



NUFFIELD
NEW ZEALAND
FARMING SCHOLARSHIPS

Global vision,
leadership and
innovation



Resign or **Redesign**

Redesigning NZ farming to thrive through change

A programme delivered by:



David Eade
Resign or Redesign



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Introduction

Our Nuffield experience has been different than that of generations before. The most significant change being the limited opportunity to travel internationally during this period. However, every crisis brings opportunity and the COVID crisis has created this. Without the breadth of international travel, an opportunity presented itself to delve deeply into the current challenges facing the New Zealand primary sector.

My desire to pursue a Nuffield scholarship came out of the belief that the role of a farmer is changing, and this change is yet to be reflected in how farmers identify in society. I had two initial hypotheses. Firstly, market led, nature-based payment incentives will form a large percentage of farming revenues in the future. Secondly, investor sentiment has changed to a point where funds for the 'noble pursuit' of protecting the environment are easier to access. Instead of producing milk, farmers will be producing healthy waterways. Instead of producing beef, farmers will be increasing biodiversity for future generations.

'Biodiversity collapse', 'wildfires', '1 in 100-year floods' are new words and phrases introduced into our vocabulary as the tangible effects of climate change are starting to occur more often. The irreversible nature of these effects means that we must act now. As farmers, we can make a disproportionate positive effect on climate change when compared to other individuals.

However, the right incentives and tools are needed to drive environmental change that is equitable for all stakeholders.

Our current models reward farmers for commodities but not the essential role they play in mitigating climate change and increasing biodiversity. My goal was to build a tangible financial product that rewards farmers for the intangible benefits they provide society. However, before jumping into solutions mode, I quickly realised that I had to leave my hypothesis at the door and listen to the challenges currently facing farmers in New Zealand.

What follows can be thought of as the ingredients of a future cake that still requires baking. These ingredients have been gathered from a cross section of New Zealand livestock farmers and experts within the primary and financial sectors. Insights were gathered agnostic of land use, race or beliefs. It is important to view the information in this report as a snapshot at a point in time. These insights will age. These solutions are by no means a silver bullet, but rather the outcome of what happens when we approach problems from a point of curiosity.

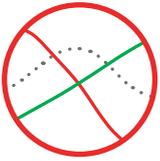


David Eade

David, his wife Harriet, and young family, own and operate a finishing block in Whanganui where they are focused on building ecological equity and high-quality produce through regenerative practices. Having grown up on a Hereford stud in North Waikato, the call of the land drew David and his family back to New Zealand in 2020 after living and working in San Francisco for six years. Drawing on a broad skill set across the technology, finance and livestock farming sectors, David is interested in using finance as a tool for good for food producers globally.

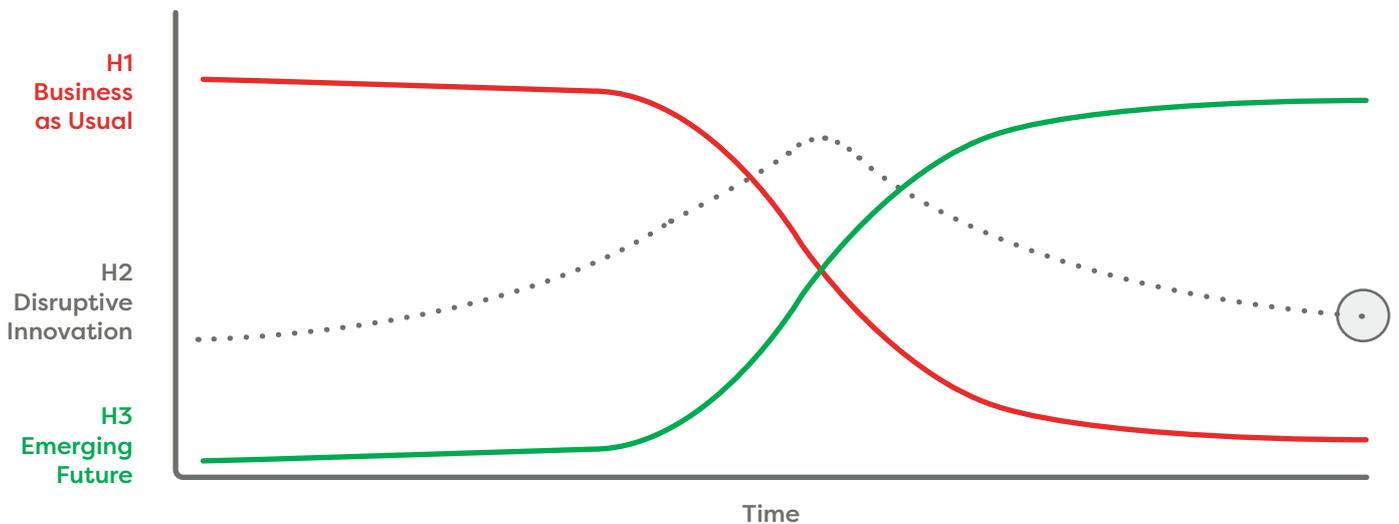
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Tools used



Three Horizons Growth Model

Bill Sharpe's Three Horizons Model has been used to succinctly capture the past, current and future. This model is broken into three horizons - Horizon Three, the future horizon to which we are headed. Faint signals of this horizon are evident in the current state. Horizon one, the current. What is currently declining and no longer fit for purpose. Horizon two, the bridge. What is going to help us transition to a bold new world? What is currently available and what is being created.



- **Horizon 1 (H1)** – The current business. As time passes and things change, its relevance decreases. In the long run, organisations stuck in H1 will fail.
- **Horizon 2 (H2)** – The bridge where business decisions either enable the H3 future, or reinforce the H1 status quo. As decision-makers, we act from the H2 perspective - choosing either H2 positive innovations (that enable H3) or H2 negative innovations (that prop-up H1).
- **Horizon 3 (H3)** – The theorised future state. It represents profitable growth in the future through business activities not yet commenced, but identified in H1.

H2 negative vs H2 positive

H2 negative (H2-)

These strategies are often politically feasible, but prevent evolutionary disruption and may ultimately force revolutionary change. E.G. In 1973, the UK joined the European Economic Community. Instead of looking outward, New Zealand turned inward, borrowed heavily and regulated its economy, precipitating the revolutionary changes of “Rogernomics” in 1984.

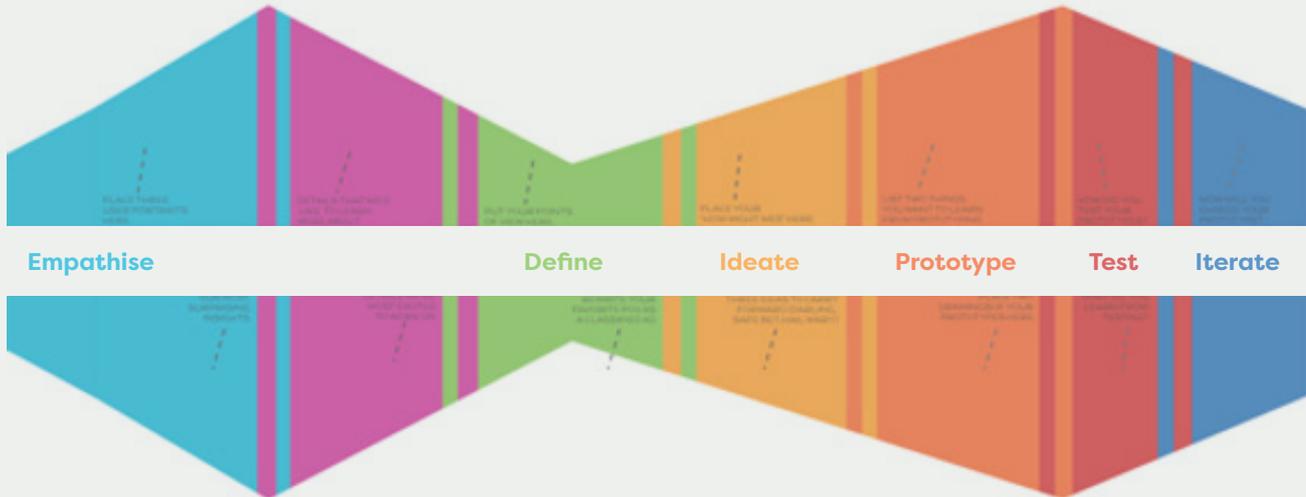
H2 positive (H2+)

These strategies hasten the H3 future and allow systems, economies and people to adapt and evolve over time, without the trauma of revolutionary change. E.G. ‘He waka eke noa’ unprecedented primary sector collaboration building a framework to measure and reduce GHG emissions at the farm level. The initiative is a potential foundation for future cross-sector collaboration.



