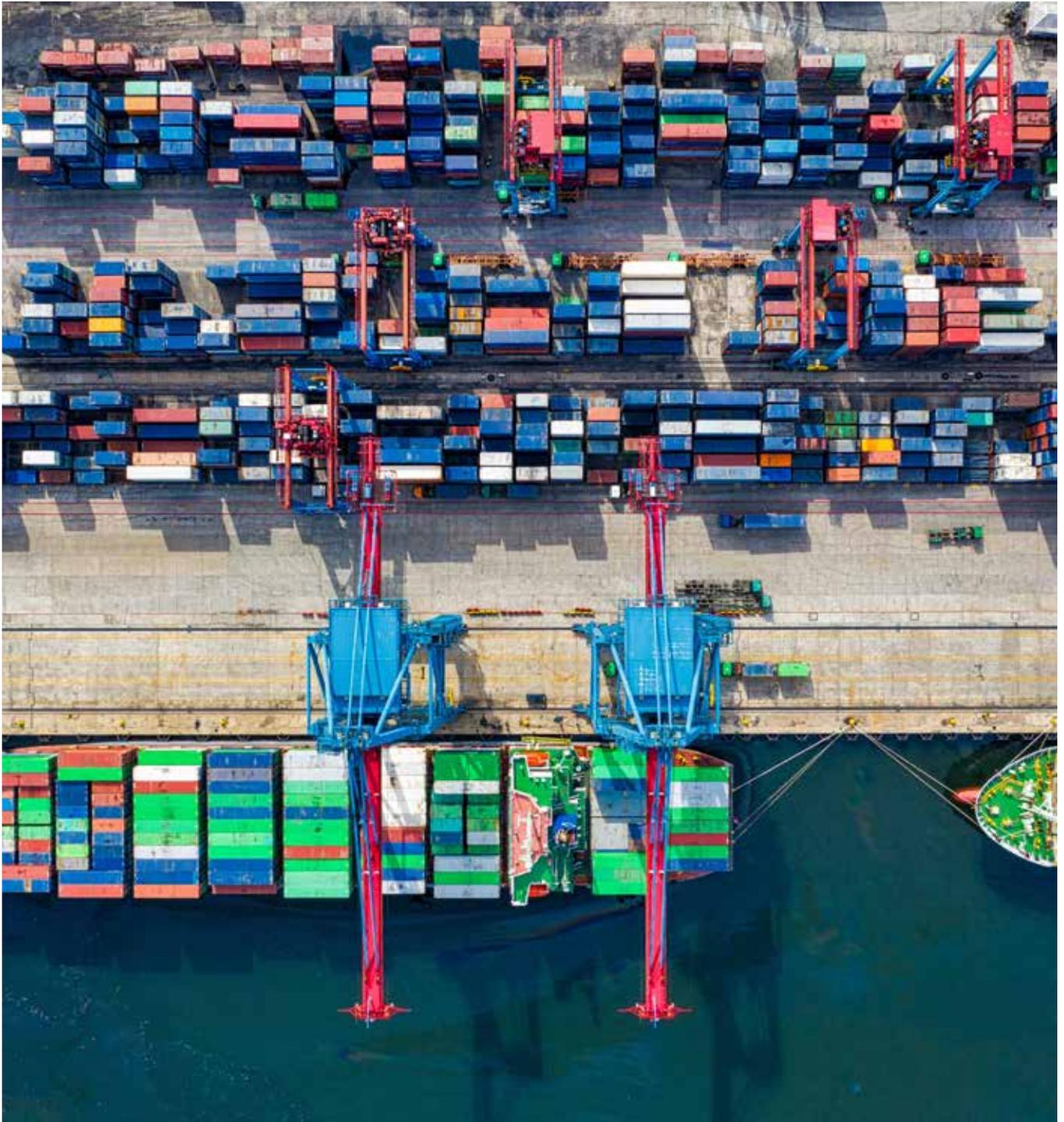


THE

JOURNAL

The Official Publication of The New Zealand Institute of Primary Industry Management Incorporated



INTERNATIONAL MARKETS POST-COVID **ESSENTIAL FRESHWATER PACKAGE** **MYCOPLASMA BOVIS AND BIOSECURITY**
NZ DEER DAIRY INDUSTRY **INTEGRATING FORESTRY INTO FARM SYSTEMS** **RISK MANAGEMENT ON DAIRY FARMS**



NZIPIIM'S ONE DAY FORUMS

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Converting high-level visionary rhetoric into action



In July 2020, the Government launched a plan to boost primary sector export earnings by \$44 billion over the next decade through the release of *Fit for a Better World – Accelerating our Economic Potential*. This roadmap is intended to unlock greater value from the sector and is premised on the Primary Sector Council's vision around the principles of Te Taiao that define our relationship with nature.

In its vision statement the Council states:

'Alongside innovative science and technology, we are designing modern regenerative production systems fit for a better world. Within a generation they will be the foundation of our prosperity and the way we produce high-quality, trusted and healthy food, drinks and fibres. These outstanding products will speak of our land, oceans and people. They will be enjoyed by people all over the world, fulfilling their desires for functionality, wellbeing and aesthetics.'

When discussing the Council's vision with members and farmers, it has been interesting to observe the general lack of knowledge of either the Council's future vision for the primary industry or the publication *Fit for a Better World – Accelerating our Economic Potential*. Maybe there is a sense of *déjà vu* all over again where we see a plethora of new transformational visions and strategies across the primary industry that promise so much, yet deliver very little, or worse still hastily disappear when lofty milestones fall apart.

The ability to convert high-level visionary rhetoric into action has been occupying my mind of late. This is particularly the case as we are seeing more and more policy settings and public funding drivers being aligned with the Council's vision, which has struggled to gain traction within the primary industry or provide meaningful clarity about how it will be applied in practice.

Creating a vision for the future is becoming more important for the primary industry sectors as we look to navigate a pathway forward on many challenges faced by New Zealand's farmers and growers, including increasing environmental pressures, changing market dynamics and increased societal demands, to name some.

But developing an industry vision in isolation that does not engage, excite or have the buy-in of its intended audience will always have limited impact.

So what is needed to take action and make a vision a reality? In looking at what is needed to successfully transform a vision into reality the following elements seem to be commonplace, including:

1. **Can we see the vision clearly** – creating a visual image that inspires and excites stakeholders around the vision is critical. If the vision lacks clarity or cannot be easily articulated then it will struggle to be realised.
2. **Who is going to own the vision** – leaders need to own the vision. They should be able to inspire trust and belief that the vision is attainable to get the required buy-in from stakeholders.
3. **Focus on the mid-term as well** – describe the intermediate goals over the next three to five years, as annual goals are too tactical and long-term goals too abstract.
4. **Believe in the vision passionately** – a passionate belief by leaders in the vision will provide stakeholders with a sense of purpose, dedication, direction and endurance.
5. **Pursue the vision relentlessly** – a vision is something that must be continually communicated to stakeholders along with articulating a pathway and actions to achieve the vision. This is not a one-off exercise and must be vigorously pursued until the vision is achieved.¹

In developing a vision for a business or industry we are often guilty of believing the job is completed once we come up with the vision statement, and then hand it over to others to interpret what it means or how it should be applied in practice.

Establishing a vision for the primary industry is never going to be easy given the diverse range of stakeholders, sectors and politics involved. While opportunities exist in developing and implementing a vision underpinned by Te Taiao principles, these need to be led by passionate leaders who can clearly articulate the vision and pathway forward, and who can inspire trust and belief that the vision is attainable and then relentlessly pursue it to completion. ■

1. Dan Oswald: Making Your Vision a Reality

NAVIGATING COVID-19 WITH THE SPIRIT OF NEW ZEALAND

Special Agricultural Trade Envoy, Mel Poulton, reflects on the impact of the COVID-19 pandemic on the agricultural sector, as well as on how to survive the uncertainty.

Into the COVID-19 storm

About 1990, aboard the tall sail ship *Spirit of New Zealand*, we were crossing the Cook Strait and harnessed up on the lifelines in a massive swell as we sailed back to Wellington. Some of us leaned in and braced ourselves as the ship positioned itself to surf down one wave and punch into the next – blue water rising up over the deck. Many were very seasick, including the captain. Although we were all on the same ship, in the same conditions, our responses were quite different. Some were despondent and desperate, a ‘get me off this boat now’ approach, but others were quiet, with patient endurance and confidence that we would get to calmer waters eventually. In the end we found sanctuary in Wellington harbour and everyone

disembarked safe and well. It was an experience and set of circumstances many of us had never had before.

Neither have we experienced this specific set of COVID-19 circumstances before. Rather than classifying it as a post-COVID-19 world, it would be better to acknowledge that we will be dealing with the storm of the pandemic and the ramifications of individual government responses to it for some time yet. These implications intersect people, trade, markets, economies and food.

While COVID-19 itself is new, we do know that history has a habit of repeating itself. It is in times like this that many reflect on other great upheavals such as World War 1, the Spanish flu, World War 2, the Avian flu, or just difficult experiences in our own lives.

It is early days, and there will continue to be up, down and sideways shifts in markets and prices.

Different approaches

Our collective and individual, historic and present experiences, and general outlook, will determine what lessons we draw on and where we put our focus as we navigate our way through the stormy seas of this pandemic. For instance:

- Some might easily be focused on the intersection of human loss of life, economic hardship, trade and business disruption, market uncertainty and food insecurity. This approach results in a fairly despondent and despairing response about the headwinds and stormy seas we are facing, perhaps with a 'get me off this boat now' perspective.
- Others might focus on the intersection of human courage, economic adaptability, trade and business flexibility, market resilience and food generosity. They may be hoping that we will get through this storm with an 'I will endure this and we'll find a way to calmer waters' perspective.
- Another approach again may have people focusing on the intersection of human optimism and determination, economic innovation, trade and business collaboration, market opportunities and food security solutions. This is the group that is confident and excited that we can capture and create opportunities, and be a solutions partner to countries, markets and people facing challenges they cannot solve on their own. It is an approach that adjusts the sails of our businesses and the sector finds the right course to harness the winds, navigate the storms and sail to new horizons – positioned and poised to surf down one wave and punch through the next.

Some effects of a global pandemic

With regard to agricultural trade, the global food system feeds about 80% of the world's population, which demonstrates just how interdependent people, economies, markets, trade and businesses are on each other globally. According to the CSIS Risk and Foresight Group (July 2020), 'COVID-19 is the beginning of an era of accelerated, continuous change that will play out this decade and perhaps beyond.'

Globally, the current situation is a little bit like the sea – a mix of currents, winds and tides moving in all sorts of directions. Some like China appear to be doing well, consumer confidence seems to be returning and overall New Zealand goods exports are pretty much the same YTD as last year.

In other places there are rising levels of unemployment, increasing poverty and less disposable income, whereas

there are still consumers across the globe who are not experiencing a major loss of income. While the reports or forecasts coming out of international institutions like the WTO make for sober reading, other reports suggest that things may not be as bad as initially modelled. It is early days, and there will continue to be up, down and sideways shifts in markets and prices.

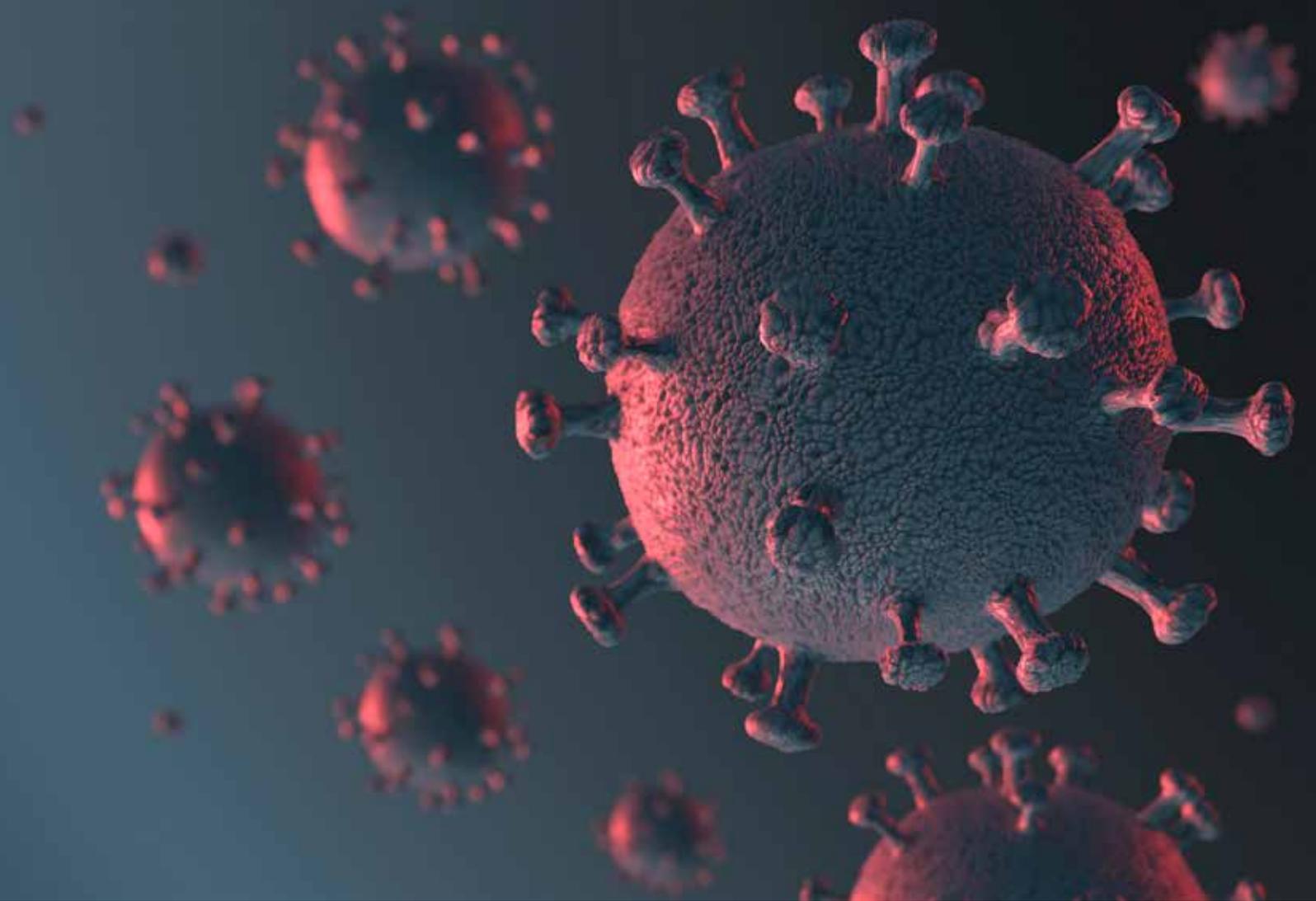
In many markets there is a shift of domestic product from food service to retail and/or export markets in response to the closure of restaurants and schools, as well as the downturn in hospitality and tourism. Their product has to go somewhere, particularly for countries with big agriculture and big populations. With changing levels of lockdowns in different countries or domestic regions/states it will continue to be difficult to determine market certainty.

Behind the farm gate, the impact of closed domestic markets that food producers have supplied has been severe for some. The ongoing implications for production from the closure of processing and packing facilities with live prime animals, or even fresh produce crops not being able to move on time, has backed up right through to the decision-making around next year's production. Many are forced to take the loss, tighten their belts and hunker down or, in some cases, for those already financially stretched it was a matter of having to close the business. The financial implications for those who keep operating will be felt for years to come. However, others have been and are well able to adapt and pivot, creating new opportunities or avenues to market – even creating a far better business model for themselves.

Government response

We have seen a lift internationally in national protectionism, which was trending upwards even before the pandemic hit. In a New Zealand review of trade response measures due to COVID-19 by our major trading partners (to 22 June 2020) there have been 142 trade response measures and sub-measures from New Zealand's trading partners, of which 60% are subsidy measures and 18% are export restrictions. We have seen responses in state aid, storage aid and/or direct farm aid in many countries.

This attracts our attention here in New Zealand, given that our food and fibre producers receive less than 1–2% government subsidisation and our economy is export driven. About 75–95% of much of the food and fibre we produce is exported to well over 150 different markets around the world.



On the international stage New Zealand has been a consistent advocate for stable, predictable market access, trade liberalisation, rules-based trade, and ambitious and meaningful trade agreements.

In the US, direct farm aid increased from USD11.5 billion in 2017 to more than USD32 billion in 2020, reported as an all-time high with more to come. Commentators have been clear that this is not sustainable and there has been a lack of scrutiny about this. With regard to the US-China trade war, the US trade bail out spanning three years now is over USD23 billion.

In Europe, it is reported that there has been a €16 billion economic aid response for dairy and meat, which includes:

- Private storage aid
- Flexibility for market support programmes – wine, fruit, vegetables, olive oil, apiculture and the school scheme
- Temporary derogation from EU competition rules – milk, flowers and potatoes
- Exceptional support to farmers and SME's under the Rural Development Fund – extra support to farmers and small agri-food businesses
- Higher advances of payments and higher state aid for farmers and food processors.

On the international stage New Zealand has been a consistent advocate for stable, predictable market access,

trade liberalisation, rules-based trade, and ambitious and meaningful trade agreements. It is also the view of many that by increasing protectionism, subsidies and price interventions, it will only exacerbate and prolong the COVID-19 recovery for people, trade, markets, economies and food. So ensuring that these support measures do not get locked in for good is very important to us.

In many countries with very large domestic populations, and with food sectors (from production, processing to services and retail) being so disrupted, the pressure on governments for quick action, fast decision-making and urgent help has been significant. The need for certainty and confidence is critical and the route with least resistance has often been an easy choice – in the interim.

