



The great New Zealand balancing act

Delivering sustainable emissions
reductions, food security and
economic prosperity



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“We believe that New Zealand needs to maintain an appropriate balance between a strong economy, food security, reducing emissions from agricultural activity and protecting the health, wellbeing and vitality of our rural communities.”

Foreword



How we reduce carbon emissions while increasing production to ensure food security is shaping up as the challenge of our age.

In August 2022, we published our first Rabobank New Zealand white paper – *Steering into the food transition* – mapping out the high-level issues and terrain in this critical debate for New Zealand agriculture. The 12 months since then, including the extreme weather events in parts of the North Island, have underlined the enduring importance of food and agriculture to the New Zealand economy and the wellbeing of our society.

As New Zealand's only specialist food and agri bank, we are pleased to publish this sequel. *The great New Zealand balancing act* also aims to help our customers and other leaders in the public and private sectors negotiate these existential challenges and opportunities.

We believe that New Zealand needs to maintain an appropriate balance between a strong economy, food security, reducing emissions from agricultural activity and protecting the health, wellbeing and vitality of our rural communities.

We look forward to continuing dialogue and collaboration on a myriad of activities to help drive an equitable food transition for New Zealand as we stand up for our place in the world.

We are proud of our work in supporting the resilience of rural communities, championing the role of food producers and promoting just transitions to lower emissions production.

We trust this report is a valuable contribution to these ongoing transitions.

A handwritten signature in black ink, appearing to read 'Todd Charteris'.

Todd Charteris
Chief Executive
Rabobank New Zealand

Summary

Like many countries, New Zealand faces a challenging balancing act of competing national priorities as it seeks to significantly reduce greenhouse gas emissions over the coming years.

New Zealand needs to meet its climate commitments, but at the same time, it must ensure its agricultural industry continues to underpin its national economy and helps to feed and clothe a growing world population.

Agriculture is the cornerstone of most rural communities in New Zealand, and its positive impacts reach further than you might think.

Approximately 16% of New Zealand's population live in rural areas, and around 35% in total live in rural or semi-rural locations.

Policy to sustainably reduce emissions needs to equally consider economic and social sustainability alongside the environment.



Emissions efficiency is the key to balancing competing national priorities

- **Penalising efficient New Zealand operators must be avoided** as it threatens food security and increases total global emissions by encouraging less-efficient producers abroad to grow their output.
- **Achieving excellence in emissions efficiencies on farms per output unit** to deliver on the combination of reduced emissions and growing agricultural production. The world needs highly efficient operators to continue to sustainably produce food and fibre and to avoid carbon leaking – the transfer of production to less carbon-efficient operators in other regions.
- **New Zealand's economic balance and the prosperity of its rural communities are at risk** if farm production (growth) is limited, as the food and agriculture sector is a crucial GDP contributor.
- **Agriculture is a major source of employment in rural areas.** The impact of Government policies on communities and their financial and social wellbeing can be significant.
- **Food is a key inflation driver.** A slightly undersupplied global market results in rising prices and threatens affordability – even in a place of relative abundance like New Zealand.

Achieving harmony in all facets of sustainability – how do we achieve emissions reductions while maintaining global food security, national budgets and rural prosperity?

1. Absolute Government emissions reduction targets require a **pathway to support industry transition to excellence in emissions efficiency per output unit.**
2. **Food waste reduction** is important but won't be enough to deliver the needed change alone.
3. **Meat and dairy will still be needed** as alternative proteins remain an option for only a few consumers and meat and dairy are also needed from a nutritional standpoint.
4. **Building a political and financial framework to support efficient farms** to grow production while strengthening their sustainability and improving the efficiency of average farms.
5. **Consumers must emotionally buy in, which requires stories that build trust in the changes** to increase their willingness to pay for environmental services delivered by farmers.
6. **Linking market access and trade agreements to sustainability** are core issues for New Zealand exporters to ensure their products remain price competitive and supplies remain strong.
7. **Increasing the value of exports rather than just the volume of exports.** Adding to basic farm products through exports of higher-value products.
8. **Incentivising rather than forcing change.** Farmers are agile business people and positive economic incentives can be the most effective way of encouraging a large-scale transition.
9. **Creating an environment that appreciates research and development** – a wave of innovation is needed.
10. **Ensuring careful offsetting of emissions** as we realise the benefits and not just the costs to farms and rural communities.

The global landscape of climate and food

Climate change is a major threat on a global level

Extreme weather events as well as adverse impacts on biodiversity and nature caused by climate change, including the higher risk of floods and droughts, are increasing costs to the economy and threats to society. Damage to infrastructure, disruption to communities and threats to our ecosystems ultimately negatively impact the income, livelihood and wellbeing of our population. Limiting global temperature increases requires major efforts by politicians to set clear targets such as the Paris Accord and enable positive change. This includes industry implementing meaningful changes and consumers making changes to reduce waste and paying premiums to reward the positive actions implemented by the whole supply chain.

Closely related to climate change and emissions reduction efforts is the challenge of addressing biodiversity loss. Global policy makers are already focusing on this, and farmers and the food supply chain will be instrumental in successfully delivering on the needed changes. This will often require similar approaches and considerations to those discussed in this paper.

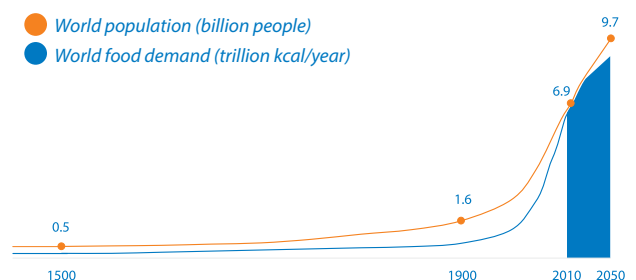
Food security and affordability remain major issues to tackle

Food security is a major challenge, and emissions reduction efforts must not result in reduced food supply. Global supply and demand for food products are very sensitive systems, and even a marginal undersupply can result in significant price increases. High prices force consumption reduction to balance supply and demand – often the poorest of the world's population are forced to cut back, increasing instances of malnutrition. As food is a major inflation driver, the impact is quickly felt by consumers, even here in New Zealand where food is relatively abundant.

The global population is 8 billion today and expected to peak at 10 billion in a few decades. This creates a global challenge for agriculture and the food supply chain to meet an increasing need for affordable calories and nutrients. Global supply and demand for food are usually narrowly balanced, but today a sizeable number of people around the world are starving as they cannot afford food. To serve the strong growth in demand for food and fibre, farmers around the globe need to produce significantly more, and in a sustainable way, every year.



Figure 1: Longer-term outlook for global food demand growth



Source: CSIRO 2011 (global food demand); UN World Population Prospects 2022, Worldometer (population statistics)



Enabling opportunities by balancing and incentivising climate, food and rural priorities

The right policy directions and incentives can unlock a real opportunity for sustainable food production.

This rewards farmers and the supply chain for their service, benefits consumers with desired food quality and emissions footprint and delivers sufficient affordable supplies to importing nations.

It also benefits New Zealand's economy and supports rural prosperity while helping to mitigate the negative impacts of climate change.



Climate change: a real threat to New Zealand

New Zealand's economy incurred \$840 million in costs from climate change-related flooding and droughts between 2007 and 2017, while the flooding events of early 2023 cost the economy an estimated \$1.76 billion.¹ At the same time, consumers faced higher prices for food, vehicles, housing and construction due to natural disasters.

Arguably, climate change has a disproportionate impact on agricultural production:

- *Flooding* destroys or damages crops, livestock and critical infrastructure.
- *Droughts and heat waves* reduce productivity and increase resource usage. Severe droughts in the agricultural sector, especially on livestock properties, often have multi-year impacts as herds must be reduced and rebuilding productive livestock inventories requires multiple seasons.
- *Fluctuating water availability* – rivers and lakes experience volatile volumes and seasonal timing of water entering, moving through and exiting freshwater environments as rainfall, snowfall and melting of snow change. Irrigation becomes more complicated, affecting the productivity of crops.
- *Warmer temperatures* threaten existing crop and livestock production systems and may heighten pest and disease risks within seasons. However, increasing temperatures could provide opportunities for the growth of new crops in some areas.
- *Changing wind patterns* and intense storms may lead to higher soil erosion and reduce the productivity of farmed land and damage infrastructure.
- *Heavy snowfall* can cause persistent low temperatures that impact the productivity of farming activities. Melting of snow can lead to flooding, intensifying the problems already faced.