Design Process

The design process is a non-linear, iterative process used to understand challenges, redefine problems and create innovative solutions to prototype and test. In this instance, a co-design process was followed with New Zealand livestock farmers as the target audience. The main goals were to listen, learn, validate and execute. The process is broken into four key stages below.



Empathise

Over the course of the past year, 50+ 30 minutes interviews were conducted with farmers. An additional 30+ interviews were also carried out with industry experts to seek a divergent perspective.



Define

Common themes were validated further by more than 100 responses to a survey. The overarching problem statement was generated based on these insights.



Ideate

The goal of the ideation phase is to use creativity and innovation to develop solutions to the problem statement formed during the define phase. Assumptions are to be challenged and ideas are to be created. Three ideation sessions were held with people from diverse backgrounds to generate solutions that tackle a concise problem statement.



Prototype, Test and Iterate

Three prototypes were generated. One stood out based on early feedback. Nineteen (19) separate conversations with New Zealand livestock farmers were used to test and iterate on this prototype to form final insights.

Executive Summary

Commodity prices received by New Zealand farmers are close to all-time highs, yet we are protesting in the streets for the first time in decades. **Our resistance to environmental regulation has exposed a vulnerability – we, farmers, are struggling to hold our place in the power hierarchy.**

We took our place atop the power structure when the SS Dunedin set sail for the United Kingdom with the first shipment of refrigerated produce in 1882. We have maintained our place in society with strong representation for the best part of 140 years. This is starting to change.

Our economic model is no longer fit for purpose as we approach an environmental point of no return. We are transitioning from a model optimised for human capital to one focused on maximising natural capital. The negative externalities associated with the farming models we have used for over a century are coming home to roost.

To maintain our place in the power hierarchy, we are defaulting to old tools such as protest and advocacy groups. We do not currently have the right mix of tools needed to drive and support change in a modern world.

Biodiversity loss, net zero commitments, the rise of alternative proteins and climate change are some of the many signals on the horizon that threaten our current system. We can either view these as threats, or as opportunities. Some of the most effective ways of reaching net zero commitments come through effective land use. Through the correct stewardship of land, farmers can make a disproportionate positive impact on the environment. What's more, a burgeoning market of investors is looking to get behind this exact cause.

Individually, farmers in New Zealand are projected to spend \$150,000 over the next 10 years to meet the latest round of environmental regulation. Collectively, the New Zealand Dairy industry alone is projecting \$6 billion dollars in annual losses attributable to environmental regulation. Yet, at the same time financial markets across the world are experiencing the largest amount of investment backing net zero commitments from both large institutions and through the rise of citizen finance.

We have a model that is no longer fit for purpose. It does not serve the environment or farmers. We also have a disconnect between farmers looking to make positive environmental change and investors looking to fund these exact pursuits.

What do we do when something is no longer serving us? We redesign it.

A design process was kicked off. The first step was to empathise with the challenges faced by New Zealand livestock farmers. Over the course of 50+ hours of interviews and 100+ survey results, challenges started to emerge. Many livestock farmers currently face a negative spiral with each challenge compounding upon the last:

- margins are being squeezed and profits are variable
- farming businesses struggle to pay what is needed to attract good talent
- many farming businesses remain understaffed
- understaffed businesses lead to farmers spend more time in an operational capacity
- after operational tasks are taken care of plus the day to day complexities of farming, there is no time left to understand ambiguous environmental regulation
- tired farmers carry the mental tax of having to defend a negative public image.

When summarised - New Zealand livestock farmers are scared that environmental regulation will cripple their low margin business.

We are not fundamentally bad people, and we are certainly not environmental villains. The negative spiral faced by farming businesses needs to be broken. What breaks this may be an unlikely source. The environment itself.

A series of complex and simple nature-based solutions emerged during the ideation phase of the design process. These potential solutions were viewed against the criteria defined by farmers during the empathize stage – the ability to help farmers; get paid, reduce complexity, get time back and feel valued in society. Most importantly an ideal solution had to provide the first tangible step New Zealand livestock farmers could take to make positive, profitable environmental change. The final prototype leverages many existing tools to create an outcome that will break the negative spiral faced by New Zealand livestock farmers. Of the 19 farmers pitched the idea, 75% said that they would pay to use the product.

By no means is this a silver bullet, but it is an example of what happens when we become deeply curious about a problem we are facing. Assumptions are left behind and problems are reframed. We are going to need many solutions that enable and empower New Zealand livestock farmers. This is but one tool in what will be a large toolbox. The findings in this report could be the ingredients of a future cake. A diverse range of people are needed to bake this cake and ensure that farmers can adapt to market lead signals.

The Current



Background

At its core, farming is a practice through which we convert natural energy into protein and carbohydrates. Economic theory determines where farmers choose to store this energy by assuming a rational person would allocate scarce resources to their highest economic return.

Like many developed and industrialised sectors, our current farming system allocates most of the stored energy to commodity-based products, with niche products making up a small portion of volume, but a high portion of return. Profitability from niche products reduces over time as supply outstrips demand with more producers entering the market to replicate early adopters. The market becomes saturated. Early adopters leave and find new niche markets. The once niche products experience a significant increase in production volume and become the new norm. Given this model, the primary sector always needs a release valve for volume.

Livestock farming has been pivotal to New Zealand's prosperity. The reason New Zealand enjoyed some of the highest living standards in the world at the turn of the 19th century can be traced back to the invention of the SS Dunedin in 1882; the first ship to set sail to the United Kingdom with refrigerated produce. This advance in technology provided access to new markets and demand for primary produce from New Zealand outstripped supply. Technological gains also ensured that additional bush could be cleared quickly to create more farmable land to increase the supply of primary commodities. These technological improvements brought with them changes to societal and power structures. Morale was high in the primary sector and farmers held great sway in the political arena. The role of a farmer was regarded as one of the highest in society, so much so that in our family, my great uncle was ridiculed for choosing to be a doctor instead of a farmer.



Signals of decline

- **>50% of New Zealand land is already in an agricultural land use - no more 'pioneer' land to break in.**
- **Flooding, droughts, heatwaves and other extreme weather events have occurred five times more frequently over the last decade when compared to the six previous decades**
- **Per capita suicide rates in rural New Zealand have surpassed urban New Zealand**
- **High nitrate levels found in the drinking water of towns close to New Zealand's largest dairy producing area**
- **Traditional hill country farms are selling for forestry at \$19,000 per hectare - a price where sheep and beef is uneconomic.**
- **Price of urea up 300% to \$1,200 per tonne in Jan 2021**



Today

Fast forward to today and the world is approaching an environmental point of no return. The latest report issued from the Intergovernmental Panel on Climate Change (IPCC) emphasises the fact that “..adapting to worsening floods, fire, droughts, heat waves and other natural disasters becomes significantly harder once the planet tops 1.5 degrees Celsius of heating. The planet has already heated 1.1 C and is likely to cross 1.5 C not long after 2030. At 4C of heating, every second plant or animal species we know will be threatened”.