This is being exacerbated by government policy and regulation, which in the minds of many food producers around the world runs contrary to enabling domestic food production. Finding the sweet spot of the needs and demands of the people, environmental stewardship, food security, market access, trade and economies is no easy task.



There are many positives that can emerge from such a large global crisis, and we need to make sure we are well positioned to be part of the new and unexpected.

The need for agricultural trade

Most countries are unable to produce the total food demand of their population at all times of the year – be it quantity or variety, or even quality at a price point their own domestic market are prepared to pay. New Zealand is not excluded from this as we still look, for instance, offshore for our tropical fruit. Countries such as the United Arab Emirates (UAE) import 90% of their food.

The core fundamentals remain – consumers the world over are seeking food that will deliver safe and tasty nutrition they can trust. New Zealand kiwifruit, for example, has been well positioned with product proposition around health and nutrition (as well as market diversity) so it has been able to do really well through

the COVID-19 storm to date. Even red meat protein and dairy products from New Zealand are able to deliver, with fundamentals of global protein shortage holding a supply demand imbalance – this does not remove price volatility.

The extensive market diversity has meant different sectors in New Zealand have been able to move product internationally in ways that are not necessarily available to others countries, with domestic production focused on their own domestic food service market that has encountered all sorts of shutdowns. This has not been easy or without very real and extensive challenges for our food and fibre export sector. There has been a lot of international effort to keep supply chains open and trade flowing.

At a national level we need to ensure that policy and regulation is permissive rather than restrictive and maintains the New Zealand position of being outputs-based not inputs-based.

Another element is that with climatic shifts in weather patterns, countries are finding shifts in food production. Crop yields are decreasing in some areas, with opportunities increasing for our arable sector to do more seed multiplication.

Navigating to new horizons

There are many positives that can emerge from such a large global crisis, and we need to make sure we are well positioned to be part of the new and unexpected. This is where New Zealand's food and fibre sector can steer its course to surf the waves and punch through the challenges, creating and capturing opportunities to be a solutions partner in trade, market access, environment and food security. This course will enable economic recovery for ourselves and others. Our size and scale, while often perceived as a disadvantage, can be a significant advantage as we are relatively more able than other countries to be nimble, flexible and adaptable. Our international market network for food and fibre is extensive and we have the relative advantage of being able to anticipate and position our product where best we can.

As Kiwis we are wired to be innovative, proactive and solutions-focused. We have a long history of this approach right across the food and fibre sector – from scientists, to service providers, our food producers, processors/packers, exporters, logistics, freight, and even our government agencies and the government itself (irrespective of colour or brand).

Working together, digging deep with grit and determination, and with our positive, innovative, solutions-focused approach – like we did through the first lockdown – it was quite outstanding what was actually achieved. Yes, the *Spirit of New Zealand* was at work. It took everyone operating in their specific area of expertise and speciality to navigate our way through the first lockdown crisis domestically and internationally.

And so we need to be investing and implementing what is needed for New Zealand to navigate its way through the current global storm. We need to find ways to enable and underpin positive innovative action which positions us to be a solutions partner with people, business, markets and countries around the world. We need to be on the front foot for creating and capturing opportunities and being part of the 'new and exciting' that will emerge from this COVID-19 crisis.

Starting at home on the farm, the money, time and energy we are investing to maintain or improve standards

for our natural resources and environment, in our people, in our animals, our production systems and business performance needs to continue. A review of our systems and structures is always worth another look to ensure we are match fit, positioned and poised for the operating context we find ourselves in. As food producers, we need to continue to own the responsibility to understand and invest in solutions to the challenges we face.

At a national level, there needs to be significant and smart investment in the infrastructure to enable New Zealand to thrive and position itself to be the best solutions partner to the world we can be. In my view, while there are many needs the two biggest new national investment priorities include: water storage for all; and digital telecommunications infrastructure providing both cellphone and internet connectivity across the landscape.

Also, at a national level we need to ensure that policy and regulation is permissive rather than restrictive and maintains the New Zealand position of being outputs-based not inputs-based. We need to ensure the problem identification is clearly defined, at a local level, so that landowners can work with scientists to understand the issues and then prioritise investment in mitigation approaches. When investing limited capital in an economic downturn, it has to go to the actual problem, priority and solution in order to be efficient and effective. This is important for ensuring integrity and credibility to our pitch internationally as a responsible, safe, reliable food producer, particularly as we progress trade negotiations and our exporters market our produce.

Leaders and rural professionals will acknowledge the challenges, and recognise that we will be operating in a most certainly uncertain COVID-19 world for some time yet. However, taking advantage of our small size, with agility, flexibility and teamwork across the food and fibre sector, we can capture the opportunities that arise. Rather than 'get me off the boat now' or 'enduring till we get to calmer waters', we can all draw on the unique strengths of New Zealand. We can also draw on our experiential history and DNA of being positive, innovative solutions-focused people who in the *Spirit of New Zealand* position ourselves to surf the opportunities, and with poise take on the challenges to navigate our way through the global storms of this pandemic into new horizons.

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ACTION FOR HEALTHY WATERWAYS

Mike Bennett explores the implications of Action for Healthy Waterways regulations – how they might impact the primary sector at a strategic level and how rural professionals might respond.

Intent and elements of new regulations

The intent of Action for Healthy Waterways regulations is to: stop further degradation of New Zealand's freshwater resources and improve water quality within five years; and reverse past damage and bring New Zealand's freshwater resources, waterways and ecosystems to a healthy state within a generation. The key elements of the regulations are:

- National Bottom Lines for various water quality parameters, along with water quality limits and controls to ensure these are achieved
- Rules to control intensive winter grazing, stock access to surface water, and other activities with adverse effects on water
- Structures to ensure the new requirements are applied. These include the new enforcement powers for the

Environmental Protection Agency (EPA), and objectives and policies that ensure the intent of the regulations is reflected in planning decisions.

The overall package of regulations is very strict and goes beyond anything we have seen before, both for direct intervention by central government in the day-to-day management of water quality on farms, and prioritisation of water quality over economic or community outcomes. For the economic impact and the long-term viability of farms, the biggest risks will arise from 'indirect' provisions (such as the strict National Bottom Lines for water quality) and the new enforcement powers of the EPA.

It has also been made clear that the new regulations are the first step in an ongoing process. Various changes are anticipated in coming years, including 'mandatory and enforceable freshwater farm plans in place for all farms'. Some

Fenced off wetland with willow control and riparian planting

The overall package of regulations is very strict and goes beyond anything we have seen before.

things are likely to become more manageable as it evolves, and other areas are likely to emerge as more problematic.

Whatever happens, the implications for rural professionals and how we work will be profound. Water quality and the ability to safeguard it will become intrinsically linked to the viability of farm businesses, and there will be enormous demand for qualified advice to support farmers to achieve a better outcome. Relationships with regional councils are likely to become closer as rural professionals seek to become better informed and councils seek to support those who need to understand desired outcomes and results.

National Bottom Lines

The National Policy Statement for Freshwater Management (NPS) includes national water quality limits (National Bottom Lines) relating to contaminants such as nitrogen, phosphorous, and indirect effects such as periphyton growth. Regional councils are required to include these National Bottom Lines in regional plans, and set limits on resource use, and to put in place controls to ensure they are achieved, including controls on land use, inputs (e.g. fertiliser) or outputs (e.g. losses caused by leaching or run-off).

It appears the National Bottom Lines are quite strict and will not be able to be applied in many productive catchments without significant disruption to existing land use. We have seen water quality limits implemented in places like Lake Taupo and Canterbury before, but the need to improve the environment has always been carefully weighed against social and economic concerns. The result will be that limits, while often tough and requiring managed reductions over time, specifically allow for social and economic requirements alongside the environmental. Action for Healthy Waterways includes limits that are much less compromising, which reflects an overall approach where environmental values come ahead of social and economic needs.

It is going to take some time to work out what is going to happen, but the upshot is that it is now impossible to understand the future viability of an intensive land use (arable farming, vegetable growing, dairy or dairy support) without having some idea of the state of water quality in receiving water bodies and how far this is from the expectations set in National Bottom Lines.

The specific attributes of most impacts, and how difficult it is to meet them, will vary from one location to another and have a lot to do with soils, climate and the context of the farm in the wider catchment. These factors are very different on flat free-draining irrigated land on the Canterbury Plains compared to the gently sloping tile

drained land that predominates over much of that land that is in dairy in Southland.

The EPA and supporting policies

Action for Healthy Waterways includes various supporting provisions to ensure it is implemented effectively, including new powers for the EPA and supporting objectives, policies and directives.

New powers for the EPA include the ability to appoint officers and undertake its own enforcement of regional plans or the new regulations. It is not fully understood how the EPA will use these powers at this time, but it will certainly influence how regional councils respond. Most will probably be unwilling to have the EPA come in from the outside to implement rules on their behalf, which will result in a strong incentive to show that they take the regulatory package very seriously and are doing whatever they can to implement it effectively.

There are also a range of supporting policies and objectives, which provide certainty that the regulations will be implemented as intended when councils make decisions on resource consents or plans.

A comment on rules

This article does not go into much detail on specific rules because they are very well described in summaries prepared by industry bodies. It is best to specifically look at summaries of the requirements on intensive winter grazing, stock access to waterways, land use change, and nitrogen fertiliser use.

It is also important to note that there are now two sets of permitted activity rules for many activities because they are already covered by regional plans. In these instances, both rules need to be looked at and the strictest criteria apply. For example, the Canterbury Land and Water Regional Plan already includes standards for stock access to surface water that are stricter in many ways than what is in the new regulations.

Also be aware that the policies that support the rules will be invoked when making decisions on resource consents. Some of the new policies are quite strict and the implications are not well understood. For example, renewals of water permits for irrigation or community water supplies will now be made subject to nationally directed criteria, which run parallel to those already developed in regional plans.

Intensive winter grazing

New rules apply for the grazing of animals on an annual forage crop between 1 May and 30 September. Currently these are a cause of great concern to many farmers and are also seen as a priority by interest groups in some places.

It is certain that environmental advice will continue to be a growing area of practice.

There are three levels to the rules for intensive winter grazing:

- The activity is subject to a Certified Freshwater Farm Plan (no consent required)
- If there is no Certified Freshwater Farm Plan, the activity is permitted, but with somewhat restrictive criteria
- If the permitted activity criteria cannot be satisfied, the landowner must make an application for a resource consent.

Because of the difficulties with consents mentioned above, and also the lack of capacity to prepare and process the large number of consents that are required, it would be best for farmers to get a Certified Freshwater Farm Plan in place if at all possible. The problem is there is a lack of guidance other than that the plan must be 'certified' by someone appointed by the council, and there are few rural professionals with the capability to produce a Certified Freshwater Farm Plan.

The practical difficulty with these rules illustrates the potential difficulty with the new powers of the EPA supported by new policies that also apply in the context of consent decisions. Regional councils are usually very aware of contradictions or problems that arise during the implementation of plans, and generally will not require that people carry out the impossible if things are moving forward as fast as they can in the circumstances.

There can also be circumstances where compliance with a rule will cause more environmental harm, as readily occurs with wetlands completely retired from grazing when grey willow is present. There is no such local connection with the EPA, and some time must elapse before it or anyone else can determine how it will respond when there are practical barriers to compliance that cannot be immediately overcome.

Implications for rural professionals

Despite resource limitations, it is expected that regional councils will implement the provisions of Action for Healthy Waterways to the greatest extent they can in the circumstances because this is what they are going to need to do. Their approach will vary from one part of New Zealand to another because environmental conditions, pressures and existing plans also vary. It will be critical to listen carefully to the messages coming out of regional councils and they are the best place to ask if you are unsure about the state of water quality in a catchment and what that might mean for farm viability.

It would be very good to see regional council programmes to support and inform rural professionals in all parts of New Zealand, and I was involved in initiating this in Canterbury. These programmes are a great way to convey crucial information to rural communities. Rural professionals receive information relevant to their practice and the council is able to access not only an audience who are directly impacted by what they do, but indirectly the wider farming community as well.

We will not all become experts on regional council rules or environmental management overnight, but we will be able to pass on key messages, reassure farmers, and help them stay on track with the things that matter. It is strongly suggested that if such programmes are not running in your region now, that you approach regional council advisory staff and discuss what you and your peers require for information and support and the most effective ways to get that to you.

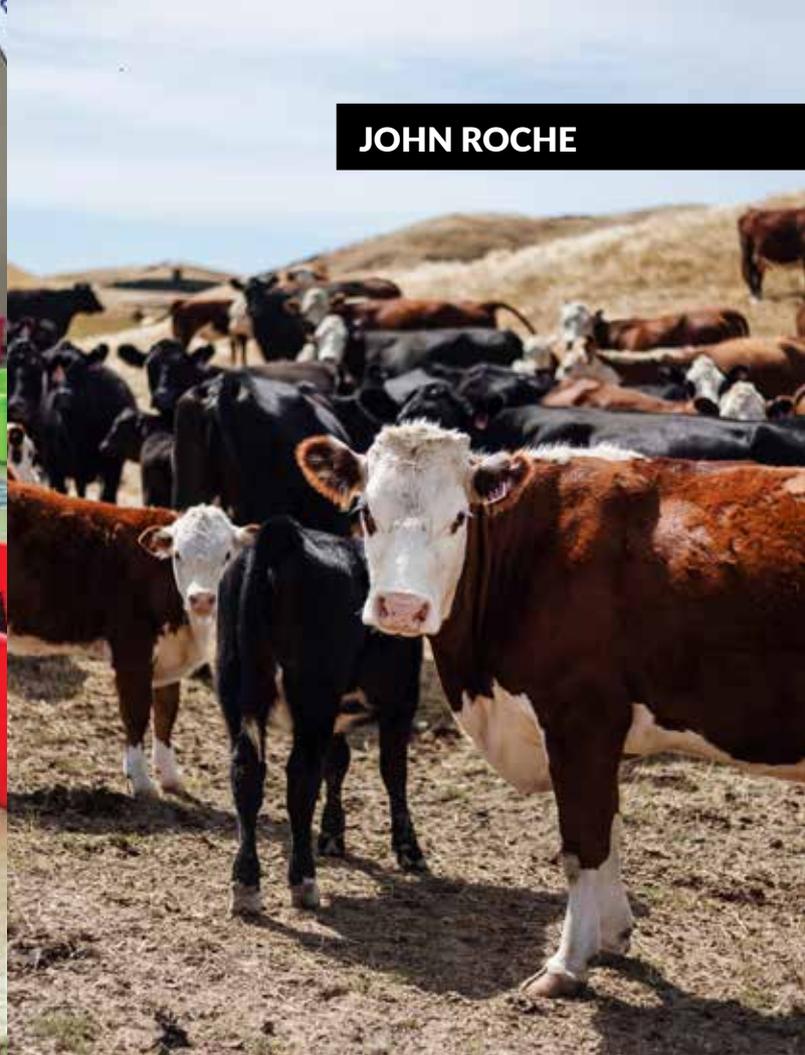
It is certain that environmental advice will continue to be a growing area of practice. A Certified Freshwater Farm Plan will be required for most winter grazing with forage crops, and this will expand to other activities over time. The overall intention appears to be towards Farm Plans rather than resource consents to manage the adverse effects of farming activities, which I believe is immensely helpful because it will minimise administration costs and maximise return for effort.

Farmers and the rural professional community need to get behind a Farm Plan led approach. Done well, and with good support from regional councils, government and the professional community, this will create a step change to how farmers engage with and manage the environment on their farms in an integrated way and become a point of pride, not only for those with a particular passion for the environment, but for everyone with an interest in the primary sector. There is much to appreciate and be proud of, and farmers are ideally positioned to act in positive ways, not only for the betterment of the environment, but for their own future.

Evolving situation

The views in this article are initial opinions based on my reading, recent discussions with industry people, and several years of experience in environmental management on farms. We will need more time before anyone can offer specific advice because the new regulations are very complex, and we are just beginning to understand what they mean for farmers and the wider primary sector.

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MYCOPLASMA BOVIS AND BIOSECURITY - FROM THE BORDER TO THE FARM

New Zealand's world-first effort to eradicate *Mycoplasma bovis* is making good progress. This article looks at the reasons for this and why a strong biosecurity system is vitally important to Aotearoa.

Eradication making good progress

It is just over three years since *Mycoplasma bovis* (*M. bovis*) was first detected on a New Zealand dairy farm. The resulting biosecurity response, and the effort to eradicate the disease, has been one of the largest and most complex biosecurity challenges this country has faced.

The dairy and beef industries believed that allowing the *M. bovis* infection to spread through the national cattle herd was untenable. The estimated production loss over the first 10 years alone was \$1.3 billion, and farmers would have had to make substantial changes to their farm management practices in order to manage and mitigate the impacts of this disease. *M. bovis* causes many stock diseases, most notably mastitis, arthritis, pneumonia, and can cause abortions. On this basis, and with the

information at hand that eradication was feasible, the Government in partnership with DairyNZ and Beef + Lamb New Zealand embarked on a phased eradication plan.

Today the eradication effort is well on-track. At the time of writing, there are currently three properties confirmed as infected and still going through the eradication process. Only two of these properties, both beef finishing farms, still have infected cattle on them. The number of farms under movement restrictions while they are tested is at an historic low (28 as at 31 July 2020). While we expect to find a tail of infected herds, in particular during spring calving when these herds are more likely to be found, we are very confident we can eradicate *M. bovis* and free all farms in New Zealand from this disease in the future.

An MPI study in 2015 estimated that a large-scale foot and mouth disease outbreak would have a net cost of \$16 billion to New Zealand over eight years in real GDP terms.

The effort to eradicate *M. bovis* has affected farmers around the country. More than 1,900 farms have been put under movement restrictions while they were tested, and 250 herds have been found to be infected and the stock culled. To date, over 1,533,930 cattle have been tested for *M. bovis*, 157,869 have been culled, and \$168 million has been paid in compensation to affected farmers.

