zealand's total exports are produced by the primary sectors

39%

of New Zealand's primary exports are dairy products

11%

of New Zealand's total workforce are employed in the primary sector

21%

of New Zealand's primary exports are bought by Chinese consumers

BIGGEST MOVERS EXPORT BY PRODUCT

\$NZ million, year ended June

We earned MORE from	2014	2015	Difference	% Change
Beef & Veal	2,199	2,983	783	▲ 36%
Kiwifruit	931	1,182	251	▲ 27%
Casein & Protein Products	1,925	2,130	205	▲ 11%
Live Animals	208	370	162	▲ 78%
Innovative Processed Foods	330	468	138	▲ 42%
We earned LESS from	2014	2015	Difference	% Change
Whole Milk Powder	8,393	5,385	-3,008	▼ 36%
Skim milk Powder, Buttermilk Powder, & Infant foods	2,285	1,762	-522	▼ 23%
Logs	2,541	2,060	-481	▼ 19%
Butter, AMF & Cream Products	2,699	2,220	-479	▼ 18%
Sawn Timber and Sleepers	885	779	-106	▼ 12%
Total Primary Sector Exports	38,352	35,742	-2,610	▼ 7%

Ministry for Primary Industries
Manatū Ahu Matua



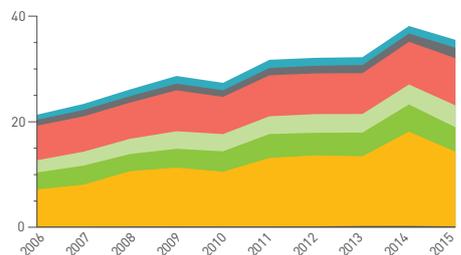
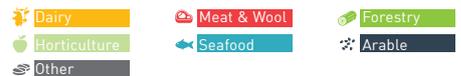
Almost all of the 33 percent fall in exports of whole and skim milk powder is due to fewer exports to China, our second largest export market. Prices have fallen dramatically in the latest year, but Chinese demand has been subdued as well.



Beef exports to the US remain strong on the back of herd rebuilding activity in America. Australia, our main competitor in the US beef market, has also increased exports in the latest year.

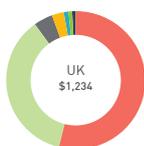
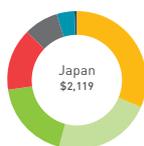
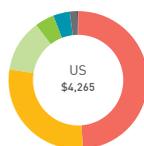
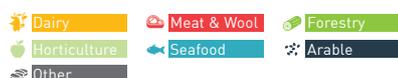
NZ'S PRIMARY SECTOR EXPORTS

\$NZ billions



MAIN EXPORT MARKETS

\$NZ million



CONTACT

Ministry for Primary Industries
PO Box 2526
Wellington 6140

info@mpi.govt.nz

@MPI_NZ

www.mpi.govt.nz

0800 00 83 33 (NZ only)
+64-4-894 0100

Growing and Protecting New Zealand

We're helping to maximise export opportunities for our primary industries, improve sector productivity, increase sustainable resource use, and protect New Zealand from biological risk.

New Zealand Government

September 2015



Working for all New Zealand Dairy Farmers

DairyNZ is the only organisation to represent 100% of all New Zealand dairy farmers in protecting and advancing their competitive edge on the global market. We do this through collecting the dairy farmer levy and investing it in world class applied dairy science, biosecurity, pest control and the development of proven tools that ultimately achieve change in profitable, sustainable and competitive farming practice.

