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THE JOURNAL

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

PRINCIPLES OF GOVERNANCE AGRIBUSINESS SUSTAINABLE FINANCE **RISK MANAGEMENT & DECISION-MAKING**
LOWERING LIVESTOCK GHG EMISSIONS **WATER-SENSING TECHNOLOGY** COMPOSTING SHELTERS
CREATING A FUTURE FIT FOR A BETTER WORLD

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Contents

Enabling change across primary producers

Extension is about working with people in a community to facilitate change in an environment that has social, economic and technical complexity. Does this sound relevant for the primary sector for 2023? Extension is achieved by helping people gain knowledge and confidence, so they are equipped to change, and providing support to ensure change is implemented effectively. It relies on the commitment of the community to the change process. While some behaviour can be changed quite easily by simply informing people through good marketing and communication, for complex changes an extension approach provides a better option that is both appealing and lower risk.

Extension focuses on change in more complex environments where the risk of failure is greater, and people need to develop the capacity to change. An important distinction between facilitation and extension is that extension involves providing technical support to facilitate change. The need for capacity building distinguishes extension from many other change management approaches. It involves people learning from their peers, their own activities and accessing new sources of knowledge. The learning process helps build community knowledge that improves decision-making and this leads to a better, more embedded outcome.

An important part of building capacity is empowering people in the community to really engage in the change process. People who invest their time and resources will be more committed to achieving a successful outcome for themselves and their community. Change requires understanding of what needs to be done and why communities need to be educated so they can make informed decisions.

An extension worker facilitates the change process in a community by helping people to work together more effectively and to establish a common commitment to shared goals. By harnessing the collective knowledge, skills and resources of all those involved, extension greatly increases the probability of a successful outcome. Encouraging people to take responsibility for the change process is a key focus of extension, working with the community to identify barriers to progress and developing ways of overcoming them. Extension works where other approaches fail because it harnesses community knowledge and is a real collaboration between partners, achieving change in environments often considered too difficult when using other approaches.

Participation in the decision-making process creates understanding of what needs to be done and why. A real strength of extension is achieving sustainable change by involving and gaining a strong commitment from the people in the community. This gives them greater ownership and control over their own destiny. It also motivates them to learn about the issues and better utilise community skills and resources.

Extension achieves change by following a series of simple principles. These aim to improve the capacity of people to change and maintain the momentum of the process. A fundamental principle is that of partnership. Extension relies on building partnerships where the partners have a common goal and invest in the process. Initially the partnership can be quite narrow in the goals the participants have in common, but this often broadens as trust and respect develops.

Engagement is also key. People often learn best when they engage with, and learn from, others within the community. Catchment groups are a great example of this, where knowledge to understand and integrate catchment challenges, values and context are developed and built together, at community level. Extension workers facilitate change by working with these groups and helping them to work with each other to achieve common goals.

A third principle is that of empowerment. Empowerment involves people taking responsibility for the change process and being committed to achieving a successful outcome. For those working in extension, empowering people and communities is important in developing a strong partnership to facilitate change. People learn best by doing. The more involved people are in the change process, the more they will learn and be committed to achieving a successful outcome.

Communication and cultural awareness are also critical. If people are to change behaviour, they need to understand the need for change and how to go about it. As the changes become more complex, simple communication of information alone is not enough and more sophisticated approaches to facilitate learning need to be used. Extension workers must be aware of cultural needs and communicate accordingly so that individuals can visualise the change within their own personal values and context.

The challenge for NZIPIM members is in understanding all these extension issues and principles, and employing them as we work with the sector to achieve sustainable change J

FRAZER WEIR

PRINCIPLES OF GOVERNANCE AND THE ROLE OF TRUSTED ADVISORS

Trusted advisors can play a pivotal role in establishing governance within farming businesses. This article outlines the key governance principles that are the basis to successful governance in the sector and how a trusted advisor can facilitate the implementation of this process.

Evolution of governance in rural sector

Historically, governance has almost been an alien concept in the agri sector. However, over recent years it has become more common and accepted as a key factor in the success of many agri businesses.

There are a number of reasons for this, with the key drivers being the increased scale and complexity of farming businesses in New Zealand. These businesses are needing to rely on external parties to assist with decision-making on complex issues. The range of these external parties involved can be quite wide and is dependent on the respective strengths of the business owners.

The owners of these businesses are still generally a husband and wife duo, but often other family members are becoming more involved, which provides another dynamic that needs to be managed.

The scale, complexity and number of people providing input to key decisions means that it is becoming increasingly

When families attempt to implement governance without external support the process is often not effective.

difficult for these businesses to make strategic decisions using informal processes as they would have done in the past. These businesses find that using a structured approach allows for a balanced discussion and effective decision-making. The benefits include:

- Better and clearer communication
- Lower levels of stress for the owners
- Better relationships with family, staff and stakeholders
- Better decisions, which in turn improves the performance of the business
- Improved business resilience
- Improved access to debt and equity funding.

Most of this governance is in the form of advisory boards, but these can successfully transition to formal governance when the time is right for the business.

Governance principles for closely-held farming businesses

When families attempt to implement governance without external support the process is often not effective due to three main factors:

- Lack of structure for the meetings
- Parties are not held to account as part of the process
- The parties involved in the process normally wear many hats, including family member, owner, director and management. During the meetings they often consider and discuss issues from their dominant 'hat', which can result in poor communication and decision-making.

To limit the impact of the above factors, the following principles are key to implementing effective governance in these businesses:

Structure and holding to account

- *A chairperson:* This role is to facilitate discussion and hold to account when needed. Another key aspect of this role is to ensure that the meetings focus on governance issues and do not morph into management meetings for the business.
- *Agenda and board pack:* These need to be distributed before the meeting so all parties understand the issues and decisions that will be required beforehand. Without this the meeting can become long and ineffective.
- *Minutes and action points:* This is key to ensuring that all decisions are documented and actioned. There is an art to preparing concise minutes that reflect the meeting.
- *Governance calendar:* This ensures that all key considerations are addressed on a regular basis. Without this process issues such as risk management can easily be neglected.

Determining a purpose/strategy

- A clear strategy is essential to enable the governance team to assist with making effective decisions. Often the first role of a governance team is to collaborate with the owners to establish and document their strategy. While governance can appear to be effective without a clear strategy, there is significant risk that the business will head down an unintended route pursuing an opportunity that doesn't align with the strategy.

Diversity of thought/skillsets

- It is human nature for individuals to gravitate to people with a similar personality, thought pattern and risk profile. Diversity of thought and skillset will result in issues being considered from all angles and also in robust discussions before a decision is made. When forming a governance team, the initial consideration should be the skillsets that are missing within the business and those that are key to taking it forward.

Review process

- Governance can quickly become stale if the process is not reviewed regularly. For businesses that have implemented this process effectively, it is common for the number of people involved and frequency of the meetings to alter regularly, depending on the stage of the business cycle and risk profile. I am involved with governance processes that have evolved from an advisory board to a formal board of directors and then back to an advisory board. Within this governance structure the people involved has also changed, with some leaving and then being reappointed at a later date. This occurred as the owners regularly reviewed the process and what was fit-for-purpose for the business at that stage.

Governance can quickly become stale if the process is not reviewed regularly.

The role of the trusted advisor

The key role for a trusted advisor within this process is to assist with the design and implementation of the governance system for the business. Governance structures can be successfully implemented within all businesses, provided that the process is refined for that specific business. Effective governance for some businesses is a meeting twice a year with the owners and a trusted advisor. For others, a full board (including independent directors and/or an independent chair) is required. The ownership structure (including whether companies, trusts or partnerships are involved) will also impact on the design and implementation of the process.

Business owners are often wary of governance as their initial perception is that it will be a costly process and they will lose control of their business. Due to this, governance is often a process of evolution that begins with regular meetings with key advisors, the accountant, lawyer or farm consultant. As the owners begin to understand the process and see benefits, the process evolves to become more formal. This may include independent parties who have the specific skillsets required within the business.

A sign of a successful process is when the trusted advisor is no longer required to run and facilitate governance within a business, allowing them to support other businesses to implement relevant systems.

Within smaller family businesses the key role for the trusted advisor is often to facilitate the meetings, including chairing the meeting, preparing the minutes and holding parties to account when required. Often family farming businesses cannot effectively hold governance meetings without any input from a third party, and a trusted advisor is often the best person to facilitate these discussions. In particular, if there is significant tension or stress within the business and family, it can be more effective to have these meetings facilitated by an independent person.

Business owners are often wary of governance as their initial perception is that it will be a costly process and they will lose control of their business.

Conflicts of interest

The independence and position of the trusted advisor is an issue that needs to be considered and discussed by the stakeholders when establishing a governance structure. Often advisors are also wearing more than one hat when working for a farming business, by providing management support to the business and facilitation, or contributing to the governance process. They can also be advising third parties who are competing in similar markets or considering purchasing the same properties.

While a trusted advisor can be the key to successful governance process, it is hard to argue that they are completely independent. It is important that all stakeholders understand this, and any potential or actual conflicts of interest are disclosed and discussed with the stakeholders.

Outcome of governance for the business and advisor

Having a better understanding of what governance is, along with customisation of processes for the rural sector, has resulted in governance now being commonplace within the sector. Outcomes that these businesses have experienced are:

- Clearer strategy
- Better decision-making
- Improved communication between the principals
- Improved communication with all stakeholders
- Reduced tension
- Improved access to debt and equity funding.

From an advisor's perspective, implementing and facilitating these processes can be rewarding work that results in stronger relationships and a much deeper understanding of a client's business.

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DANA MUIR

BANKING ON NET ZERO AGRIBUSINESS SUSTAINABLE FINANCE

New Zealand has done well to promote the efficient, natural steps taken to produce world-renowned food. The challenge now is to take this one step further and the banking sector has a role to play in helping to achieve this.

Moving from volume to value(s)

For years the primary sector has spoken of the need to move from 'volume to value'. It has been widely heralded in recent years that the sector has managed to achieve just that. There has been a concerted effort to do so; farmers working to continuously improve their products, and processors, marketers and successive governments working to understand what it is that our global customers would pay more for and producing products that fit that bill.

Grass-fed, clean and green, hormone free – all of these claims have been supported through traceability and assurance programmes, so that we can proudly drive value back to the farmgate and to the New Zealand economy.

New Zealand has done well to promote the efficient, natural steps taken to produce world-renowned food. The challenge now is to take this one step further. When the 'volume to value' call moved to 'volume to values' (i.e. connecting the value of our food production to the values driving how it is produced), it was a signal that we needed to double down once more on our efforts to meet ever-evolving consumer demands.

With the introduction of the Zero Carbon Act, the focus turned (for all sectors within New Zealand agriculture) to what we were doing to continually reduce our greenhouse gas emissions. This was so that we could, at best, derive premiums for this in combination with our already strong, clean, green image, and at least continue to gain access to markets. Also, importantly, keep showing our large global customers what is being done to help them reduce emissions across their supply chains.

Why does this matter? Take our claim to be the most efficient producers of dairy in the world. The work our processors and co-operatives have been doing in recent years to measure the overall emissions it takes to produce New Zealand dairy, compared to competing nations, has helped secure our position as a preferred supplier of dairy products to key customers. The benefits of our farming systems and current efficiency gains are measured by our emissions, and we have been able to use this to our advantage.

Scope 1, 2 and 3 emissions targets

It is an advantage that will need to continuously improve if we are to keep being able to tout these claims. Recently, Fonterra signalled to its shareholders that it would be looking to introduce a Scope 3 emissions target in conjunction with its Scope 1 and 2 emissions science-based targets commitment. This is in response to the clear signals from the market that emissions from across the food supply chain need to be being measured and improving.

Scope 1, 2 and 3 – these are phrases that the primary sector will become increasingly familiar with:

- Scope 1 emissions include all those released directly from a company, such as from a fleet of vehicles
- Scope 2 emissions include indirect emissions from a company, such as electricity usage. Both are directly within a company's control (i.e. their actions can lead to positive emissions reductions)
- Scope 3 emissions include all other emissions generated along a company's value chain, including raw materials, logistics and suppliers. Taking the dairy processor example again, the emissions of their farmer suppliers would contribute to the processors' Scope 3 emissions. The challenge for any company is to account for the emissions across their entire value chain, much of which is outside of their own direct control.

For the food value chain (which farmers and growers are ultimately a key part of), this is where knowing your on-farm emissions number comes in, as well as the role of industry, banks and rural service providers in helping you get a sense of your current position and options to manage it. Once you can measure it, it helps to manage it.

This, in turn, is supported by strong legislative programmes that have positioned New Zealand's baselines for what is considered a minimum standard for sustainable practices across farms, alongside a framework of assurance programmes that support this.

The trajectory of travel

The Zero Carbon Act requires New Zealand agriculture to reduce biological methane by 10% through to 2030. This is at a sector level, not farm by farm. The pricing of biological methane via a farm-level split-gas levy is one of a long list of tools aimed at helping the sector to achieve this target, along with significant investment in R&D and services to start to explore incremental efficiency gains and so forth.