The stereotypical climate destroyer is that of a wealthy oil executive who has consciously prioritised individual wealth over the environment. Best intentioned farmers are now being added to this stereotype due to the emissions profile of the sector. This is a very confronting position to be in as a farmer.

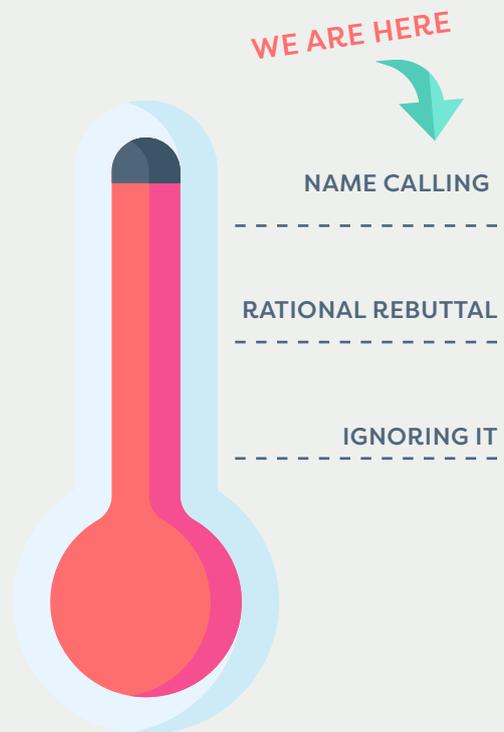
The externalities associated with New Zealand’s rise in prosperity are coming home to roost and pressure to act is being mounted by both our international customers and local stakeholders. Our economic model is updating from that of a post war recovery model focused on maximising human capital to one that ensures we measure and maximise natural capital. No longer can profits be privatised and losses socialised. The additional prosperity achieved through dairy farming is being overshadowed by the negative stigma of excessive nitrate leaching into our waterways and drinking water. The additional prosperity created by the beef industry is being overshadowed by the amount of methane entering the atmosphere.

Why is it that farmers are in the street protesting when commodity prices are at all-time highs?

The pendulum has swung and, this time around, change is shaking the societal and power structure we farmers have come to rely on. Farmers have lost their political weight. When in doubt, we protest or fight through advocacy because we farmers do not currently have the right mix of tools needed to drive change in a modern world.

Three stage of users’ resistance

MIT professor Elting Morison describes the three stages associated with adapting to change in his 1966 book *Men, Machines, and Modern Times*. Morison considers three stage of users’ resistance to change. When change is afoot, people first try to ignore it before applying rational rebuttal. Name calling starts when rational rebuttal fails. Farmers are well into the third stage of resistance as we adapt to changing environmental regulation.





The Future

With two young kids, I find myself slipping into my all too familiar song list when bedtime rolls around. Old MacDonald Had a Farm always makes my limited repertoire of three songs. After bumbling through the song countless times, it dawned on me that this song is the first impression kids have of farmers and it does not reflect that role that farmers are going to play over the coming decades. What does an updated version of a song look like over the next two decades? My daughter and I attempted to craft a narrative of what this may be:

Old Macdonald had a farm. E I E I O. And ...

... on that farm they had biodiversity.
With a Totara here and a Kereru there.

... on that farm they had clean water.
With Kokopu here and no leaching there.

... on that farm they had healthy soil.
With Fungi here and Evarthworms there.

... on that farm they had happy people.
With school visits here and the public days there.

In this case, the future of farming is one of stewardship. The one where farmers are at the centre of driving positive environmental and social change.

Animal numbers have reduced significantly as industrial feedlots are a thing of the past. However, animals are still key to ensuring diversified land-based farms cycle nutrients in the most effective way. Monocultures have been replaced with farms incorporating multiple land uses. Farmers are rewarded for the services they provide society: increasing biodiversity, sequestering carbon, reducing flood risk and maintaining clean water. A higher value is placed on living systems than dead commodities. For the first time in history, the cost of producing cellular and plant-based protein derivatives is lower than that of natural proteins. A lower shelf price for derived products leads to increased demand. However, the competitive advantage for land-based farmers is their ability to share a service and experience that derived products cannot. Nature. Pricing for our products has changed from our current cost-plus model to a value-based model.

A monetary value is placed on the values of the producer. A bridge is being made to bring people back to the essence of producing food. Urban communities who are multiple generations removed from the land take great pleasure in attending local farms to partake in food production. They are reminded of what it means to be in nature - the ability to connect to something bigger than confined town and city living - a connection to land and community.



- The price of a New Zealand carbon unit breaking through \$85 NZD.
- \$475 million in venture funding committed to solutions in Climate Fintech and Finance over the last year.
- 4 trillion invested in funds committed to achieving Net Zero outcomes
- The Reserve Bank of New Zealand stating that “It is plausible... that agriculture could face drought, a consumer shift towards plant-based protein, intensified regulation [to cut greenhouse gasses] and a carbon border adjustment mechanism in key export markets all at the same time,”
- China’s 2022 five year agricultural plan is the first to include investment in cultivated meats.
- \$3 billion invested in alternative food companies during 2020.
- Cost of producing alternative proteins has dropped from \$1 million per kg in 2000 to \$100 per kg today.
- Cost of producing alternative proteins expected to drop below \$10 per kg by 2025.

Crossing the Chasm

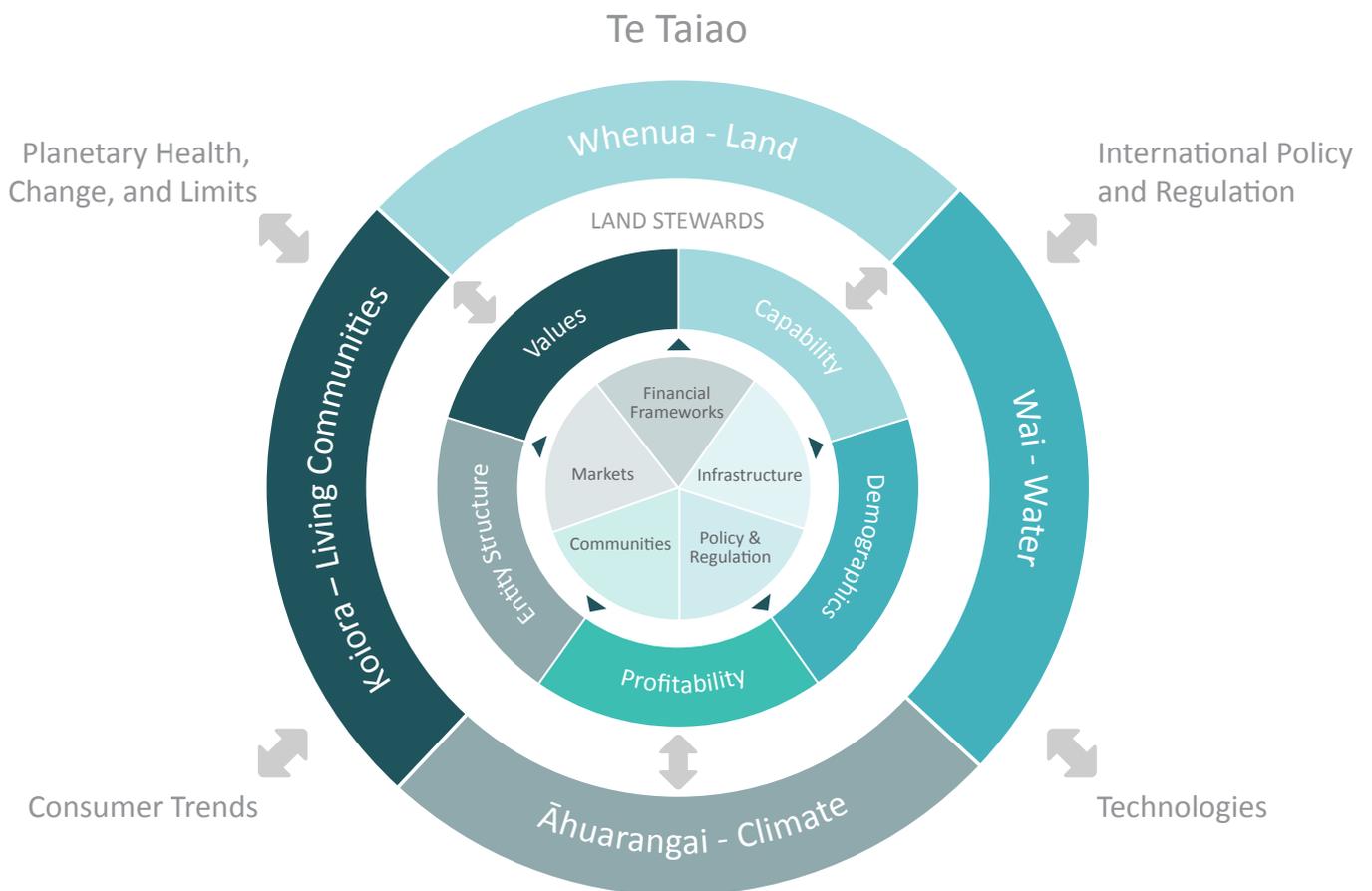
We have an economic model that is no longer fit for purpose and signs of disruption on the horizon. What is going to take us to the Third Horizon?