So, after three years battling this disease, where is the biosecurity system at and what have we learnt about on-farm biosecurity?

The biosecurity system

Biosecurity is vitally important to this country, given the potentially devastating effect of unwanted pests and diseases. New Zealand maintains a list of almost 15,000 unwanted plants, animals, pests and diseases, all of which could damage our economy, or environment, and our way of life.

The entire biosecurity system faces increasing pressures. While the threat posed by tourists coming across the border has temporarily abated due to COVID-19, imported goods and packages continue to grow in volume, and climate change and the pressure from established pests and diseases is increasing.

To keep this huge range of threats at bay we have three interlocking layers of protection:

- Pre-border – to stop threats from ever arriving here
- Border – to find and stop risks when they arrive
- Post-border – to detect, eradicate or manage anything that has already arrived.

This layered approach gives us our best possible defence against biosecurity threats, allowing us to stop as many as possible, and to respond quickly and decisively if they do arrive. Our approach is underpinned by science and innovation, which also have a major role to play in future-proofing New Zealand's biosecurity system.

Biosecurity surveillance programmes

Biosecurity New Zealand, part of the Ministry for Primary Industries (MPI), continually looks for pests and diseases that might have arrived from overseas. Finding them early is vital for a successful response. This is critical in assuring our trade partners that New Zealand's exports are safe, and helps us find any harmful pests or diseases early before they get established.

Alongside formal surveillance programmes, every New Zealander has a role to play in biosecurity. New Zealanders report about 10,000 suspected pests and diseases to MPI every year.

Four other large biosecurity threats

Apart from the *M. bovis* eradication effort, four biosecurity threats are currently our top priority to keep out of New Zealand:

• Brown marmorated stink bug (BMSB)

BMSB is one of Biosecurity New Zealand's highest priority pests. If a breeding population were to establish in New Zealand, it would likely spread throughout the country and cause substantial economic damage. BMSB affects a wide range of crops by disfiguring fruit, in many cases making fresh produce unmarketable. Crops affected include apples, pears, peaches, wine grapes, peas, beans, sweetcorn and maize, capsicum, tomatoes, nectarines, apricots and blueberries, among others.

Some producers in the US have reported crop losses of up to 95% due to BMSB. Even with a significant increase in applications of broad spectrum insecticides, many growers still suffer high crop loss. BMSB could also become a significant public nuisance. Affected parts of the US and Europe have seen overwintering adults aggregate in large numbers in confined dark spaces, including homes. Also, as its name suggests, BMSB releases a remarkably unpleasant odour when disturbed.

• Foot and mouth disease (FMD)

An MPI study in 2015 estimated that a large-scale foot and mouth disease outbreak would have a net cost of \$16 billion to New Zealand over eight years in real GDP terms. The study showed even a single case of foot and mouth disease would result in a first-year GDP loss of \$5.8 billion. The losses would arise largely from the loss of export revenue due to the closure of New Zealand's main markets for primary produce, especially meat and dairy products. The report also highlighted the impacts that an outbreak would have on all New Zealanders – not only the agricultural sector – with economic losses affecting everyone across the economy.

• Queensland fruit fly (QFF)

QFF is a native of Australia, where it is considered to be the country's most serious insect pest for fruit and vegetable crops. This distinctive Australian pest also poses a serious threat to our trade with other countries. We have caught it half a dozen times in traps over the past decade and have managed to stop it establishing here each time.

If QFF were to establish here, it would have serious consequences for New Zealand's \$6 billion horticultural industry and home growers of fruit and vegetables. To manage the risk of this pest establishing here, our



MPI is currently leading an overhaul of the now 26-year-old Biosecurity Act to make sure that the legislation we have is robust and resilient.

surveillance programme watches for 100 species of fruit fly, including the QFF. More than 7,600 traps are set around the country, where pheromones are used to lure flies.

● African swine fever (ASF)

ASF is a highly contagious virus that affects pigs and is regularly found in parts of Africa, Southern Russia, Georgia, Armenia and Azerbaijan. Europe is currently experiencing an outbreak. The disease was found in China in 2018 and is spreading into South East Asia. Biosecurity New Zealand is taking the threat from ASF extremely seriously. New Zealand has had import restrictions in place for pork products for many years, and we have taken additional measures to ensure this animal disease has not come into this country since the start of the global outbreak last year.

Standing ready to respond

Responding to incursions when they occur is a key part of the biosecurity system. However, the sheer scale of the

threats that we face means that, on occasion, pests and diseases will find a way through the net.

Biosecurity New Zealand has a specific Readiness Group that oversees and manages a comprehensive programme of readiness activities. The group is tasked with improving our overall readiness, so that we can respond effectively to a range of situations including biosecurity incursions, food safety, adverse events, animal welfare and trade issues.

The readiness programme encompasses: planning; improving processes; having the right people on board and maintaining good relationships; and access to the best information and processes. This ensures that we are ready to deal with any significant incursions, such as foot and mouth disease or BMSB. As well as the positive progress we have made towards eradicating *M. bovis*, we have recently celebrated eradicating:

- Pea weevil from the Wairarapa, a world first
- Queensland fruit fly from Auckland
- The *Culex sitiens* mosquito from the Kaipara Harbour.

ON-FARM BIOSECURITY



Cleaning and disinfecting is good biosecurity practice

When it comes to what we can do about on-farm biosecurity, there are obvious and easy steps that every farmer and grower can take to minimise the risk of bringing unwanted pests, weeds and diseases onto the farm or spreading them from one farm to another. Here is some advice from MPI's industry partners DairyNZ and Beef + Lamb for New Zealand's cattle farmers:

Clean on – clean off

- Get everyone (staff and visitors) to clean their hands, and clean and disinfect their boots/footwear on arrival and departure
- Have green areas where visitors and contractors can enter, and red areas that are out of bounds to everyone without your permission

Animal movements and NAIT

- Ensure you meet all of your NAIT requirements – tag, register and record every animal
- Know the health status (vaccination, drenching, fly treatments etc) of incoming animals
- Record all animal movements on and off-farm (NAIT, ASD forms)
- Quarantine incoming animals for 7–14 days
- Maintain good boundary fences to guard against unintended animal movements

Animal health management

- Well-fed, vaccinated animals are better able to fight off disease – including the dogs!
- Many diseases can be 'bred out' through genetics
- Have an animal health plan – talk to your vet
- Record everything

People and equipment

- Maintain a register of visitors to the farm, and establish green and red zones for visitors
- Equipment should be cleaned, and if possible disinfected, before entering the farm
- Have the fewest possible entry points to the farm
- Keep yards, woolsheds, dog kennels etc clean and free of vermin

Feed and water

- Know where bought-in feed comes from and what weeds/seeds might come with it
- Never feed ruminants anything from a bag with a warning label that prohibits it
- Do not feed dogs uncooked offal
- Trough water is more likely to be free of liver fluke, leptospirosis etc

Pest control

- Monitor and control animal pests like possums, rats and cats as they can carry diseases like TB, leptospirosis and toxoplasmosis
- Monitor and control weeds and be on the lookout for unusual plants
- Consider joining forces with neighbours on a pest control strategy

Animal waste and carcase management

- Identify and remove carcases as soon as possible to a site inaccessible to livestock and scavenging animals
- Manage effluent run-off from holding areas
- Have a stock rotation policy that doesn't put young stock at risk of high parasite intake

Shared knowledge and understanding

- Ensure all farm staff are a part of the biosecurity plan
- Make sure visitors are informed of their responsibilities while on-farm
- Ensure staff know who to contact and what to do if they encounter a suspected pest or disease
- Make biosecurity practices a part of normal everyday life

Keep boundaries secure

- Maintaining complete and secure boundary fences reduces the risk of unwanted animals contacting your herd, and maintains the animal health 'bubble' of the farm
- Check fences regularly and carry out any maintenance promptly

The effort to eradicate *M. bovis* isn't over and we need every farmer in the country to stay committed to properly maintaining NAIT records and making on-farm biosecurity a top priority.

Biosecurity the top priority for industry

The recent 2020 KPMG Agribusiness Agenda showed that agribusiness leaders continue to rate maintaining a world class biosecurity system to protect our economy from new pest and disease incursions as their top priority.

Working closely with industry is a vital part of how we make the biosecurity system work. Through our *Government Industry Agreement on Biosecurity Readiness and Response* (GIA) partnerships, we work with primary sector industry bodies to prepare for and effectively respond to biosecurity risks. Under the partnership, industry bodies have a direct say in managing risk and sharing response decision-making and costs with Biosecurity New Zealand.

A key part of the system that we have tested throughout *M. bovis* is government and industry working together to deal with a biosecurity threat. The *M. bovis* Eradication Programme is a joint effort between MPI and its industry partners, DairyNZ and Beef + Lamb New Zealand, with each party involved in the funding, governing and the operation of the programme. This joint approach has proven to be successful, and brings more voices to the table on how to deal with biosecurity challenges.

Refreshing the framework

MPI is currently leading an overhaul of the now 26-year-old Biosecurity Act to make sure that the legislation we have is robust and resilient in the face of all of these challenges.

We have been working extensively with Treaty partners and stakeholders (such as industry representatives, regional councils, environmental and not-for-profit groups) to establish a clear understanding of the challenges across the system and how these impact on all of these players.

We will be testing our early thinking on possible options with these same groups later this year, with a view to consulting publicly on issues and options in 2021. At this stage we anticipate commencing consultation in March 2021, but this will be subject to government priorities at that time.

On-farm biosecurity

The final level of biosecurity controls happens on-farm. We need farmers and growers around the country to make biosecurity their top priority, so we can control the pests and diseases that we already have in New Zealand and spot and stop any potential new incursions.

When it comes to the cattle sectors, *M. bovis* has shown us the enormous scale of cattle movements in New Zealand, as calves go to rearing facilities and onto

paddocks, rising cattle move to different classes of land, and dairy cattle move from milking platforms to grazing blocks, and back, and between farms. It is this movement of cattle that presents the greatest biosecurity and disease risk to individual farmers and the industry.

Before *M. bovis*, the full importance of the National Animal Identification & Tracing (NAIT) system was poorly understood. The system was clunky to use, many farmers ignored important steps, and little was done to enforce compliance. That has changed, and there can be no doubt that NAIT compliance is a top priority for everyone involved in the system. There are now more than 30 full-time compliance staff at MPI, the legislation has been changed to fix flaws in the system, and we have seen a large increase in the number of farmers doing their bit to ensure full compliance and lifetime traceability for all cattle. For those farmers who still fail to comply, infringements (and in the worst cases prosecutions) are making it clear to them that this behaviour is no longer acceptable. Farmers have also made it clear that they do not want bad behaviour tolerated.

What's next?

While we are making excellent progress, the effort to eradicate *M. bovis* isn't over and we need every farmer in the country to stay committed to properly maintaining NAIT records and making on-farm biosecurity a top priority. That will allow us to get rid of this disease as quickly as we can, and leave the system strong and ready to respond to any further diseases or pests we might face.

The *M. bovis* programme is investing up to \$30 million in research to support the eradication effort. While the key goal is to accelerate the eradication of *M. bovis*, other aims are to leave New Zealand's biosecurity system stronger, and to reduce the impact of the disease and the Eradication Programme.

While we never know what the next challenge might be, the system and the people behind it stand ready to take it on and protect what New Zealanders care about most – our natural environment and precious taonga, and our vital primary industries.

Acknowledgements

Thanks are due to Beef + Lamb New Zealand and DairyNZ for their invaluable advice about best practice on-farm biosecurity.

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DEER DAIRY INDUSTRY IN NEW ZEALAND - A WORLD-FIRST OPPORTUNITY

The concept of milking deer, one of the most flighty farm animals known, became a reality in 2016 for South Canterbury deer and dairy farmers Graham Carr and Mark Faulks. Since then, the process of understanding the science, developing the compliance, and exploring the commercial opportunities of deer milking has revealed the huge potential for a new deer dairy industry.



The milking shed designed to milk 40-50 hinds per hour

How it began

In 2015, Graham Carr and Mark Faulks were approached by an entrepreneur with an unusual concept – could they provide deer milk for a new business opportunity? The concept of deer milking was something they had become familiar with through a fellow deer milker from Central Otago who had been experimenting with it. He decided not to proceed with the project, but the curiosity of commercial deer milking eventually got the better of Graham and Mark. It was not long before they decided it was an opportunity they wanted to pursue by establishing Deer Milking New Zealand (DMNZ).

Mark employed an experienced bovine dairy milker who had been experimenting with deer milking. This milker's knowledge and expertise was integral to the development of the new enterprise, ensuring systems and processes were efficient and could scale up should the future require it. Equipment was sourced from the goat and sheep dairy industry, and a milking facility based on standard dairy operations was crudely developed on the Faulks' Lincoln Hills farm in South Canterbury. The next step was to work with a herd of hinds during the fawning season to see if

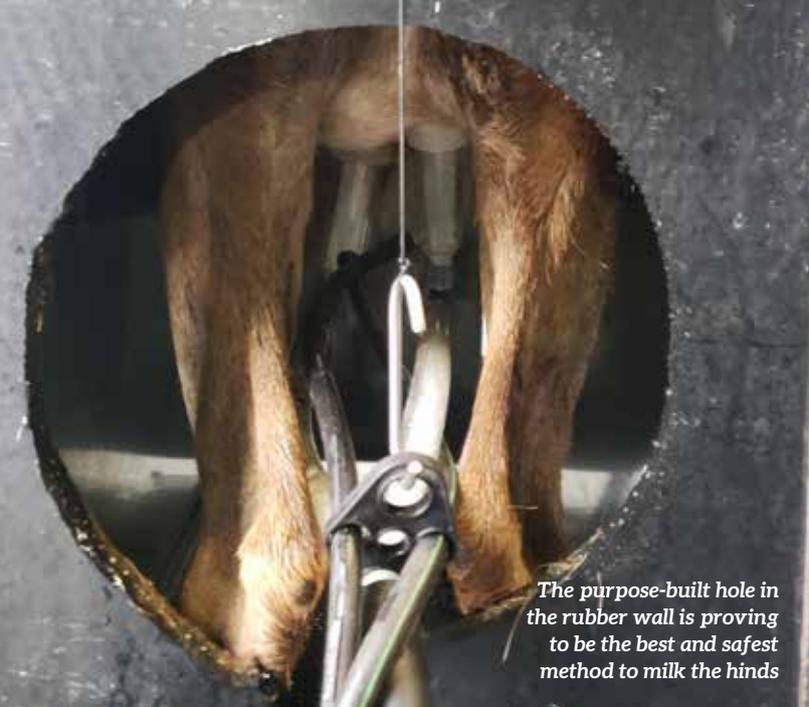
milking this flighty creature could actually be done, and this was achieved on the farm in 2016.

Deer milking process

Lincoln Hills is a deer breeding farm developed specifically for hinds. Stags are only brought in for the roar and then taken off again. The hinds are farmed and nurtured on their own part of the farm throughout the year. The rolling hills and natural cover on the land make it a perfect breeding ground for the hinds so they can fawn naturally.

Early on it became very apparent that you cannot just milk any deer. On any normal deer farm, deer are only yarded about twice a year. The team were cautious about how the deer would react to being yarded daily. However, through a process of elimination and careful selection an optimal milking hind herd was refined. These more calm-natured hinds eventually became very used to the milking process, and began walking calmly into their milking stall to be milked.

The shed is designed so that 40-50 deer can be milked per hour. The shed is dimly lit and fully enclosed to minimise distraction. Each hind has her own milking stall,



The purpose-built hole in the rubber wall is proving to be the best and safest method to milk the hinds

which is padded for safety. Once settled, the cups are attached through a hole in the purpose-built rubber wall in each milking stall. Each hind is milked for approximately eight minutes. The milking infrastructure, pipework and collection is based on standard dairy methods. The milk is collected in a stainless steel vat, which includes an internal stirrer that has been specifically designed in regard to speed to cater to the consistency of deer milk.

The collection vat is emptied regularly according to the Risk Management Protocols (RMPs) developed for this end use. The milk is either taken away for cheese-making by a tanker or packaged up into bladders for freezer storage.

The milking season is approximately 140 days and the deer are milked from December through to April. At the peak of the milking season, typical production levels from each hind are on average around 1 litre per day and they are milked once a day. This is in comparison to goats who produce on average 2.5 litres per day, sheep 1-2 litres per day, and cows up to 30-40 litres per day.

DMNZ's milking herd has now grown to approximately 300 hinds. These hinds are carefully nurtured on their own section of the farm and will be used for genetic breeding for milking hinds in the future.

Regulation and compliance

Because this is a world first, the regulatory and compliance work with the Ministry for Primary Industries (MPI) has been the main focus of the business these past few years. Before DMNZ could consider any real commercial opportunities, it was important to the business that all processes and methods on-farm (the milking shed, the storage, the logistics and the processing of the milk) were compliant and that there was actually a future for deer milking.

DMNZ have therefore been working closely with MPI and Asure Quality to ensure RMPs are developed that will enable a future in deer milking in both the domestic and export markets. This work is ongoing and the future is now starting to look promising for deer milking.

Benefits of deer milk

First and foremost, the taste of deer milk is exceptional. It is smooth and creamy with a sweet aftertaste that leaves many who sample it wanting more. DMNZ decided to explore what else is behind the taste and engaged Callaghan Innovation in Wellington as research partners. DMNZ were initially accepted under a grant scheme, but have also had to invest into further research programmes. Over two years of work has now been conducted to understand the science of the milk across the lipid, protein and carbohydrate profiles, and also what happens to the integrity of the milk under different processing methods, including heat treatment, freeze drying and freezing.