¹ Evans, S. (2023, May 3). New Zealand flood industry loss estimate raised 6% to NZ \$1.76bn. <https://www.artemis.bm/news/new-zealand-flood-industry-loss-estimate-raised-6-to-nz-1-76bn/>

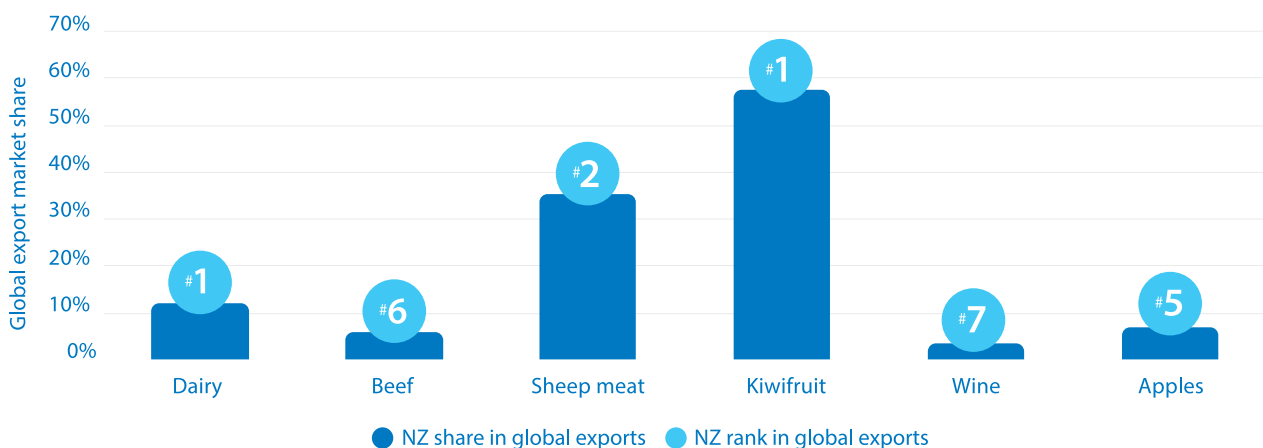


New Zealand's obligation to deliver on global food security

New Zealand farm exports are essential for the country's economic and rural prosperity, and these exports also provide essential nutrients to importing nations. The world relies on global trade to provide its rising population with food, fibre and energy for two main reasons:

- Consuming countries cannot produce sufficient volumes domestically and rely on imports for their population's food security.
- Consuming countries cannot produce the volumes needed efficiently and/or economically. This goes hand in hand with sustainability and emissions considerations – food that cannot be imported needs to be produced by operators who require more inputs and may emit more emissions per output unit.

Figure 2: New Zealand is a major supplier of food to the world's import nations (in value terms)



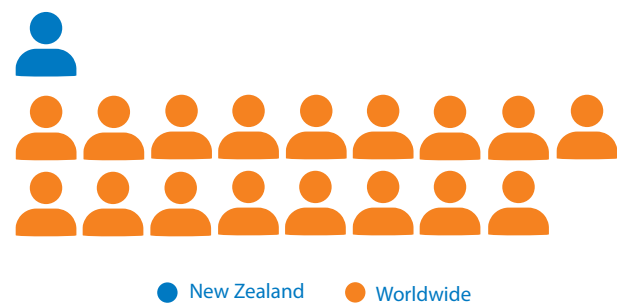
Source: FAO, USDA, Rabobank 2023

New Zealand's role in feeding the world should not be underestimated. For every person New Zealand farmers feed domestically, they also feed seven people elsewhere in the world. The ratio is even higher for our dairy farmers, who feed 17 consumers in the world for every one consumer in New Zealand.

With so many people consuming New Zealand's products, it is ever more important our food production systems are not put at risk. Rabobank supports the need to actively reduce New Zealand's emissions but also acknowledges the role our country has in sustainably producing enough food to feed the growing population.

Figure 3: New Zealand dairy farmers feed 17 consumers globally for every 1 consumer fed domestically

Calculated based on recommended daily intake



Source: DCANZ, Rabobank 2023

Food affordability in New Zealand

New Zealand consumers are facing increased household budgetary pressures, with consumer inflation at its highest level for many years. The Reserve Bank's efforts to return annual inflation to its 1–3% target band has seen interest rates rise quickly, putting further pressure on household budgets – in particular increasing the food and housing affordability challenges faced by many Kiwi families.

² The Treasury. (2022, June 30). *Medium-term outlook for dairy exports*. <https://www.treasury.govt.nz/publications/research-and-commentary/rangitaki-blog/feu-special-topic-medium-term-outlook-dairy-exports>

New Zealand's financial health and the prosperity of rural communities

The food and agriculture sector is a major contributor to New Zealand's economic and social wellbeing, and exports are a key contributor to New Zealand's economy both financially and through employment.

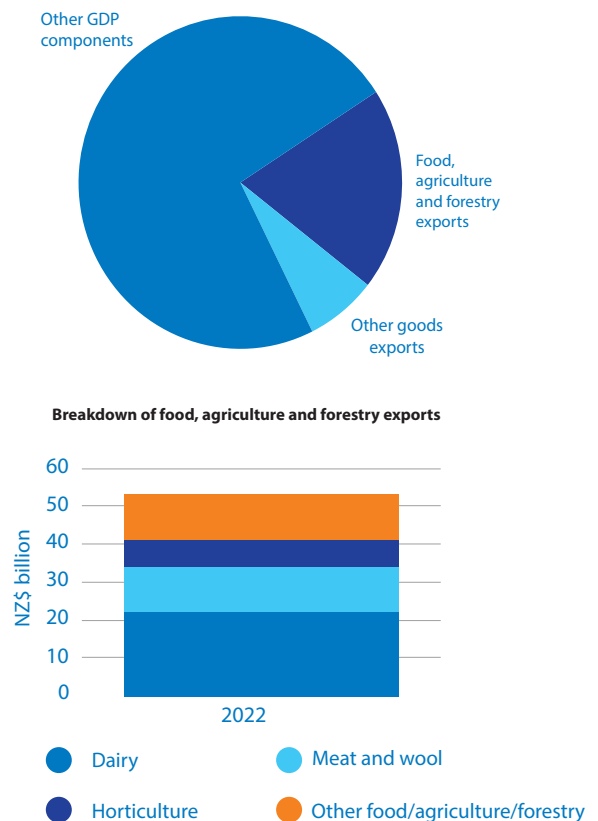
The agriculture sector is essential for the prosperity of rural communities because it provides employment and income through farming as well as related rural industries such as input suppliers, accountants and marketers.

Food and agriculture exports contributed 21% of New Zealand's gross domestic product (GDP) in 2022 and over 70% of the value of New Zealand's exports of goods with exports of food and fibre exceeding NZ\$50 billion and on track to exceed NZ\$56 billion by June 2023 according to Government forecasts. The sector's future performance in the highly competitive global landscape is crucial for New Zealand's financial health.

In 2022, New Zealand's total imports significantly exceeded exports and drove a massive current account deficit of \$33.8 billion. This deficit was much larger than the typical -1% to -5% seen over the past decade and exceeded the previous record set during the Global Financial Crisis.

The New Zealand Treasury acknowledges that declining growth in national income would cause a depreciation in the exchange rate and have implications for domestic consumption.²

Figure 4: Food, agriculture and forestry exports contribute 21% of New Zealand's GDP thanks to dairy, beef and sheep



Source: Ministry for Primary Industries, Rabobank 2023

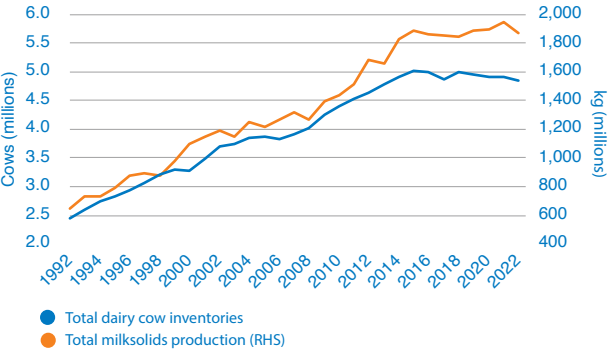


Food, agriculture and forestry exports account for 60% of New Zealand's total export value and are equivalent to 21% of New Zealand's GDP. Products related to ruminants (dairy, beef, sheep meat and wool) are delivering the lion's share of about 65% of all food and agriculture exports but also generate a large share of New Zealand's emissions. These exports and their essential contributions to New Zealand's economy are facing some challenges currently.

In 2022, dairy export volumes decreased by 7% but record dairy prices prevented an even harder hit to New Zealand's current account balance. Similarly, beef and sheep meat volumes have fallen by 4.4% and 5.8% respectively, with lower prices in 2023 compared to 2022, and it is unlikely that future volume reductions of livestock exports will be compensated by stronger prices. A continuation of strong agricultural export volumes is essential for New Zealand's current account balance and the country's economic and rural prosperity.

