Summary report

Hill Country Futures Partnership Programme

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Acknowledgements and Indemnities

Resources are made possible by sheep and beef farmer investment in the industry.

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Executive summary

Overall

- The Hill Country Futures (HCF) Partnership Programme was a five-year, $8.1 million investment led by Beef + Lamb New Zealand, with support from the Ministry of Business, Innovation and Employment (MBIE), PGG Wrightson Seeds and RAGT New Zealand.

- Its purpose was simple: **to help New Zealand's hill country farmers build more profitable, resilient, and sustainable businesses**.

- The programme focused on two key areas:
    - **Resilient farmers –** providing tools and knowledge to strengthen decision-making, wellbeing, and long-term farm viability, and
    - **Resilient forages –** identifying and developing pasture species and management practices that perform well under New Zealand hill country conditions.

- Farmers were at the heart of the research. The programme brought together farmers, researchers, and industry experts to ensure practical, on-farm solutions were developed.

- As a result, HCF has produced a wide range of resources — including, extension guides, management tools, and research findings — which cover pasture management, farm systems, environmental care and farmer wellbeing.

- These resources are now freely available to help farmers make better decisions, lift productivity and secure the future of their businesses and rural communities.

Programme outcomes

The HCF Partnership Programme delivered a wide range of practical benefits for New Zealand's sheep and beef farmers that are focused on building resilience across farm systems and communities.

Resilient Farmers

- **Wellbeing and decision-making support –** The development of *FarmSalus* (the Farmer Perspective Series) provided a structured tool for farmers and rural professionals to assess and support wellbeing, farm business health, environmental care and social connections.

- **Farmer perspective series–** Insights from over 300 farmers shaped resources that reflect real-world challenges and aspirations, including succession planning, regenerative agriculture, and environmental action.

- **Championing farmer stories –** 37 media articles showcasing farmers improving their land, livestock, and communities help build public understanding and sector pride.

Resilient Forages

- **Improved forage selection –** Field trials and modelling tailored to diverse hill country conditions supported better decision-making around pasture species selection for a range of forages that included lucerne, clovers, plantain and chicory.

- **Lucerne benefits –** Lucerne systems demonstrated significant productivity gains, including higher lamb growth rates, increased liveweight weaned and improved drought resilience.

- **AgYields database –** Farmers now have access to a national forage database showing which crops grow best in their region which supports more confident investment in pasture improvement.

- **Exploring native shrubs –** Pilot trials showed potential for native species like coprosma to serve as alternative forage that also offer biodiversity and erosion control benefits.

Knowledge and tools

- Over 100 published resources, 130 extension activities, and 68 peer-reviewed papers were produced.

- Tools and models developed during the programme are freely available to help farmers make better informed and robust decisions.

Programme outputs and achievements

Engagement with farmers and sector stakeholders

Over the course of the entire programme and despite the challenges of Covid-19 lockdowns, we still found the opportunity to engage with farmers and stakeholders and produce numerous research outputs.

Examples include:

- Workshops and Hui - 16
- Substantive information sharing and advice (e.g. field days, conference presentations, meeting presentations, podcasts) - 130
- Non-peer reviewed published articles (e.g. articles, reports, fact sheets) - 104
- Conference proceedings - 36
- Peer reviewed published articles - 68
- Postgraduate thesis - 10

Award finalists

Although we did not win the New Zealand Primary Industries Awards in the Teams and collaborations category, becoming a finalist in this category paid tribute to all the collaborations and the teamwork that went into making the HCF programme successful.

Presentation and publication showcasing the HCF programme

At the end of the programme, a presentation was given at the New Zealand Grasslands Association conference which provided an overview of the entire programme and its achievements. An overview of the programme and its achievements was also published in the Journal of New Zealand Grasslands (Hill Country Futures—Resilient farmers and forages).

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B+LNZ – Foreword

The Hill Country Futures Partnership Programme (HCF) has been a milestone in our efforts to support New Zealand's hill country farmers. It's been a privilege to work alongside farmers, researchers, and industry partners to deliver a programme that's practical and forward-looking.