An important finding is that deer milk is extremely high in milk solids, at around 25%. The quality of the lipid profile, in particular, shows some unique characteristics that set it apart from other milks. The density of bioactive compounds and other key nutrients suggests that the complex lipid composition could be a better source of specific nutrients than other milks. Dairy complex lipids can be known to have the following health benefits:

- Anti-inflammatory
- Skin protection
- Gut health
- Cognitive function
- Brain development
- Immune health.

Studies have been published by various research facilities around the world about some of the properties of deer milk which include:

- **Amino acids** – due to the rich protein content, deer milk could be a valuable source of essential amino acids vital to human function. Research suggests it could include three times more total protein than cow milk
- **Vitamin B** – deer milk has higher levels of Riboflavin (B2) and B12, which supports metabolism and body tissue health
- **Zinc** – deer milk contains higher levels of zinc, which supports immune health, reduces inflammation and can help with skin conditions such as acne and skin damage
- **Calcium** – this is vital in maintaining bone health and supporting heart and muscle function
- **Lactose** – this is the main carbohydrate in milk and an important energy source, but some people have trouble digesting it. Deer milk has one-third lower lactose than cow's milk, which is appealing for those who have difficulty tolerating it but still require the protein energy source
- **Other** – deer milk contains higher selenium and phosphorous than cow, sheep and goat milk.

Deer cheese and other products

In 2016, Graham and Mark approached local cheese-makers to see if they would be interested in making

*Hinds in in paddock
on Lincoln Hills farm*



Many of the integral foundations, processes, methods and compliance protocols have now been developed and refined, despite some setbacks.

cheese from their freshly extracted deer milk. This world-first opportunity appealed to the cheese-makers. Through the development of new compliance methods, testing, experimenting and hard work, the world's first deer milk cheese was developed in the form of a Gouda and Havarti.

The potential for further product development of deer milk products is very promising, but is also plagued by ongoing compliance and regulatory work. DMNZ has been working to secure a processing partner to convert raw frozen deer milk into a powder format, which proves to be a much more saleable form of the deer milk. Frustratingly, converting the deer milk into a powder has been no easy feat. There have been many challenges, including the development of new RMPs for the processor, pasteurising, scale of milk supply, and facility risks because of the costs and the fact that it is an unknown milk.

Positive future for deer milk

DMNZ have been following the journey of how goat and sheep milk became commercially viable in New Zealand 10 years ago. At the time of writing, its first batch of deer milk has successfully been freeze dried and is intended for sale to an export client, thus adding to the types of alternative milk available in this country.

Many of the integral foundations, processes, methods and compliance protocols have now been developed and refined, despite some setbacks. The main key objectives

that have been achieved for a future deer milking industry are:

- The design and function of a successful milking shed to effectively extract and store deer milk
- The identification of milkable deer with superior milk production
- Thorough on-farm RMPs and testing methods that sit comfortably with MPI
- Research and understanding the science of the unique properties and benefits of deer milk
- Successful processing of milk into powder, which will ensure a saleable and attractive product option for sales in both domestic and export markets.

The pricing structure of deer milk powder in these early days is certainly at a premium, and DMNZ will continue to refine production and processing to ensure cost efficiencies in the future. There is now a sustainable and scalable business model so that deer milk products can be taken to market. Because of this the future for deer milking could also be a reality for others who may be considering it for future revenue generation from their animals.

Mark Faulks and Graham Carr are Directors of Deer Milking New Zealand which is based at Lincoln Hills Farm in South Canterbury. Email: lindalefarming@gmail.com. 

ECONOMIC SURVEY PROVIDES INSIGHT INTO FINANCIAL PERFORMANCE ON DAIRY FARMS

DairyNZ's latest Economic Survey of a sample of dairy farmers for 2018/19 reveals farmers had a mixed year on-farm. With potential uncertainties about future milk prices, a focus on cost control and debt repayment (where possible) is a key strategy to build resilience on-farm.

Dairy farms had a reasonable year in 2018/19. Milk production hit a high but farmers faced some challenges

The latest Economic Survey shows that in 2018/19 dairy farmers had a reasonable year for operating profit and milk production, but they face a number of challenges.

Highlights from the Economic Survey

A lot has happened in the past year – COVID-19 has changed our landscape by affecting international markets and staffing, and farmers have needed to adjust their on-farm practices in recent months.

While significant changes have occurred, DairyNZ's Economic Survey for 2018/19 still has some valuable insights into farmers' financial situation, particularly on-farm expenses, debt and profitability.

The survey has been carried out in its present form for 14 years, but has a legacy going back to 1964. The most recent survey analysed a representative sample of 260 owner-operator and 122 herd-owning sharemilking farms (50:50 sharemilkers) across New Zealand who are part of DairyNZ's DairyBase database.

Overall, the latest Economic Survey shows that in 2018/19 dairy farmers had a reasonable year for operating profit and milk production, but they face a number of challenges. Key insights from the survey include:



Farms in Marlborough, Canterbury, Otago and Southland had a better year than other regions and recorded higher-than-average operating profits per hectare.

- Data shows operating profit per hectare for owner-operators was \$2,154 in 2018/19, down 3.8% on the previous season, but above the 10-year average of \$1,696. Sharemilkers had a positive year with \$775 operating profit per hectare – the highest level since 2013/14
- The milk payment received of \$6.42/kg/MS was down 20 cents on the price payment received in 2017/18. This is based on the deferred payment from 2017/18, plus the advance for 2018/19
- In line with the 2018/19 Dairy Statistics report, milk production hit a 10-year high. Dairy Statistics recorded annual average milk production of 381 kg/MS per cow, while the 2018/19 Economic Survey's smaller sample size recorded 395 kg/MS per cow
- Operating expenses per kilogram of milksolids for owner-operators were similar to the 2017/18 season (see Figure 1)
- For owner-operator farmers, the operating return on assets was 4% (see Table 1). Total return on assets increased by 0.7% to 0.5%. Equity decreased with reductions in capital values.

Also of note was that farms in Marlborough, Canterbury, Otago and Southland had a better year than other regions and recorded higher-than-average operating profits per hectare. Good growing conditions over spring in these regions may have contributed to this result.

Discretionary cash near long-term average

While discretionary cash is slightly lower than the previous year (Figure 2), it is still close to the longer-term average. However, all capital replacement and principal repayments must come from discretionary cash, so there will be continued pressure for managers to improve profitability.

The key is managing costs on-farm

Looking at the Economic Survey results in the light of current conditions, volatility will remain a significant challenge for farmers to manage. A number of factors linked to COVID-19 could cause the milk price to shift up or down over the next year.

While recent results for operating profit and production were positive, increased costs, debt repayment and COVID-19 will have a strong influence on farm business

Table 1: Owner-operator summary

	2017/18	2018/19
Physical KPI's		
Peak cows milked	430	424
Milksolids sold per cow	376	395
Milksolids sold per hectare	1,067	1,145
Prices		
Payout received \$ kg/MS	6.62	6.42
Profitability		
Dairy operating profit per hectare	2,238	2,154
Dairy gross farm revenue per kg/MS	7.23	6.98
Farm working expenses per kg/MS	4.20	4.25
Dairy operating expenses per kg/MS	5.13	5.10
Dairy operating profit per kg/MS	2.10	1.88
Returns		
Operating return on dairy assets	4.3%	4.0%
Total return on assets	-0.2%	0.5%
Total return on equity	-4.4%	-3.4%
Risk		
Closing term liabilities per kg/MS	25.31	24.92

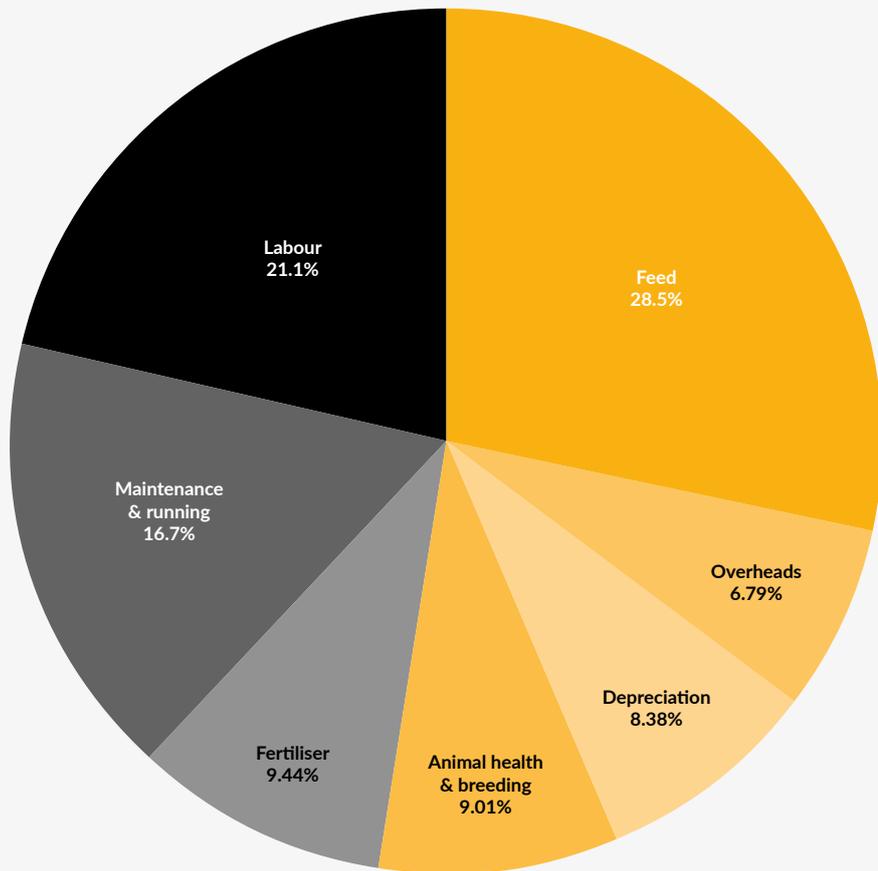


Figure 1: Proportion of dairy operating expenditure 2018/19

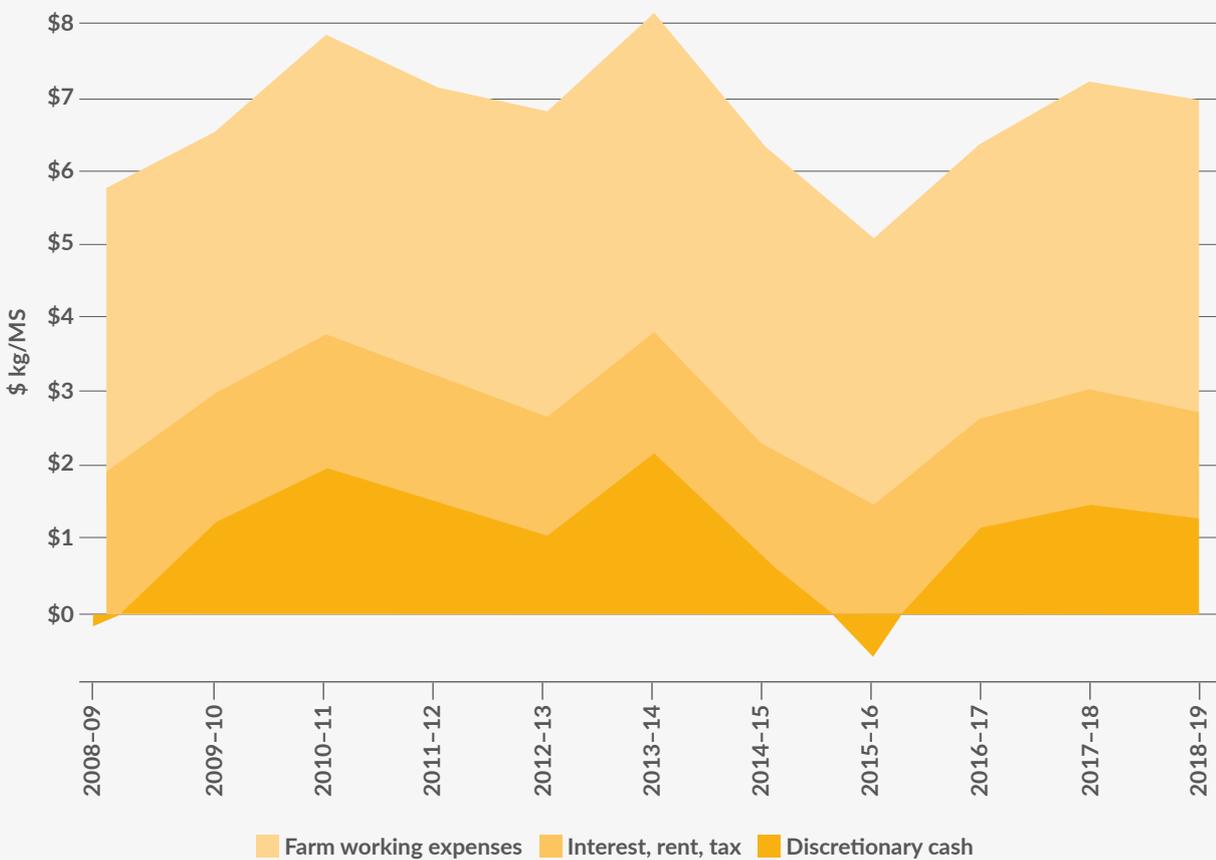


Figure 2: Annual change in cumulative revenue and expenditure 10 years (\$ kg/MS)

Mandatory debt payments are also lifting due to higher interest rates being set for some farmers and increasing pressure to pay principal.

performance, both now and in the future. Cost control will be key to help buffer dairy businesses against variable milk prices.

A number of farmers are seeing substantial pressure on balance sheets. Recent data shows us that in the last season dairy farm sales were down 40% and farm-scale prices were down, on average, 17%.

Mandatory debt payments are also lifting due to higher interest rates being set for some farmers and increasing pressure to pay principal.

Feed continues to be farmers' largest expenditure area and is a key item to review when they are looking to control costs. Careful planning to replace supplements with homegrown feed, where appropriate, can have a significant positive effect on operating profit.

All sectors of the economy are facing challenges. Relative to other sectors, dairy farms still have a strong cashflow and will play a pivotal role in New Zealand's recovery.

Economic Survey data now more accessible

This year's Economic Survey is designed to make survey data more accessible. For instance, the survey is in a new e-book format. This allows farmers and rural professionals

who want to analyse the data to download accompanying Microsoft Excel tables or explore interactive graphs to read precise figures off graphs, including regional information. Farmers and rural professionals can compare their results and changes with similar farms through DairyNZ's DairyBase.

DairyNZ has also developed a series of budget case studies that analyse the performance of above-average farmers from locations around New Zealand and what affects their profitability and returns. These farms typically have clear goals, a good understanding of their financial situation and costs, and carefully monitor their performance. They are a useful benchmarking tool for farmers and rural professionals to get insights and ideas from.

Resources available

To read the DairyNZ Economic Survey 2018/19 visit: dairynz.co.nz/economicsurvey. For budget case studies, budget templates and other resources visit: dairynz.co.nz/business.

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DAVID CHAPMAN, IAN WILLIAMS AND CHRIS LEWIS

PRODUCTIVITY OF NEW ZEALAND DAIRY PASTURES

- RECENT TRENDS AND FUTURE PROSPECTS

Pasture eaten in the New Zealand dairy industry increased strongly from 1990 to 2003, but has levelled off almost completely between 2004 and 2020. This article explores the reasons for, and the implications of, this trend and proposes some responses.

Pasture production – how are we tracking?

Pasture is New Zealand's number one feed source for the low cost, high value animal protein products that we export successfully to markets around the world. Our pasture heritage is something we are rightly proud of. However, like all things global, complacency and stagnation are an open invitation to others to eat your lunch. We must continue to focus on and improve pasture performance to hold our competitive position in global markets and exploit new opportunities in the future.

In this article we ask the question – how well is New Zealand performing in terms of pasture yield? The question

was motivated by several factors, including observations of strong gains being made in livestock production efficiency overseas (e.g. in feed maize yields in the US), evidence that other countries are making solid gains in pasture production, and the speed of change in the economic settings for our pasture-based industries resulting from trends in local climate, global markets and local environmental and other regulations.

We focus on the dairy industry, since data for the dairy sector are relatively easy to access and subject to less variability due to stock class, land class and altitude compared with the sheep and beef sector.

Since 2003, South Africa, Tasmania, Victoria and Argentina have all substantially exceeded New Zealand in compound annual growth rate in the total pasture harvest.

Trends in pasture eaten 1990–2003 versus 2004–2019

Between 1990 and 2003, national average pasture eaten (PE) on New Zealand dairy farms increased consistently at a rate of about 154 kg DM/ha/year (Figure 1a). However, since 2004, PE has remained static at about 11 t DM/ha/year (Figure 1b). The overall increase from 1990–91 to 2019–20 of around 2.5 t DM/ha (+100 kg/ha/year, or 1.1%) is impressive, but it is the trend since 2004–05 that is cause for concern. Had the 1990–2003 trend continued, by 2019–20 the national average PE would be about 13.3 t DM/ha – 2.2 t DM/ha greater than the actual average of 11.1 t DM/ha.

Meanwhile, other countries are achieving gains in PE. For example, it has been calculated that since 2003, South Africa, Tasmania, Victoria and Argentina have all substantially exceeded New Zealand in compound annual growth rate in the total pasture harvest. (Table 1). This is the farming equivalent of the All Blacks taking a flogging from the Wallabies, the Springboks and the Pumas in the Rugby Championship. Not an attractive prospect.

Table 1 is based on data from farms in Red Sky (n=90) as well as DairyBase (n=640), and therefore broadens the sample compared with DairyBase alone, which was the basis for Figure 1. However, the story remains the same – pasture harvest rates have been flat since the early 2000s.