While it is not yet known for certain how biological methane will be priced, we do know the direction of travel for the sector, and we know the work that needs to continue. That continuous improvement requires significant investment from both the public and private sector:

- From the public sector, there is strong support from the likes of MPI's Sustainable Food and Fibre Futures funding programme and work to accelerate New Zealand agritech
- In the private sector, providers of capital (such as banks and investors) are increasingly looking at the impact of their lending portfolios. There are also some exciting evolutions in how financing is allocated and to where, not least of which is the growth of the sustainable finance market.

New Zealand has done well to promote the efficient, natural steps taken to produce world-renowned food.

While in recent years legislation has been one of the key levers of change within the agricultural sector, we are now entering an era where corporate sustainability targets and commitments will play a significant role in driving sustainability improvements.

There are organisations of all shapes and sizes, right across the economy, embracing the move to more sustainable business models in response to demands from multiple stakeholders at board level, central and local government, staff, communities, customers, as well as lenders and investors.

This growth in the rise of conscious investors starting to think differently about where they place their hard-earned dollars has been described as the 'great reallocation of capital'. The allocation of capital towards sustainable funds already has significant momentum, with the growth of global environmental, social and governance (ESG) investment predicted to reach $41 trillion by the end of 2022. This trend is mainly driven by Europe, but the wider global market is also starting to grow in this space.

Disclosing our impact

This momentum is also having ripple effects across the banking sector, where banks will (and are already) financing transitions to more sustainable business models. Within New Zealand, new frameworks providing reporting mandates have helped chart the financial sector's trajectory.

The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 is a new law (commonly referred to as TCFD) that will require around 200 large financial institutions to start making climate-related disclosures. The first expected disclosures are from FY 2023, subject to the publication of climate standards from the XRB.

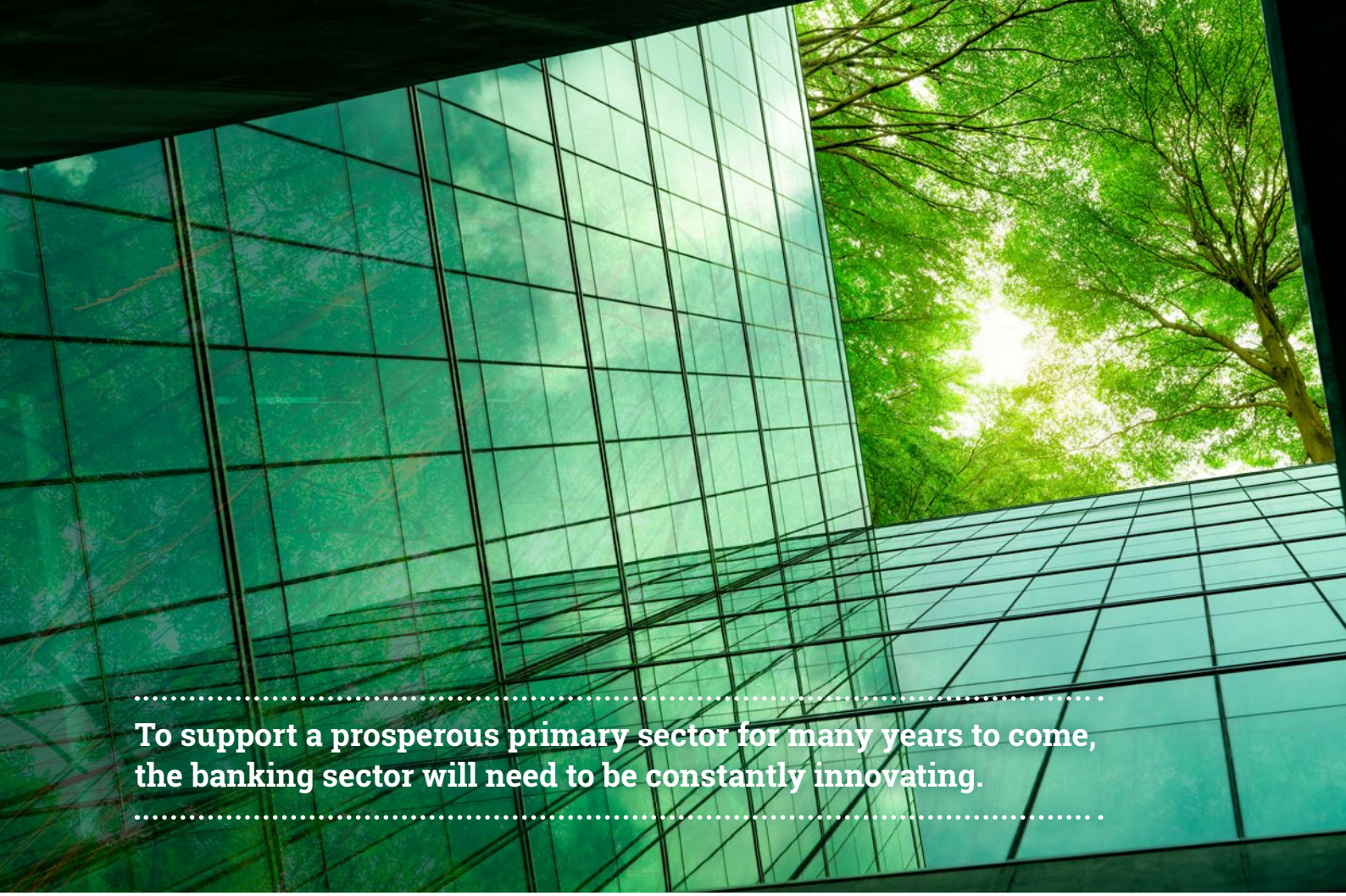
The goals of mandatory climate-related disclosures are many and include:

- Ensuring that the effects of climate change are routinely considered in business and investment
- Assisting climate reporting entities better demonstrate responsibility and foresight in their consideration of climate issues, leading to the more efficient allocation of capital
- Helping smooth the transition to a more sustainable low-emissions economy.

The Net Zero Banking Alliance has a significant role to play too. An industry-led, UN-convened voluntary commitment for the global banking sector, the Alliance currently represents more than 40% of global banking assets, with members committed to aligning their lending and investment portfolios to net zero emissions by 2050.

Combining near-term action with accountability, this ambitious commitment sees signatory banks setting intermediate targets for 2030 or sooner using robust science-based guidelines. This reinforces the key role that banks will continue to play in supporting sectors right across New Zealand to transition to low-emissions business activities.

The challenge for any company is to account for the emissions across their entire value chain, much of which is outside of their own direct control.



To support a prosperous primary sector for many years to come, the banking sector will need to be constantly innovating.

Sustainable finance

Sustainable finance is one way that banks can incentivise and support customers on their sustainability journey. There are new pressures emerging across the private sector that are likely to impact capital allocation in the future. As the largest suppliers of capital to rural New Zealand, banks have a critical role to help farmers and growers as they work towards a more sustainable future.

Sustainable finance is one of the key system levers that banks are engaging to drive change across various sectors. We are acutely aware of the impact that sustainable finance can play in supporting our most ambitious and mature customers to achieve their sustainability goals.

The first form of sustainable finance was launched in 2008 by the World Bank, has accelerated since the Paris Climate Accord in 2015, and has grown mainly through the issuance of sophisticated debt capital market products and green bonds.

Supporting the future of the primary sector

For the primary sector, this looks like finding new ways to offer incentives to ambitious, leading farmers and growers. We're seeing new forms of sustainable finance designed to help incentivise leading environmental and social practices on-farm, or offer cheaper rates to fund projects that help to 'green' some farming practices.

With rural lenders increasing their focus on what forms of support are available to farmers and growers, their commitments to sustainability indicates the same story that has been played out with the rise of the conscious consumer, a cost versus opportunity issue. You can wait to move, but ultimately it is going to cost you more the longer you wait.

It is heartening for us to see that farmers and growers understand this momentum too. Through surveys, farmers have outlined to BNZ, for example, that they expect the rise of the conscious investor to play a significant role in their farming business by 2030. They have asked banks to be innovative and think differently about how we support their ongoing efforts to improve their sustainability credentials and incentivise positive environmental and social progress, especially through sustainability linked loans.

So, it is clear that the work required of the primary sector will be challenging – there is an absolute desire across our farmer and grower communities to get on with things. To support a prosperous primary sector for many years to come, the banking sector will need to be constantly innovating. It will need to look for new ways to help customers use debt for good, and support the primary sector in a just transition, while acknowledging and backing farmers and growers across New Zealand to deal with the realities of farming today and make the most of opportunities for tomorrow. Together we know we'll find a way to the prosperous, sustainable and successful primary sector of the future.

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JENNY CAMERON

The Aotearoa New Zealand pavilion at the 2020 Dubai World Expo

CREATING A FUTURE FIT FOR A BETTER WORLD

This article shares insights into the *Fit for a Better World* roadmap and explains how it can help accelerate New Zealand's food and fibre sector.

Accelerated change

The world is changing, and we must change with it. The challenges in recent years have been plentiful: the impacts of the COVID-19 pandemic, the ongoing war in Ukraine, workforce constraints, supply chain disruptions, increasing extreme weather events and rising costs of fuel and fertiliser.

Our farmers, growers, fishers and foresters have been navigating these testing circumstances with resilience and determination. New Zealand's primary producers are some of the most highly productive and sustainable in world, but what we already do well can always be done better.

To adapt to the changing climate and market conditions that New Zealand is facing, we must be hungry for the knowledge that can put us in a better position to tackle the next major challenge and feed into future successes. By making smart alterations we can structure our food and fibre sector to build on our strengths of being agile and adaptive, while also recognising opportunities to develop new and emerging markets.

Integral to that is advice and guidance to build the capability of food and fibre across the country, with integrated plans vital to help producers meet consumer,

environmental and business needs. A bold plan to help accelerate New Zealand's primary sector exists: *Fit for a Better World*.

It emerged through the work of the Primary Sector Council, a group of New Zealand agribusiness leaders, which released a united vision for the food and fibre sector in 2019. Their *Fit for a Better World* concept outlined how sustainable production represents New Zealand's best and most prosperous future, and embraced the concept of Te Taiao – a deep relationship of respect and reciprocity with the natural world.

Building on that work, the Government launched the 10-year roadmap *Fit for a Better World – Accelerating our Economic Potential* in 2020 to aid the ongoing success of New Zealand's food and fibre sector, and to help enable our economic recovery from COVID-19.

It brings together actions, investment and resources that will work together to accelerate the transformation we need. It also draws together significant opportunities to add value across the agriculture, horticulture, fisheries and aquaculture, and forestry sectors.

Fit for a Better World roadmap

At its heart, the *Fit for a Better World* roadmap is about ensuring a strong future for our primary producers and rural and coastal communities, prioritising prosperity, resilience and a healthy natural environment. The roadmap sets a clear direction and articulates ambitious targets to reach by 2030. It is grounded in meaningful government-industry partnerships and is built on three pillars – productivity, sustainability and inclusivity.

Fit for a Better World values contributions from people across the sector who are supporting, challenging and correcting our strategic direction and course of action. Feeding into those efforts are three partnership groups:

- **The Food and Fibre Partnership Group** – consists of chairs and chief executives from across the sector, Māori agribusiness leaders and government agency chief executives, and works to consolidate the interests of the wider sector and recognise the importance of moving forward together
- **Ngā Pouwhiro Taimatua (The Māori Primary Sector Forum)** – provides strategic advice towards policy solutions and opportunities for how the Māori primary sector can best realise the potential of its whenua, communities and economic interests
- **Te Puna Whakaaronui** – is a primary sector think-tank convened to provide thought leadership, strategic analysis and capability with a commercial focus.

We also have the Ministry for Primary Industries (MPI), the Ministry for the Environment, New Zealand Trade and Enterprise, and the Ministry for Business Innovation and Employment to provide resources to help activate the changes we need.

By making smart alterations we can structure our food and fibre sector to build on our strengths of being agile and adaptive.

Fit for a Better World seeks to help everyone working across New Zealand's food and fibre sectors to see themselves in the roadmap's ambitions and principles.

Beyond developing targets and building relationships, we can promote acceleration opportunities to help take us to the next level. Mechanisms are in place to help primary sector businesses access funding to accelerate their growth, including the Sustainable Food and Fibre Futures fund and the Kānoa Regional Economic Development & Investment Unit.

Outcomes needed

What are the outcomes we're looking for?