This section will focus on financial incentives that reward the intangible role farmers provide to society.

If we really want to scale change, we are going to need system change such as that outlined by Toitu te Whenua, Toiora te Wai. Having the correct financial incentives are not going to single-handedly save coral reefs. However, financial incentives have an instant impact on farming operations and behavioural change.

The focus of this behavioural change is providing ways through which farmers can make a positive impact on the environment. Whether this be through planting trees, changing farming practices or simply measuring what they are currently doing.

A big challenge when setting financial incentives is applying a tangible value to something that is intangible. We have done this many times before, whether it be through religious beliefs and gods we cannot see, or internet banking with money that we cannot access physically. The coming decades will see a series of interactions that allow value to be placed on living systems. The current versions of incentives are blunt, but they are important starting points to engender behavioural change. Every product that follows, and the value derived from them, will become more meaningful to an ever-increasing market over the next decade.

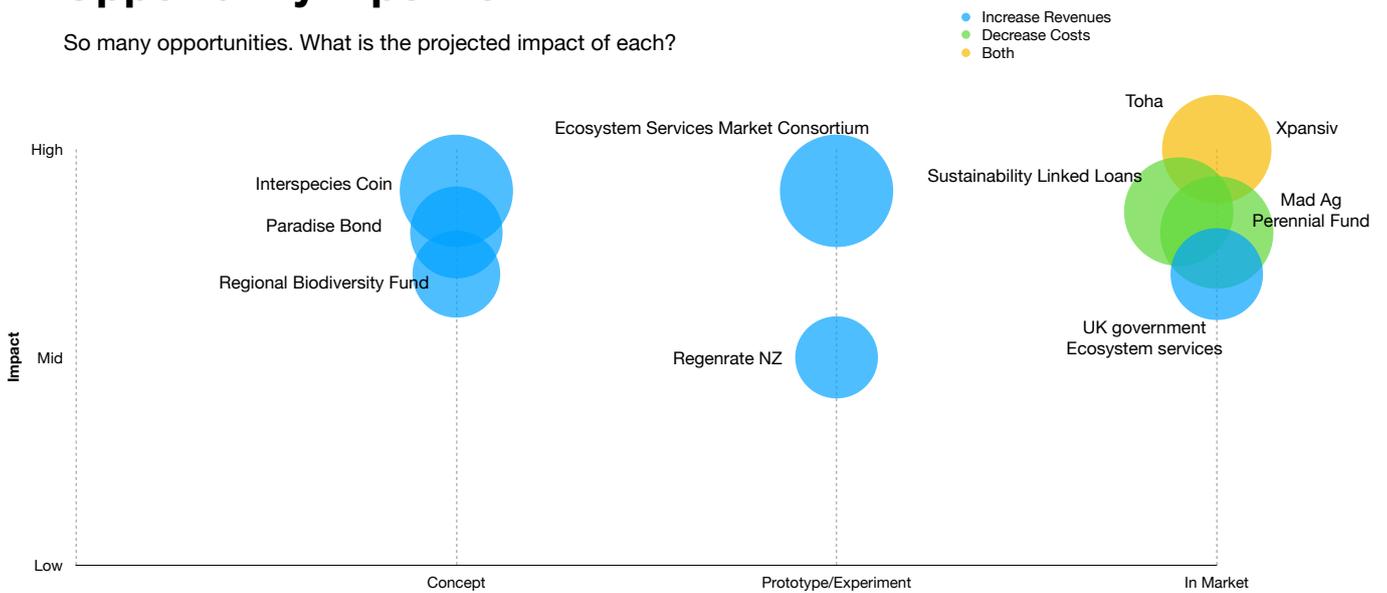


Market Landscape

A cross section of emerging products that will help us cross the chasm are compared below based on the extent to which they increase profit for farmers. These products are broken down into three buckets, concept, prototype and in market. The products that are currently in market could be considered 'blunt' as they are the first attempt at trying to incentivise new behaviours.

Opportunity Pipeline

So many opportunities. What is the projected impact of each?



These products are by no means the complete picture of what is out there but have been pulled together to show the differing approaches that are being taken from the extreme to the mainstream. Four foundation principles of these products: value nature, create a market, provide incentives and fund the noble pursuit.

Value Nature

A forest has historically had no value until felled. However, the New Zealand Emissions Trading Scheme (ETS) and corresponding secondary market for carbon, has created a market that places more value on a living forest than on timber. Subsequently, New Zealand farming is currently going through one of its largest land use changes driven by carbon. Hill country which previously sold for \$5,000 per hectare, is now fetching \$19,000 in some parts of New Zealand; a point at which the previous land use of sheep and beef becomes uneconomical. There is much criticism of this attempt to value nature, whether this be through using the wrong tree in the wrong place or incentivising the wrong outcomes. However, this signals a first attempt to place a value on a living forest. The critical point being that a living system is worth more than a dead commodity.

Stepping away from carbon and into biodiversity - pollinators, earthworms, clean water, rainforests and clean air are currently considered worthless in our society. This is also changing quickly. Biodiversity Credit Exchange is currently used by the Government of South

Australia. This scheme relies on a local offsetting where unavoidable impacts on biodiversity from development activities must be offset by enhancing biodiversity elsewhere. The logical place to do so is on farmland. As part of the process, farmers have their land assessed for potential biodiversity credits and the management costs associated with managing and restoring areas.

A more utopian idea is that of the interspecies coin - a concept where value is placed on living species to improve global biodiversity. In this instance, fractional rewards are provided to people carrying out tasks that positively affect the density, diversity, and health of species. The more endangered a species, the higher its value and the higher the fractional share received when carrying out services of protection. The mechanics are not clear. The short-term picture relies on the Bank of Other Species, a centralised bank monitoring the supply of biodiversity to place a value on nonhuman life. In the long run, it is thought that this system will support itself through packaging and selling data to investors.