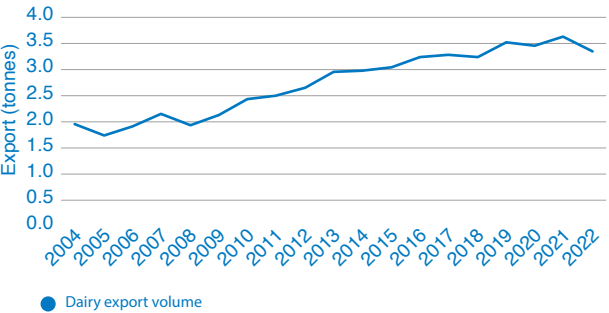
However, the country faces some challenges, with stricter environmental regulations, including for emissions and freshwater, having an impact on New Zealand's dairy and meat production. The Treasury acknowledges that "dairy export volume growth will slow in the medium term as production flattens".³

Figure 5: Dairy flattening due to policy



Source: DairyNZ, Rabobank 2023

Figure 6: New Zealand's dairy export at risk



Source: Ministry for Primary Industries, Rabobank 2023

³ The Treasury. (2022, June 30). *Medium-term outlook for dairy exports*. <https://www.treasury.govt.nz/publications/research-and-commentary/rangitaki-blog/feu-special-topic-medium-term-outlook-dairy-exports>



Rebalancing the impacts on rural communities



Farming, land and life on the economic frontier are often held up as key elements of New Zealand's national identity.⁴ However, this pivotal role is under pressure from a combination of technological, social and economic changes underpinned by Government policies that are having negative effects on rural communities.⁵

For example, the pending loss of rural jobs and community vitality with its knock-on effects on rural business confidence and mental health are unintended impacts of increasing carbon forestry encouraged by the New Zealand Emissions Trade Scheme (ETS).⁶

Significance of rural communities

A significant proportion of the population still lives rurally in New Zealand. Around 16% of the population live in rural areas, and around 35% in total live in rural or semi-rural locations. These figures are higher for Māori. Data from the 2018 Census shows:⁷

- 16.3% of the total population live in rural areas – this proportion is even higher for the Māori population at nearly one in five people (20%)

- 10.0% of the total population and 14.7% of the Māori population live in small urban areas – for example, Thames, Stratford and Gore
- 8.4% live in medium-sized urban areas – for example, Cambridge, Te Awamutu and Rolleston.

In 2019, the food and fibre sectors employed 13.4% of the New Zealand workforce (aged 15+), an equivalent to one in seven people. Approximately 22.5% of the rural population is employed in agriculture, forestry or fishing. For some regions such as Southland, this is as high as approximately 28% inclusive of those directly employed, and another 6–7% are those in the sector's support services. Jobs in rural and urban locations in enterprises servicing the agribusiness sector also need to be acknowledged with agricultural-related industries a major employer. The share of people working on farms or in closely related industries is significantly concentrated in rural areas. Any further loss of these jobs will have severe negative impacts on the vitality of these rural communities.

Impacts of Government policy on rural communities

Agricultural emissions are set to enter the ETS from 1 January 2025 if the sector and Government do not agree on an effective alternative through He Waka Eke Noa – Primary Sector Climate Action Partnership.

Rabobank supports the social and economic contract that lies at the heart of He Waka Eke Noa. If a price is put on agricultural emissions, it should be at the farm level and outside the ETS. We see this as the most effective and fairest way to encourage agricultural emissions reductions while at the same time helping the food and agriculture sector make the required transition to minimising impacts on food production. We also agree that farmers should be fully recognised for their on-farm sequestration as a core component of any agricultural emissions pricing system

Business advocacy group BusinessNZ believes some communities will be decimated by the introduction of pricing agricultural emissions.⁸

Earlier modelling by the Government indicated the pricing could result in a 6–7% income loss to dairy farming and an 18–24% income loss to sheep and beef farming.

Five districts in New Zealand – Southland, Waimate, Clutha, Wairoa and South Taranaki – have more than 40% of their total employment in sheep, beef and dairy farming and vulnerable upstream and downstream industries that are critically dependent on farming. Upstream industries include fertiliser suppliers, vets and agricultural support services, while downstream industries include meat and dairy processing industries.

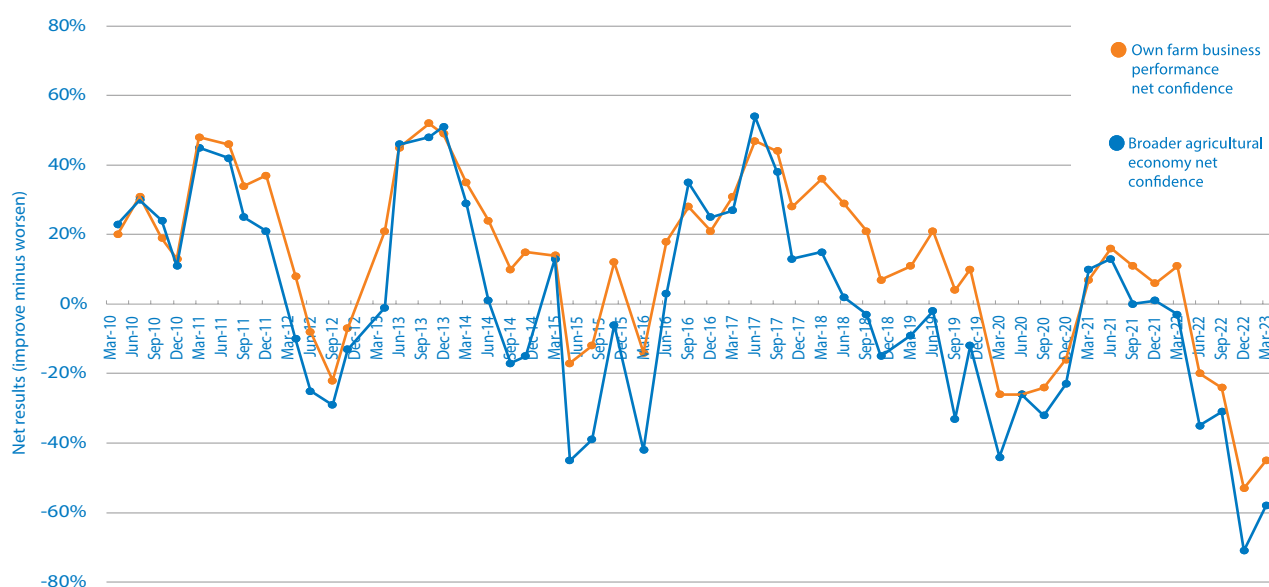
BusinessNZ estimates that more than 99,000 jobs are vulnerable nationally if agricultural emissions become subject to pricing. This includes around 54,607 jobs in the key upstream and downstream industries nationally and a further 44,500 vulnerable jobs in sheep, beef and dairy farming. Over and above these concerning figures are the negative flow-on effects to rural populations and hence to schooling, healthcare and retailing, which may become unsustainable and unviable in some locations.

Downward pressure on farmer confidence

Since 2003, Rabobank has worked with independent research organisation TNS to conduct a Rural Confidence Survey, interviewing an average of 450 farmers across New Zealand each quarter. Monitoring outlook and general sentiment in the country's major agricultural industries, it is one of the most robust studies of its type in New Zealand.

Overall rural confidence remained deeply negative in the first quarter of 2023 with only one in 20 farmers holding an optimistic view on the prospects for the agricultural economy in the year ahead. However, at -58 %, this has slightly recovered from the record low of late 2022. Sheep and beef farmers and horticulturalists are currently more optimistic about the prospects for the agricultural economy, while dairy farmers are more pessimistic. The major sources of farmer optimism were overseas markets (54%), demand (34%) and rising commodity prices (31%), with rising input costs (65%) and government policy (53%) the major sources of concern.