- ***Kauneke tauwhiro* – sustainability.** New Zealand is playing its part in tackling climate change. *Fit for a Better World*'s goals include enabling the New Zealand food and fibre sector to meet its net zero carbon ambitions by 2050, and to contribute to the global effort to limit warming to 1.5°C. Together we can restore the health of our freshwater and environments within a generation and reverse the decline in New Zealand's biodiversity.
- ***Whaihua* – productivity.** Our target is to add $44 billion in cumulative export earnings over the next decade through a focus on creating value. Priorities will not only be maximising and enhancing our existing products, but achieving new products and new value streams, as well as opening more trade and market access opportunities
- ***Whakaurutia* – inclusivity.** We need to attract people into our food and fibre sectors by showing them that it is an exciting place to be, retain them when they come and invest in their wellbeing and education. The challenges are great, but the opportunities are great too. We need talented people to help us achieve our aims. We want to see 10% more New Zealanders employed in the primary sector by 2030.

Like all finely-tuned machines, those three pillars need to be balanced to ensure that we can maximise the benefits of our mahi. If we pursue productivity at the expense of sustainability and our workforce, then we are going to be out of balance, and we cannot sustain that.

Equally, if we pursue sustainability at the expense of our communities and livelihoods or at the expense of viable businesses, then that will also be out of balance. A three-legged stool that is out of balance needs to be propped up. With that in mind, we can find a sweet spot in the middle where we can have sustainability, viable businesses,

Our target is to add $44 billion in cumulative export earnings over the next decade.

assist rural and coastal communities, and achieve better workforce conditions.

To achieve success, we have to be vision-led. We must have our aspirations in mind, so that we know where we have to go. But the key element to this approach is the collaborative mindset: we must be business- and community-led and government-enabled.

It is important to note that no single person or organisation can achieve these aims by themselves. Being '*fit for a better world*' is not one action. It is going to take thousands of everyday decisions to balance those sustainable, productive and inclusive choices we need to make. We must do this together and we must do it across all our food and fibre sectors. We are all interconnected across our oceans, our land and our people.

Incentives for participation

Achieving these shifts will strengthen New Zealand's position as consumer demand, preferences and tastes evolve, and market and investment settings change to support climate and biodiversity action. Customers across the world are increasingly demanding transparent, ethical and environmental stewardship, as well as safe, high-quality products from food and fibre producers.

New Zealand already has a great global reputation, and the values that the world's consumers are seeking are familiar to us in terms of our traditions, including kaitiakitanga and mātauranga Māori principles. The people in our food and fibre sector are passionate about our environment and care deeply for the land. But our farming practices will face more and more scrutiny as international markets change.

We know from research by New Zealand Trade and Enterprise and Lincoln University's Agribusiness and Economics Research Unit that discerning global consumers are increasingly looking for sustainable attributes in what they buy. They are willing to pay a premium for those goods, in the same way that they prioritise purchasing food and fibre they know to be safe and of high quality.

The trust that is so key to our global reputation as a food-producing country is enhanced by our commitments to reaching and maintaining sustainability standards. There is a real incentive then for farmers and growers to adjust the way they work to shift away from volume to values, so that there is a premium added to what they produce.

By looking after the land, the land will look after us – for many generations to come. We are not just farming for today. We are farming for tomorrow.

Tackling our biggest challenge

To respond adequately to the challenges facing the food and fibre sector, initiatives must enable farmers, growers and businesses to adapt. It will require resources for research and development from both public and private sources.

A project that is gathering momentum is the Centre for Climate Action on Agricultural Emissions, signposted in Budget 2022 and launched at Mystery Creek Fieldays, to help tackle the primary sector's biggest challenge. It includes a 50:50 joint venture between Government and agribusiness leaders to work together on this issue. Partners include Fonterra, ANZCO Foods, Ravensdown, Synlait and Silver Fern Farms. Rabobank has also signed on to join the partnership.

These primary sector companies will work directly with government and research agencies to discover and develop tools and technologies that can reduce emissions (methane in particular) from our livestock systems. The public private joint venture is projected to see a combined investment of about $170 million over the next four years. It fits with *Fit for a Better World*'s vision of affecting change through meaningful partnerships.

By working together, we can help farmers reduce their environmental impacts more quickly and meet the sustainability standards increasingly valued by discerning export customers. What is good for New Zealand's economy can align with what is beneficial for our environment.

Exploring the science of regenerative farming

Science and innovation provide the tools to help us reach our goals by providing sound evidence upon which investment and farm planning decisions can be made. Ngāi Tahu and the Government have recently embarked on a seven-year study seeking to validate the science behind regenerative farming practices. Ngāi Tahu Farming, in partnership with Ngāi Tūāhuriri, has received $8 million in funding through the Sustainable Food and Fibre Futures fund for the research programme.

The $11.58 million project will compare side-by-side dairy farms in Canterbury with the same stock ratio to assess the environmental impacts of their practices. One 286 ha farm will use regenerative farming methods while the adjacent 330 ha farm will use conventional practices. The environmental, financial and social impacts of each practice can then be compared over time.

Key to understanding the outcomes of the project will be Ngāi Tahu Farming's relationships with research partners. It has contracted Manaaki Whenua – Landcare Research, DairyNZ, AgResearch, the AgriBusiness Group and Soil Connection as providers for the trial.

Researchers will analyse an array of metrics including water-use efficiency, root zone nitrate leaching, changes in soil carbon and nitrogen stocks, nitrous oxide and methane emissions, worker wellbeing, task diversity and productivity, benchmarking and evaluation, assurance standards and consumer trends.

What is good for New Zealand's economy can align with what is beneficial for our environment.

The data from the study will broaden our knowledge base by allowing for comparative analysis on underlying animal health, reproductive health and overall productivity.

Refining farm systems by honing conventional methods

Alterations to farming methods do not have to seem like reinventing the wheel. The N-Vision NZ programme aims to explore innovations and better harness existing resources to help farmers reduce nitrogen loss. The application of scientific technology will provide tools to offer farmers options to reduce environmental impacts while maintaining production and productivity.

Ravensdown is leading a $22 million study seeking to significantly reduce agricultural greenhouse emissions and nitrate leaching, with $7.3 million funded over seven years through the Sustainable Food and Fibre Futures fund.

The study offers three different avenues for innovation:

- A new soil test to inform nitrogen fertiliser decisions on pastoral farms, helping to capitalise on the nitrogen already in soil organic matter
- A fungal bio-inoculant to increase nitrogen use efficiency, examining how naturally occurring fungi boost the nitrogen efficiency of plants
- A new nitrification inhibitor technology looking at new methods to block the biological processes in the soil that result in nitrous oxide emissions and nitrate leaching.

The co-investment model will ensure the outcomes of the study, and the products and technologies that result from it, will be made widely available.

Developing new farm nutrient technologies

The mahi to identify tools for enhancing the sustainability and profitability of New Zealand's primary sector has been underway for some time. The five-year Future Ready Farms programme, led by Ballance Agri-Nutrients, began in 2020. It aims to trial and develop 12 farm nutrient technologies that will help meet national environmental targets for reducing greenhouse gas emissions, agricultural chemical use and nutrient loss to waterways.

One such project involves the development of a nitrate inhibitor for use alongside robotic technology that detects urine patches in paddocks, a significant source of nitrogen loss. The $25 million project received more than $10 million of funding from the Sustainable Food and Fibre Futures fund. Projections suggest it will bring benefits worth at least $1 billion to the food and fibre sector by 2030.

What will we look like in 2030?

There are numerous areas of investment that offer exciting insights into how New Zealand's primary sector might look in 2030. Passionate people are driving new product developments across a diverse spectrum, including in hemp, premium pet foods, sheep milk, deer milk, medicinal cannabis and seaweed.

Ongoing programmes of work are underway to help contribute to a brighter future. Industry Transformation Plans are underway to help set a long-term vision for change in agritech, food and beverages, fisheries and aquaculture, and forestry. A Horticulture Action Plan is aiming to improve grower margins and double farmgate value of production to $12 billion by 2030.

The Government is investing $25 million to recruit and train farm advisors to help farmers meet growing compliance requirements, recognising the critical role that primary industry advisors have in supporting producers to plan for their futures.

Fit for a Better World has been making measurable progress towards achieving its initial goals, but we know that progress is not linear. The world can be a messy place and can throw up unexpected surprises. The insights that drove the creation of *Fit for a Better World* are still relevant. Our core principles are still very much what New Zealand needs.

Refreshing and adapting our objectives will be necessary to ensure the roadmap remains on course to best take advantage of opportunities, assist our rural communities and fulfil the ambitions of New Zealand's primary sector.

We are right to focus on the importance of biodiversity and responsible environmental management. We are correct in prioritising the role of data to ensure that decisions for the future are evidence-based. We are seeing investments in digitally-enabled systems begin to pay off.

Telling our stories offshore so that consumers know our products, recognise their value and respect our methods is essential.

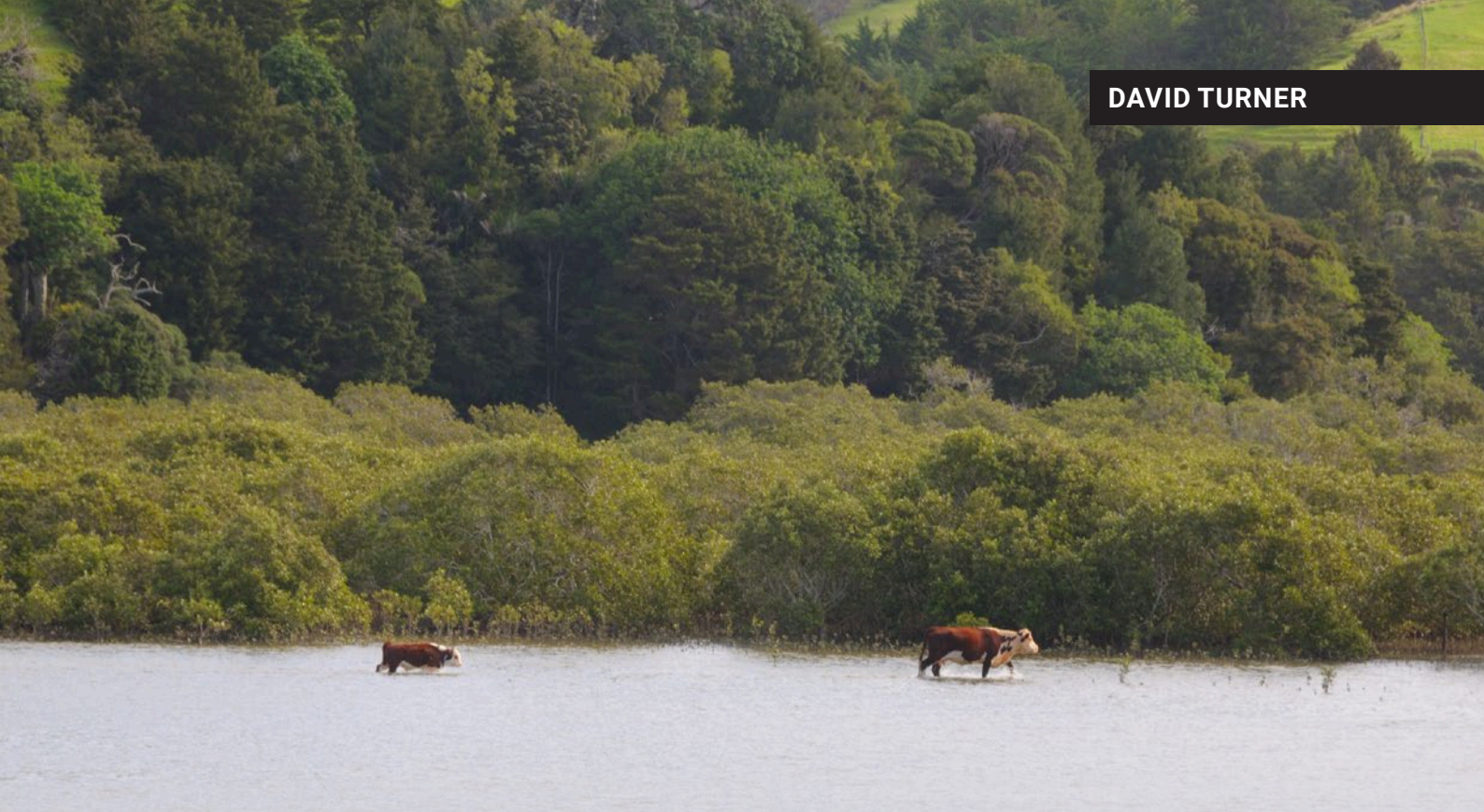
We have seen major wins with the UK and EU free trade agreements, which will expand our market access. We are consolidating and building on our relationships with trading partners, both regionally and further afield.

But the global context is always shifting. We see conditions change regularly and at pace. This underlines why prioritising resilience and adaptability is key for our primary producers, and why the focus of shifting away from volume and towards value is so important.

The success of New Zealand's food and fibre sector is built on trust. Telling our stories offshore so that consumers know our products, recognise their value and respect our methods is essential to ensuring we can thrive now and for many years to come.

Change is not easy. It can sometimes require difficult conversations. But together we can continue to build momentum so that New Zealand strengthens and expands its position as a world leader in producing sustainable, ethical, healthy food and fibre.