Regional trends

In 2007, Dave Clark and colleagues tabulated the pasture yields achieved in research trials throughout New Zealand from ~1971 to 2001 and proposed that 'yields of 16.5 to 17.5 t DM/ha are probably close to achieving industry targets for production.' In Tables 2 and 3, we apply a utilisation factor of 85% to those yields to estimate industry benchmark PE values for the major dairy regions.

Table 2 shows estimated PE for the 'early 2000s', while Table 3 presents the same information for the 'late 2010s'.

Farm averages

Average PE across the six regions was the same for the early 2000s and late 2010s, consistent with Figure 1. Only Canterbury showed an increase in mean PE over the

period of 1.4 t DM/ha. Stocking rate also increased for Canterbury by 0.44 cows/ha. Average PE declined in all North Island regions and remained the same in Southland. Thus, the 'headline' national average PE numbers conceal variation among regions, which needs to be taken into account when considering what might be holding back progress in PE.

Top-performing farms

Mark Neal and Simon Woodward (DairyNZ) developed the Pasture Potential tool to help farmers get an idea of how much pasture they could potentially harvest from their farm. 'Potential' is indicated by the 90-percentile PE values from the Pasture Potential tool – 10% of farms are at this level and 90% are below. The 90-percentile farms exceeded the industry target in all regions and both periods, except for Northland (Tables 2 and 3). Thus, our top pasture harvest farms are performing well relative to research trial benchmarks.

However, there is evidence of slippage in the 90-percentile PE levels between the early 2000s and late 2010s, particularly in the Waikato, Taranaki, Manawatu and Southland (by ~1.2, 0.6, 0.8 and 2.7 t DM/ha/year, respectively). It is important to note that the number of farms in DairyBase in 2005–06 was generally low, except for the Waikato, hence there is a high degree of uncertainty around the 90-percentile values. This may explain much of the difference between the early 2000s and late 2010s. We acknowledge that we need more data from farms that stay in DairyBase for multiple years to increase confidence in past and future trends.

What do these trends mean economically?

As noted above, the 'flattening of the curve' in PE rates means current national average rates of PE are about 2.2 t DM/ha/year less than they would have been if the trend up to 2004 (Figure 1a) had continued. If we value one tonne of DM eaten at around \$300, then some simple arithmetic leads to the conclusion that the industry is foregoing approximately \$1.16 billion across the 1.76 million effective hectares currently used for milk production.

Table 1: Compound annual growth rate (%) in tonnes of pasture dry matter harvested/ha/year 2003–2019

	NEW ZEALAND	VICTORIA	TASMANIA	SOUTH AFRICA	ARGENTINA	URUGUAY
CAGR (%)	0.1	0.7	1.3	2.2	0.7	0.2

Source: Becca, D. 2020. Evaluating the Loss of Profitability and Declining Milk Production in the Australia Dairy Industry. Australasian Agribusiness Perspectives 23, Paper 9

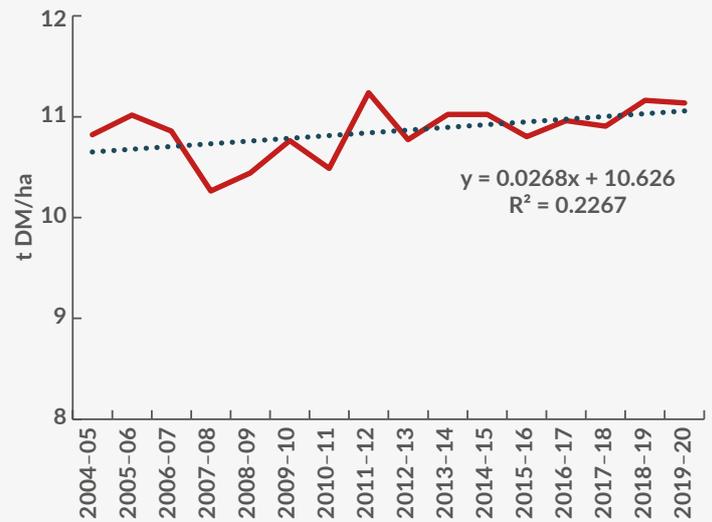
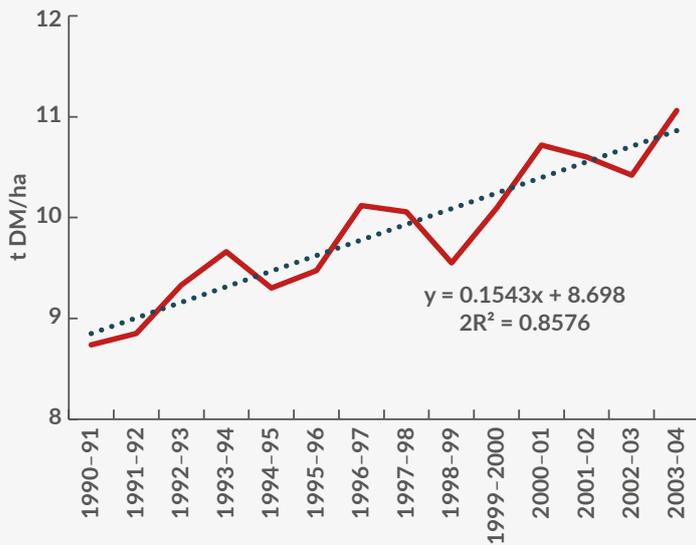


Figure 1a: Mean pasture eaten (t DM/ha) on NZ dairy farms - 1990-91 to 2003-04

Figure 1b: Mean pasture eaten (t DM/ha) on NZ dairy farms - 2004-05 to 2019-20

Table 2: Dairy industry statistics for the period 2001-02 to 2005-06

	STOCKING RATE (COWS/HA)	MS/HA (KG)	PASTURE EATEN (t DM/ha)				HECTARES	\$ VALUE OF THE DIFFERENCE
			RESEARCH BENCHMARK	5-YEAR MEAN 2001-02 TO 2005-06	90-PERCENTILE (2005-06 ONLY)	DIFFERENCE 90-% VERSUS MEAN		
Northland	2.15	591	14.4	8.5	12.3	3.8	143,236	40,822,260
Waikato	2.79	878	13.9	11.2	16.4	5.2	436,501	170,235,390
Taranaki	2.75	873	12.9	11.2	15.2	4.0	171,758	51,527,400
Manawatu	2.66	860	13.2	10.6	13.5	2.9	137,408	29,886,240
Canterbury	2.98	1,062	15.0	12.5	15.6	3.1	147,176	34,218,420
Southland	2.66	938	11.9	11.0	15.6	4.6	167,624	57,830,280
Average	2.67	867	13.6	10.8	14.8	3.9		
Total							1,203,703	384,519,990

Data sources: Stocking rate, MS/ha, 5-year mean PE and ha - DairyNZ Economics Group 2019; Research benchmark - Clark, D.A. et al. 2007. Issues and Options for Future Dairy Farming in New Zealand. New Zealand Journal of Agricultural Research, 50: 203-221; 90-percentile PE: Pasture Potential tool DairyNZ. The \$ value of the difference = (t DM/ha difference x \$300/t DM) x ha/4, where the denominator accounts for the biophysical and economically feasible change (Neal, M. et al. 2017. Defining the Value Proposition for Using Technology to Improve Pasture Management and Harvest More Pasture. 1st Asian-Australasian Conference on Precision Agriculture and Livestock Farming, see text for further detail)

Table 3: Dairy industry statistics for the period 2013-14 to 2017-18

	STOCKING RATE (COWS/HA)	MS/HA (KG)	PASTURE EATEN (t DM/ha)				HECTARES	\$ VALUE OF THE DIFFERENCE
			RESEARCH BENCHMARK	5-YEAR MEAN 2013-14 TO 2017-18	90-PERCENTILE 2013-14 TO 2017-18	DIFFERENCE 90-% VERSUS MEAN		
Northland	2.26	722	14.4	8.2	12.3	4.1	137,182	42,183,465
Waikato	2.88	1,037	13.9	10.8	15.2	4.4	478,881	158,030,730
Taranaki	2.82	1,055	12.9	10.7	14.6	3.9	170,451	49,856,918
Manawatu	2.76	1,000	13.2	10.2	12.7	2.5	157,092	29,454,750
Canterbury	3.42	1,403	15.0	13.9	15.7	1.8	285,823	38,586,105
Southland	2.72	1,107	11.9	11.0	12.9	1.9	312,781	44,571,293
Average	2.81	1,054	13.6	10.8	13.9	3.1		
Total							1,542,210	362,683,260

Data sources are the same as for Table 2

The industry went through a decade from around 2003–04 to 2013–14 of producing a lot more milk with no matching increase in pasture eaten. The extra milk had to come from another feed source – enter more crops on-farm and imported supplements.

However, as discussed below, there are many potential reasons why the trend did not continue, some of which are beyond the control of farmers, so the \$1.16 billion figure is almost certainly a large over-estimate. Another estimate of value foregone can be derived by comparing PE rates achieved by the 90-percentile (top 10%) farms with the mean. In 2017, Neal and colleagues calculated that about half of the feed gap between average and 90-percentile farms is due to factors (such as soil type and topography) which are fixed for any individual farm. They also point out that the remaining half of the gap can be closed by 'changing operational management, strategy or additional investment on farm', but note that 50% of the gains made via these routes are unprofitable, leaving about a quarter of the gap that is biophysically and economically feasible.

In all regions, the difference between the 90-percentile and average values for PE was in the range 1.8 to 5.2 t DM/ha/year (Tables 2 and 3). If we assume an economic value of \$300/t pasture DM eaten, and apply the 2017 Neal '25% biophysical and economic' sense test, then the likely \$ value gap between average and 90-percentile is between \$362 million and \$385 million per annum (Tables 2 and 3).

These numbers give us a 'line of sight' on the value of improved pasture management and technology in the New Zealand dairy farm sector. They scale to about \$1 billion of national value add when the flow-on effects in other sectors of the economy are added.

Why have pasture eaten rates plateaued?

Two trends stand out – systems change and climate change.

Systems change – more N, more feed, more milk

The increase in PE from 1990 to 2003 was associated with an increase in N fertiliser use in the national pastoral sector from around 50,000 tonnes to around 350,000 tonnes (Figure 2), most of which would have been applied to dairy pastures. At the same time, stocking rate increased by 0.25 cows/ha/decade (DairyNZ Economics Group 2019). N fertiliser use levelled off for a period after 2003, as did stocking rate increases which slowed to the equivalent of 0.05 cows/ha/decade, one-fifth of the 1990–2003 rate of increase.

But milk production kept climbing after 2003 – at a rate of 50 million kg/MS/year until 2014–15, after which it too levelled off (Figure 3a). So the industry went through a

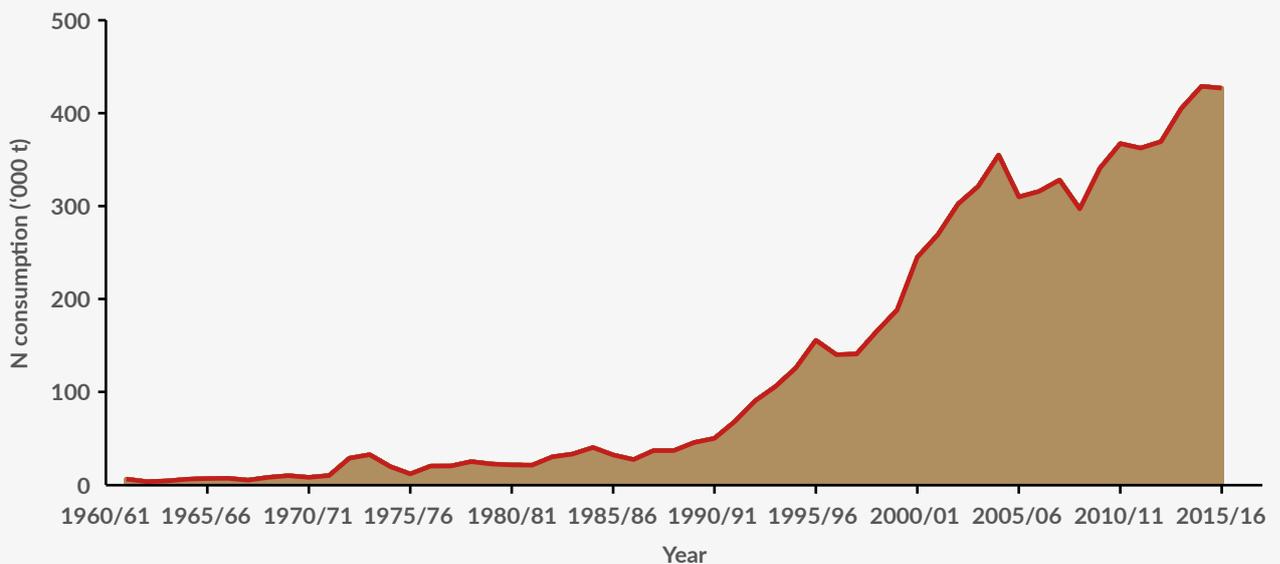


Figure 2: Changes in N fertiliser use in the NZ pastoral sector. From Moot, D. 2019. Overcoming the Weakest Link in Pastoral Farming – A Lack of Nitrogen. *The Journal*, 23(1): 12–18

decade from around 2003-04 to 2013-14 of producing a lot more milk with no matching increase in PE. The extra milk had to come from another feed source – enter more crops on-farm and imported supplements. Feed other than pasture increased from 8% of the diet nationally in 2003-04 to 19% in 2013-14, which equates to an additional 3 million tonnes feed/year, an average of 1.7 t DM/ha across the 1.75 million effective hectares used for milk production.

The effect of this at the system level is seen in **Figure 3b**, where the contribution of pasture to MS/ha is partitioned out based on feed use data from the DairyNZ economics team. The gap between the two lines grew steadily from year 2000 onwards.

Climate and other environmental stresses

Future climate projections point to lower summer rainfall totals across Northland, central Waikato, the top of the South Island and coastal Canterbury, but higher summer totals in Taranaki, the lower North Island and Southland. The frequency of extreme summer temperatures is expected to increase across all dairy regions. Projections are variable, depending on which Global Climate Model (GCM) is used, what Representative CO₂ Concentration Pathway (RCP) is assumed, and the timeframe of interest.

Most GCM x RCP combinations foreshadow higher temperatures, especially in summer, which may favour pasture growth in regions where higher summer rainfall is possible, but exacerbate summer moisture deficits in