Figure 7: Rural Confidence Survey net results (March 2023)



Source: Rabobank 2023

⁴ Ream, R. (2009). *Capturing the Kiwi spirit: An exploration into the link between national identity, land and spirituality from Māori and Pākehā perspectives* [Master's thesis, University of Canterbury]. <https://ir.canterbury.ac.nz/bitstream/handle/10092/2742>

⁵ Trafford, G. (2023, February 23). *The trend of rural demographics concerns Guy Trafford, and those concerns aren't eased by data supplied by Stats NZ*. <https://www.interest.co.nz/rural-news/119521/trend-rural-demographics-concerns-guy-trafford-and-those-concerns-arent-eased>

⁶ Fellowes, C. (2022). *The impact of exotic carbon forestry on rural Aotearoa New Zealand*. Kellogg Rural Leadership Programme. <https://ruralleaders.co.nz/the-impact-of-exotic-carbon-forestry-on-rural-aotearoa-new-zealand>

⁷ Environmental Health Intelligence New Zealand. (n.d.). *Urban-rural profile*. <https://www.ehinz.ac.nz/indicators/population-vulnerability/urbanrural-profile/>

⁸ Howard, R. (2023, May 5). *Whole communities could become unviable – BusinessNZ*. <https://businessdesk.co.nz/article/primary-sector/whole-communities-could-become-unviable-businessnz>

Managing farmers' mental health

The social and economic factors discussed are cascading into a mental health crunch for the rural and farming community. In its recent ground-breaking report, Te Hiringa Mahara | Mental Health and Wellbeing Commission found that accessing mental health services can be challenging in rural areas of New Zealand and that COVID-19 has severely exacerbated the situation.⁹

The report found that rural communities in New Zealand persistently experience poorer mental health outcomes than the general population. Almost half of all the people in farming and agriculture-related industries who take their own lives are under the age of 40. The report cites 2016 Ministry of Health findings that suicide rates were approximately 17% greater in rural than urban communities, although this has decreased over time as a range of community-led interventions have emerged:

- Farmstrong – a targeted mental wellbeing promotion initiative for farmers, growers and rural communities across Aotearoa.
- Rural Support (rural people helping rural people), FirstMate (commercial seafood sector support), Surfing for Farmers (opportunities to connect off farm and learn to surf, co-sponsored by Rabobank New Zealand), industry groups' wellbeing initiatives and targeted initiatives for specific populations such as Māori, young people and rural mothers (funded through the Ministry for Primary Industries).
- Other local initiatives aimed at promoting the wellbeing of rural communities such as Ag Proud NZ, Rural Women New Zealand, Dairy Women's Network, Agri-Women's Development Trust, Federated Farmers, New Zealand Young Farmers, Horticulture New Zealand and DairyNZ.
- Rural community hubs run by local community leaders, which provide a range of educational, health, social and cultural activities (supported by the Ministry for Primary Industries).
- New and expanded primary mental health and addiction services available in rural areas and accessed through local general practices and telehealth.



⁹ Te Hiringa Mahara | Mental Health and Wellbeing Commission. (2023). *The impact of COVID-19 on the wellbeing of rural communities in Aotearoa New Zealand*. https://www.mhwc.govt.nz/assets/COVID-19-insights/Paper-3-Rural-communities-/Eng_TechnicalPaper_RuralWellbeing.docx

¹⁰ Ibid, pp. 19–20 (references omitted).

Te Hiringa Mahara's report finds that stress plays an outsized part in the life of farmers and growers, which "impacts not only on the farmers and growers, but also their partners and families, who advocacy groups note are often the ones 'holding things together'" and highlights the results of several surveys:¹⁰

"A survey by Dairy New Zealand of their members reported that the top three causes of mental health issues for the farming sector are: government regulations (57 percent; public/media perception of dairying (55 percent); and financial concerns (40 percent) ... Similarly, regulatory pressure was the top cause of stress identified in surveys conducted by Manaaki Whenua Landcare, for 74% of participating commercial rural operators, and Rural Women New Zealand for 76.5% of participants. This was also evident in the top three concerns reported by respondents in the Federated Farmers Farm Confidence Survey, in

January 2022, climate change policy 54.2% of participants, regulation and compliance costs 37.9%, and freshwater policy 26%. This was further reflected by rural advocacy groups, who pointed to the massive amount of stress farmers are under related to Government regulations and the uncertainty of these, increasing farm costs, interest rates and debt levels, labour shortages and perception of public opinion."

While farmer advocates are clear that the public perception of farmers is a source of stress for them, with the arrival of COVID-19, the perception of farmers was seen to dramatically improve as they were recognised as essential workers and the primary sector did more of the heavy lifting for the national economy.







Rural proofing – the aspiration and the reality

As the lead Government agency spanning the food and agriculture sector, the Ministry for Primary Industries (MPI) has not been immune to the distress signals coming from the sector about the speed and impact of Government policy on farming practice.

In 2018, a Cabinet paper¹¹ stressed the need to “give weight to the importance of Rural Proofing and reinforce the Government’s view that healthy, vibrant rural communities are at the heart of rural productivity and that it is the Government’s intention to work with all primary and rural industry sectors to provide support and infrastructure where needed”. The Minister stated, “I believe that the need for Rural Proofing is increasing with a declining proportion of New Zealanders having practical experience of the primary industries and rural living, and the difficulties that isolation, limited service provision and infrastructure constraints place on rural households and businesses.”

Following the paper, MPI has provided policy development guidelines for all policy makers seeking to ensure a rural impact lens is applied to legislation during the development process.

MPI describes Rural Proofing as:

- understanding the unique aspects of rural communities
- identifying the impacts of policies on them
- ensuring the policy outcomes are fair and equitable.

“Rural Proofing is most effective when considered early and throughout the policy process. This means building a rural lens into the full cycle of our policy development, implementation, service delivery, and evaluation of policy effectiveness.”¹²

We encourage all future governments to give greater consideration to the impacts on rural communities when making policy decisions around the Cabinet table.

In its commendable quest to deliver on commitments under the Paris Agreement, the Government has tended to overlook perverse outcomes such as harmful impacts on the viability of rural economies and the risk of the inadvertent exporting of emissions to less-efficient producers offshore, as outlined in this paper.

¹¹ Ministry for Primary Industries. *Rural proofing government policies*. (2023, April 23) <https://www.mpi.govt.nz/legal/rural-proofing-guidance-for-policymakers>

¹² Ministry for Primary Industries. *Rural proofing government policies*. (2023, April 23) *Rural proofing guide for policy development and service delivery planning*. <https://www.mpi.govt.nz/dmsdocument/29294-Rural-proofing-Guide-for-policy-development-and-service-delivery-planning>

Aligning policy priorities to balanced economic, social and environmental outcomes



Inadvertent impacts of Government policy

A common refrain from New Zealand's agriculture sector over the past decade is that the regulatory change is coming on too hard and fast.

This has been a recurrent theme for the past decade through Rabobank's Rural Confidence Survey and reinforced in surveys by DairyNZ, Manaaki Whenua | Landcare Research, Rural Women NZ and Federated Farmers. As one farmer put it recently, "A rapid bombardment of policy from central Government in the past five years has put huge pressure on the primary sector. Food and fibre producers feel unheard, exhausted, and threatened, which leads to a widening gap between policymakers, farmers, and communities (hapori)."¹³

Aligning government policy measures

Government policies should not be viewed independently from each other and not pull in different directions. Policies must look beyond national borders – the challenges of emissions reductions, biodiversity and food security are global challenges that must be addressed jointly. New Zealand's rural prosperity and economic strategy need to be aligned with those global goals.

The supply chain will play a crucial role

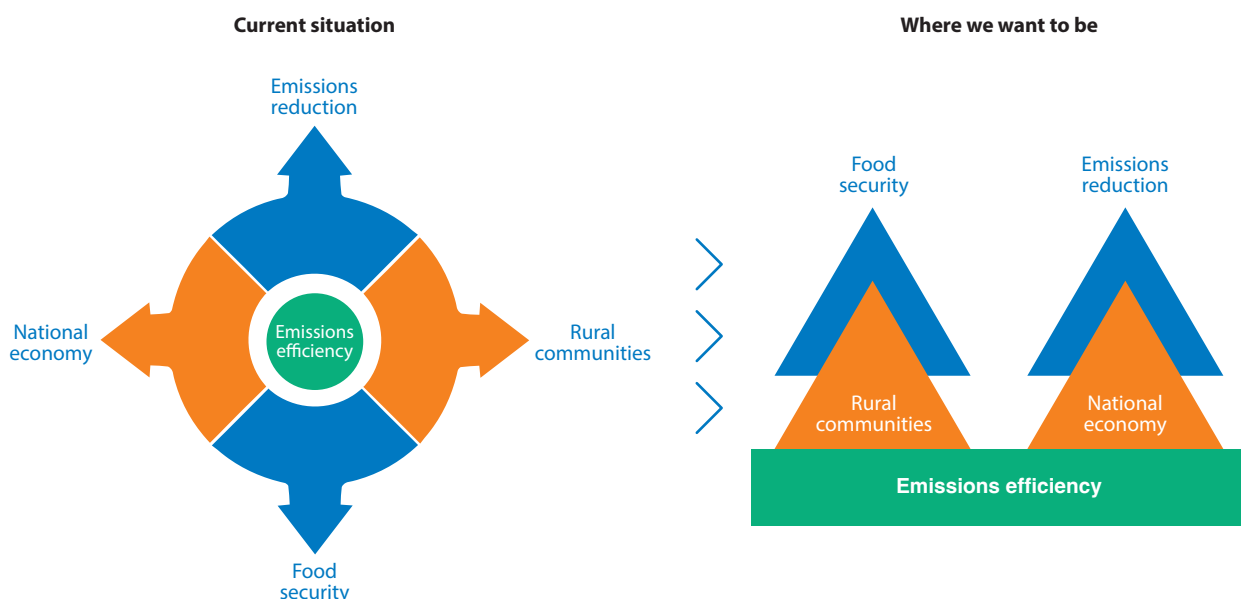
Besides policy makers setting a workable framework on farm to deliver successful change, the food supply chain needs to implement necessary changes to support farmers in the transition and to develop opportunities for producing food with an improved emissions footprint.