Jenny Cameron is Chief Transformation Officer at MPI based in Wellington. Email: jenny.cameron@mpi.govt.nz



DAVID TURNER

RISK MANAGEMENT TO ENHANCE DECISION-MAKING

This article looks at why risk management is becoming increasingly important in assisting all industries across New Zealand, and especially the rural sector.

Becoming more resilient

For frontline risk managers who know their industry well (farmers, farm consultants/advisors, support service/supply line or banking staff), what needs to be considered with risk management, and how can it be given appropriate attention?

When I grew up in Taranaki over 30 years ago, I often visited a relative's farm, and even on those short visits we could clearly see the amount of work required to run the farm business. This was a time when standards, compliance, health and safety, and the hiring of staff were not as high on the list of risks and issues compared to the demands of today's farms, as well as those placed on the rural sector overall.

Risk management has been around for a long time and across many industries, but it is often not officially learned or written down into processes and procedures. Rather, it is just known and practised daily like almost any other activity (e.g. planning, basic financial management, ordering, delivery, and health and safety).

Over the past 10 years risk management has increasingly turned into a key service because its practice can be quite complicated, procedural and heavy on reporting (raising the complexity). For many organisations that offer risk advice and risk management assessments and associated services, risk has become a very profitable and reliable source of revenue.

As the demands placed on rural businesses rise there is an increased need to practice good risk management. But there is an underlying perception that it is all too hard, expensive and complicated and that farm businesses need consultants and specialists to guide them. The reality is that farmers and their existing trusted advisors may be able do a certain amount of risk work themselves (and probably are already).

Common risks in agricultural operations

In my experience, the key factors placing risk at the forefront of the minds of farmers and farm consultants/advisors include, but are not limited to:

- Climate change and the effects of uncertainty
- Regulated environments
- Future thinking and planning
- The Ministry for Primary Industries (MPI) and its predictions
- Freshwater farm plans
- Animal welfare
- Wintering systems – stock and feed
- Markets and potential markets
- Carbon issues and profitable farming
- Financial viability
- Health and safety.

Strengthening risk management

Given the factors to the left, to enable good risk management moving forward, a stronger connection between rural professionals and farmers regarding farm business risk is suggested. Working together could benefit the practice of good risk management and reduce some costs, as well as potential stress.

For example, closer working ties could look more like the relationship set out in **Figure 1**:

Risk management has been around for a long time and across many industries, but it is often not officially learned or written down into processes and procedures.

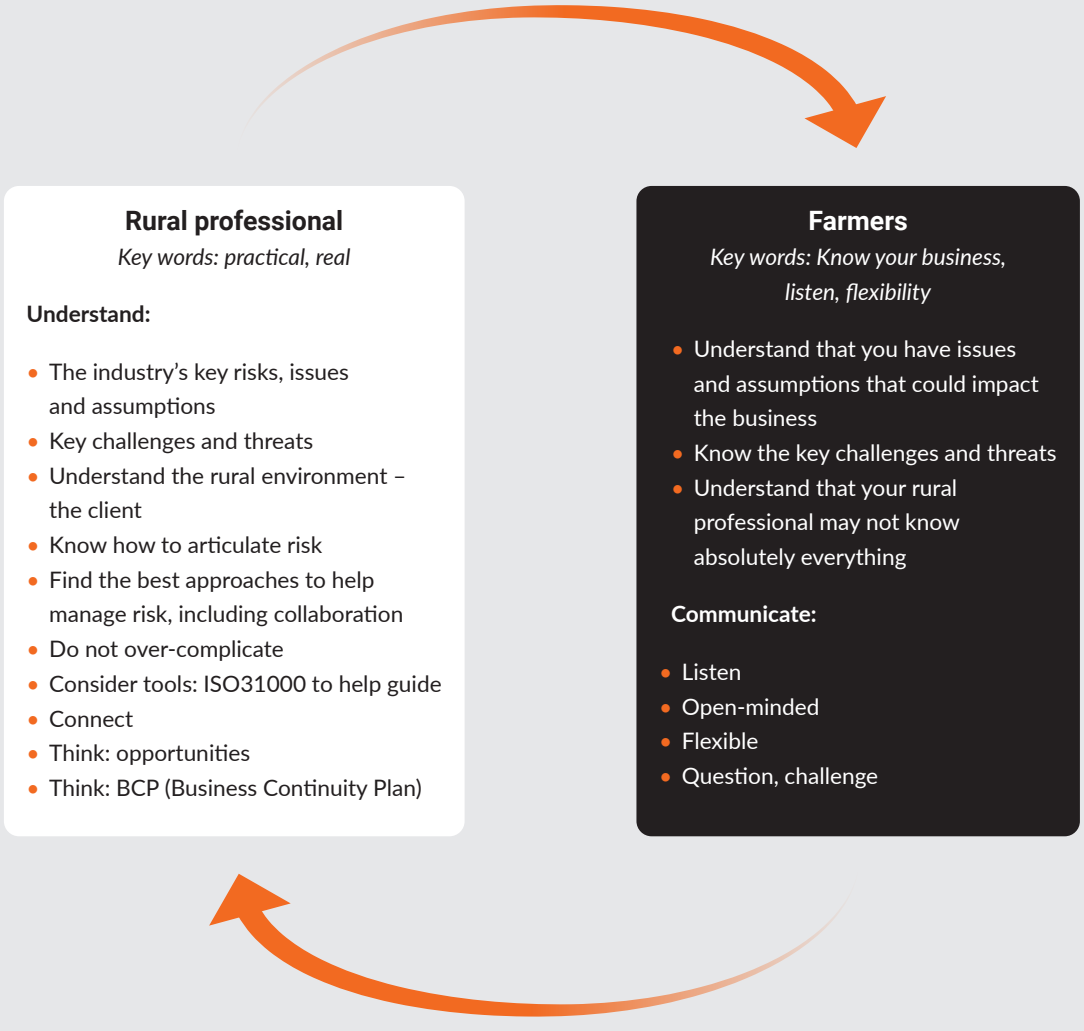


Figure 1: A better relationship between rural professionals and farmers regarding risk management

Business continuity planning document

After developing a good understanding of what risks exist and how they might be managed, the next step should be to develop and review a business continuity plan (BCP). This will be relevant to the risks that have been identified. It can also be a way to help with continuity should there be disruptions or crises that impact the farm business and should involve managers and governors alike.

The BCP is a document that guides a business through disruptions or crises by providing alternatives and contingencies for processes, procedures, stakeholders and partners, employees, key financial requirements and areas that are required for continued operations.

A typical BCP will provide checklists to work through that include IT, data back-ups, equipment, contact information for staff and suppliers, and guidance for either a longer-term or short disruption. In a farm business this would likely extend to the needs of livestock, feed supply and produce collection. The BCP is aimed at ensuring the business can still operate as effectively as possible during a disruption to lessen the impact on production and services.

However, while this might all work in theory, if not given enough attention, detail and understanding about how the BCP will work in practice if required, it can work against a business and impart a false sense of security about its capacity to respond. The key is to make it as realistic as possible by accurately identifying the risks and potential risks and issues and planning appropriately for these.

It is important to ensure that simple things like contact details are up-to-date and that the business puts the BCP to use as an exercise at least once every 12 to 18 months. These simulations can also be an effective way to develop a BCP. Running simulations will also provide the business and its stakeholders with trust and confidence that it works and ensure that the plan doesn't sit there as a good idea only.

Placing key risks and emerging risks into business planning will not only help decision-makers in understanding their business better to be able to prepare for the future, but will also provide confidence to other key stakeholders, such as lenders, suppliers and investors. This is especially so when a SWOT (strengths, weaknesses, opportunities and threats) analysis is done, coupled with up-to-date financial information and performance indicators, which are key to remaining sustainable and resilient.

A typical BCP will provide checklists to work through that include IT, data back-ups, equipment, contact information for staff and suppliers.

Good risk management means better resilience, so farm businesses are better prepared for what might come.

What to be careful of

Good risk management means better resilience, so farm businesses are better prepared for what might come, or what may be here right now (i.e. a current issue). However, farmers will at times benefit from seeking advice.

The key to good advice spans three areas:

- Knowing exactly why the advice is needed and what needs to be achieved from receiving it, so the farmer can articulate and demonstrate this well to their chosen rural professional/consultant
- The quality of information provided to the advisor or consultant. Rural professionals are only able to help correctly by knowing as much as possible about what their clients need to achieve and knowing the farm business well enough to provide accurate and calculated observations and decisions
- Most importantly, who the farmer receives the advice from. Consultancy, advice, guidance, or however it is described, will only be as good as the first two points coupled with the experience and capability of the person providing it. Farmers need to look hard at who they choose to help with risk management and never hesitate to ask direct and hard questions of their advisors. It might also require them to seek advice outside their existing group of advisors. This will help ensure that the rural professionals being engaged not only understand the farmer, the farm business and what needs to be achieved, but they know what they are doing and have the experience and knowledge to deliver well to reach the agreed objectives and outcomes.

Articulating risk to benefit the farm business

Have you ever asked for directions and could not understand the answer, and then became more confused than you were before you asked?

The goal of risk management should be that key decision-makers have the ability to quickly identify the top risks and issues they face within the farm business, and then communicate these externally with precision and conviction. When someone can do this off the top of their head, explain and articulate this well and demonstrate how these risks and issues are being managed, it reflects a large amount of understanding of the business. It will also help to ensure that keeping on top of the risks is more of a habit rather than a separate function that only receives attention now and then.

Understanding risk management can be a powerful tool and provide many benefits.

Having this knowledge and understanding can then be used for other important issues. For example, when a farmer is applying for any type of request, loan, grant or funding, having the ability to articulate the risks to the operation well lets other people know that decision-makers are completely across their business and its risk status.

Summary

To be more resilient is about understanding one's own business and environment very well, which means key decision-makers can adjust, change, redirect and take better ownership of what they do and how they do this. This will mean they are much better prepared for disruptions through crises, changes in markets, the weather and the economy, and in key areas of a business, such as safety, financials and staffing.

Understanding risk management can be a powerful tool and provide many benefits, particularly for farm businesses. When managers and governors truly understand the risks to their business, then they not only know their capacity, capability and limitations, but also their potential.

David Turner is CEO of Risk New Zealand based in Wellington.
Email: david@risknz.org.nz

Checklist for dealing with risks

You can workshop the risks – chat, talk, nothing is out of bounds. The following can be practised, enabling a clearer focus on risks and issues:

1. So, what are our risks? – collect the risks
2. What might happen if we don't manage each risk? – discuss the risks
3. Determine:
   - What is a critical risk for you?
   - High risk?
   - Medium risk?
   - Future and emerging risks?
4. Do we have:
   - Issues?
   - Assumptions?

Having gone through this process, farmers and their trusted rural professionals should have a much better insight into what requires attention, by who, and by when.

MARK ASPIN

LOWERING LIVESTOCK GHG EMISSIONS – THE PATH TO MARKET

This article discusses the challenges that a methane and nitrous oxide mitigation technology needs to address and the process through to adoption.

Finding workable solutions

In the September edition of *The Journal*, Sinead Leahy and Harry Clark from the New Zealand Agriculture Greenhouse Gas Research Centre provided an update on the main technologies under development for the reduction of methane and nitrous oxide. They also provided a snapshot of the progress towards them being ready and available to be deployed across New Zealand farming systems.

This article builds on the mitigation technologies these authors identified and provides a perspective on the challenges remaining on the path to market for them. It will also look at what other factors we will need to understand and address over and above the efficacy that they demonstrate, to support commercialisation and give confidence for farmer adoption.