Create a Market

All the aforementioned examples use different tools to reach the end outcome of rewarding farmers. Each tool needs a marketplace to function. There are two main types of markets - mandatory and voluntary. Governments around the world are creating mandatory, compliance based, markets to ensure they meet their 2050 net zero commitments. Two of the previously discussed examples, NZ ETS and Australian Biodiversity Exchange, rely heavily on government intervention to create behavioural change. Voluntary markets act outside of mandatory markets and allow individuals to purchase products on a voluntary basis with no intended use for compliance purposes.

Private, voluntary marketplaces are growing quickly. Take 'Toha' for example, a venture backed, New Zealand based company looking to reduce the constraints associated with impact investing. 'Calm the Farm' is the first impact instrument from 'Toha' set up to accelerate the global transition to regenerative agriculture. Farmers create a pledge to change their farming practices with the intention of improving environmental outcomes whether this be reducing nitrogen applied or planting a diverse seed mix. The environmental impacts of these land management changes are continually measured and verified through market leading science within 'Calm the Farm'. Outcomes are currently attached to discounted lending. However, in the future, it is the data backed pledge that will hold value and this pledge will be tied to an underlying commodity for example, one tonne of carbon. Enter Environmental Social Governance (ESG) commodity markets.

ESG commodity markets are growing quickly with next zero commitments expected to 10x or 40x the size of these markets over the next decade. The tradable commodity within this marketplace is an ESG claim which is delivered separate from an underlying physical asset. Like a future oil contract is the promise to extract from the earth and deliver a certain quality of barrels in the future, a Pledge offered by Calm the Farm is an ESG claim to change farming practices that will deliver a physical commodity in the future. The physical commodity backing this could be carbon credit, water credits, biodiversity credits or something not yet developed. Investors will be able to claim the positive future benefits held within this pledge through payment to a farmer. A live example of this is Xpansiv, an early stage ESG commodity marketplace that has recently received a \$2 billion valuation.

Regulatory change to the New Zealand financial systems is also creating a market for nature-based solutions. In reaction to a recent report published by the Reserve Bank of New Zealand, New Zealand Banks are moving early to avoid potentially having to hold more in balance sheet reserves for loans that are susceptible to climate change. Many of the loans in question are in the primary sector. This has paved the way for sustainably linked loans; a mechanism through which farmers receive discounted interest rates should they reach self-selected goals that increase their resilience to climate change. This achieves a win-win outcome - farmers are rewarded for resilient farming practices and banks de-risk their lending portfolio from climate change.

Provide an Incentive

Once a value has been assigned to nature, farmers are currently rewarded through one of two means - increased revenues or decreased costs. Trey Hill, from Harbourview Farms in Maryland, partnered with Nori, a carbon removal marketplace, to increase his farming revenue through carbon sequestration. Farmers like Trey are adding cover crops to their rotation, applying compost and reducing tillage all in an effort to increase the organic matter and carbon holding capacity of their soils. In his first sale, Trey was able to generate \$210k (USD) in additional revenue off a portion of his 10,000 acre farm.

Decreased costs are being introduced in the form of the already discussed examples of Sustainability Linked Loans or Pledges, offered by 'Calm the Farm'. Additionally, an interesting concept is that of a Paradise Bond, a long-term fixed rate bond issued by banks and placed with investors in the mainstream capital market. Debt is raised with the intention of retiring land from agricultural uses and returning land to forests, riverways and wetlands. Long term results-based payments are agreed on with the New Zealand Government, who complements the interest payments on the bond as environmental results are achieved. Landowners receive discounted lending and stand to gain from any additional nature-based payments that are available such as carbon credits or biodiversity credits during the transition.

Fund the noble pursuit

One of the challenges is finding capital to fund the 'noble pursuit'. Or, as put by Mike Lee from Alpha Food Labs, who co-authored the recent beef and lamb report on Regenerative Agriculture, "How do we bridge the hedonistic with the altruistic? How do we get people to eat great food that solves environmental issues?" Our default approach has been to demand a premium for our produce, which by all means we should. I believe that there are signs of a supplementary approach, one where our consumers will become our investors.

Investing continues to become democratised through the rise of citizen finance. The next generation of investors are gaining agency to allocate their investments directly to a meaningful cause. Square Cash App, Robinhood and, closer to home, the likes of Hatch, Sharesies and Kernel, are examples of where investors can access investment opportunities which would otherwise be out of their reach. Instead of having to save \$473,364 USD for one Berkshire Hathaway share, investors can buy a fraction of this share with what they are willing to contribute, even if that be \$1.

The intentions of this group are to drive change through investment. A 2020 survey of 1,000 New Zealanders aged 18+ by mindful money, highlighted that 60% of the public would be motivated to save and invest more money to make a positive difference to the environment and society. We have historically seen the supermarket as a place that we get to vote with our dollar - instead of choosing cage eggs, we go for free range, in the hope that our vote ensures the profitability of a business we believe in. Democratised access to investing enables a new way for funds to flow to the businesses we believe in. We need to consider our consumers as our investors.

Furthermore, sustainable investing continues to rise globally. In 2020 McKinsey & Company named biodiversity as the 'next environmental issue for business'. Fast forward ten years and the World Economic Forum's 2020 Global Risks Report ranked biodiversity loss and ecosystem collapse as one of the top five threats humanity will face in the next 10 years.

The outcome of COP26 highlighted two big areas 1) short term political cycles mean that sovereign nations are not yet able to unite against climate change even though the risks are well documented 2) investors are going to have to play a crucial role if we want to hold temperature rise to under two degrees Celsius. Since COP26, International funds have rallied behind this cause with close to \$4 trillion under management commitment to achieving net zero commitments. Another signal of private market action is the \$475 million in venture funding committed to solutions in the Climate Fintech and Finance sector over the last year. This is a small commitment relative to the size and urgency of the problem. Over time, however, these numbers have been rising with a 2x year on year increase.

Design Process

What do we do when something is no longer serving us?
We redesign it.

Everything up until this point has been hypothetical in nature. Armed with a hypothesis, evidence of a broken system and signals of a bright new horizon there was a glaring gap - what do New Zealand livestock farmers think? What are their challenges? Do these ideas meet the needs of New Zealand livestock farmers? If they did, then farmers would not be protesting in the streets against unworkable regulation. A practical explanation was needed and what better way to do this than following the principles of good design.

From this point on, the four steps of the design process:



Empathise



Define



Ideate



Prototype, iterate and test

will be used to understand challenges, redefine problems and create innovative solutions to prototype and test.

We are dealing with a big ambiguous problem, which stems from the fact that our current economic model is not servicing farmers, the environment or society. The outcome of this design process was to create the first tangible step farmers can take to make change. True co design, means that assumptions are left behind and all decisions are guided by the target audience.



Empathise

What follows are the ground truth challenges faced by New Zealand livestock farmers at this point in time. The insights are united across the New Zealand livestock sector agnostic of any agenda caused by siloed industry bodies.

Generating and maintaining a profitable business model

On the surface, this seems like an obvious challenge, almost expected in fact. Our current economic model is set up for competition at every level; amongst famers and across the supply chain. Given this, any business operating in a perfectly competitive market can make a short-term profit that is very hard to protect in the long run. The less obvious part is that profitable business models are the outcome of good strategy and execution. We are moving away from a model that has relied on capital gain and expansion to one that needs to be cash flow positive. This is put under further stress by volatile commodity prices and rising input costs.