Delivering sustainable change to drive emissions efficiency

In a nutshell, our challenge both in New Zealand and globally is producing more food with a smaller carbon footprint. In other words, producers need to make significant improvements in carbon efficiency – a challenging task as there are many ways to achieve this. If done right, it can be beneficial for farmers, the food supply chain, consumers, the climate and the economy. But time is ticking, and only positive change can deliver on all of this. Government, industry and farmers need to work together by learning, implementing, sharing and jointly addressing the task. If this change is not successful, one or more of the goals will be missed – with negative consequences for everyone involved.

To deliver sufficient and affordable food to a rising population, preserve rural prosperity and reduce emissions, the food supply chain and the farming sector need to change. Such change requires policy makers and the whole food supply chain to think beyond national rules and adopt a global framework and way of thinking. As discussed in this paper, there is a risk that less-efficient producers/regions will pick up any production shortfall, damaging global emissions reduction efforts. Farmers in New Zealand need to be provided with opportunities to meet these challenges while also being able to benefit economically from the environmental service they are providing to both local landscapes and the global mitigation of climate change risks. Policy makers and the supply chain alike need to adopt a holistic approach to achieve more carbon-efficient food production in New Zealand.

Figure 8: Emissions efficiency can align contradicting policy forces



Source: Rabobank 2023

¹³ Farmers Weekly. (2023, March 9). Policymakers unaware of the vital role of rural communities. <https://www.farmersweekly.co.nz/opinion/policymakers-unaware-of-the-vital-role-of-rural-farming-communities/>

An efficiency-focused approach is essential to meet global and local goals

Farmers have successfully stepped up to the challenge to supply more food and to lower emissions in recent years, and with increasing focus on lowering emissions, emissions efficiency is the name of the game! Efficiency will become even more important in the future as agriculture needs to deliver sufficient food, fuel and fibre for a growing population as well as global emissions reductions. Supplying 50% more food will likely result in at least 25% more greenhouse gas emissions. Here is where it gets especially challenging – the farm and food supply chain will have to cut absolute emissions by at least 75% from 2010 levels, and this will require 4–5 times higher carbon efficiency with the increased production needs.

One might think that the extra food, feed, fibre and biofuel produced in the past all stems from efficiency gains and that farmers are fully up to the challenge. However, a significant amount of the production expansion also results from additional areas for crops and increased livestock numbers. Globally, constraints on land use change will keep livestock expansion around the globe well below that of the past. While productivity has improved significantly over the past decades, it will have to do most of the heavy lifting

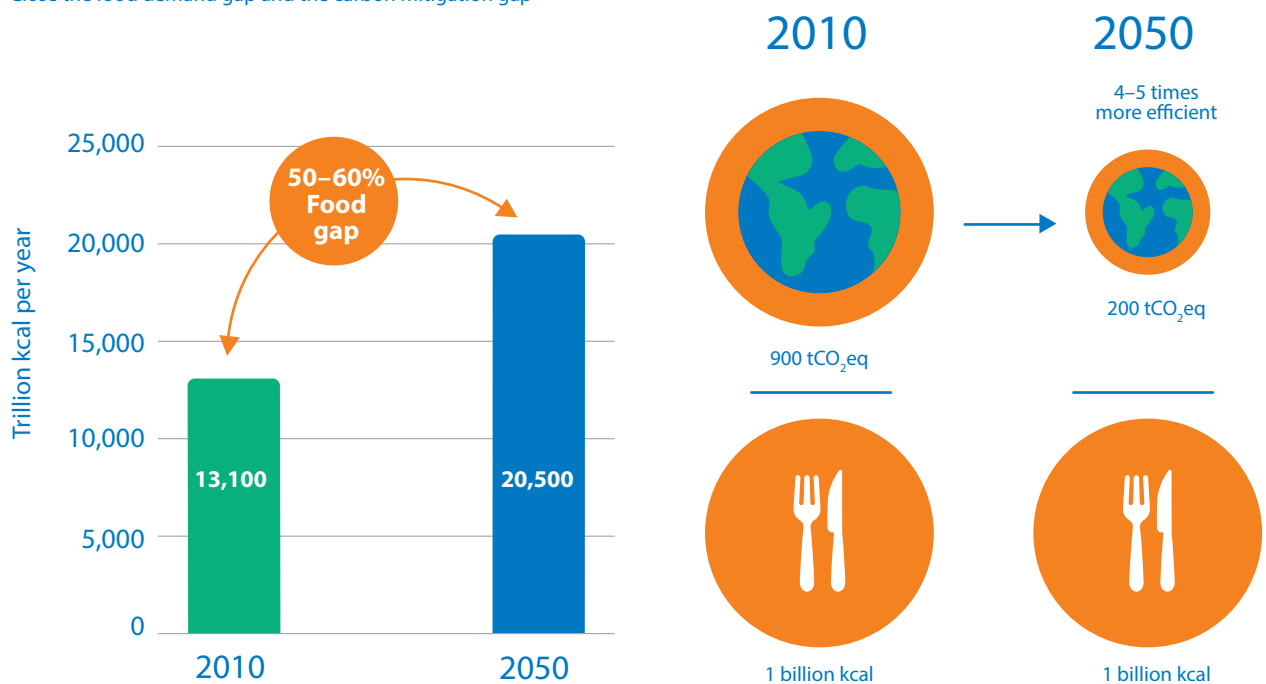
to produce the extra food volumes needed globally in the future. Jumps in efficiency towards lower emissions as well as increased food production volumes have been achieved in several ways but more is needed:

- Improved genetics are required to assist in delivering higher yields, with even stronger efforts to increase output with fewer inputs.
- Increased intensity has resulted in higher use of fertilisers for cropping as well as in increased livestock numbers per hectare. It remains questionable how much further growth can be achieved given the focus on emissions reductions.
- Improved efficiency to produce the highest returns per hectare has driven replacement of lower-yielding crops or livestock with higher-yielding varieties.

The easy shifts have been implemented, making it even more important to allow farmers to access innovation and to innovate on farms to grow further, and the world needs even more efficient farmers to continue to produce more. However, this is threatened in various key producing regions by national policy approaches that can result in future production losses.

Figure 9: Feeding the world sustainably requires 4–5 times more carbon efficiency

Close the food demand gap and the carbon mitigation gap



Source: Rabobank 2022



The need to successfully scale emissions efficiency in New Zealand and globally

Most national policies aimed to lower emissions or improve biodiversity focus on absolute domestic greenhouse gas emissions reduction or other absolute reduction targets for water use and nitrogen reductions. While this is the safe bet to reach nationally set emissions targets, the real challenge will be to also deliver on the required food outputs. Successfully scaling emissions efficiency will be the core challenge of the coming decades.

Policy makers need to work with the whole supply chain to develop and help adopt solutions. This is particularly true as the list of regions implementing absolute emissions reduction targets is large and preventing those rules from limiting farmers' efficiency is essential. As well as New Zealand, many other countries will have to deliver on this approach. Failing to do so will have massive negative consequences locally and globally.

European Union (EU) Green Deal and Farm to Fork Strategy¹⁴

Risk assessments by universities and other institutions predict that the implementation of the planned 50% reduction of fertiliser and chemical use, combined with the mandate to farm 25% of agricultural land organically, would result in heavy production losses. This would include up to 20% of the EU's grains and oil seeds crop, making the EU one of the largest grain-importing areas in the world rather than a major exporter. If emissions efficiency fails, this would threaten global food security and/or result in a large-scale shift of production to other regions and, as a best case, keep total net emissions reductions at negligible levels.

Netherlands: Nitrogen reduction to protect biodiversity¹⁵

A risk assessment by the Dutch Government expects that only 50% of the needed nitrogen reductions can be achieved through innovation with the remainder achieved by a reduction of livestock numbers. Dairy

cow inventories are expected to fall by 30%, poultry production by 20% and hog inventories by 10%.