Over five years, HCF delivered a wide range of work — from developing resilient forage systems to supporting farmer wellbeing and robust decision-making. Its success lies in collaboration and bringing together diverse expertise to co-create solutions grounded in science and farming realities.

Hill country farming faces complex, evolving challenges, including climate change, land-use pressures, regulation and shifting expectations (to name a few). HCF responded with tools and resources, but also with empathy, by recognising that resilient farms begin with resilient farmers. The development of *FarmSalus (*the Farmer Perspective Series) and engagement with over 300 community members reflect this people-first approach.

The programme also advanced our understanding of forages. Through trials, modelling and case studies, we built a strong evidence base to support better forage selection and management. Resources like AgYields and lucerne yield models now help farmers make decisions suited to their landscapes. We also explored native shrubs as alternative forages which offer promise for co-benefits such as increased biodiversity and overall farm resilience.

This document captures not only what was achieved, but more importantly, it reflects the voices of farmers who shaped the work. Their insights ensured the outputs are relevant for other farmers and grounded in the practical realities of farming.

Thank you to everyone who contributed. Your commitment has created a legacy that will continue to support hill country farming well into the future.

Jenni Vernon – Foreword

Chair, Hill Country Futures Partnership Programme steering committee

I have fond memories of growing up following my grandfather around the Ruahine Hills. Sheep and beef farming was fundamental to the country's very existence and rural communities were the beating heart of the nation.

As land-use has changed, dairy farming and horticulture have become more prominent. Yet there is still a huge acreage of hill country farming that is of great value to our economy. It's part of the fabric of our society - and has some of the most unique rural communities.

Because I am a hill country farmer, I understand the background as well as the challenges farmers face working for a future with regulatory and climate change, urban expansion and the need to encourage the next generation to be part of that future.

I also know why New Zealand needs hill country farming, and that we need future hill country farmers to continue farming these vast slopes out there in the back of beyond.

So, it's been hugely rewarding to be part of the Hill Country Futures Partnership Programme, working to empower these rural communities and farmers, supporting them to remain profitable and resilient in the face of change.

In this document, you will see how the programme has delivered new tools and information to support us farmers to remain adaptable versatile and resilient. The social research undertaken, which has put farmers font and centre, was critical to this delivery. It has been a litmus test of how our farmers are feeling and what is

needed to secure the future of hill country farmers, their farms and their communities.

I’m also excited about the opportunities around biodiversity within the forage landscape, including the potential to integrate native shrubs as an alternative fodder as part of integrated farming systems.

As some of our most beautiful soils get swallowed up for urban living, hill country will now become even more valuable and important. Ultimately, the work that has been done in the programme will also add value to our markets.

It’s been a privilege to chair the HCF Steering Committee. I want to thank my incredible colleagues on the Steering Committee for their passion and commitment and the Beef + Lamb New Zealand staff for their amazing support.

Photo taken by ER Imaging Photography

Introduction

A thriving hill country farming sector is crucial for New Zealand's economy and its regions. However, it faces numerous challenges, such as climate and land use change, increased regulations, and changing societal expectations. To address some of these challenges, the HCF Partnership Programme was developed.

This five-year programme (commencing April 2018) was co-funded by Beef + Lamb New Zealand ($3.5 million), the Ministry of Business, Innovation and Employment ($3.15 million), RAGT New Zealand (formerly Seed Force New Zealand; $0.75 million) and PGG Wrightson Seeds ($0.75 million). Beef + Lamb New Zealand led the programme under the management of Mhairi Sutherland.

The programme Steering Committee was chaired by hill country farmer Jenni Vernon and members included Derek Woodfield (PGGW Seeds), James White (RAGT), Sam Lang (farmer), Jacqui Cottrel (farmer), Rita Batley (farmer), Rawson Wright (Federation of Māori Authorities) and Suzi Keeling (Beef + Lamb New Zealand).

During the programme, the farming community were actively engaged, and a collaborative research approach was employed involving Beef + Lamb New Zealand, farmers, universities, Crown Research Institutes and consulting agencies. The programme consisted of two interconnected workstreams with a focus on ‘Resilient farmers’ and ‘Resilient forages for the future’.