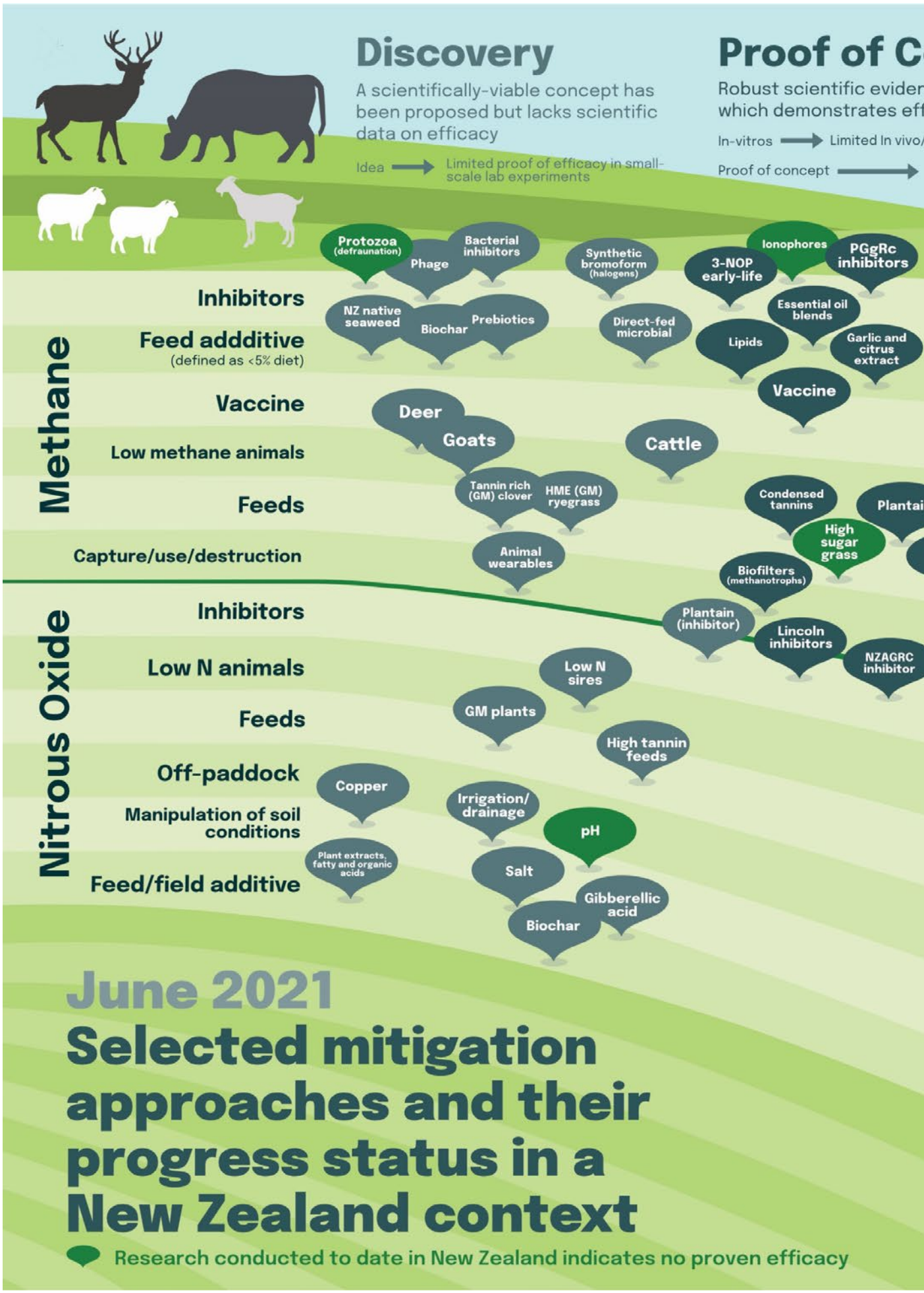
In addition to this requirement, we also expect mitigation solutions that enhance our products to meet global consumer needs, which increasingly include climate change aspirations. This article aims to show that while challenges remain, they are being recognised and addressed, and New Zealand's continued ability as an exporter of quality goods is enhanced.

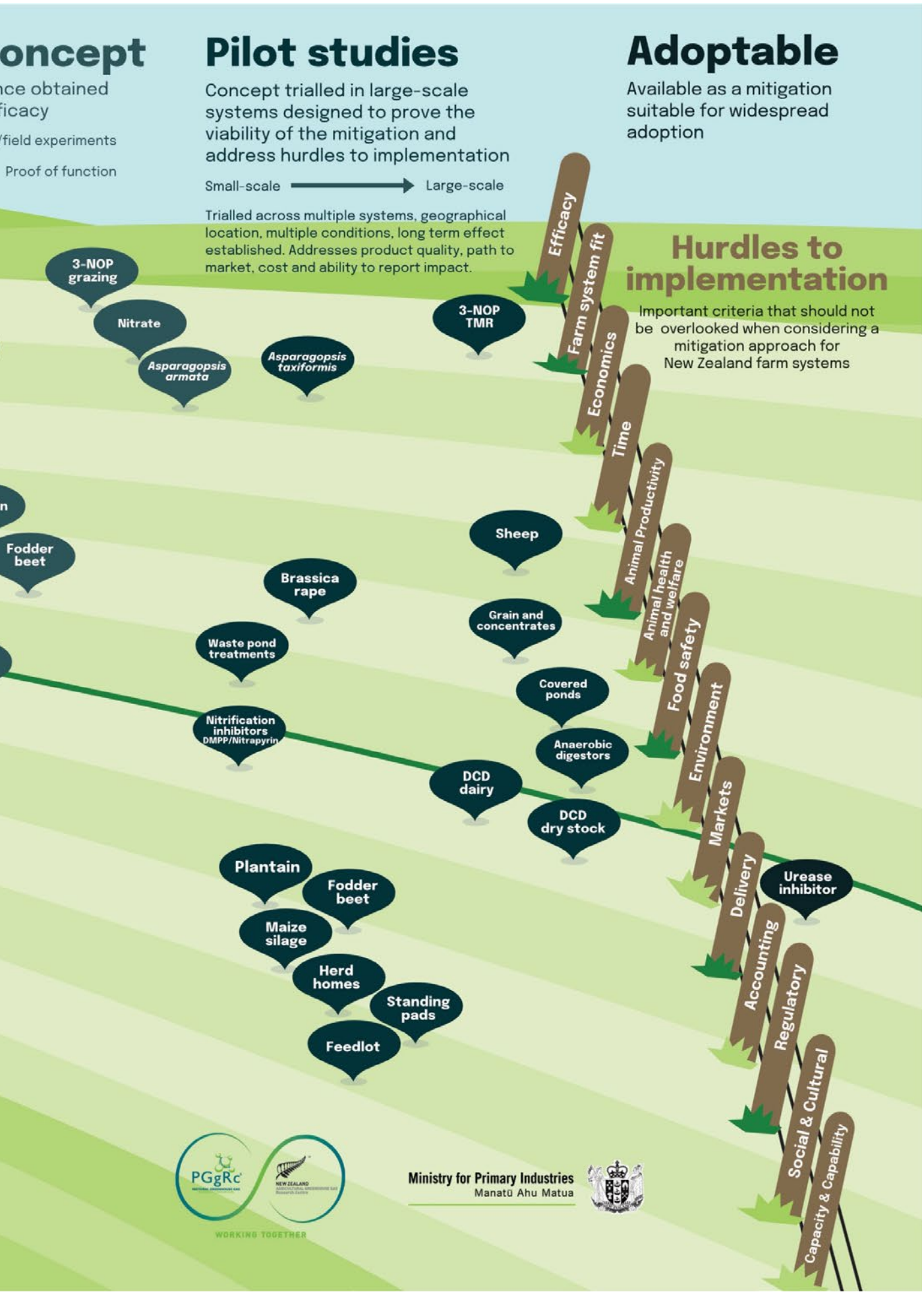
I draw on my experience as the Manager of the Pastoral Greenhouse Gas Research Consortium (PGGRC) responsible for the development of industry-driven research to find greenhouse gas (GHG) mitigation solutions. As a livestock industry investor PGGRC has been conscious of both these aspects in developing GHG mitigation options – finding low-cost mitigation options for our farmers while supporting the high-quality food and fibre goods we provide globally.

While primarily being focused on science to find options that work, we also developed an approach we called 'mitigation solution profiles', which drew on collective knowledge to identify what broader attributes need to be captured and understood to make a mitigation solution acceptable.

The research approach is a linear process, sometimes referred to as a pipeline, that mitigations progress along as they overcome barriers on the way to becoming a valid opportunity for lowering GHGs and being adopted. This pipeline has evolved in the New Zealand research landscape as we have taken on the challenge of applying science to find mitigation solutions.

To identify and discuss the barriers that must be overcome, it is important to be clear on what the goal of this work is, and appreciate the process that is used to develop and deliver mitigation solutions for livestock GHG emissions.


Discovery
A scientifically-viable concept has been proposed but lacks scientific data on efficacy
Idea
Limited proof of efficacy in small-scale lab experiments
Proof of C
Robust scientific evider
which demonstrates eff
In-vitros
Limited In vivo/
Proof of concept
Methane
Inhibitors
Feed addditive
(defined as <5% diet)
Vaccine
Low methane animals
Feeds
Capture/use/destruction
Protozoa (defraunation)
Phage
Bacterial inhibitors
Synthetic bromoform (halogens)
Ionophores
3-NOP early-life
PGgRc inhibitors
NZ native seaweed
Biochar
Prebiotics
Direct-fed microbial
Essential oil blends
Lipids
Garlic and citrus extract
Vaccine
Deer
Goats
Cattle
Tannin rich (GM) clover
HME (GM) ryegrass
Condensed tannins
Plantai
High sugar grass
Animal wearables
Biofilters (methanotrophs)
Nitrous Oxide
Inhibitors
Low N animals
Feeds
Off-paddock
Manipulation of soil conditions
Feed/field additive
Plantain (inhibitor)
Lincoln inhibitors
NZAGRC inhibitor
Low N sires
GM plants
High tannin feeds
Copper
Irrigation/ drainage
pH
Plant extracts, fatty and organic acids
Salt
Gibberellic acid
Biochar
June 2021
Selected mitigation approaches and their progress status in a New Zealand context
Research conducted to date in New Zealand indicates no proven efficacy


oncept
nce obtained
ficacy
/field experiments
Proof of function
Pilot studies
Concept trialled in large-scale systems designed to prove the viability of the mitigation and address hurdles to implementation
Small-scale
Large-scale
Trialled across multiple systems, geographical location, multiple conditions, long term effect established. Addresses product quality, path to market, cost and ability to report impact.
Adoptable
Available as a mitigation suitable for widespread adoption
Hurdles to implementation
Important criteria that should not be overlooked when considering a mitigation approach for New Zealand farm systems
Efficacy
Farm system fit
Economics
Time
Animal Productivity
Animal health and welfare
Food safety
Environment
Markets
Delivery
Accounting
Regulatory
Social & Cultural
Capacity & Capability
3-NOP grazing
Nitrate
Asparagopsis armata
Asparagopsis taxiformis
3-NOP TMR
Fodder beet
Brassica rape
Waste pond treatments
Nitrification inhibitors DMPP/Nitrapyrin
Sheep
Grain and concentrates
Covered ponds
Anaerobic digestors
DCD dairy
DCD dry stock
Urease inhibitor
Plantain
Fodder beet
Maize silage
Herd homes
Standing pads
Feedlot
PGgRc
NEW ZEALAND AGRICULTURAL GREENHOUSE GAS Research Centre
WORKING TOGETHER
Ministry for Primary Industries
Manatū Ahu Matua

The main driver for the methane emissions from livestock is the amount of feed they consume, explaining around 85% of the variation in emissions.

What are we trying to do?

It is known that the main driver for the methane emissions from livestock is the amount of feed they consume, explaining around 85% of the variation in emissions. The challenge in developing mitigation technologies is to find effective ways to decouple methane and nitrous oxide emissions from the feed intake needed to support productivity.

To reduce methane and nitrous oxide emissions we need to alter the biological systems through which they are produced. Simply put, there are four ways this can be achieved:

1. Remove the source of the emissions – lower the number of animals farmed or reduce the amount of urine nitrogen (N) being deposited on the pasture.
2. Lower the potential for GHG emissions by reducing the substrate for the emissions through a change in feeding and diet.
3. Target the microbiological process directly in the rumen (methane) or in the soil (nitrous oxide) to inhibit or reduce the amount of GHG formed and released.
4. Finally, there are the options of capturing and destroying or transforming the emission gases before they are released to the atmosphere.

Farm businesses are likely to consider all these approaches and may utilise them in part or collectively, depending on the economics, efficacy and practicality of the options. Essentially, this is a risk management decision informed by the data we have for the technologies and their fit with a farming operation.

All approaches are represented in the options that were profiled in the September edition and are being explored and developed. Each will have unique attributes that suit different farming systems and business enterprises to be favoured as a mitigation option worth considering. Those attributes will set them apart as an opportunity for farmers. However, they will all have been through the same process to get to being considered – a development path from discovery that culminates with an adoptable mitigation solution.

The stages of development

The goal is for a mitigation to become adoptable, defined as being a solution widely available and suitable for adoption, including being able to count in GHG terms on-farm and in the national inventory.

To become adoptable, all solutions have to go sequentially through and complete three stages:

- **Discovery:** A scientifically viable concept has been proposed, but lacks scientific data on efficacy, and through focused research this evidence is confirmed or the concept is rejected.
- **Proof of concept:** Robust scientific evidence obtained which demonstrates the efficacy of an acceptable level, across a few experimental stages from in vitro through to in vivo demonstration in target animal species or farm systems.
- **Pilot studies:** A proven concept trialled in large-scale systems that is designed to prove the viability of the mitigation and address the barriers to implementation. These studies will go from small-scale through to large-scale and will cover multiple farm systems, geographical location, and establish the long-term effects of a mitigation for all ruminant species. They are likely to be multi-year and across seasons.