Canada's plan to cut fertiliser emissions by 30% by 2030 vs 2020¹⁶

Canada's plan to cut fertiliser emissions by 30% by 2030 is another example of an absolute emissions reduction target that does not take productivity into account. While not yet formalised, concerns are voiced about the speed of implementation, the lack of data and the threat of production in a major exporter of wheat, barley and canola.

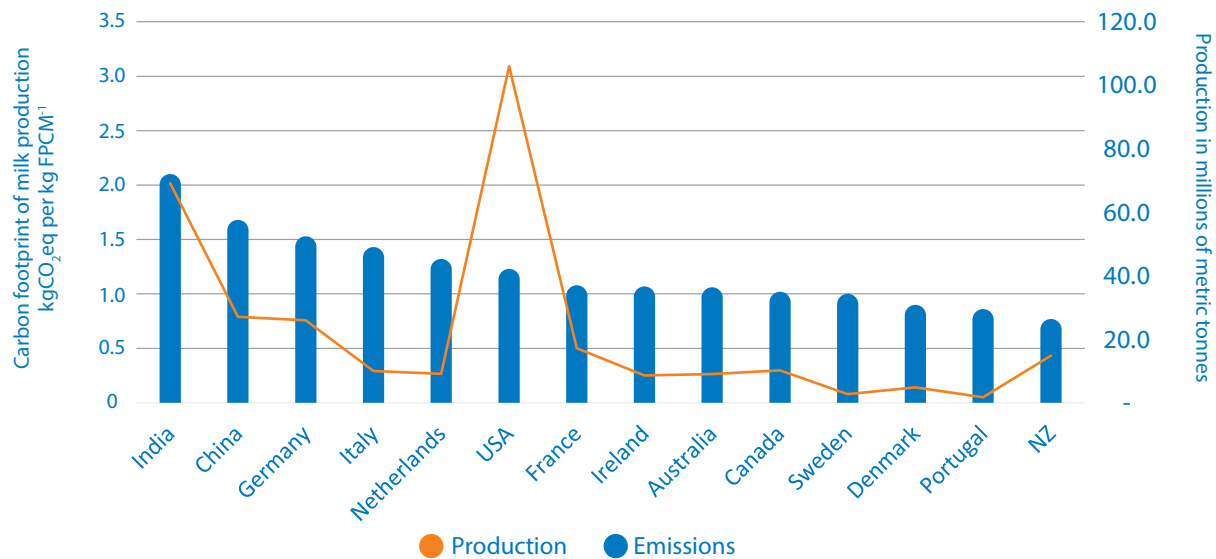
Highly efficient New Zealand farmers need to get even more efficient

New Zealand ranks among the top global exporters of dairy, meat and fresh produce. While globally traded volumes of those products are rising, New Zealand's exports have contracted in recent years, requiring farmers elsewhere in the world to step in with the risk of less-sustainable production and emissions on a global scale not falling.



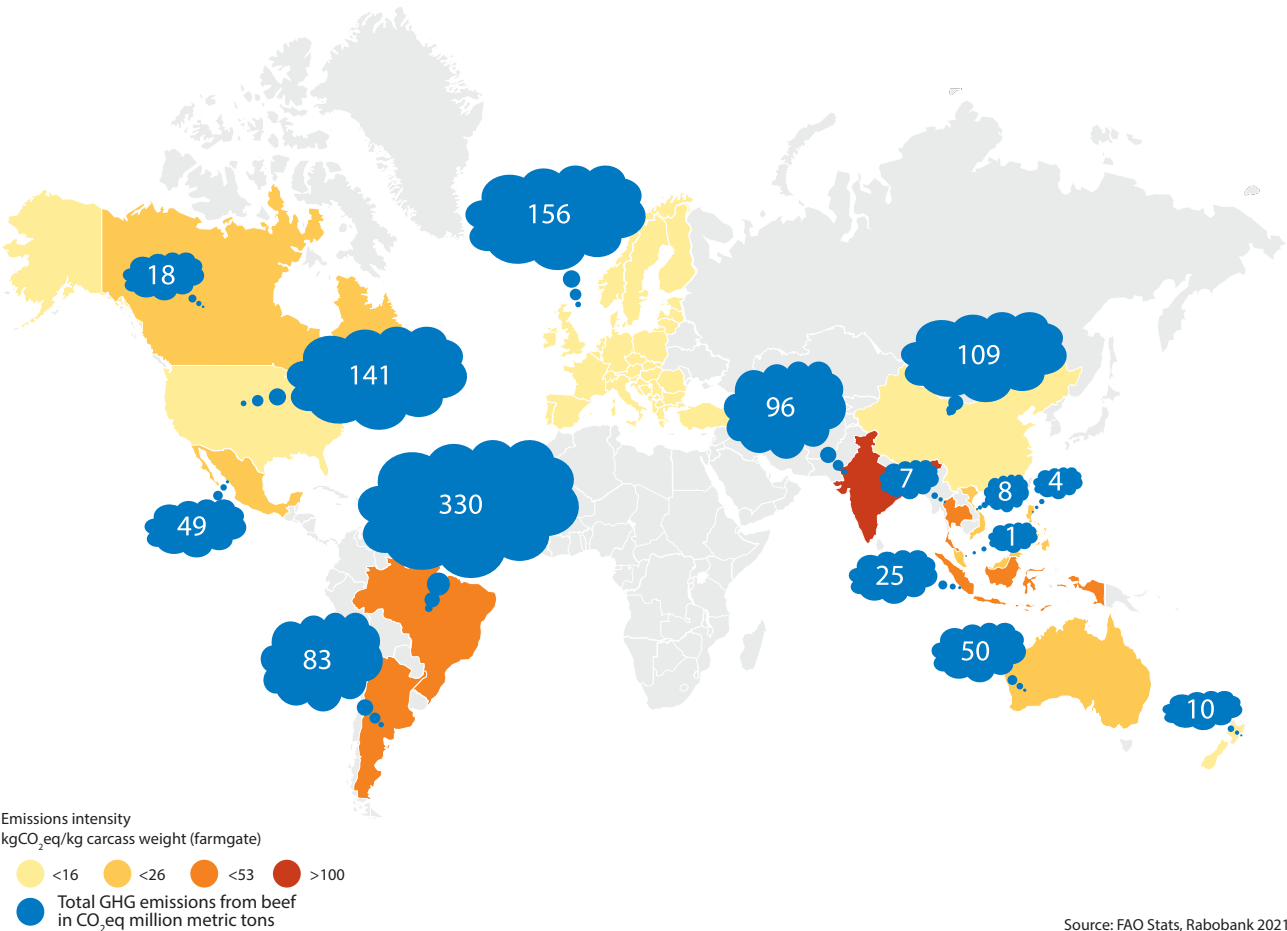
Figure 10: New Zealand is a highly emissions efficient dairy producer

Carbon footprint of milk production in different countries (after correction to common GWP, functional unit and allocation methodology) – New Zealand data excludes direct land-use change and would be 0.91 if it was included



Source: Adapted from <https://www.agresearch.co.nz/news/research-shows-nz-dairy-the-worlds-most-emissions-efficient> production data from Statista

Figure 11: New Zealand is a highly emissions efficient beef producer



Source: FAO Stats, Rabobank 2021

¹⁴ European Commission – (2023). *Farm to Fork strategy*. https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en
¹⁵ Government of the Netherlands – (2023). *The Nitrogen strategy and the transformation of the rural areas*. <https://www.government.nl/topics/nature-and-biodiversity/the-nitrogen-strategy-and-the-transformation-of-the-rural-areas>
¹⁶ Government of Canada – (2022). *Fertilizer emissions reduction target*. <https://agriculture.canada.ca/en/departement/transparency/public-opinion-research-consultations/share-ideas-fertilizer-emissions-reduction-target/what-we-heard-report-fertilizer-emissions-reduction>

Achieving harmony of emissions reductions, food security, a healthy New Zealand economy and rural prosperity

1. Pathway to support the industry's emissions efficiency transition

To reach target greenhouse gas emissions reductions, joint efforts across the public and private sectors are needed. Appreciation of and support for innovation to improving efficiency is key. Supporting New Zealand's producers to become even more emissions efficient will be essential, which also requires certainty and rules that allow farmers to further grow and invest. A climate of fear and uncertainty would stall needed investments and prevent the success of the transition. The same is true for all current and future measures taken to address biodiversity loss.

2. Food waste reduction is important but not enough

The global food system emits approximately one-third of total greenhouse gases annually, and food waste is a major reason for this. In New Zealand, 4% of total greenhouse gases are from food and organic waste. While food loss and waste contribute to greenhouse gases at landfills by generating methane, the inputs required to produce the food are also wasted when food is discarded. This includes processing, transporting, preparing and storing the food and therefore inevitably encompasses the carbon use and emissions during these stages of food handling. Examining food loss at each stage of the supply chain can improve efficiency of production, with a reduction in food that will ultimately not be consumed, saving both resources and emissions.