Farmers buy retail and sell wholesale. Furthermore, farmers have the most risk capital on the line in the supply chain and consistently make the lowest margin. As of now, commodity prices are very strong, and have risen sharply across the board from those faced a few years ago. The only thing to rise quicker is input costs. As I write this report, urea is up from \$400 per tonne in 2021 to \$1,200 per tonne in January 2022, interest rates are starting to bounce off historic lows, council rates continue to increase faster than inflation, which itself is at never seen before levels, and the minimum wage is set to rise from \$20 per hour to \$21.20 in April 2022. Revenues are capped and costs are variable. When operating in this model, farmers are incentivised to lower costs to maintain profitability.



86% of farmers have financial concerns.

Top three challenges

- ✘ Input costs are increasing much faster than my revenue
- ✘ I am asset rich but cash poor
- ✘ I will need to sell if I want to retire as cash flows mean that the next generation cannot support the level of debt needed to purchase the farm

FARMER INSIGHT

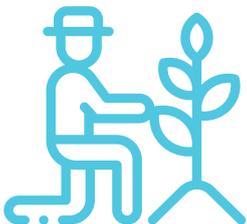
“My costs go up and profitability goes down. I could previously rely on capital gain but can’t now. Our ability to create cash surplus doesn’t keep up with capital value.”

“The price the market is paying for my produce is insufficient to make enough to cover input costs and generate profit. There is a squeeze going on. Tight margins mean that we are under-resourced. Long hours lead to less observation time. Less observation time means less appreciation.”

“The problem with farming is that you take a short term cash hit to get long term asset value increase”

EXPERT INSIGHT

“New Zealand is at risk of losing the family farm and the family aspect associated with it. Scale is needed to be bankable. How do we get them access to funds so they can grow?”



Attracting and maintaining great people

Two out of three farmers who employ staff struggle to attract and maintain great people. Farms are complex operations that run 7 days a week, 52 weeks of the year. Staffing any year round business brings challenges. For every one employee, an additional 2/3 of an employee is needed to ensure the business can operate after all weekends, sick leave, annual leave and public holidays are taken into account.

The reasons specific to farming can be divided into four areas; capability, pay, nature of employment and competition.

There is a feeling that many people who turn up are not qualified for the complex role of farming and farmers struggle to find the time to develop under qualified employees. Many farmers have learned first-hand that it is more expensive to hire the wrong person than not hiring anyone at all.

The minimum wage of \$20 per hour in New Zealand is set to rise to \$21.20 as of April 2022, and unemployment is close to 3%. At this level of unemployment, it suggests that everyone who is looking for a job, has one. Competition is fierce for top talent and pay is used as an incentive to attract quality people to a new role. Many farming businesses can simply not compete with what is being offered by other industries.

After pay, the toolbox is limited to work life balance and career pathways. The long days, rostered shifts and physical work associated with many roles in the primary sector mean that employees must have an internal driver to stay dedicated to what they are doing. This has historically come through a clear career progression to ownership. However, many sharemilking pathways have been taken away as owners turn corporate.

The result is that good talent leaves the sector to find roles that offer more pay and higher levels of fulfilment. The people that are left in the sector require more time for development. The two levers need to compete for quality talent are the ability to pay more and offer more personal development; two things that slim margin, time-poor farmers struggle to offer.



78% of farmers struggle to attract and maintain quality people.

Top three challenges

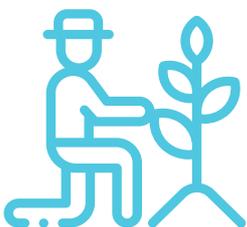
- ✘ Can't pay enough
- ✘ The lifestyle and time demands are too much for most people
- ✘ I cannot offer clear career progression or personal development.

FARMER INSIGHT

"If I can't pay my staff well, I can't get good staff. If I don't have good staff it becomes an ever decreasing circle of profitability"

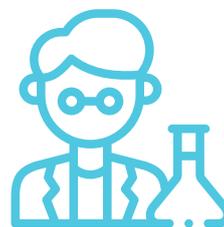
"There is a huge lack of people wanting to be in the industry because you have to work 7 days a week for low pay and no hope of farm ownership"

"Time poor and find hard to balance between employees development and practically getting work done"



EXPERT INSIGHT

"Not being able to attract people to our industry, at any tier, is our biggest threat. Especially as farmers are getting older."





Time poor and increasing complexity

Farming systems are naturally complex. Farmers are running a business reliant on people, animals and nature. Not only do farmers need to know business and leadership fundamentals, but they also must be able to make decisions that are irreversible for a particular season. Layer on top of this the fact that farmers are working operationally within their businesses due to a lack of employee reliability means that there is very limited time to invest in people or understanding policy changes, let alone finding time for family and friends.

It is easy to see where a feeling of overwhelm enters. Farmers constantly experience decision fatigue given the frequency at which they must make decisions and the weight the outcomes hold. The more decisions you make in a short period of time leads to a lower quality of outcome.



72% of farmers are time poor.

Top three challenges

- ✘ Farming is complex and only becoming more so
- ✘ Regulation and compliance are taking up a lot of my time
- ✘ My business is understaffed relative to the level of complexity

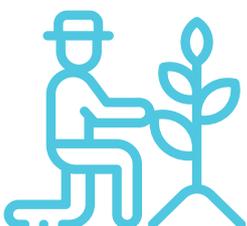
FARMER INSIGHT

The complexities of farming in general are hard to communicate. The time, hard work and money it takes to change a farming system to adapt to a new future are not acknowledged”

“Farming is great. We are time poor. It is hard to be everything to everyone. NZ farmers are technically some of the best in the world, but now you also need to be an HR Advisor, Environmentalist, Technology Expert, Office Administrator plus deliver great food to the world and tell your story. Are you exhausted by that list? We are.”

“Our farmers are knowledge workers, yet the profession of farming is not portrayed in this way. The ability to make decisions based off nature’s signals becomes initiative over a lifetime, but these mental models held in the heads of farmers are complex algorithms when explored deeply.”

“As an owner operator you play every role. Therefore you need to prioritise tasks. The majority of the year I do not have enough time to prioritise staff well being.”



Keeping up with environmental regulation and compliance

60% of livestock farmers identified this as a problem. Many farmers agree with the direction of travel, but are struggling to justify the proposed changes due to three drivers - the cost of compliance and potential loss in revenue, ambiguity associated with regulation and the speed at which positive outcomes are expected.

The tangible costs associated with meeting the new freshwater regulations are easily measured, whether this be through fencing or additional consulting costs; \$150k per farmer over 10 years has been estimated by beef and lamb (here). The total economic cost of pricing the emissions of New Zealand livestock farmers is expected to have a much higher dollar value attached to it, with estimates from Dairy NZ totalling \$6 billion (NZD) per year to the dairy sector alone.

Dollar value aside, the ambiguous nature of these proposals is taking a larger toll. As per the previous point, farmers are already time poor. The additional time associated with deeply understanding what is going on and how it will affect their operation is causing many farmers to question why they went farming in the first place.



84% of farmers are struggling to deal with environmental regulation

Top three challenges

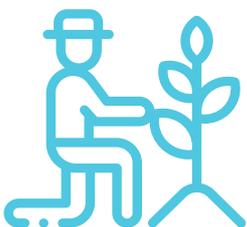
- ✘ The cost of compliance and potential drop in revenue
- ✘ Too much ambiguity associated with environmental regulation
- ✘ The speed of expected change does not match that needed to change a biological system

FARMER INSIGHT

“We have spent \$40k per year over the last three years to fence off waterways. This comes out of our modest cash flow and it is unsustainable.”

“You become a farmer because you love working with the land, and people. Now we have to prove that we are caring for the land and it is dragging people down.”

“As far as environmental change goes, it is the perception of being told what to do. As a farmer, I don't like being told what to do with their land.”