There are no shortcuts to becoming adoptable. These three stages evaluate the options and provide the evidence and the confidence that they will provide a reduction in GHG emissions and address any implementation barriers preventing or hindering adoption and use.

What is required in a mitigation?

Given the focus for GHG emissions is how to reduce them, it is not surprising that most of the dialogue around the options is considering the reduction potential of a technology, but while this is certainly the priority it is only one of the factors we need to address. Within the PGGRC, and more recently the Biological Emissions Reduction Science Accelerator (BERSA) process, we have developed a more fulsome list of the criteria that will define whether a mitigation is 'fit for purpose' and therefore ready to be commercialised and deployed. These criteria can be split into two broad categories covering off efficacy and technology impacts, and they can be used to provide a comprehensive assessment and understanding of a mitigation that more accurately informs the wider impact to a livestock business when considered for adoption.

Given the focus for GHG emissions is how to reduce them, it is not surprising that most of the dialogue around the options is considering the reduction potential of a technology.

Efficacy criteria

There are six efficacy criteria:

- **Reach:** What is the potential to reach all the emission sources? Can it be expressed as a percentage of total potential, and does it fine tune expectations of the total reduction achievable?
- **Impact:** How much will the technology impact (reduce) emissions? This is assuming an expected daily impact of the mitigation and reflecting a realistic adoption rate to be considered. Very few approaches are going to be 100% effective or 100% adopted, and for the overall impact to be understood there needs to be an appreciation of how long a technology will be actively reducing emissions. For example, genetic selection has a low daily impact (1/365%) but it is happening every day, while an inhibitor may reduce methane by 30% but must be fed daily to continually achieve that.
- **Confidence:** How scientifically sound and relevant is the evidence? A subjective judgement (low-high) based on the level of evidence provided and the type of farming systems the technology has been validated across.
- **Farm system fit:** An assessment of the likelihood that a mitigation can work in different farming systems from extensive to intensive and across cattle sheep and deer.
- **Economics:** What will it cost to deploy and use? Are there capital or farm infrastructure costs required to make it work?
- **Time:** How regularly does it need to be applied? Can it be used tactically or strategically to meet GHG targets and goals for a farm?

Technology impacts criteria

These issues should be diagnosed and understood for any mitigation solution as these are the factors that can affect the wider farm business. A neutral or enhanced status requires knowledge of the impact on:

- Animal/pasture productivity
- Animal health and welfare
- Food safety and product qualities
- Environmental impacts outside of the targeted methane or nitrous oxide
- Market access and customer acceptability
- Meeting any regulatory requirements
- Accounting for farm business carbon impacts and inclusion in the national GHG inventory
- Social and cultural factors.

Farmers and consumers have an expectation that all these criteria will have been accessed and a known position on them publicly communicated. Without this understanding there may be significant risk associated with the use of these technologies. This is especially so for aspects that may be considered as showstoppers, where a mitigation is assessed for whether there are any veto or red flag issues stopping its use (e.g. known residues or a genetically modified organism is required).

Recent New Zealand Trade and Enterprise surveys show that 78% of European consumers reported sustainability as an important factor in their lifestyle in 2020.

The carbon market challenge

Many of the criteria identified are well-known and understood by farmers as everyday factors they need to consider to meet the consumers' needs of our global markets. However, the application of these in the context of GHG reduction and global carbon management is new in trade terms and will need to be addressed. In the face of a global intention to address human-induced climate change, accounting for the GHG emissions that products produce is (it would seem) rapidly moving. It is developing from a novelty way of marketing products to an expectation that all products will be able to account for their carbon footprint and be supported by evidence that there is an ongoing strategy to reduce this further.

At this point our trading partners do not require the adoption of carbon-reducing technologies and, as to whether countries would require them, it seems unlikely that they would go so far as to state how something must be done. It is more at a higher level of requiring sustainability more generally. This may change as more mitigation technologies become available and are widely used across the globe.

Recent New Zealand Trade and Enterprise (NZTE) surveys show that 78% of European consumers reported sustainability as an important factor in their lifestyle in 2020. This increased to 88% sampled by NZTE research in 2021. While sustainability covers many aspects of the way goods are produced, it is well-recognised that the carbon footprint is playing a larger role in this understanding as the effects of global warming are felt around the world.

In the global marketplace, this can be seen by the way that many multinational food companies have set themselves aggressive targets to reduce emissions under schemes such as the internationally-recognised Greenhouse Gas Protocol or having them approved by the Science Based Targets Initiative (SBTi) aligned to the United Nations.

Within these approaches an organisation's emissions are split into three scopes:

- **Scope 1:** Covers direct emissions from owned or controlled sources.
- **Scope 2:** Covers indirect emissions from the generation of the electricity, steam, heating and cooling bought and consumed by a reporting organisation.
- **Scope 3:** Includes all other indirect emissions that occur in a company's value chain.

This last scope captures many of the ruminant products that we produce here in New Zealand. As the other two scopes are addressed the focus is going to shift more directly onto these products and the GHG credentials they have. That challenges us here in New Zealand to get mitigation solutions proven and in farmers' hands as quickly as we can, and have in place the processes and systems that confirm our GHG footprint for them.

Regulatory systems required

The development of these systems is underway, building on the carbon accounting for the national GHG inventory already well-established and providing data across the economy to calculate the country's emissions and report them internationally.

Given that until recently agriculture was not required to directly reduce emissions and account for them, there was not a compelling driver for a regulatory system for methane and nitrous oxide mitigation products. To this point the only products registered in the national GHG inventory system as mitigations, and therefore recognised as being accepted internationally for reducing emissions, have been nitrification and urease inhibitors (both addressing nitrous oxide). With the adoption of the Zero Carbon Act 2019, the need for all mitigations to be recognised and incorporated as quickly as possible has now become a high priority.

Ensuring emission reductions made on-farm count in GHG calculators and in the national inventory system will be challenging. However, this is a crucial linking activity that is now being put together, so that the dual benefits of producing high-quality consumer products with lower GHG impacts can be realised by the farmers who produce them.

The Ministry for Primary Industries (MPI) is now addressing the challenge through standing up a regulatory system to ensure mitigation products are proven scientifically and registered if they wish to make label claims on reducing livestock emissions. An important link for this system is to ensure the GHG impact the products create can also meet the standards to be captured in our national GHG inventory.

New Zealand has opted to take a pragmatic approach by enhancing its current regulatory systems operating through the Food Safety Authority and Environmental Protection Agency, rather than go for a new unique approach. Systems are being incorporated to include inhibitory products for methane and nitrous oxide to be registered in a similar fashion to those used in food systems currently. As noted, importantly these will also need to reach efficacy standards that are consistent with how the national GHG inventory is calculated.

MPI has enhanced the Agricultural Compounds and Veterinary Medicines Act 1977 through an Order in Council

to incorporate these changes and have further plans to develop the system by a more comprehensive review of the Act soon. They are to be commended for the consultative and engaged approach they have taken working with industry to evolve the system. While MPI are the regulator and must set and hold standards that are recognised internationally for the benefit of all, they are conscious of the challenges these new evolving carbon-based factors are bringing to exporters and have shown a supportive attitude to helping to get a system that can work for all in place.

While the mitigation technologies are becoming registered, their application will be assessed at three points: on the farm (GHG calculators); at a product-level (Lifecycle Assessments or LCAs); and, finally, in the national GHG inventory. These three stages have different audiences that they have to satisfy.

The on-farm calculator allows a farm business to identify where the emission sources are and take steps to change them. Unless there are productivity benefits, incorporating a mitigation technology into the business must show GHG benefits, otherwise why bother?

An LCA identifies the carbon footprint of a product, which is becoming more commonplace, and is currently generally used to highlight the system components for GHG emissions and advantages over other competitors. Carbon footprinting is also the mechanism that underpins the certification of carbon credentials. This information is aimed at consumers to garner market preference. Finally, the national inventories present our position as a world citizen and support our contribution to international treaties and obligations.

It is critical that the flow of carbon emissions across these three points from the farm through to the national accounts is reported in a consistent and understandable manner. It is a significant challenge given the complexity of the task that will be addressed as each of these component parts are advanced. How this will be achieved and align with any pricing scheme that may be brought in is still to be decided and remains an additional challenge.

Finally, perhaps paradoxically, as it's the first question that farmers generally ask, there is one barrier that remains. Does reducing emissions lead to improved productivity from our ruminant livestock? While the improved use of N in a farm system may have clear benefits, the methane reduction–productivity question remains largely unanswered due to the lack of solutions that until recently could be applied, as well as the lack of longer-term farm-scale studies where a true answer can be confirmed. The answer to this remains in the science and understanding of the impacts of reducing methane and nitrous oxide emissions and the validation at scale across our farming livestock systems.

A clear productivity advantage through reduced emissions would drive uptake more rapidly without a doubt. Answering this question is a critical aspect of the plans to accelerate biological emissions reduction through science, which is currently being developed by government, science and industry in the Centre for Climate Action on Agriculture Emissions (CCAAE).

There are more than two billion ruminant livestock globally and the solution that we will employ will have a larger market than what we offer in New Zealand. That should provide some confidence that there will be commercial opportunities for companies to exploit as these technologies come to delivery.

This initiative was announced in the May Budget with an initial $338 million funding over four years. It will be looking to take the promise that the technologies under development have and boost their progress, so that we can adequately meet and prosper from the challenges that the reduction of our ruminant livestock emissions present our sector with.

Final comment

This article has not addressed the question of the economics of a mitigation technology and its carbon cost, which ultimately will have a major impact on whether a solution is deployed or not, or indeed whether the sector will be able to sustain its level of output in the long term. I have not commented on the commercial opportunity that the reduction in ruminant emissions offers companies who are developing and delivering mitigation solutions.

Clearly our dairy, beef, sheep, deer and goat industries are not alone in this challenge as there are more than two billion ruminant livestock globally and the solution that we will employ will have a larger market than what we offer in New Zealand. That should provide some confidence that there will be commercial opportunities for companies to exploit as these technologies come to delivery.

Acknowledgements

I am a member of the Working Group for BERSA. drawn from agriculture, Māori, science and government, and coordinated through MPI to develop a research and development plan for rapidly reducing methane and nitrous oxide. Thanks are due to my colleagues in the Working Group and PGGRC who contributed significantly to the development of the criteria explained in this article.

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HAMISH PENNY

WATER-SENSING TECHNOLOGY AN UPDATE

New water-sensing technology is being developed that allows growers to irrigate permanent crops exactly when they need it. The new technology equips growers to deal with increasing pressure from severe drought and changing consumer attitudes to the environmental footprint of production.

Changing climate

Many key agricultural regions in the world are under severe stress, with multi-year drought becoming the norm in some places such as California, Spain, South Africa and Chile. In New Zealand, we are currently faced with an abundance of water, causing problems for the opposite reason but with the same cause of human-induced climate change. The world is changing. Precipitation is becoming much less predictable and more extreme, which is putting pressure on food producers who have to learn to operate under these intense environmental pressures.

Compounding this, consumers are increasingly conscious of the environmental credentials of food and are changing habits as a result. An example is the shift away from almond milk after the water requirements to grow it joined the public consciousness. Quality data to support decision-making can help growers deal with these challenges and continue to successfully feed the world in the coming decades.

New sensor technology inspired by wine industry

A technology has been developed by Croptide, a water optimisation technology company, to monitor plants directly to gather precise insights that allow growers to irrigate permanent crops exactly when they need it. It is enabled by a sensor that attaches directly to the stem of plants, such as apples, grapes and kiwifruit, reading key metrics of plant status in real time.

The idea was sparked by hearing from winegrowers in Hawke's Bay about the improvements they had seen through the use of the pressure chamber to read mid-day stem water potential (SWP), a manual method for reading water stress directly from the plant. In particular, Villa Maria had achieved consistent water savings of over 50% and observed an improvement in wine quality.

The manual method involves placing a bag on a leaf to stop transpiration and allowing it to reach equilibrium with the stem, removing the leaf and placing it in a chamber,

then pressurising the chamber until sap flows from the cut point on the leaf. In simple terms, this indicates the negative pressure within the plant that it is having to use in order to draw water from the soil. A more negative reading means the plant is having to work harder to access water.

In talking to other winegrowers around New Zealand, it became apparent that there was a broader desire in the wine industry to leverage the benefits of SWP, but the labour requirements of the pressure chamber method were inhibiting adoption. As a result, we set out to use its unique measurement technique to automate the pressure chamber and provide data in real time.

Early prototypes were put together and trials were run with Villa Maria in wine and T&G in apples, both in Hawke's Bay. Results from these early trials provided proof-of-concept with consistent correlations between the data and pressure chamber readings.

Trials and other horticultural links

Although the New Zealand wine industry had started adopting the pressure chamber commercially, conversations with Zespri and T&G made it clear that the kiwifruit and apple industries were also interested in how they could optimise production with direct-plant data. There is also pressure on water consent allocations, particularly in Hawke's Bay, and growers were interested to have data to prove that they were using water exactly when plants need it.