Most of the waste occurs downstream of the supply chain, often at consumer level where products expire and/or go bad. Working together is key to forming proactive consumer habits that optimise food consumption and reduce waste. Fresh produce like fruit and vegetables is also more prone to waste given limitations in storing and keeping it fresh. Opportunities need to be further developed to strengthen sustainable packaging and storage, increasing acceptance for products that do not look perfect but are absolutely edible and promoting alternative uses to add value and repurpose fresh produce.

Existing programmes in New Zealand that push for food waste recovery in attempts to reduce the harmful environmental impacts fall under the Aotearoa Food Rescue Alliance and include organisations such as KiwiHarvest (a Rabobank partner). Such initiatives adopt the concept of rescuing food and recycling otherwise-wasted ingredients to produce meals and thereby avoid potential greenhouse gas emissions. While initiatives to reduce food waste do contribute to lowering emissions, this won't be enough by itself to deliver the necessary changes.




3. Meat and dairy alternatives are only options for a few consumers

In recent years, meat and dairy alternatives have failed to continue their strong initial growth. Those alternatives are often highly processed and may not meet the desired nutrition content or are fortified with nutrients such as calcium or certain vitamins. Key markets in North America and Europe have shown limited volume growth. Taste and texture issues as well as cost and health concerns are identified by consumers as key reasons. Consumption of these products in Asia, Africa and Oceania has been relatively small. While they all have a role to play, their uptake is not anywhere near strong enough to prevent a global demand increase for real dairy and meat. The farmers of the world and those in New Zealand need to cater to consumer demands. This is also true for dairy, which is an important source of nutrients for a large share of the population.

4. Build a political and financial framework to support efficient farms and improve average farms

Lowering emissions effectively from New Zealand's farming sector without threatening global food security requires support from public and private partners. Government can step up to assist in the transition. While it is essential that legislation is consistent to achieve targets, practical solutions on farm should be scaled to account for different farmers' needs. Policies and actions by Government and large corporations must focus on what will really help farmers understand emissions efficiency – how to identify

Table 1: Food and agriculture supply chain approaches and initiatives to drive emissions reduction changes

Company	Approach	Initiatives
	<p>Build a solid foundation for a sustainable future that emphasises efficient production without compromising food production. The sustainable strategy focuses on three key aspects: people and culture, nature, working together. Ensure people make positive social impacts, creating healthy communities and collaborating to form solid relationships in efforts to continue leading the dairy industry amidst a growing population.</p>	<p>Sustainable Finance Framework helps investors contribute capital by issuing and managing loans and bonds (sustainable debt) in alignment with market standards. Use of proceeds instruments and sustainability-linked instruments. The Co-operative Difference framework, launched in FY 2019, provides farmers with a price premium when certain sustainable goals are met and encompasses these focus areas: milk, people and community, environment, animals, co-operative and prosperity.</p>
	<p>Transformative change that protects and replenishes today's resources to enhance the resilience of future communities. Focus on using regenerative agriculture to reach net zero, with a firm belief that regenerative agriculture forms the solid foundation for sustainable food production.</p>	<p>Fonterra, Nestlé and Dairy Trust Taranaki partnered to implement a net-zero dairy farm that reduces emissions by examining farm operations and sharing lessons with farmers. Fonterra and Nestlé's Greenhouse Gas Farmer Support Pilot allows farmers to receive additional support to help with implementing changes and solutions that lower on-farm emissions.</p>
	<p>Rabobank looks to align its products and policies to the unique pathways of each farmer's journey to reaching net zero. Rabobank New Zealand supports all efforts in meeting emissions reduction targets by collaborating with various organisations such as KiwiHarvest, New Zealand Roundtable for Sustainable Beef, Toitū Envirocare, Centre for Climate Action Joint Venture, UN Environment Programme and Ballance Farm Environment Awards.</p>	<p>Rabobank aims to help clients transition by launching a carbon farming loan, providing targeted sustainability-linked loans and holding regional sustainability and climate training sessions. We will advocate for change by engaging strategic networks to position New Zealand at the forefront of leading change.</p>

Source: Rabobank, company information 2023

on-farm areas needing improvement, how to implement the correct equipment or procedures and, most importantly, how make the necessary data available conveniently for all required stakeholders to access.

Food supply chains have long identified that most of the emissions in the wholesale space – from retailers to food producers and farm input suppliers – have not resulted from their own operations (scope 1) or the energy they procure (scope 2) but from others in the supply chain (scope 3). Therefore, farmers have been identified as an essential driver to help reduce emissions along the whole supply chain. Companies are increasingly working with farmers to reduce emissions, but more efforts, support and financial remuneration of farmer services are needed to drive the large-scale change needed in New Zealand and globally. The cooperative model might benefit some of New Zealand's farm sectors as it might allow farmers to benefit through dividends rather than just direct farm product prices.

5. *Consumers must trust the changes and emotionally buy in*

Generally, consumers will not see any difference in the appearance of their products produced using sustainable practices and so will need to trust the emissions reduction practices of providers and suppliers. Clear communication will be key. The supply chain needs to convey the message of the extra environmental benefits delivered by farmers, which will likely increase costs and therefore needs to be rewarded financially by consumers. It will also be necessary to achieve the emotional buy-in of consumers. The food supply chain will have to work with its customers to deliver strong stories on the change executed along the food supply chain and its benefits. A good example might be the messaging of the coffee industry, which tells such stories well – consumers may not taste the difference, but they have buy-in to the good emotions they experience through stories from individual coffee farms.

6. *Market access and trade agreements linked to sustainability*

As Government policies on emissions reductions impact the economics on farm, it is essential for an export-driven country such as New Zealand to deliver tangible solutions to ensure its products remain competitive in the global market. The New Zealand-EU Free Trade Agreement sets a positive example by tying preferential market access into the EU's major consumer market with sustainable production goals. However, this will need to be monitored to ensure the agreement is strong enough to deliver benefits to New Zealand's farmers once the emissions reduction targets take effect and on-farm costs rise. It is questionable whether similar trade agreements can be implemented at scale with the most relevant being New Zealand export destination markets in Asia.

7. *Increasing the value of exports rather than just volume*

A large share of New Zealand's food and agricultural exports is in the form of commodities. Adding value to basic farm products, stimulating their domestic consumption and particularly increasing exports of higher-value products

will be important to ensure continued strong income from exports. This is easier said than done. It is also a long and slow process and bears the risk that farmers miss out on the financial gains from higher-value exports as the downstream value chain does not share those gains. Once again, the cooperative model might bring some benefits to farmers from higher-value food and agricultural exports.

8. *Incentivise rather than force change*

Intrinsic changes are always the best. However, in the case of emissions reductions, the speed and magnitude of change is too big to be achieved through this kind of change alone. Change needs to be incentivised, which can be done in a positive (carrot) or negative (stick) way. Most farmers are agile business people, and positive economic incentives are the most effective way of encouraging a large-scale transition. That means building a political and financial framework to support farms to grow their production while assisting them to adopt emissions reduction practices and strengthen their sustainable farming. The key intent should be to improve emissions efficiency on farm.

9. *Create an environment that appreciates research and development*

As discussed last year in Rabobank's white paper *Steering into the food transition*, a wave of innovation is needed to boost emissions reduction without losing output volumes. Technology will be key to boosting this emissions efficiency. This includes developing new technologies to reduce emissions on farm and along the supply chain as well as scaling technology adoption by individual operators and identifying, introducing and adopting innovation to allow farmers to take advantage of inevitable changes. Being open to new ideas and technologies can give producers a competitive edge when seeking solutions to challenges related to emissions. A wave of technology is needed and with it an appropriate policy framework to appreciate the development, distribution and adoption of such technology to maximise farm performance and lower emissions.

10. *Careful offsetting of emissions*

Temporarily offsetting emissions can be a valid way to deliver on emissions reduction target commitments, particularly if actual reductions cannot be achieved in a timely manner. However, over time, consumers want to see change along the supply chain and with it real changes in the emissions related to a product. Careful offsetting of emissions is essential as we realise not just the benefits but also the costs to farms and rural communities. Conversion of farmland into carbon forests is ongoing. If not carefully implemented, it drives farmland values and disturbs farm economics, ultimately hurting the prosperity of rural communities through income and job losses.