EXPERT INSIGHT

“We are not telling farmers what change will look like and we are failing to support them with roadmaps. We just push them and expect them to make the right decisions”



Dealing with the negative perception people have of farmers

During the discovery process, New Zealand farmers were taking to the streets to protest unworkable regulation. These were the largest protests seen for at least three decades. It was no surprise to find that 71% of farmers feel that their role as a food producer is undervalued. Many of the farmers I spoke with said that they would not have otherwise made contact if it wasn't due to being fed up with how they are perceived by the public.

For me, this was an eye-opening point. We have a traditionally stoic farming community reaching a point where they want to be heard. When digging deeper, there are two main points of frustration - the idea of a rural urban divide or a misrepresentation from media and leaders in how stories are portrayed. Both opinions seem to be based on stories seen in the news rather than direct confrontations with the public.

Personally, I believe this stems from the answers to a separate, but related question. When asked, "what are your greatest challenges when understanding customers and stakeholders?" 61% of farmers stated that this is not something they think about. We believe that this is the role for our cooperatives and marketing companies. We focus on production rather than value, and supplying companies rather than customers.

I am not asking every farmer to be the Chief Marketing Officer for their cooperative, but I do ask every farmer to be deeply curious about what consumers are demanding. If we listen empathically to the needs of the people we think are attacking us, we will find that we collectively value many of the same things.



90% of farmers struggle with the negative perception of farmers current held by the New Zealand media

Top three challenges

- ✖ The role of a food producer is undervalued in society
- ✖ All positive farming stories are told in farming circles
- ✖ A small group of activists gets too much attention in the media

Interestingly...



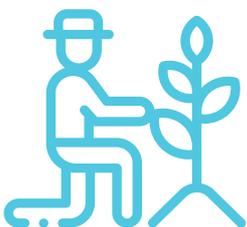
60% of farmers do not think about their customers and stakeholders

FARMER INSIGHT

"I'm too old and lazy to start engaging with our customers, that's a long game. If I was 40 and had capital, I would give it a go."

"Farming has plenty of detractors in the public arena. As farmers we have had our heads down trying to make a living wage, we have forgotten to explain to the wider community why and what we are doing to keep the country in the standard of living they expect."

"There is a disconnect between rural communities and city people who don't understand farming or appreciate what farmers do for the land, the environment and the country."



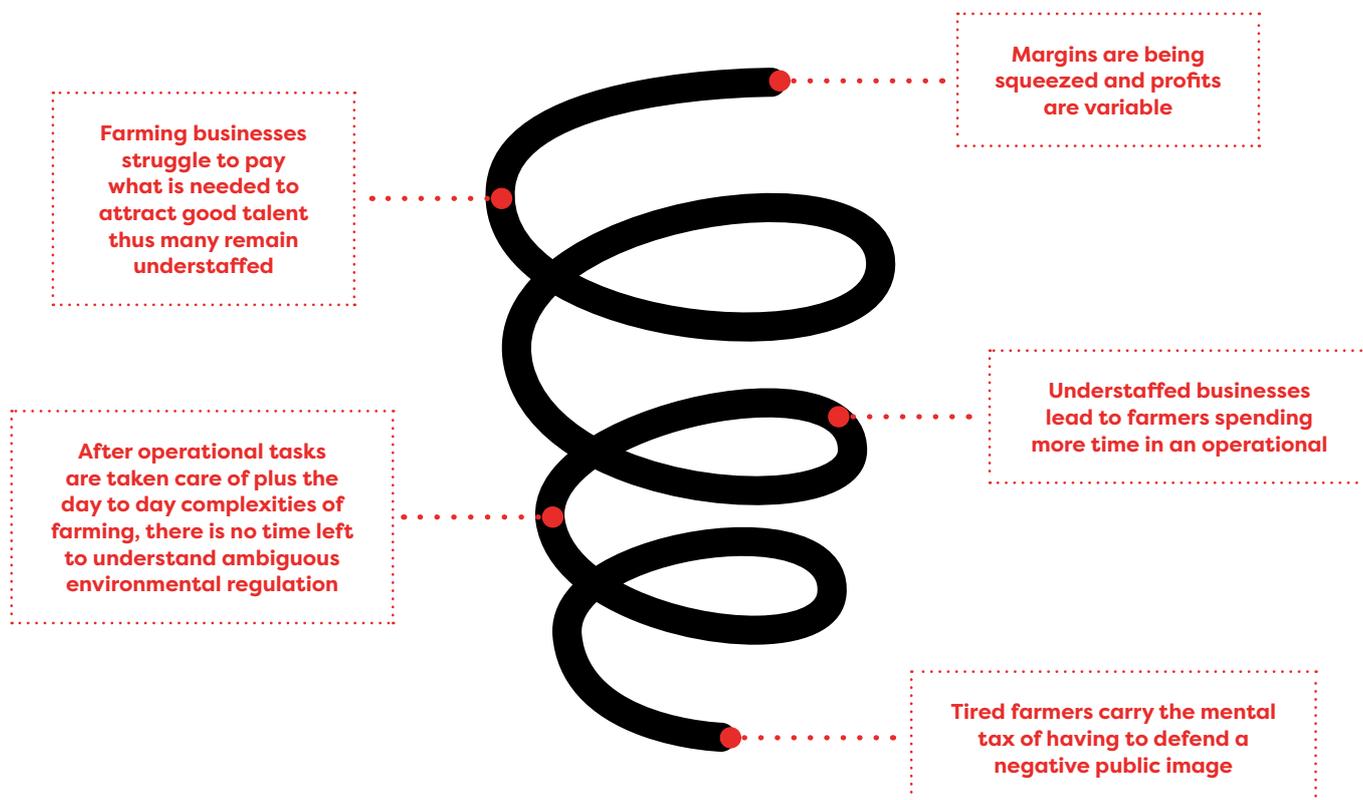
EXPERT INSIGHT

"There is a social cost that is not being discussed. We are in a dangerous time. Farmers are beaten up to the point that they don't see a future beyond five years."



Define

These insights are relatively obvious when viewed in isolation. However, when combined, it is evident that they are all related and form a negative spiral.



Squeezed margins lead to lower profitability, which means competitive salaries cannot be offered to attract talented people. With a lack of reliable talent, more of the farm owner's time goes into developing people and picking up operational tasks. The complexity and ambiguity of continuously updated regulations requires time or additional advisory costs to review. Time and cash flow being two things that farmers are short of leads to a feeling of overwhelm. The last straw is that everywhere farmers look they see themselves as the environmental villain.

When summarised, the main problem statement is:

New Zealand livestock farmers are scared that environmental regulation will cripple their low margin businesses.

A conservative estimate attributes \$150,000 in environmental regulation costs over the next decade per farm in New Zealand. These are only the hard costs associated with compliance (fencing, reporting, etc) and do not factor in any opportunity cost associated with a reduction in production that methane pricing and the freshwater reform may cause. Extrapolated out over the estimated 49,350 farms in New Zealand, we create a \$742 million dollar problem.

Drilling deeper on this topic, many farmers state that it is only a fraction of their farm that requires any form of substantial work. Less than 20% in most cases. Yet how to approach this 20% is creating a serious headache for our farmers.

Environmental regulation could be considered the straw that broke the camel's back, but this is a critical piece in the puzzle of future success. It is the small problems that divide us, but the large problems untie us. Could what farmers perceive as unworkable environmental regulation be seen as a unique impact investment opportunity for others?

How might we bring profitability to New Zealand livestock farmers in a way that serves the environment and makes farmers feel valued as food producers?

Ideate

The goal of the ideation phase is to use creativity and innovation to develop solutions to the previously defined problem statement.