Also, new varieties of these fruit are higher yielding and more sensitive to water stress. New plantings are also typically on more marginal soil. Newer production systems (including FOPS/2D, higher density of trees/vines) have created a combination of factors driving interest in the use of direct-plant data for the management of the modern orchard or vineyard.

Trials were conducted in New Zealand last season (2021/22) with partners Zespri, T&G, Indevin/Villa Maria, Pernod Ricard and Cloudy Bay across the Bay of Plenty, Hawke's Bay and Marlborough. The purpose was to gather extensive manual data from the pressure chamber and other sources. Over 1,500 manual measurements were taken throughout the season and compared to data from the sensors. This yielded encouraging results, with a consistent relationship between the sensors and the pressure chamber.

A key focus for us was to move into the northern hemisphere as soon as possible to gain the benefits of testing the approach for a second season in the same year. It also allowed us to understand the different cultures and challenges in the northern hemisphere. Existing partners were very supportive and provided introductions to offshore operations of their company or connections in their network. Fortunately, all but one of the offshore growers was interested and trials were set up in California (wine), Washington State (apples), Spain (wine), France (wine) and Italy (kiwifruit).

The offshore growers were very supportive and pleased that a New Zealand company was trying to solve one of their most important problems. Key learnings were gained in how the technology could be commercialised, and data from the very hot and dry summer in the US and Europe allowed significant technical progress.

Scalability

An advantage of the method used by the sensor is the scalability it allows, with a simple installation procedure and high durability (a life of approximate 10 years), which is important for enabling adoption at scale. The sensor integrates four small pins that are pushed into the living tissue of the plant. An analysis is performed, and the data is sent to the cloud using a LoRa network where it can be delivered directly to growers. A phone and web app have been developed to give growers access to the data.

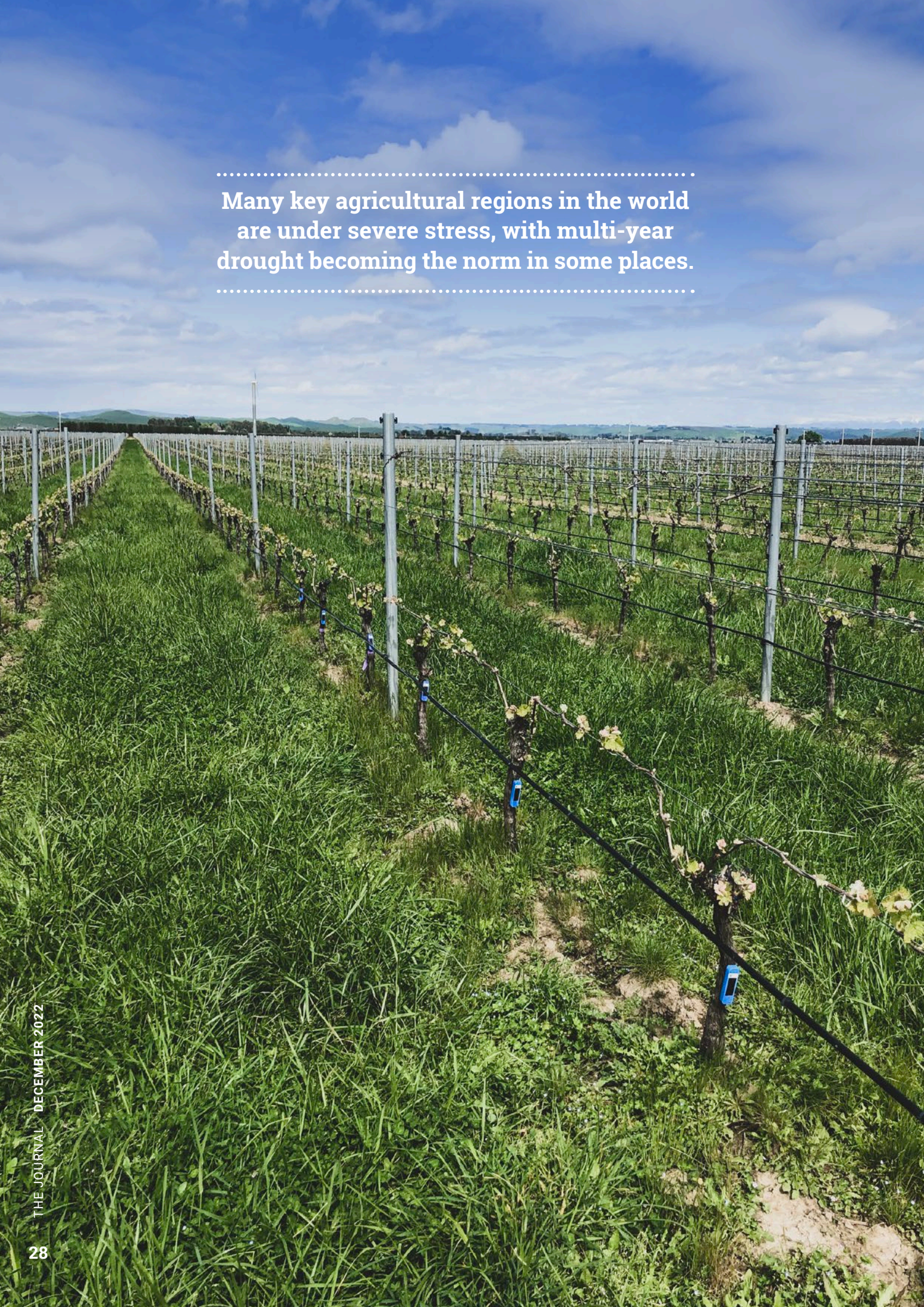
Although the development of the technology is still at an early stage, and there is much more work to be done in data analysis, two key metrics of water status are currently available to growers. The first is a metric of daily plant transpiration and the second indicates accumulated water stress through the season.

Overseas technology

There are several other companies also offering direct-plant measurement systems, most from Israel or the US. These technologies broadly fall into three groups:

- Using dendritic technology that measures the tiny changes in stem diameter throughout a day to judge water stress. This method has been around for decades, but companies are now digitising it and integrating it with other data to help guide irrigation decision-making. Two example companies are Supplant and Phytech.
- Measuring 'sap flow' using a system that emits a heat pulse in the stem tissue and times how long it takes for the pulse to reach a temperature sensor slightly further up the stem. This gives the litres per hour passing through the stem and can be used to observe when the plant is shutting down due to water stress, as well as offering a precise understanding of orchard water usage to guide the volume of irrigation to apply. This method has also been around for decades. Examples of companies trying to commercialise it are Treetoscope and Fruition Sciences.
- Novel methods to directly measure the SWP using a membrane implanted within the stem. An example is the Florapulse device that was developed over a 10-year period at Cornell University. These offer direct automation of the pressure chamber and have a reputation for providing good quality data if installed correctly. However, they have an issue that the plant tissue in contact with the membrane is slowly rejected as the plant tries to heal. This means that the sensor has to be removed and reinstalled into a new plant once a year.

Many key agricultural regions in the world are under severe stress, with multi-year drought becoming the norm in some places.



There is no doubt that direct-plant data is the future, but the key barrier to making this a reality is the low scalability of the existing methods.

The level of activity in the space is reflective of the increasing appreciation of the value of data directly from plants, as well as the increasing pressure on growers outlined earlier. There is no doubt that direct-plant data is the future, but the key barrier to making this a reality is the low scalability of the existing methods. The irrigation experts we have engaged with generally acknowledge that current methods for guiding irrigation, such as soil sensors, are in most cases insufficient to meet the challenges of the future.

Replication within a cluster

The initial product that has been developed by our company can deliver integrated sensor data with a web/phone app that also offers weather and management information. It allows a grower to see key metrics of plant water stress in real time. Currently, the approach is to concentrate a 'cluster' of six sensors into one or more measurement sites within a block.

This replication within a cluster allows a precise understanding of the site and is important as neighbouring plants have a surprisingly high variability. When taking pressure chamber readings, it is common for the SWP of neighbouring plants to vary by 20% or more. Using a replication of six plants in a cluster provides a statistical validity to the measurement of that point within an orchard or vineyard.

Water savings and quality

The current focus for the technology is on the three key crops of apples, kiwifruit and wine. These are the main crops in New Zealand, but we also have significant offshore markets in areas where there is a near-term commercial opportunity. Longer-term, the technology is applicable to any permanent crop with a stem diameter greater than about an inch. This includes citrus, avocados, almonds and cherries, all crops that have experienced production growth but face challenges around water efficiency and optimisation.

Although water efficiency can have a strong financial value proposition, particularly in regions such as Australia and California where growers pay for water, there are a range of reasons a grower would choose to shift towards direct-plant measurement. Quality is a key factor. The size and flavour of fruit and grapes is heavily influenced by the curve of plant water stress through the season.

In the wine industry growers can manipulate water stress to achieve particular flavour profiles in the harvested grapes. There is also strong evidence that the storage life of fruit could be extended with some specific improvements that could be made with direct-plant information, as well as harvest timing, and these are areas we are actively exploring.

Management efficiency

Alongside value from water savings and quality, there are significant management efficiency improvements that could be enabled with farm digitisation, with precise data a key factor. This is perhaps one of the most powerful drivers of technology adoption for growers. With labour becoming more scarce and more expensive, and consolidation of the industries an increasing pattern, digitisation is seen by growers as a way to do more with less.

The size and flavour of fruit and grapes is heavily influenced by the curve of plant water stress through the season.

Long-term vision

The long-term vision of the company is to provide a technology that integrates sensor data with other sources to provide a complete tool for guiding the optimised management of an operation. A key opportunity is using the dataset built through comparison of precise plant data with the yield and quality outcomes achieved at harvest each season to allow growers to constantly improve.

The concept would be to build a digital model of the property and use these data inputs to allow optimisation and prediction of yield and quality characteristics. For example, it is conceivable that a winery trying to achieve particular flavour profiles in wine could correlate data with the appearance of those profiles season on season. Over time an understanding of how to achieve that optimal output could be developed for that specific block.

In the 2022/23 season, 500 sensors will be deployed throughout the country and for the first time data will be delivered to growers in real time using the app. It is important that this technology is used to enable New Zealand to produce quality food and wine in the future with the minimum possible environmental impact.

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RACHEL DURIE & KEITH WOODFORD

Cows in Waikato composting shelter

COMPOSTING SHELTERS

Farmer experiences and case study modelling on a South Waikato dairy farm.

A recent project led by Rachel Durie from Perrin Ag, combined with technical expertise from Keith Woodford and funded through Our Land and Water, leveraged farmer knowledge to explore the impacts of incorporating composting shelters on a case study dairy farm.

Composting shelters

Composting shelters are a unique animal housing structure. Cows spend a proportion of time under a covered structure where they lie on a deep (approx. 600-800 mm) plant-based bedding material. Aerobic composting, aided by daily tilling and ventilation, mixes the bedding with urine and dung to create in situ composting. The heat generated from composting keeps the bedding warm and dry, allowing it to remain in place for one year or more before it is replaced and applied to land.

Farmer interest in these composting shelters is steadily growing as landowners look to operate more sustainable, resilient and profitable businesses. Limited knowledge within the New Zealand pastoral context, however, is available to support farmers and rural professionals in their evaluation of the system. Through an Our Land and Water Rural Professional's Fund project, whole system impacts of composting shelters in New Zealand were explored through farmer interviews and then quantified for a case study dairy farm.

Farmer interviews

Interviews and field tours across the Waikato, Hawke's Bay, Canterbury, Otago and Southland regions were conducted to capture existing farming knowledge and understand the qualitative impacts from incorporation of the shelters on-farm.

The unanimous response from farmers was that the investment in the composting shelters had been beneficial to their farm system, and none wanted to return to farming without a shelter. While most noted financial gain, it was the intangible benefits that were valued most highly and were the key drivers for investment. Of note were the consistent advantages across farms for increased cow comfort and welfare, improved staff working conditions or improved labour efficiency, better environmental performance and reduced pasture damage.

For all farms, the ability to winter cows either 24/7 inside the shelter or for a portion of each day was a key reason behind the initial decision to build. Most noted that wintering was a difficult and stressful time of the

The unanimous response from farmers was that the investment in the composting shelters had been beneficial to their farm system, and none wanted to return to farming without a shelter.

year and was 'hard on people, hard on cows and hard on the soils.' This sentiment came across particularly from the farms wintering on crop but was also noted by farms wintering on pasture.

For the latter, the damage done to pastures during inclement weather in winter was a key motivator, along with the desire to provide stock with shelter. Wintering was also specifically mentioned as an expensive process by three of the farms, both in the cost of cropping or grazing off as well as from damage done to soils and races. One of the farms noted the 'fact that cows could be fed much less was hugely inviting' given the lower feed requirements of cows housed in the shelter over winter.