Case study: *The unintended impacts of plantation forestry*

*New Zealand's commitment under the Paris Agreement to achieve net-zero emissions by 2050 has accelerated the planting of *Pinus radiata* in New Zealand, including on productive land where previously the land value would have been too high to be considered for forestry. The new permanent forestry category added to the ETS on 1 January 2023 is likely to incentivise a long-term 'lock up and leave' approach to some models of forestry.*

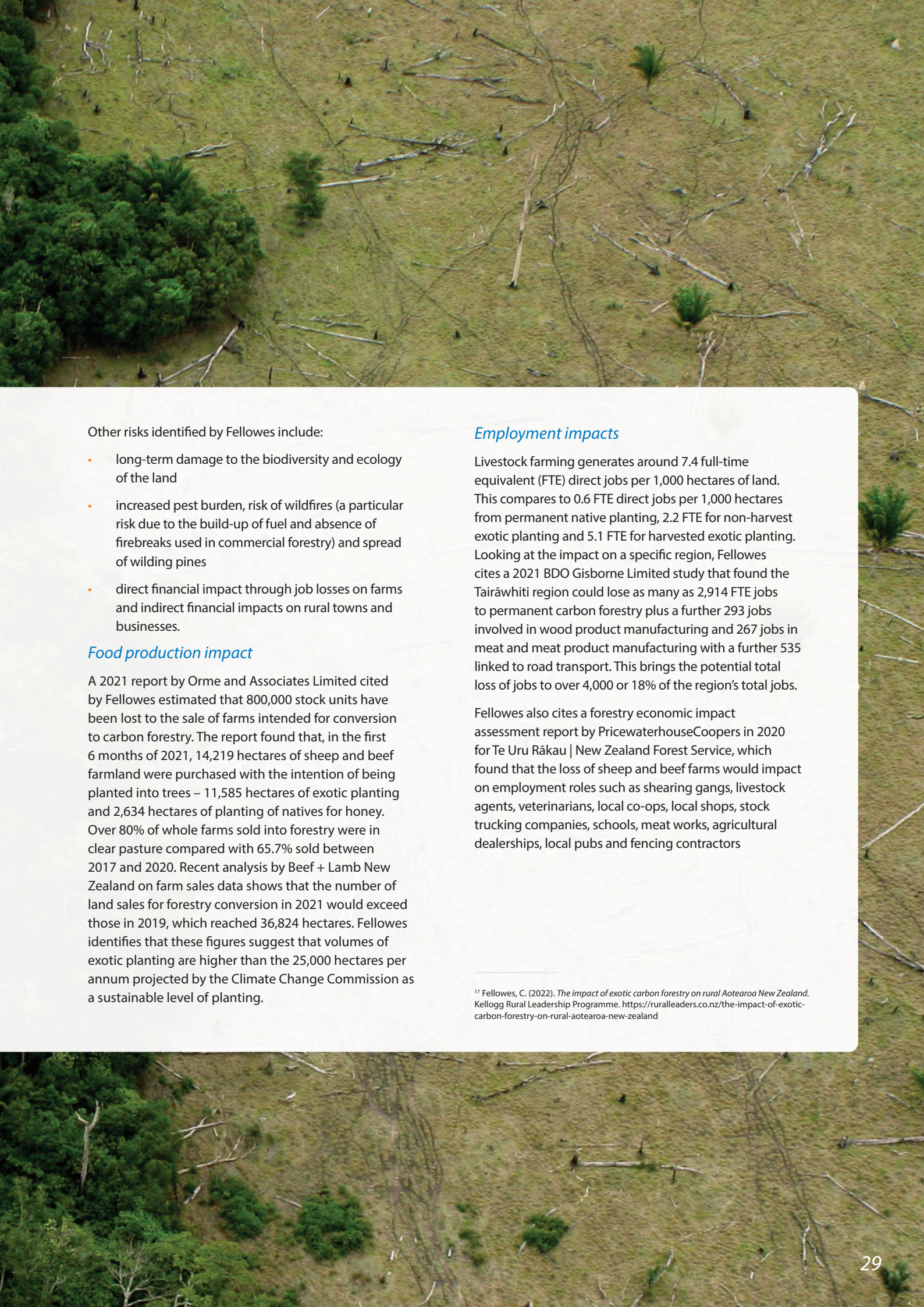
While acknowledging that large-scale permanent exotic forests will generally allow New Zealand to meet its emissions targets more rapidly and at a lower direct economic cost, 2022 Kellogg Scholar and Otago farmer Craig Fellowes argues that the consequences of the policy fall disproportionately onto the rural sector.¹⁷

Risks of large-scale transfers of land from food production to carbon sinks

Based on current and forecast returns, he finds that investment returns for permanent exotic forests, driven by the high underlying price of New Zealand carbon emissions units (NZUs), will outweigh relative competing land uses and native trees, leading to large-scale transfers of land from food production to carbon sinks.

As farming margins become tighter and regulations increase on farming practices, going into or selling out to exotic permanent carbon forests may become

the most attractive option. Fellowes cites returns from permanent exotic forestry at 2022 carbon prices (averaging between \$70 and \$80 per metric tonne) sitting at around \$30,000 per hectare. By comparison, investment returns for production forestry are \$20,000 per hectare and for sheep and beef at \$4,500 per hectare. MPI estimates 645,000 hectares of exotic afforestation will occur over the next decade driven by the ETS. Around half of this afforestation by 2030 (350,000 hectares) will be in permanent carbon forestry. It is worth noting, however, that the price of NZUs has markedly come back to around \$55 after hitting close to \$90 in mid-November 2022.



Other risks identified by Fellowes include:

- long-term damage to the biodiversity and ecology of the land
- increased pest burden, risk of wildfires (a particular risk due to the build-up of fuel and absence of firebreaks used in commercial forestry) and spread of wilding pines
- direct financial impact through job losses on farms and indirect financial impacts on rural towns and businesses.

Food production impact

A 2021 report by Orme and Associates Limited cited by Fellowes estimated that 800,000 stock units have been lost to the sale of farms intended for conversion to carbon forestry. The report found that, in the first 6 months of 2021, 14,219 hectares of sheep and beef farmland were purchased with the intention of being planted into trees – 11,585 hectares of exotic planting and 2,634 hectares of planting of natives for honey. Over 80% of whole farms sold into forestry were in clear pasture compared with 65.7% sold between 2017 and 2020. Recent analysis by Beef + Lamb New Zealand on farm sales data shows that the number of land sales for forestry conversion in 2021 would exceed those in 2019, which reached 36,824 hectares. Fellowes identifies that these figures suggest that volumes of exotic planting are higher than the 25,000 hectares per annum projected by the Climate Change Commission as a sustainable level of planting.

Employment impacts

Livestock farming generates around 7.4 full-time equivalent (FTE) direct jobs per 1,000 hectares of land. This compares to 0.6 FTE direct jobs per 1,000 hectares from permanent native planting, 2.2 FTE for non-harvest exotic planting and 5.1 FTE for harvested exotic planting. Looking at the impact on a specific region, Fellowes cites a 2021 BDO Gisborne Limited study that found the Tairāwhiti region could lose as many as 2,914 FTE jobs to permanent carbon forestry plus a further 293 jobs involved in wood product manufacturing and 267 jobs in meat and meat product manufacturing with a further 535 linked to road transport. This brings the potential total loss of jobs to over 4,000 or 18% of the region's total jobs.

Fellowes also cites a forestry economic impact assessment report by PricewaterhouseCoopers in 2020 for Te Uru Rākau | New Zealand Forest Service, which found that the loss of sheep and beef farms would impact on employment roles such as shearing gangs, livestock agents, veterinarians, local co-ops, local shops, stock trucking companies, schools, meat works, agricultural dealerships, local pubs and fencing contractors

¹⁷ Fellowes, C. (2022). *The impact of exotic carbon forestry on rural Aotearoa New Zealand*. Kellogg Rural Leadership Programme. <https://ruralleaders.co.nz/the-impact-of-exotic-carbon-forestry-on-rural-aotearoa-new-zealand>

Working together to make it happen

Rabobank New Zealand remains keen to play its part and continue working with others to steer the food transition

Rabobank is New Zealand's only specialist food and agribusiness bank. It was set up in the Netherlands over 120 years ago as a cooperative – by farmers, for farmers. Today, Rabobank operates in 38 countries and is among the world's 30 largest financial institutions.

Here in New Zealand, Rabobank has a focus on supporting Kiwi farmers, growers and food producers. Our 500-plus employees work from 28 offices across New Zealand and from our new purpose-built head office in Hamilton.

We are deeply committed to the communities where we live and work.

Under our global mission – *Growing a better world together* – Rabobank takes a long-term view of food and agribusiness, working alongside our rural and wholesale clients and supporting them to achieve their business and sustainability goals.

To find out more about steering into the food transition, visit us at www.rabobank.co.nz





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