When the problem statement is broken down, an ideal solution will ensure that farmers:

-  **Get paid**
-  **Get time back**
-  **Reduce complexity**
-  **Feel valued in society**

To be sure that we looked beyond the current solutions and perceived barriers, a diverse range of minds came together to throw all the ideas they could at the problem. From public servants to farmers, environmentalists to founders of financial technology companies, social entrepreneurs to investment professionals. There were no constraints on ideas at this point. A list of solutions was generated with ideas ranging from a Decentralised Autonomous Organisation (DAO) that provides ownership and voting rights on farming models to children's story books and everything in between.

When reviewing the ideas generated after each session, I noticed my complexity bias - a tendency to prefer complicated solutions over simple ones. A bias built into humanity. It is easy to take a shiny idea and see how it is going to transform society. However, I had to remind myself of what I was trying to achieve - provide the first tangible step to reward farmers for the intangible role they provide to society. The examples in Horizon Two highlighted that we have simple tools readily available to make change and complex solutions that are still being generated. Readily available tools would need to be harnessed to provide the first tangible step of change. Taking this first step with what we currently have will allow New Zealand livestock farmers the ability to take advantage of new credits such as biodiversity credits should they launch. Further into the future, this will set farmers up to make additional income from ESG commodities mentioned in Horizon Two. The important part is getting started.

Of the principles learned in horizon two, the following were used to perform the four previously mentioned jobs required by New Zealand livestock farmers at this point in time:



Principles

Value nature

Create a market

Provide an incentive

Fund the noble pursuit



Tool

NZUs (NZ carbon credits)

New Zealand ETS

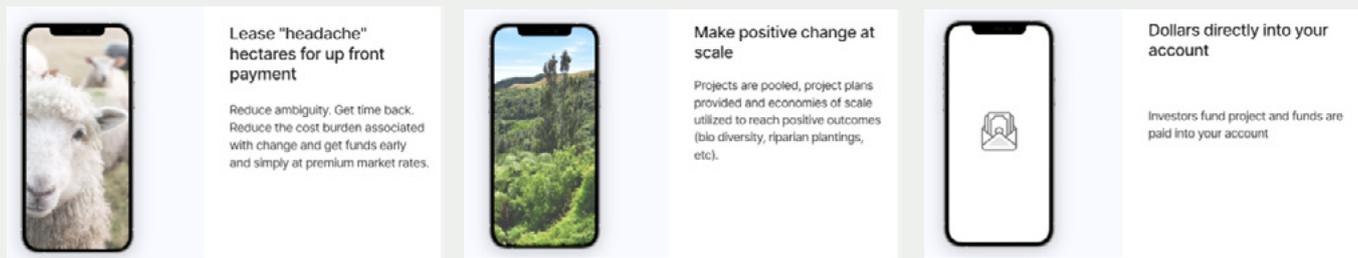
Increase revenues

Citizen finance

Prototype, Iterate and Test

The goal of prototyping is to get something tangible in the hands of farmers to learn and iterate quickly.

Very light solutions were cobbled together as well as a high level pitch including figures based on feedback received from farmers during the ideation phase. Three early prototypes were picked before deciding to push on with one based on early feedback. Prototyping was conducted in person or via video.



The prototype was called 'Margins'. This concept allows farmers to lease their headache hectares for upfront payment and create profitable environmental impact. Most of the positive impact will come through planting headache areas in a species that suits the preferences of the farmer and the location. The outcome will be improved on farm biodiversity and carbon sequestration, and environmental compliance. Farmers maintain ownership of their land. Investors are rewarded with verified impact data and financial returns generated from the project. Initial financial returns will likely be in the form of NZUs until additional credits, such as biodiversity credits, are available. The end outcome - the first tangible step to reward farmers for the intangible role they provide to society.

Job

Solutions



Get Paid

Farmers lease their headache hectares that are subject to compliance and complexity (steep land, riparian, etc), and are rewarded with an upfront payment and a continued lease. Lease amounts are determined by the landowners desired outcome (restoration, retirement, production), how involved the landowner wants



Get time back

Projects are pooled and economies of scale are realised. There is no need to stress over where to put a fence, what to plant or having to organise planting crews. Farmers get time back to focus on the profitable parts of their operation.



Reduce complexity

The burden of staying abreast of environmental regulation is reduced. Reporting on environmental impact and farm planning is simplified through the sharing of data from leased hectares.



Feel value in society

Citizen finance is used to raise capital to fund projects. Project data is shared to communicate the positive impact each project is having on the environment and community. Rural and urban communities are brought together through finance.

Iterations were made and feedback was gathered when going through 19 interviews. Some of these learnings are outlined below:



What we learned

“I don’t want to sell my land.”

“I won’t use an app.”

“I like the idea of being able to measure impact with the public.”

“Does this tie in with my current farm plan? Or better still, does it take care of all my environmental compliance.”

“Removing the barrier of time and decision making is almost more important to me than finance. Having an investor for this is actually pretty handy too.”



How we changed

Included the word ‘lease’ to ensure no ownership was given up.

Removed phone screen from slides in later versions.

Matched farmers with citizens looking to finance environmental projects

All data is shared with farmers to incorporate into their farm plans. All planting areas are map and plans shared.

We will ensure that farmers can quickly get to No when thinking of what to do with their land or are easily supported to Yes. We provide the frameworks and expertise to maximise your headache hectares and meet your environmental needs/aspirations

Two final questions are asked at the conclusion of each prototype session:

Would you use this product?

16/19 said Yes



Would you pay for this product?

14/19 said Yes



Imagine what this could look like at a catchment level, where farmers and stakeholders are currently working together to achieve a common goal of improved water quality. Vast, interlinked riparian corridors that stretch continuously across the boundaries of multiple landowners will be planted. Carbon will be sequestered, biodiversity will be improved and the overarching goal of improved water quality will be achieved. At the same time, farmers get paid, get time back, reduce complexity and feel valued for their role in society.

By no means is this conclusive, but it goes a long way to suggesting that it meets the needs of many farmers.

Conclusion

The thoughts of one farmer stuck with me as I went through this process. When asked about what success would look like for their operation, they said it would be having an answer for when their kids ask them what they did when they had a chance to save the environment. As a farmer myself, I have pondered many ways to answer this question. Only time will tell if the individual decisions we take on our farms will be the right ones. However, we can only make decisions based on the information we have now.

What we know is that our environment is on a crash course to collapse and we need to act now if we want to stop irreversible impact. We know that the current economic model is not servicing farmers with low profitability fuelling a vicious negative spiral. We know that we are going to have competition from alternative proteins, which cannot offer a connection to nature. We know that nature-based solutions are increasing the profitability of environmentally positive farmers. We also know that there is a huge wave of capital backing net zero commitments, of which changes to land use makeup over half of the top 25 most power tools to reach this goal.

Farmers have a chance to be the hero in the next stanza of history. To do so effectively, we need our story to be told through the voice of someone else. This could come through investors who are looking to make a difference with their dollar.

By no means is this prototype considered a silver bullet, but it is an example of what happens when we get deeply curious about a problem. Assumptions are left behind and problems are reframed. We can either protest in the streets as we struggle to maintain relevance, or we can design the tools we need to achieve positive outcomes. If we, as farmers, get deeply curious and listen, we will hear that the needs, wants and values of our stakeholders and investors are very similar to ours.

We are going to need many solutions to bring agency back to New Zealand livestock farmers and this is but one tool in what will be a large toolbox. The findings in this report could be the ingredients of a future cake. A diverse range of people are needed to bake this cake and ensure that farmers can adapt to market lead signals. We might rewrite Old MacDonald Had a Farm after all.

New Zealand Nuffield Farming Scholars
**Resign or Redesign – Redesigning NZ farming
to thrive through change**



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