Staff wellbeing was also mentioned as a key driver where having a labour efficient and stress-free farm system was highly valued – 'one of the ways to take the stress out of the system for the staff is to take the stress out of the system for the animals.' Composting shelters were seen as a way to do this. The ability to have cows and winter feeding all in one place, sheltered and out of the rain, was seen as a time-saver and a way of providing a better working environment compared to a winter cropping system.

Knowing at night that cows were sheltered, out of the rain and not making mud could not be undervalued through its effect on alleviating stress and worry for the farmer. Calving in the shelter also created a much cleaner environment for the cow and calf, and made night checks and intervention much more pleasurable.

There were two key approaches to incorporating shelters on-farm – a hybrid indoor-outdoor year-round grazing system, and a 24/7 indoor wintering system. Four of the farms interviewed utilised a year-round approach. While the specifics varied between farm systems and locations, there was a general trend of bringing cows into the shelter at night during the cooler, wetter months, and then during the warmer months bringing them inside during part of the day. In this way, cows could be sheltered from the weather (both sun and rain), and pastures could also be managed to avoid pugging or over-grazing.

In contrast, the Canterbury farm used the shelter for wintering and calving only, transitioning from an intensive winter cropping system with a portion of cows wintered off-farm to a system where all cows and replacements were wintered in the shelter 24/7 through the dry period. Silage was utilised as the sole winter feed diet and is provided through access to adjoining feed pads. Access to the feed pads is ad-lib throughout the day, but the amount of silage offered is restricted to 8-9 kg DM/cow/day.

The volume of feed imported to the farm system after incorporation of the shelter varied across the farms interviewed. One farm increased to a high input operation, while another reverted to a low input self-contained operation. The remaining farms made no changes, although the utilisation and composition of the feed imported or cropped may have changed.

All farms found the transition to a composting shelter system relatively easy, with cows and staff taking to the system well. Management of the bedding was the key new skill that had to be learnt by operators. Successful composting is key to ensuring a clean, warm and dry environment in the shelter, and relies on good management of the bedding and correct shelter design.

For successful composting to occur, bedding temperature and moisture levels must be maintained within the optimum range. This requires regular assessment and aeration of the bedding, and taking corrective action as needed. Assessment of the bedding varied between farms, with some having a dedicated staff member to frequently read the bedding temperature and take dry matter samples. Others relied on temperature readings only, and in some cases only visual assessment was used.

Understanding the corrective action to take when bedding temperature or moisture levels deviate from the optimum was noted as a key part of successful bedding management. For most, this meant having top-up material on hand when temperature levels needed to be lifted or if bedding was getting too wet. Frequency of full replacement of bedding was dependent on how often the shelter was being used, stocking rate, shelter design and management of the bedding.

For the interviewed farms, the lifespan of the bedding ranged from one year to 18 months, except for one farm with greater spacing per cow and lower frequency of use, where replacement has been planned for every three years.

All farms found the transition to a composting shelter system relatively easy, with cows and staff taking to the system well.

The overall impact to farm financial performance at a $9/kg MS milk price was a 33% increase in cash operating surplus (earnings before interest, tax, depreciation and amortisation; EBITDA) resulting from the increase in production.

Case study modelling

Knowledge gained from farmer interviews was used to inform modelling of a composting shelter system on a Māori-owned case study dairy farm in the South Waikato. The farm is a system 4 farm, milking 560 peak cows and producing 410 kg MS/cow. Incorporation of the shelters on the farm was analysed based on a year-round hybrid indoor-outdoor grazing system. Dry cows were modelled to be wintered for 18 hours per day in the shelters from dry off through to calving. For the rest of the season, the shelters were utilised for feeding, pasture management and provision of shade.

Total feed imported remained the same under both the status quo system and composting shelter scenarios, but total feed (pasture and supplement) eaten increased by 6% under the composting shelter model. This was a result of an increase in feed utilisation, combined with a 5% increase in pasture growth from mitigating the impacts of over-grazing and winter pasture damage.

Using the shelter to winter cows replaced the current pasture wintering system with half the herd wintered off-farm for four weeks. Winter feed requirements reduced from offering 11 to 9 kg DM/cow/day, allowing more feed to be made available through the milking season.

The increase in feed eaten, improvement in feed conversion efficiency and mitigation of heat stress was modelled to increase production by 14% on the case study farm, equivalent to an additional 57 kg MS/cow (+186 kg MS/ha). The way in which an individual farm alters the

Tilling of the bedding in a South Island shelter

diet following incorporation of the shelters will be a key determinant of the impact to milk production, as will the level of improvement in feed conversion efficiency achieved.

Two shelter design scenarios were modelled for the case study farm, each with a high and low capital cost model reflecting the range of options available to farmers. Scenario 1 models were based on a rigid roof design and Scenario 2 models on an industrial fabric roof design. The difference between the high and low capital cost models within each scenario largely reflects the level of concrete used.

Some farmers opt to include concrete for large parts of the composting structure and surrounding area, including tractor lanes, feed alleys and walls, cow stand areas, compost retaining walls, and connections to other farm infrastructure. The high capital models reflect this scenario. In contrast, some farmers choose to limit concrete and may only include it for the cow stand area, compost retaining walls and turning apron, utilising other materials (i.e. timber, gravel or compacted rock) as a substitute. This is what the low capital models reflect.

Some farmers may also choose to limit concrete even further, having none within the shelter and very minimal concrete surrounding the structure. They may only have the base of the feed alley as concrete. Often, this decision is made based on potential animal health implications (e.g. lameness), as well as minimising initial cost. This scenario has not been modelled. Total capital costs, inclusive of the shelter, earthworks, surrounds and machinery, ranged from $1.8 million ($3,324/cow) for the lowest modelled capital cost option to $2.6 million ($4,546/cow) for the highest modelled capital cost option.

The overall impact to farm financial performance at a $9/kg MS milk price was a 33% increase in cash operating surplus (earnings before interest, tax, depreciation and amortisation; EBITDA) resulting from the increase in production. While savings were made in off-farm winter grazing, this was offset by the new bedding expense and small increase in repairs and maintenance.

The investment performance was assessed at the pre-tax level using discounted cashflow analysis. Over a 50-year investment period, the expected lifespan of the structure, the resulting whole business return ranged from 6.8% to 7.4%, depending on specific capital cost decisions, and was above the 6.3% return achieved from the status quo system. The return on the composting shelter system investment itself, based on the new capital expenditure and consequent changes in net cashflows from the status quo, ranged from 8.4% to 12.4%. The return on investment at a 25-year lifespan was not significantly different.

For the South Waikato case study farm, additional production from the composting shelter scenarios was necessary to generate a return greater than the status quo. For farms where the cost structure can be significantly reduced following incorporation of the shelters (e.g. systems where in-shelter wintering could replace intensive winter grazing on crops), the level of additional milk production needed will likely be much less, and there may be some situations where no extra production is required.

Environmental modelling, using OverseerFM (v6.4.3), showed significant improvements in nitrogen loss under the composting shelter model, with a 45% reduction in nitrogen leaching. This was a direct result of reducing time on pasture, with cows spending an average of six hours per day in the shelter. This reflects 18 hours per day through the dry period, and four to six through the milking season. Greenhouse gas emissions were more challenging to quantify given the lack of science available to model the in-shelter aerobic composting process.

South Island composting shelter

Overall conclusions

There is no right or wrong decision when it comes to determining shelter type (i.e. rigid roof or tunnel roof) or the extent of concrete. In many cases, the farm location and system specifics may refine the number of options available, and conducting sufficient personal research is critical to ensuring the design is fit-for-purpose and will enable successful outcomes.

The case study modelled in this project considered impacts to the farm system at a whole business level under an owner-operator structure. When considering investment in composting shelters, thought should be given to the impact of operating structure on the likely performance of the system. Specific skills are needed to ensure a focus on management of the bedding and taking corrective action if intervention is needed. Regarding financial performance, and in the case of a 50/50 sharemilking arrangement, many of the benefits would be shared with the sharemilker. With capital costs typically paid for by the landowner, the net benefit to the owner would likely be reduced under a standard sharemilking structure.

Both the farmer interviews and case study modelling identified that composting shelters provide diverse benefits to the human environment, the physical farm system and to animal welfare, and encapsulate enhancement of Te Taiao. The overall economics appear sound.

However, significant capital expenditure is required and this needs to be budgeted with care. Also, it needs to be recognised that composting shelter developments in New Zealand agriculture are currently being farmer-led, without formal research and development programmes to guide the way. Inevitably, there is much more to be learned.

Further reading

More information on this project including reports and video can be found at: www.perrinag.net.nz/projects/composting-shelters/

Acknowledgements

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HELEN FRANCE

This profile looks at the life and career of Central Districts branch member Helen France.

'In the blood'

Helen grew up with sharemilking parents, moving around the Waikato, Hawke's Bay and the Manawatu, then finally settling in South Wairarapa. She was very much part of the dairy farm, helping where possible and loving the farm life. It was a natural pathway to go on to study an AgScience degree at Massey University. There was a moment, however, where it could have been nursing as her mum was a district and rural nurse as well as a farmer. It was a difficult decision, but farming opportunities and challenges are immense and it was already built into her DNA.

Going to Massey University in 2012, she completed her Bachelor of Agricultural Science at the end of 2014. Throughout her studies, Helen realised her passion was for soils, which is where the whole farm system starts. After study, she had her doubts when applying for rep jobs because she didn't have full confidence she was 'outgoing' enough. Little did she know that you don't have to be outgoing to be a rep.

Helen then applied for the Ravensdown Graduate programme, which commenced in 2015. This was an ideal starting place to continue her passion for soils and extend her knowledge in farm systems. For her, it was a great foundation to her ag career. Being in the graduate programme meant an opportunity to work in different parts of the country, including Christchurch, Ashburton, Balclutha, Dannevirke, and finally settling in Feilding.

During her time at Ravensdown she completed her nutrient management certification. To keep up with the changing rules and environment, she has also since gained greenhouse gas (GHG) certification. For her, the more sharing of knowledge and empowering of our farmers, the better we can tackle the issues and changes, present and coming.

Current role

After five-and-a-half years at Ravensdown the next opportunity landed Helen at Genetic Technologies – Pioneer Brand Products and she is now the Area Manager for the Hawke's Bay, Tararua and Wairarapa. Helen has been in the role since 2020 and says it is quite a change going from a farmer-facing or direct scenario to one where you are a supplier rep and work mostly with farmers through merchants. This has provided new skills and extended knowledge, especially where there is a lot of training with the merchants. She finds it extremely rewarding teaching and passing on her knowledge to merchants and farmers.

Helen believes there is great deal going on in the farming industry now and so much information that it is very easy to get overwhelmed by it all. She tries to help farmers unpick some of that information, and believes that understanding the 'why' in what we are doing is a crucial part of doing this.

It is also becoming more and more important to look at the efficiencies of systems and Helen hopes she is supporting some of this by providing advice and help around agronomy, including using her previous nutrient management knowledge. She enjoys getting to know the farms and how they operate, and really values the relationships that are built with people.

Helen realised her passion was for soils, which is where the whole farm system starts.

It is these relationships that are critical, as again, without understanding the people and the operation, it limits the ability to be able to help. She values being able to add meaning to her job by delivering support and advice, but seeing the businesses improving and becoming sustainable and successful.

The environment

Helen has been discussing GHG issues with farmers and is concerned about the potential impact on farms, especially flowing on from the government's response to the He Waka Eke Noa proposals. She feels that this is particularly so given the limited mitigation options available to farmers, the need to permit on-farm vegetation to be allowed to offset on-farm emissions, and the likely impacts on rural communities.

Industry and community activities

Helen is currently a member of the Central Districts NZIPIM branch, which she joined in 2016. She values the ability to sign into the webinars to gain knowledge and share/learn from others.

She also successfully completed the Kellogg Rural Leadership Programme in 2020. During the programme she gained enormous insights from the people she met, as well as from the guest speakers and the depth and breadth of the course content.

She has also been part of the dairy industry awards committee for the last three years, but has stepped down this year to give someone else the opportunity. She believes it is a great programme of awards, although is concerned that it struggles to get entrants. It is an opportunity to display dairy farming positively and to share the knowledge and skills in the dairy industry. It is also a great chance to network, gain prizes, and get off-farm

Helen has been discussing GHG issues with farmers and is concerned about the potential impact on farms.

In her spare time, she enjoys getting outdoors – playing hockey, squash and dabbling in some triathlons. She is also part of the Volunteer Operational Support Unit for the Palmerston North Fire Brigade. This means she attends fire calls where the fire-fighters need help or support. This is not on the frontline, but with traffic management, lighting, resources and clean up. Helen enjoys the contrast this provides to her other work and the support it brings to the community.

She has also completed 'It's all about you', an agri-women's development trust course, which she believes is important with the growing number of women in the industry. Women are an essential part of the agricultural industry and it is crucial that they can understand where and how they can play their part. Helen believes that getting confidence and support from each other is key to empowerment.

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