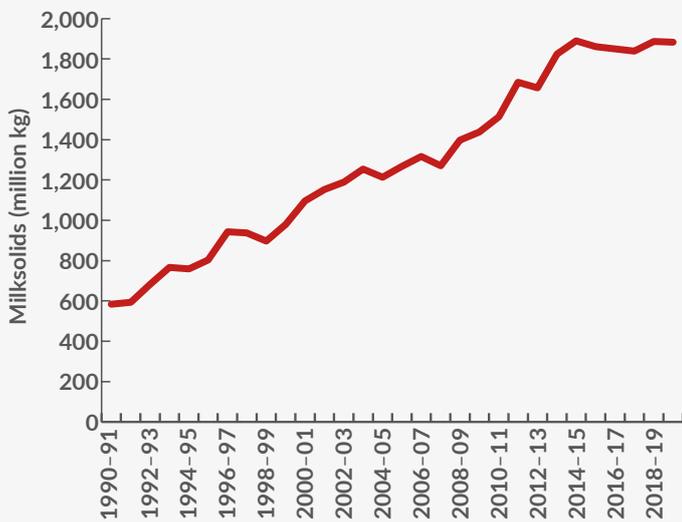


Figure 3a: New Zealand MS production – total industry

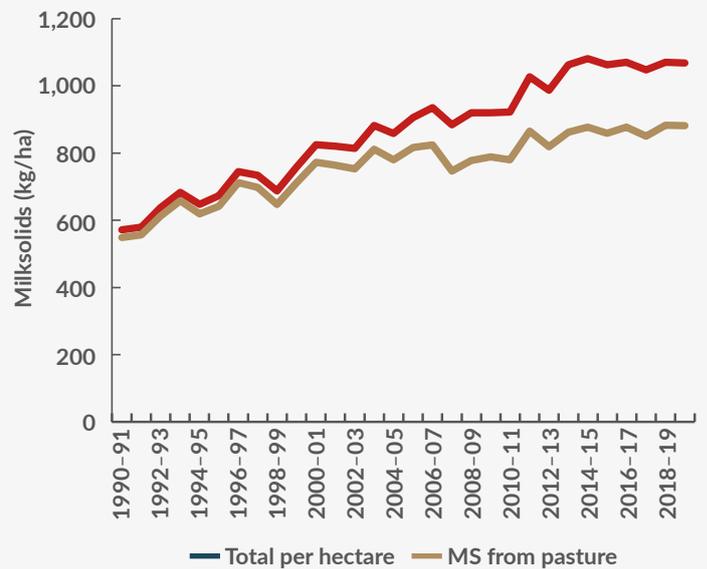


Figure 3b: New Zealand MS production – average per hectare



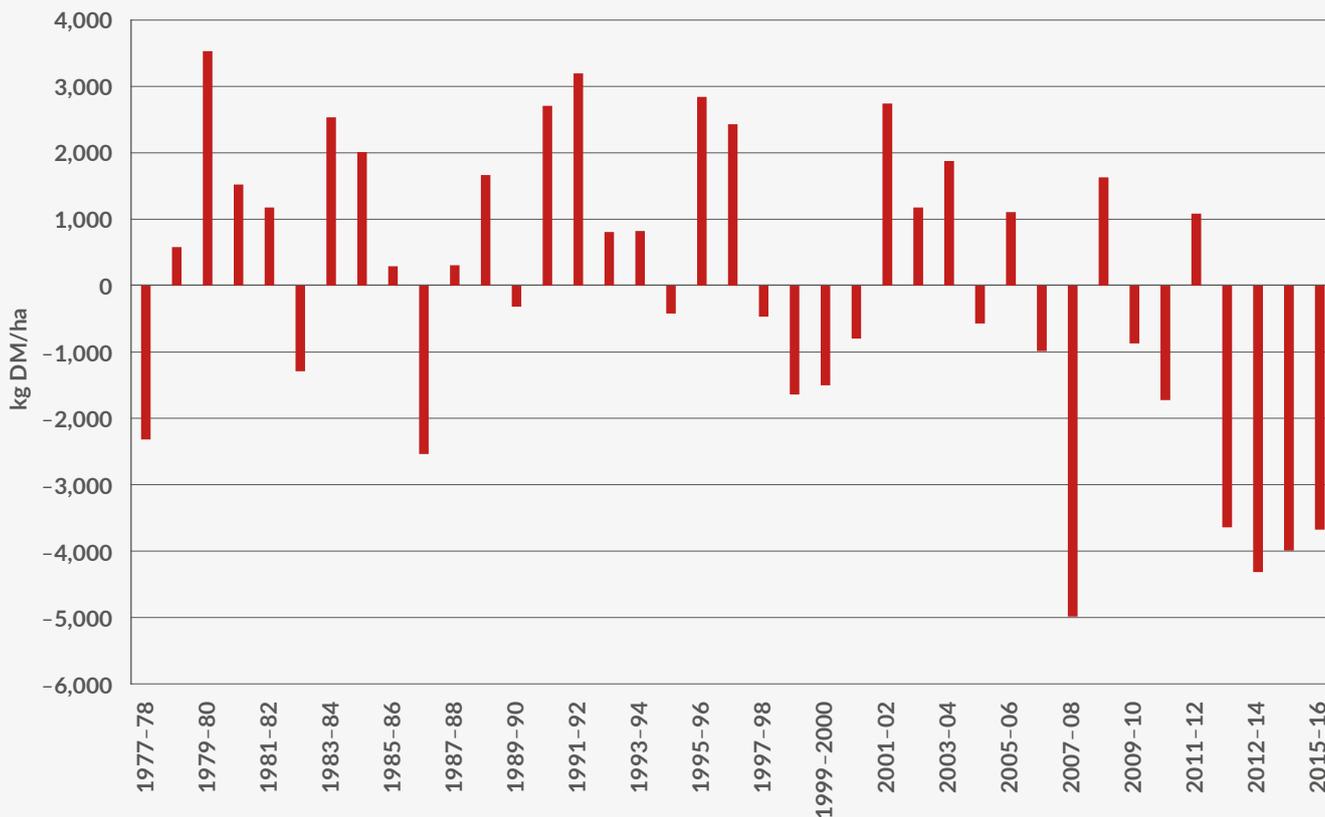


Figure 4: Difference from the 30-year average (=0) in total pasture growth from December to April inclusive at Morrinsville, Waikato

regions where summer rainfall is expected to decrease.

Figure 4 illustrates the potential consequences for perennial ryegrass pasture growth in regions exposed to the combined effects of temperature and rainfall stresses, such as Northland and central Waikato. The graph presents modelled (using the Pasture Growth Forecaster tool) pasture growth totals from December to April inclusive based on the 1977–2016 actual climate for Morrinsville.

Five of the 10 years spanning 2006–07 to 2015–16 delivered significant summer-autumn moisture deficits, starting in 2007–08 and culminating in four successive dry years where December to April growth was reduced by between 3,500 and 5,000 kg DM/ha. The latter trend has continued in recent years, notably in the extremely dry summer-autumn of 2019–20.

Dry summers are impacting total production, as shown by a DairyNZ graph of annual pasture growth recorded in systems trials at Ruakura/Scott Farm. Figure 5 shows: 1) the lift achieved with N fertiliser in the mid-1990s; 2) the variability between years, hence a need for supplements to reduce production risk; and 3) a downward trend since the mid-1990s at a rate of 750 kg DM/ha/decade. We see the same trend in the five-year mean PE figures between the early 2000s and mid-2010s for all of the North Island regions in Tables 2 and 3.

Pasture persistence

Perennial ryegrass is a great species for our grazing systems, but it is not particularly drought-tolerant. Ryegrass persistence failure has become a chronic problem in parts of (not all of) the upper North Island, where it is not unusual for new pastures to fail within two to three years post-sowing on certain soil types. Soil moisture deficits are a key contributing factor to this, interacting with soil type.

Regarding research in the Waikato, Julia Lee and colleagues noted in the *Journal of New Zealand Grasslands* (79(2016): 89–96) that the environment can totally dominate our current best ryegrass management practices and genetics. They also dispelled the notion that it is the ‘new’ plant genetics that are the problem. Even the old Nui ryegrass with standard endophyte, when sown at the same time and managed the same way, failed to sustain plant populations. Outbreaks of damaging insect pests like black beetle, grass grub and Argentine Stem Weevil (ASW) are also a key part of the environmental challenge that pastures are facing in the north. This is leading directly to higher costs of production of around \$0.50 kg/MS according to the Waikato ‘Pastures that Last’ farmer group in 2018.

Some farmers are moving away from perennial pastures. In 2018, Dodd and colleagues estimated in the *Journal of New Zealand Grasslands* (80: 177–184) that between

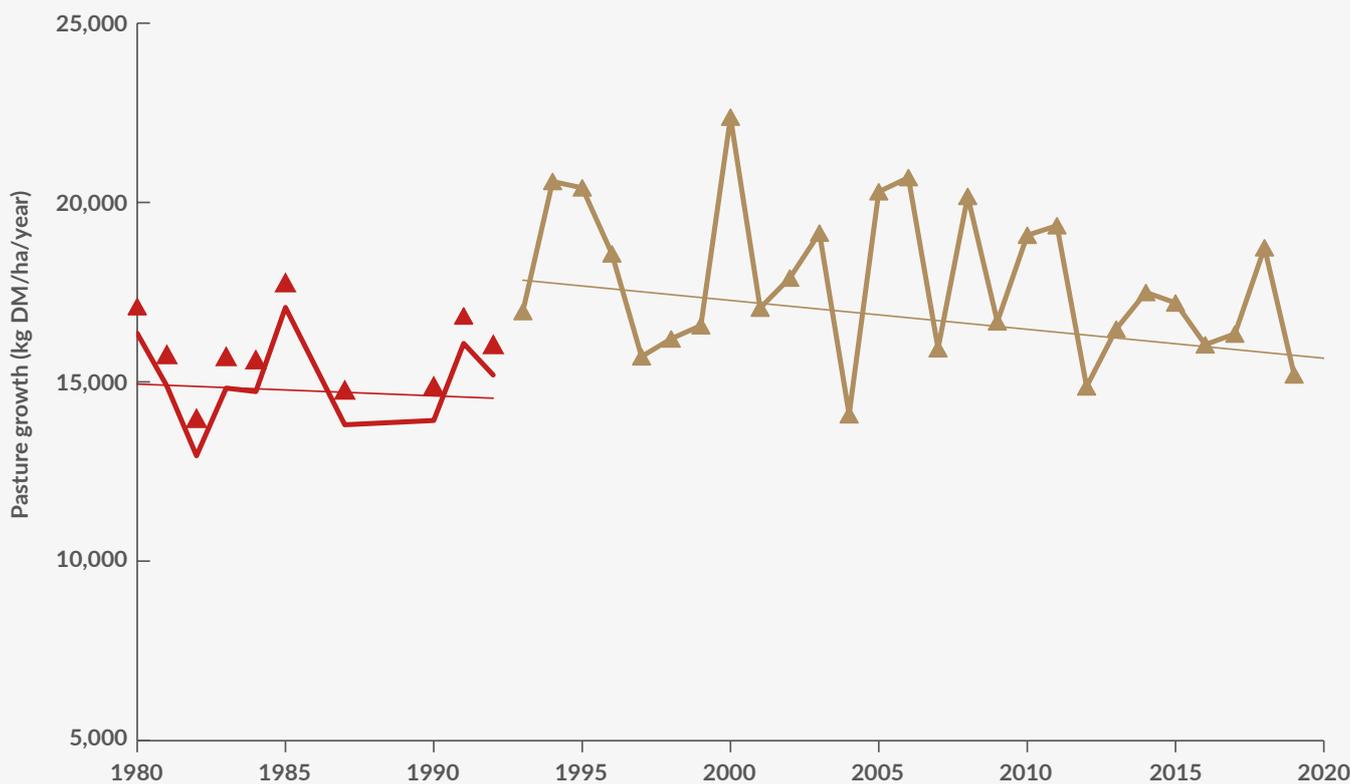


Figure 5: Total annual pasture growth recorded in farmlet trials at Ruakura No. 2 and Scott Farm, Waikato. Blue series: no nitrogen used; brown series: average of 185 kg N/ha/year

Source: Chris Glassey, DairyNZ

As a result of changes to the recently introduced Essential Freshwater legislation, farmers will be severely restricted in the tools they have at their disposal to increase pasture eaten. Tools like N, increasing stocking rate, irrigation, winter forage crops and land conversion are becoming more and more constrained.

30,000 and 50,000 ha of previously perennial pasture has moved to annual pasture/crop in the decade 2006–07 to 2015–16. This has largely been a response by farmers to compensate for the lack of reliable summer pasture growth.

Annual crop/pasture forage systems may be highly productive, but they involve more expenditure and regular soil disturbance. The first of these may lead to higher costs of milk production unless excellent yields are obtained. The second can lead to increased nitrate leaching risk, depletion of soil organic carbon and subsequent GHG loss, and disruption of the associations between plants and beneficial soil microbes that help plants to survive in stressful environments (Nigel Bell, AgResearch Ruakura, pers. comm.).

Where to from here?

As a result of changes to the recently introduced Essential Freshwater legislation, farmers will be severely restricted

in the tools they have at their disposal to increase PE. Tools like N, increasing stocking rate, irrigation, winter forage crops and land conversion are becoming more and more constrained. For example, earlier gains in PE (Figure 1a) were driven by increased use of N fertiliser which peaked in 2003–04. The advent of stringent environmental limits means this pathway is no longer available.

The current roll-out of the Essential Freshwater legislation will require large reductions in nitrate leaching on approximately 40% of New Zealand's dairy farms. Essential Freshwater includes a cap of 190 kg N/ha/year maximum on any one paddock. A recent analysis by Phil Journeaux in a report to the Fertiliser Association indicated around 35% of New Zealand dairy farms currently exceed the cap, so less N will be applied to pasture in future.

The challenge for the industry is to move the brown line in Figure 3b upwards and there are good prospects for achieving this. For example, a report by Harmer et al. in the *Journal of New Zealand Grasslands* (78 (2016): 133–138)

NZIPIM members have a crucial role to play in locking in the rebound in pasture eaten, during which farmers will need to navigate through the challenges of climate change while farming with less N fertiliser and lower GHG emissions.

suggests perennial ryegrass plant breeding has been delivering a genetic gain in DM yield of ~0.76% per year of breeding effort since 1990. Had that increase been realised on-farm consistently since 2004, then PE in 2019–20 should be >12.5 t DM/ha allowing for 80% utilisation of pasture grown – 1.4 t DM/ha more than the actual national average of 11.1 t DM/ha PE. This has not eventuated.

Had it done so, it could have provided most of the additional 1.7 t DM/ha of other feed sources which helped fuel the national drive for higher production (**Figure 3a**). Genetic improvement on-farm is definitely one of the tools we can use to ‘unflatten’ the curve; this requires increased farmer confidence in the value being delivered by breeding.

Likewise, we have not made much progress on working out the best future forage systems for climates that will become more hostile for ryegrass growth in the future. This might require lifting the foot off the grazing pressure pedal at times to allow ryegrass to rebuild populations through tillering and/or natural re-seeding. There are other perennial grass species better adapted to heat and drought (e.g. tall fescue, cocksfoot), and persistent (self-regenerating) annual legumes, that could work but are not yet gaining farmer confidence. C4 grasses should also be re-visited. All will involve some trade-offs between the needs of the plant and needs of the animal, which have not yet been demonstrated.

Importantly, the effort devoted to extending the principles and practices for increasing pasture harvest through monitoring, good execution of grazing management, fertiliser use and so on must continue.

Take home messages

At the beginning we posed the question – how well is New Zealand performing in terms of pasture productivity? The dairy industry statistics analysed here suggest the answer is: well below what is needed to maintain our international competitiveness and meet the future challenges of climate change, regulation and market forces.

PE levels nationally have been stagnant for nearly 15 years. The levelling off in national milk production since 2014–15 and the beginnings of what looks like a course correction in supplement use in New Zealand dairy farm systems will help, but these trends take time to lock in. Meanwhile, more frequent drier and warmer summers and autumns will make the job harder.

The good news is that farmers are clearly receptive to the idea that they have scope to increase PE. In a survey conducted in spring 2014 (Sean McCarthy & Chris Glassey,

unpublished), more than 60% of 520 DairyNZ discussion group respondents either agreed or strongly agreed there was room to increase PE on their farms. Less than 15% disagreed or strongly disagreed with the idea and 25% were undecided. This indicates that ~85% of farmers are ready to be convinced and/or supported to improve pasture performance. There is no other single area of focus with the potential to increase farm sector profits by >\$300 million/year without requiring significant new knowledge, technology or resources. The gains are available now, along with tools and information resources that can help realise them.

Role of NZIPIM members crucial

NZIPIM members have a crucial role to play in locking in the rebound in PE, during which farmers will need to navigate through the challenges of climate change while farming with less N fertiliser and lower GHG emissions. A key opportunity here is to help lift average PE towards the 90-percentile within regions.

In the next few months, we intend to conduct an informal survey among NZIPIM members to gather your perceptions about what distinguishes the top 25% pasture harvest businesses in your client base from the rest. We are interested in understanding your client’s perceptions of factors influencing pasture performance, and how they approach pasture monitoring and decision-making.

We believe that NZIPIM members are best-placed to identify the ‘traits’ of the top pasture harvest farmers, which will help us all to engage and assist farmers to be better pasture growers and users. We encourage you to take a few minutes to complete this survey, which will be distributed via NZIPIM. Results will be reported back to the membership in a follow-up article in *The Journal*.

Acknowledgements

Thanks are due to Chris Glassey and Mark Neal at DairyNZ for data and helpful discussion.

Useful tools

Pasture Potential tool: www.dairynz.co.nz/feed/pasture-management/assessing-farm-performance/pasture-and-crop-eaten/pasture-potential-tool/

Pasture Growth Forecaster: <http://pasture-growth-forecaster.dairynz.co.nz/>

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CONVERSATIONS FOR RISK MANAGEMENT - THREE IMPORTANT DAIRY ISSUES TO INITIATE WITH YOUR CLIENTS

Setting expectations of milk losses, the importance of business continuity planning, and understanding directors' responsibilities are three important issues farm advisors should be initiating with their clients. This article looks at what conversation topics should be covered and why.

Start the conversation early

We know that dairy farmers wear many hats and make many decisions on a day-to-day basis. The complexity of owning a farming business now requires a higher degree of human resource management, legal knowledge and financial literacy than ever before. This means that advisors need to continue to be mindful of how their information is delivered.

Once the cows have dried off dairy farmers are required to make business decisions before the focus quickly returns to the day-to-day operation of the farm. This also leaves very little time for the planning that small-to-medium businesses in other industries would do.

Previously, once the cows are dried off, it gave the time and opportunity to have in-depth conversations around some of these business decisions. As we begin the conversation this summer, in bite sizes pieces, this

will allow farmers the time required to make better decisions and put a plan in order to set themselves goals and objectives in the season to come. This article covers three key areas where advisors can really make a difference with clients.

Setting milk loss expectations

For contract milkers or sharemilkers and farm owners who have recently engaged (or are considering engaging) in a contract or sharemilking arrangement, it is important to have a complete understanding of who is responsible for what when it comes to milk losses. The sharemilker-owner relationship is usually tested when things go wrong and expectation management plays a key role in helping to avoid potential conflict. For instance, between 2017 and 2019 FMG paid out 3,730 milk claims, totalling \$13.1 million.

Although dairy farming was able to continue to operate as an essential service, the experience of COVID-19 has continued to remind us of the importance of a business continuity plan for every business.

With over 1,000 losses a year just for FMG's clients (approximately 55% of the dairy farming businesses), it is likely there will be at least one loss over a typical three-year contract. Often there are no issues when the expectations of 'who is responsible for what' are set early. When these expectations are not set it can create a strain or even cause a break down in the sharemilker-owner relationship. This can be particularly disheartening if it is the first arrangement that the sharemilker or owner have been a part of.

Table 1 gives a basic summary of the responsibilities included in a typical sharemilking arrangement contract. The guide provides advisors a high-level understanding of who is responsible for what losses to allow for a more informed conversation with a client. This may not reflect every individual contract and those who have original or amended contracts where professional advice may be required.

Farm owners often believe that the contract/sharemilker takes on all or most of the risk for milk, but as noted above the risk is shared. Although antibiotic contamination is the most common loss cause, with 30% of FMG milk loss claims, chiller failure is not far behind with 25% of claims.

Building a resilient dairy business

Although dairy farming was able to continue to operate as an essential service, the experience of COVID-19 has continued to remind us of the importance of a business continuity plan (BCP) for every business. No matter the size of the dairy business, having a BCP is a must. Often farmers (and even advisors) can be put off the process as the potential threats to the business can often seem too farfetched and abstract. If your client does not have a BCP at all it is recommended that this start by considering the following two situations:

- Prolonged inability to use the cowshed (e.g. earthquake, fire, major flood)
- Key person not able to work (e.g. injury, disablement, death).

These two events are very real situations that can have a detrimental impact on the dairy business. Trying to solve every situation is not realistic, while starting small and continuing to build on the BCP can over time promote a more resilient dairy business.

The map in **Figure 1** shows how few regions have been spared from extreme events. Last year alone FMG settled on 22 cowshed fire claims and over \$200 million from the 2016 Kaikoura earthquake. What these events all have in common is the ability to put the cowshed out of action for a prolonged period.

Milk is a perishable product that is produced and collected daily. There is no luxury of time when the cowshed is out of action when cows need to be milked within 24 hours. Those farms that have a BCP or some form of contingency plan have been able to manage the financial, logistic, environmental and animal welfare issues that come with these events.

When looking at BCPs it can be so easy to get tied up in the assets that we forget the most important one of all – the people. The Accident Compensation Corporation (ACC) found in 2014 that the dairy industry lost 155,451 days (or 425 years) to injury, costing businesses a total of \$31.7 million. It is important that the BCP plan outlines how the business would react to a circumstance where a key person on the farm is unable to work for an extended period.

Understanding director and officer responsibilities

It is quite concerning the amount of dairy businesses that operate as a company but do not understand the responsibilities they take on as a director and/or officer of the business. Company directors' decisions are often scrutinised in hindsight and a lack of detailed records around decision-making could suggest matters were not properly considered or dealt with. In addition to the business itself, directors can be held personally responsible for a range of offences under various Acts, including the Health and Safety at Work Act 2015 and the Resource Management Act 1991.

Table 1: Basic summary of milk loss responsibilities with a typical contract/sharemilking contract

PARTY RESPONSIBLE	CONTRACT/SHAREMILKER	FARM OWNER WITH MILKER	OWNER OPERATOR
AREA OF RESPONSIBILITY	Milk losses as part of the farming operation	Milk losses as part of property and plant	Accepts all responsibilities listed
EXAMPLE	<ul style="list-style-type: none"> • Antibiotic contamination • Forgetting to turn on the vat 	<ul style="list-style-type: none"> • Chiller failure • Power outage 	<ul style="list-style-type: none"> • Antibiotic contamination • Forgetting to turn on the vat • Chiller failure • Power outage

MAJOR CLAIMS EVENTS

1 April 2018 – 31 March 2020

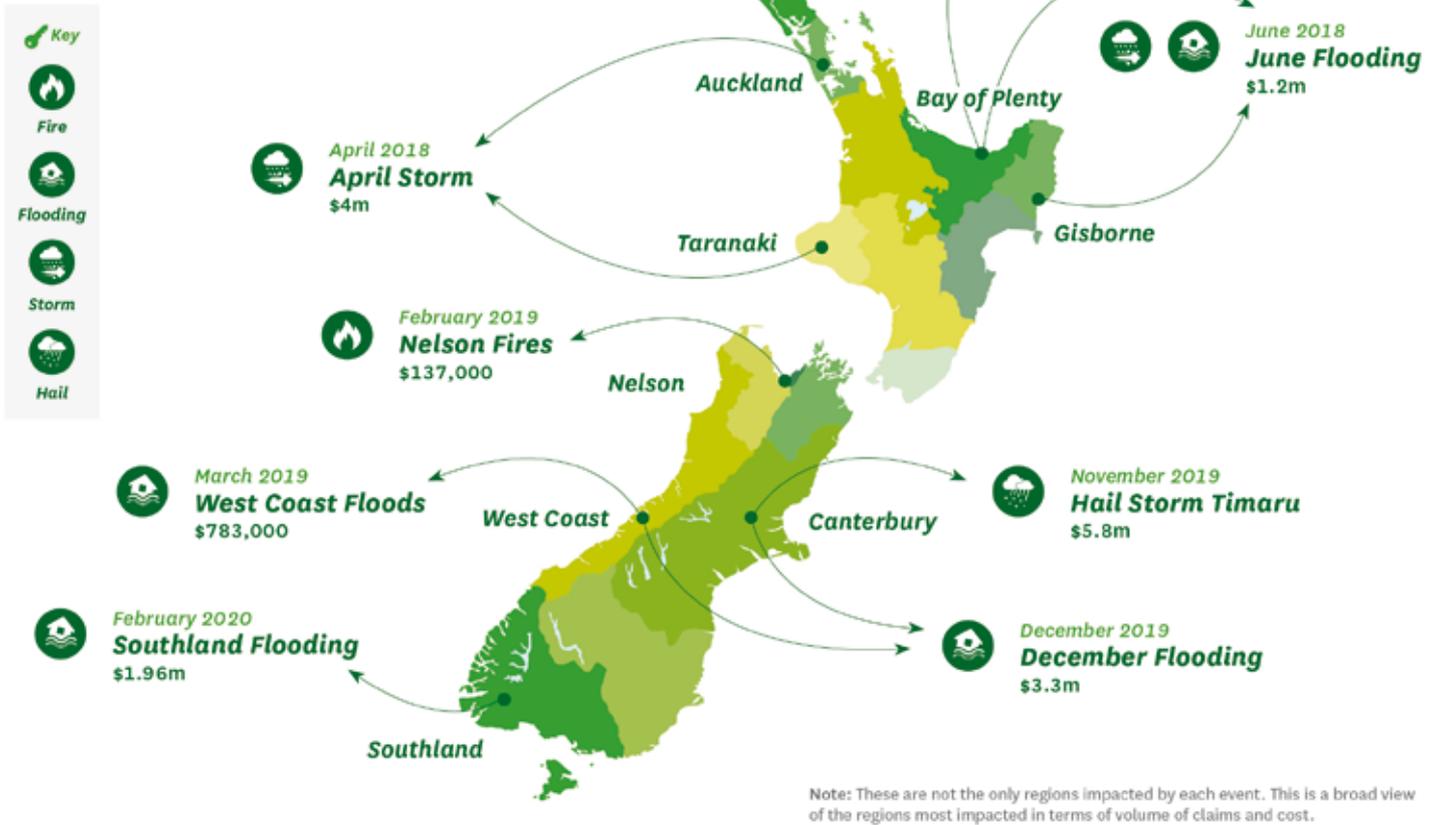


Figure 1: FMG major claims events for two financial years (1 April 2018 – 31 March 2020)

There have been cases, particularly in family-owned businesses, where spouses, children, long-serving employees or family friends have been listed as directors without taking an active governance role. In some cases, they were not even aware they were directors.

There have been cases, particularly in family-owned businesses, where spouses, children, long-serving employees or family friends have been listed as directors without taking an active governance role. In some cases, they were not even aware they were directors. It is important that all directors are aware of their obligations. If they are uncomfortable with these obligations, or are unable to carry them out, it is important to seek professional advice about reassigning governance roles.

If you or your clients are not aware of your responsibilities as a director and/or officer, the New Zealand Companies Office has very good resources available as an introduction. Given the seriousness of this area, it is recommended that legal advice be obtained. Unfortunately, ignorance offers little defense.

Talk to your clients

Advisors need to consider and take the opportunity to discuss the three topics above well before the start of the new season. It is the responsibility of farm advisors to deliver information to clients in a way that is comprehensible with sufficient time to allow clients to make an informed decision. These topics cover a range of different advisory disciplines and having these conversations with your clients, along with many others, will help to set them up for success.

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RACHEL DURIE, LIZ DOOLEY AND LEIGHTON PARKER

SEEING THE WOOD FOR THE TREES

- FARMER PERCEPTIONS, ATTITUDES AND KNOWLEDGE ABOUT INTEGRATING FORESTRY INTO FARM SYSTEMS

Phase one of the Te Uru Rākau One Billion Trees collaborative project provided extensive insight into how farmers are currently viewing and trying to source relevant information. This project is about helping them make informed decisions around adding forestry to their operations.

Increasing pressure

Many farmers are having to re-evaluate the way they farm in the light of new climate change and environmental regulations, as well as shifts in consumer behaviour. Forestry (native and exotic) provides both an income diversification opportunity and a means to boost environmental performance at an individual farm and national level.

However, large-scale afforestation is increasingly controversial in the light of a new 'wave' of institutional land purchases for forestry planting, as well as the impact of forest harvesting on communities and environments downstream. This increases the importance of farmers making sensible decisions around forestry, with this being less about a choice between farming or forestry, but rather about how to integrate forestry *with* farming.

Farming and forestry as complementary land uses

To support decisions on how to integrate trees into the farm business, ensuring they are in the right place and for the right purpose, landowners need up-to-date and easily accessed information on different forestry options tailored to their circumstances.

Te Uru Rākau and industry co-funders commissioned Perrin Ag Consultants Ltd (Perrin Ag) and PF Olsen (as collaborators) to undertake research on 'integrating dairy and hill country sheep & beef farming with forestry for profitable, sustainable land use.' The development of case studies and land use scenarios for in-depth investigation is a critical output of this work. However, it was first important to understand the current perceptions, attitudes and extent of knowledge amongst farmers about the integration of forestry into their farm systems.

Of the 50 landowners interviewed, 82% stated they had timber trees on-farm and owned a total of 1,912 ha of timber woodlots.

Farmer interviews

To ascertain this, a series of farmer interviews were conducted in 2019. In addition to semi-structured face-to-face interviews conducted with 10 farmers (five each from the Waikato/Bay of Plenty (BOP) and Rangitikei regions), 50 structured phone interviews were completed. This was to gain an in-depth insight into farm forestry practices, views and knowledge, and enablers and barriers to integrating forestry into pastoral farming businesses. These interviews are the subject of this article.

In total, 30 farmers were interviewed by phone in the Waikato and BOP. Of these, 16 were dairy farmers and 14 were sheep and beef. Twenty farmers were interviewed by phone in the Rangitikei and they were all hill country sheep and beef farmers.

Quantitative data was obtained through the phone questionnaires, with opportunities for some qualitative insight through supplementary questioning. Combined with the face-to-face interviews, this resulted in rich data providing strong insights into the interviewee's business, intentions, knowledge and views of trees on farms in the subject regions.

Commercial forestry in farming businesses

Of the 50 landowners interviewed, 82% stated they had timber trees on-farm and owned a total of 1,912 ha of timber woodlots. The 18% of respondents who did not have timber plantations were all in the Waikato/BOP. In the Waikato/BOP region, 75% of dairy enterprises and 64% of sheep and beef enterprises had planted timber trees. The average woodlot size for these groups as a proportion of the total farm enterprise area was 8% and 14%, respectively, and excludes two outlying Waikato/BOP sheep and beef farms which had planted 53% and 60% of their total farm area. In comparison, 100% of Rangitikei sheep and beef farmers had timber stands on-farm, with the average woodlot area equating to 3% of the total farm enterprise.

Pinus radiata was the most commonly planted tree species across all regions and farm enterprise types. However, in Rangitikei there was greater variation in the tree species planted, with radiata pine only accounting for 75% of timber plantings compared to 96–98% for Waikato/BOP dairy and sheep and beef farms (**Figure 1**). The greater

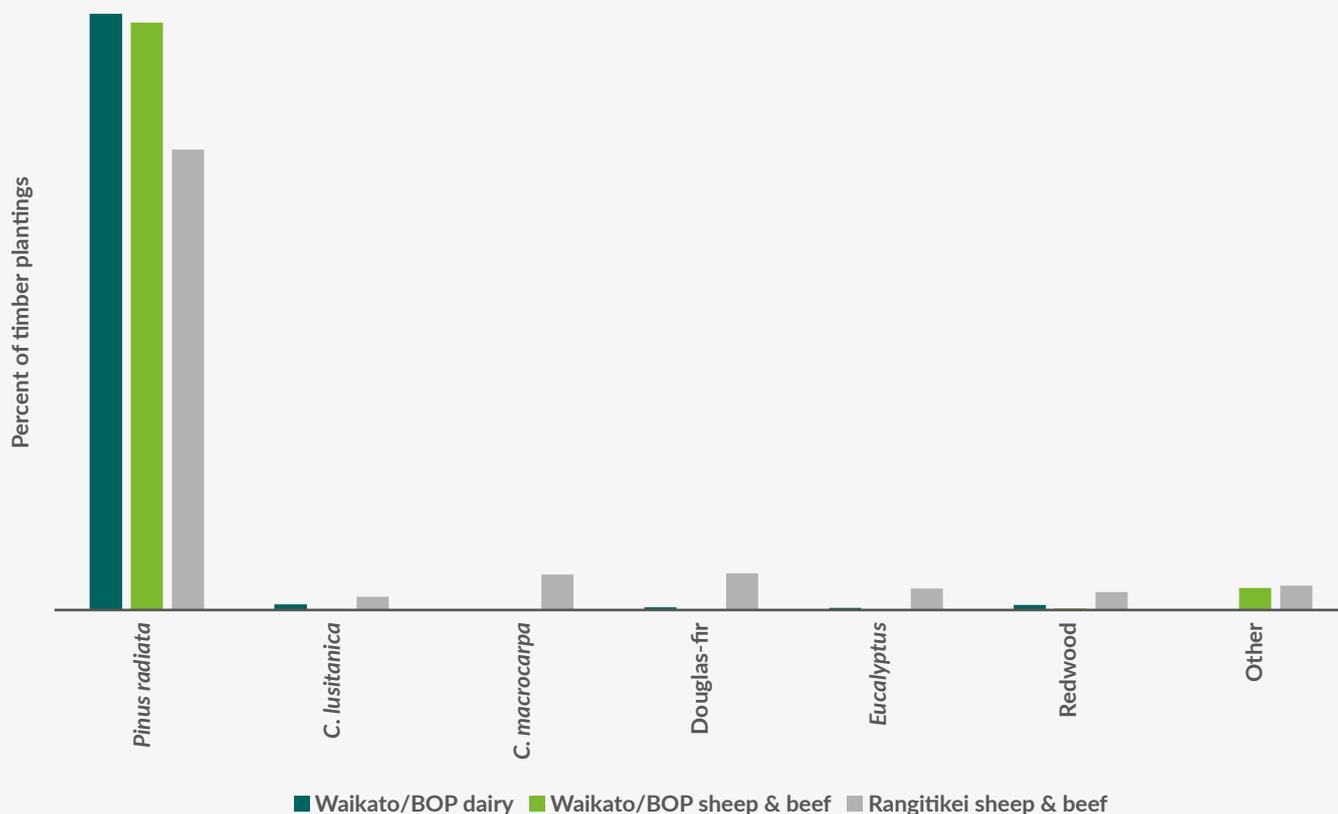


Figure 1: Timber species planted as a percentage of the total for Waikato/BOP and Rangitikei dairy and sheep and beef enterprises

A dairy farm on the Mamaku Plateau provides options for planting. Photo courtesy of Steve and Paula Holdem



Many farmers felt they did not understand the ETS, how it worked or how it was managed. They were also concerned about the fairness of the scheme, how well it had been thought out for its impact, and the way it keeps changing.

diversity in the Rangitikei is likely a reflection of the poor tolerance of radiata to altitude and snow, the strong NZ Farm Forestry Association branch which encourages alternative species planting, the distance to port or processor which reduces profitability of lower-value timber, and the multi-objectives of landowners including erosion control and stock fodder during droughts.

Emissions Trading Scheme (ETS)

Landowners were also asked whether or not trees had been registered in the ETS. In general, most respondents had not entered into the ETS (47%), and a similar number of respondents had either entered only some of their timber plantations (24%) or all of them (22%). Many of the farmers mentioned they did not understand the process and/or found the ETS too confusing and difficult. These factors restricted the registration of many woodlots that met the ETS requirements. Despite this, 63% of farmers who intended planting trees in the future thought they

would enter these in the ETS. However, having time to upskill and being able to understand the ETS, or having support to assist with it, will help determine whether many of these farmers implement this.

Many farmers felt they did not understand the ETS, how it worked or how it was managed. They were also concerned about the fairness of the scheme, how well it had been thought out for its impact, and the way it keeps changing. These factors drove some of the negativity that was captured in the interviews. Also, farmers were disappointed that small plantings were not recognised by the ETS for carbon credits and would appreciate recognition for these, particularly once they need to account for their own emissions.

Non-commercial forestry

Most farm enterprises had planted or looked after non-timber plantings that were used to provide environmental (soil and water conservation, biodiversity, nutrient

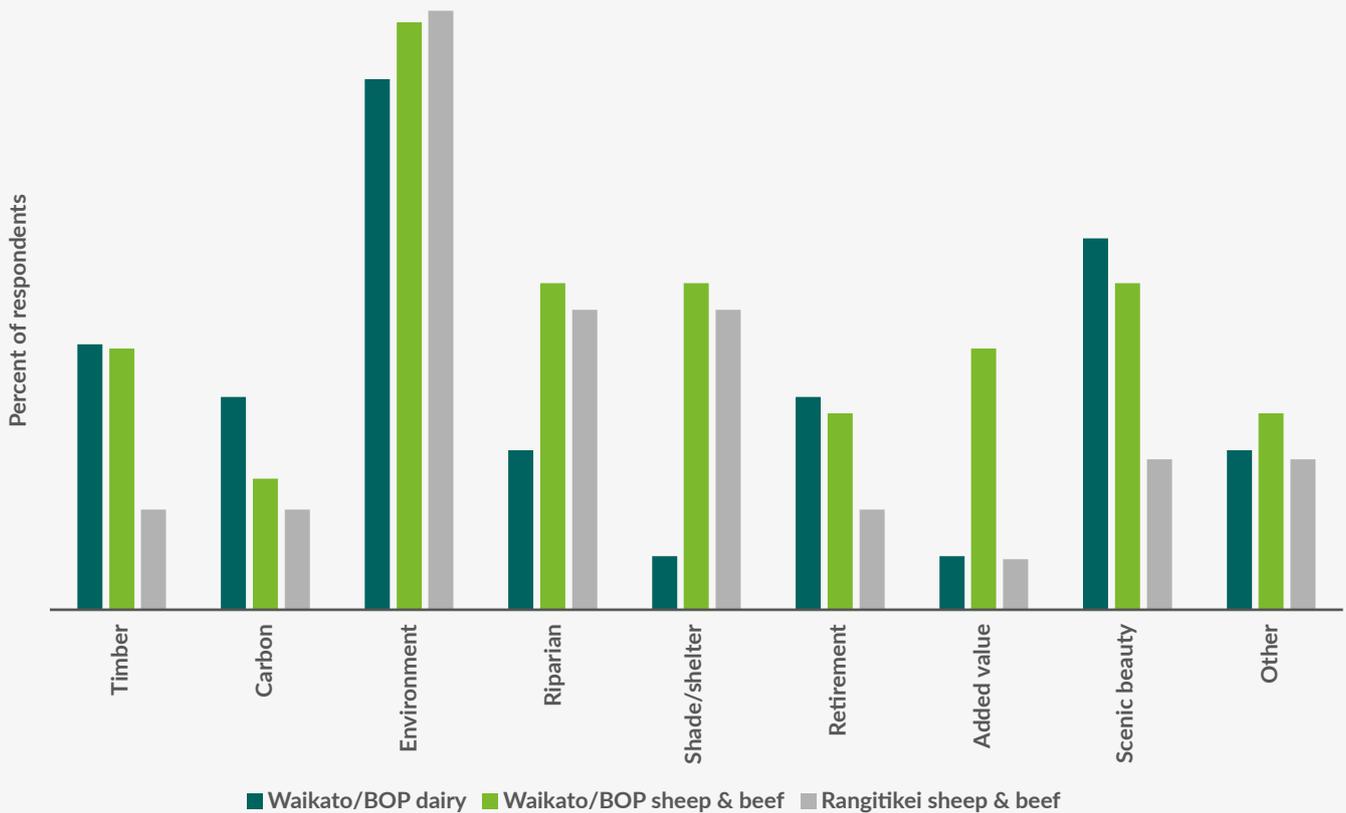


Figure 2: Objective for future tree plantings from Waikato/BOP and Rangitikei dairy and sheep and beef farmers who intended to plant or were still unsure about future plantings (n=46)

Many farmers commented there was a lot of cost involved with having trees on-farm, particularly shelterbelts which need regular maintenance, but animal health benefits and their aesthetic value often outweighed these costs.

management) and/or farm enterprise (stock shade, shelter, fodder, added value) and aesthetic benefits. The percentage of enterprises with non-timber plantings was similar across groups ranging from 85% on Rangitikei sheep and beef enterprises to 93% on Waikato/BOP sheep and beef enterprises.

The total area of planting was similar between the groups, with 9% of the farm enterprise area covered in non-timber plantings in Rangitikei, compared to 12% on Waikato/BOP sheep and beef enterprises and 11% on Waikato/BOP dairy enterprises. This excludes one outlier in the Waikato/BOP dairy group, which had a large 1,000 ha (64% of total farm area) stand of existing natives.

However, a number of Rangitikei sheep and beef farmers stated that they had many pockets of native bush scattered around their farms, which they found difficult to quantify, and so these were not captured in the interview. Similarly, large areas of poplars were

planted in the Rangitikei, but many farmers were unable to estimate the size of these plantings. Poplars and natives natural to the landscape (e.g. kowhai, cabbage trees) tend to be scattered across the landscape in this area. It is likely that these omissions will have caused the area of plantings in the Rangitikei to be underestimated.

Is more forestry being planned by farmers?

Most landowners (86%) who were interviewed plan to plant trees in the future. This decision is driven by strong values about planting trees for future generations and wanting to do what is good for the farm and environment. These values, which are a large part of what is encapsulated by the concept of kaitiakitanga, are integral to Māori landowners. When asked about the main objective for future plantings, environmental reasons received the highest number of responses followed by scenic beauty and riparian margin plantings, although this varied across regions and groups (Figure 2).



A Rangitikei hillside currently in scrub that could be planted. Photo courtesy of Sam Rainey

Barriers to tree planting on-farm

Financial constraints were the most commonly stated barrier across all groups, with 50% of farmers describing this as an impediment to planting. A lack of time and the maintenance involved in tree plantings was also a key adoption barrier for Waikato/BOP dairy farmers (38%) and Rangitikei sheep and beef farmers (37%). However, Waikato/BOP sheep and beef farmers considered the uncertainty around government policies and changing rules (29%) to be a larger barrier than a lack of time (7%).

Farmer perceptions of forestry

Overall, farmers agreed that having trees on farms has a positive impact on the farming enterprise. Many farmers commented there was a lot of cost involved with having trees on-farm, particularly shelterbelts which need regular maintenance, but animal health benefits and their aesthetic value often outweighed these costs.

Regarding blanket conversion to forestry, the overall response from farmers was this had a negative impact on the surrounding community. Rangitikei farmers, in particular, were most opposed to blanket conversion

compared to their Waikato and BOP counterparts. The general view reflected in the comments was that landowners were mostly supportive of small-scale plantings, which improved management of the environment and the utilisation of less productive land. However, almost all were against wholesale farm conversions and their negative impact on the surrounding community.

Regional insights

The Waikato/BOP has a well-established forest industry. As a result, interviewees from these regions seemed less concerned about the harvesting of (and markets for) logs than the Rangitikei where forestry infrastructure and services are less developed. In particular, farmers in the BOP felt they could access contractors and advice for the harvest, process and export of pine logs and timber relatively easily compared to farmers in the other regions interviewed. The Waikato/BOP harvesting and transport costs are considerably lower relative to many other areas in the North Island and the returns from *P. radiata* relatively higher.

Trusted informants are an important source of advice (e.g. NZFFA farmers), so initiatives that support information sharing by well-informed and trusted connections within farming communities would also increase understanding and encourage tree planting.

Regulatory controls for nutrient and sediment management into waterways are increasingly demanding in the Waikato/BOP and appear to influence the choice and role of trees. Fewer farmers have given consideration to alternative timber species in the Waikato/BOP region than in the Rangitikei. Also, radiata pine is a comparatively fast-growing species and some farmers are able to complete a number of rotations in their lifetime and receive the returns, thereby building their experience in forestry.

The Rangitikei region is higher in altitude, climatically colder and drier than the Waikato/BOP region, and is dominated by sheep and beef hill country properties. Winter snow, with significant falls every few years, is sufficient to damage young radiata pines with soft leaders. Frosts occur about nine months of the year, but can also happen out of season. Consequently, a wide range of timber tree species are grown in the Rangitikei such as

Douglas-fir, macrocarpa and *Eucalyptus*. These are all slower-growing species than radiata pine and those who plant these trees often do not harvest them. However, it is common in Rangitikei for farms to be multi-generational, with an expectation of the next generation being on the farm to harvest.

The Taihape hill country farmers commented on the low returns they had received from timber trees (mainly from radiata pine), with limited infrastructure and the long distance to port increasing harvesting and transport costs. Despite this, the phone survey results indicated that radiata is still the main timber crop in Rangitikei. Regarding regulation, this area is not yet considered a sensitive catchment, although the regional council (Horizons) is active in the region, including through the formation of the Sustainable Land Use Initiative (SLUI). This initiative aims to help farmers develop whole farm plans and offers incentives for tree planting targeted at reducing erosion.



Farmers expressed a universal dislike of blanket planting and land conversion, which was viewed as damaging rural communities and the aesthetics of the landscape.

Overall conclusions

Farmers highly value trees, often for non-economic reasons, with most of those interviewed having already engaged in tree planting of some sort and many intending to do so in the future. Their incentive for planting trees is often personally driven – aesthetic and environmental reasons play a part or dominant role in the decision – and such plantings are often self-funded. They feel that these efforts, which are part of their stewardship of the land, are often not appreciated or recognised outside the farming community. Acknowledgement and recognition for the tree planting already undertaken by farmers would be well received by them.

Time and cost are key constraints to the level of tree planting farmers can engage in. A lack of understanding can also limit tree planting. Hence, initiatives that can assist farmers financially, or through access to more concise and easily accessible information presented in a style that is relevant and easily adopted by them, would be beneficial (e.g. One Billion Trees grants and the ETS).

Trusted informants are an important source of advice (e.g. NZFFA farmers), so initiatives that support information sharing by well-informed and trusted connections within farming communities would also increase understanding and (other things being equal) encourage tree planting. Also, since finance is a barrier for some farmers, 'non-bureaucratic' (in farmers' eyes) access to funding, such as that provided by the One Billion Trees fund, could help mitigate cash constraints and motivate them to plant more trees and/or plant sooner.

Regional differences (climate, topography, forestry-related capability and servicing infrastructure) clearly confirmed the need to consider the 'right tree, right place' message in tree planting. Preferred species differed between the regions – *Pinus radiata* was less favoured in the Rangitikei, whereas poplars were more commonly planted for environmental reasons and shelter. Otherwise, species planted across the regions were similar. This highlights the fact that while *P. radiata* has a place as a fast-growing timber suited to many areas in New Zealand, there is a place for other species. Some interviewees believed a more varied species mix would also reduce this country's risk from exposure to a species monoculture (disease, fire). Farmers would like to have access to information on a range of species.

Past research in New Zealand has largely focused on plantation-scale *P. radiata* and enhancing its productivity, while propagation and information on other species has tended to be supported by independent plant breeders, industry organisations (NZFFA) and landowner research initiatives (e.g. Northland Totara group, Ian McKean Pinetum in Taihape). Some of these other species offer high value timber attributes that could be explored for future markets. There is potential for natives such as totara for timber. Packaging information and financial support for growing these alternative species would help facilitate increased plantings of 'right tree, right place'. For natives grown as timber, some certainty that regulation would permit these to be harvested could be required to incentivise planting.

Farmers expressed a universal dislike of blanket planting and land conversion, which was viewed as damaging rural communities and the aesthetics of the landscape. Rather, farmers believed there was a place for increasing tree plantings on-farm as smaller woodlots, increasing diversity, enhancing the landscape and providing environmental, erosion control and shade benefits. These trees may, or may not, be harvestable. This could require a rethink on how tree plantings on farms could be managed and harvested, possibly from the back of farms or steep areas, in an integrated way to provide scale and logistical efficiencies in processing and enabling these to be accounted for in the ETS.

Developing parallel viable low volume, high (margin) value supply chains for species other than radiata pine remains a significant challenge, and more so in districts with less well-developed processing and/or port infrastructure. Advice to farmers for these less widely grown species is needed to make this context and commercial risk clear.

Acknowledgements

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PHILLIP EVEREST

This profile looks back over the life of Phillip Everest, a long-time member of NZIPIM, who joined the organisation when it was formerly the Farm Management Society.

Lincoln start

Phill was born in Methven to school teaching parents. The family then moved to Christchurch and on to Auckland. His secondary schooling was completed at Kelston Boys' High, but no agriculture course was available there. Visits to family farming friends engendered a passion for the land. One of these friends was an early graduate of Lincoln College (as it was then) and he encouraged Phill to study there.

Arriving at Lincoln in 1978 he knew no-one, but soon developed lifelong friends in the BAgrSci year group and through rugby. In those days Lincoln had four senior rugby teams, plus U19 and U20, and social teams – a far cry from the number of teams there are now. In his final year he joined the Farm Management Society (now NZIPIM) as a student member.

Farm consultant roles

Wanting to farm, but not having any experience, he was fortunate to meet Mike Adamson at Engelbrecht Royds & Tavendale, a farm consultancy firm in Ashburton, who provided an insight into what was involved with this work. Phill then had an opportunity to complete a work experience programme with the Ministry of Agriculture and Fisheries out of Rangiora. On acceptance of a \$100 final year bursary from MAF he was bonded for two years. Subsequently, he took a position as an Advisory Officer with MAF Rangiora just at the time they were changing from being a free service to user pays.

After three years with MAF, and rising to Regional Manager, John Tavendale from Engelbrecht Royds & Tavendale then offered Phill a position. The work was

As part of the Hinds Catchment they already have a regional plan requirement to reduce the nitrogen leached from farms by 36% by 2035.

highly varied in the early 1980s – a foot and mouth scare at Temuka, a large-scale irrigation scheme development in Amuri in North Canterbury, Land Development Encouragement loans, the Livestock Incentive Scheme, the Rural Discounting Scheme, interest rates getting close to 20%, various government drought packages, a large-scale progeny test programme for the development of sheep breeding programmes, discussion groups and farm monitoring programmes.

On reflection, he feels that farm consulting was extremely rewarding. He gained a great deal of satisfaction in achieving results with clients and developed a long-term business friendship with many. However, he noted that over the years clients had become more demanding of a farm consultant's time. In the early years they were happy to wait two to three weeks before you could fit a visit in, but with the age of cellphones they started to expect a visit tomorrow!

Farm ownership

After over 30 years of private consulting, Phill and his wife Jocelyn finally reached their goal of farm ownership and established a 750 cow dairy farm 10 km from Ashburton in 2010. They were fortunate to be able to purchase 130 ha of land 10 km east of Ashburton in the 1980s downturn. The property was leased initially as a mixed cropping farm, with the Everests retaining the ability to rear and finish 50 bulls on it, as the consulting business was Phill's main focus. Other opportunities came to purchase two neighbouring blocks in ensuing years, making the combined area now 270 ha. This has provided two rectangular blocks touching in the middle, which has allowed the redevelopment of spray irrigation to pivots.

When preparing budgets in 2010 for their own farming operation it became clear that reconverting their property back to a dairy farm was the best option – the property was one of four small dairy farms that provided milk to the district in the early 1900s.

The Everests decided that a 650–750 cow operation was optimal for what they wanted to achieve – labour, infrastructure and hours in the business. They developed the farm with a 54 bail shed (fibreglass platform), in-shed feeding, Protrack drafting, heat camera and Waikato mastitis detection system (DTect). John Scandret and son Mark helped with the effluent system, a weeping wall, with approximately 50 days of storage, in part from the water saved by using 'greenwater' to wash the dairy yard. The effluent is applied through the pivots at around a 10% solution.

Ten years on the property is getting closer to its potential – they produce A2 milk for Synlait, are part of the Lead with Pride Synlait QA programme, and have had the same staff on the property for five years. The cows are milked twice a day, but the staff only do one milking a day, which keeps the work-life balance staff are now looking for.

As part of the Hinds Catchment they already have a regional plan requirement to reduce the nitrogen leached from farms by 36% by 2035. The need to make incremental movements to meet the requirement has meant:

- Additional pivots have been installed to improve water use efficiency (reduced leaching)
- Plantain and Italian type ryegrasses have been included in the pasture mix for over five years
- No nitrogen fertilisers are applied after 30 April, where possible cull cows are sold in February/March to reduce their urine deposition over the autumn
- Fodder beet is grown on platform to feed to the cows mid-April and May. The fodder beet fed on platform gives an ideal opportunity to get cows to 5 kgDM/cow/day before they go to winter grazing, making the transition to winter grazing so much easier.

The development of an aesthetically pleasing property has been high on their priority list, with the entire boundary sheltered as well as every second internal fence (even under pivots this is possible). The property has numerous drains passing through it and they have now all been planted on one side. Trials are underway to look at species for the other side that will not compromise the need for drainage when it rains heavily, and this also allows for cleaning when required. They are regional council maintained drains so all parties need to work together to provide the best outcome for everyone.

NZIPIM involvement

Phill has served on the Canterbury branch committee for over 20 years, including as Secretary and Chair. His time on the National Council included a period as President and he chaired the World Farm Management Congress in Methven, which was shifted from Christchurch due to the earthquake. During this time he has grown a wide network with other like-minded people in the primary industry across New Zealand. Phil has also regularly supported the national conferences and local field days: 'The more you put into an organisation the more you get out.'

He believes that COVID-19 has certainly driven a major rethink of how rural personal development is delivered. For Phill, Zoom has brought a whole new dimension to communication and he has been pleased to see that NZIPIM has grasped the nettle and kept members stimulated and informed.



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Primary industry changes over time

He also notes that dramatic changes have occurred since the start of 2020 with the outbreak of COVID-19. No-one foresaw a pandemic such as this, or its ramifications throughout New Zealand and the world. Just like no-one foresaw the impact on international travel, no-one can foresee the future more than a handful of years out in agriculture. However, he feels that our industry needs to react rapidly to the changing environment.

In his view, the urban-country divide has been hyped in the media, but he questions whether we have taken our opportunity through COVID-19 to show how important food is to New Zealand and the world. Have we really capitalised on this opportunity?

Farmers have been labelled, unfairly he believes, as poor custodians of the land. Hindsight is a great thing to give 20/20 vision. Unwittingly, mistakes have been made by the current generation and the Māori and Pakeha generations before. However, apportioning blame does little to resolve the problem. He feels we need to be strong in taking available mitigations to reduce our impact on the environment, but care is required to ensure all contributors are considered in balance. When considering greenhouse gases, for instance, some areas are perceived

as too difficult, such as international air travel. For many, international travel is a discretionary activity, but for a sheep or cow rumination is a part of life.

Over the years farmers have moved favourably to new and improved practices when they can see social, environmental and financial outcomes. Phil says these three pillars need to maintain some balance or the actions required can be unsustainable. One size does not fit all, and we need to develop strategies that reflect local requirements and capabilities.

Phill also believes that as science and testing improve, the requirements for food producers will get tougher. The challenge is for our 'marketers' to extract an improved return from the consumer for the higher quality products. At times he wonders if these 'marketers' are working for the producer, who actually pays their wages, or the customer.

Phill has no crystal ball regarding the future, except to add that we live in a beautiful country that is isolated (which under COVID-19 is an advantage), with a large freshwater resource and a general 'can do' attitude to 'make things work'. He feels we must do everything we can to allow these 'Kiwi' attributes to survive.

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