Photo taken by ER Imaging Photography

Resilient Farmers

Sheep and beef farming in New Zealand's hill country landscapes is subject to multiple pressures, including increasing competition by forestry, more stringent environmental regulation, direct and indirect impacts of climate change, changing societal expectations and new market requirements. Given these numerous pressures, increasing the resilience of farmers to expected and unexpected events is key to future proofing them and their farms.

To help achieve this, we studied how to measure resilience in hill country farming and how to monitor how progress might be made towards predictive "future proofing" targets.

The 'Resilient farmer' component of HCF had several aims:

- To determine a shared vision for the future of hill country farming based on key challenges and opportunities facing farmers and other stakeholders,
- To use this information to develop a resource package that can be used to measure and monitor farmer resilience and guide conversations about well-being and decision-making, and

- To showcase to New Zealanders, especially consumers, how farmers are demonstrating continual improvement for the environment, livestock health & welfare and rural communities.

We listened and talked to almost 300 people, primarily sheep and beef farmers…

We wanted to know what is happening in hill country farming, what matters most to them and what their vision is for the future.

Ultimately, farmers told us that people are at the centre of their vision for the future of sheep and beef farming in hill country.

We also wanted to know how to support our farmers and rural communities to achieve and maintain a resilient future. To do this, we worked with partner farmers to systematically identify, document and understand the drivers, challenges and opportunities they face.

So what matters most to New Zealand sheep and beef farmers?...

After we evaluated and analysed all the conversations we had had over cups of tea with our study participants, we identified the following key issues:

- Barriers and opportunities for on-farm environmental action
- Economic diversification and resilience
- The next generation of farmers: succession
- Perspectives on regenerative agriculture
- The Future of Hill Country Farming: a vision 2030?

This work became known as the Farmer Perspective Series.

FarmSalus is a resource package designed with our farmers to support resilience…

Supporting the well-being of farmers is central to future proofing their farm and resilient rural communities. We identified a need for resources that would enable rural professionals to support individual farmers' well-being.

So, we designed an evaluation resource for farm system resilience that focused on the health and well-being of the farmers themselves. This resource, *FarmSalus,* is named after the Roman goddess of wellbeing and safety.

FarmSalus supports a whole farm system approach to resilience and well-being and prompts farmers to have discussions about their own specific farming situation. *FarmSalus* emphasises four pillars of a resilient farm system.

- Healthy farmer
- Healthy farm business
- Healthy environment
- Healthy connections to support networks

These four pillars were identified by New Zealand hill country farmers to be the foundations of a resilient farm system.

FarmSalus was also designed to be used by rural professionals to guide conversations with farmers about issues important to them and their farming resilience. *FarmSalus* encourages farmers to make healthy decisions for their farm management and farm business that align with their own needs and values.

Collaboration with other organisations, such as Agri-Women's Development Trust, The Rural Support Trust, Ministry for Primary Industries and Farm Strong were important in the development and adoption of this resource with the aim of ultimately supporting our farmers and their communities.

Three resources were developed to be used by rural professionals to support resilience:

- FarmSalus: Creation of a farmer wellbeing assessment tool
- FarmSalus: Notes for facilitators
- FarmSalus: Resources for rural professionals & farmers

Our farmers have important stories to tell that must be championed …

Hill country farmers are vital for both food production and preserving the iconic hill country landscapes. In recognition of this importance, it's crucial to celebrate those farmers who are actively improving environmental and livestock health and wellbeing aspects on their farms, and the flow on effects to the wider rural communities in which they live and operate

To achieve this, a series of farmer stories were developed for a broader audience through mainstream media. These stories showcased the positive social and environmental progress taking place on these farms. Importantly, these farmers actively participated in the research conducted as part of the HCF programme, demonstrating their commitment to sustainable farming practices.

In total, 37 articles were published in rural media, including *Country Wide*, *Rural News*, *Wairarapa Times*, *Stuff*, *Farmers Weekly* and *North Canterbury News*. Through these stories, the programme was able to showcase several hill country farmers.

Read their and other stories here.

Resilient Forages

Hill country farmers farm diverse hill country landscapes across New Zealand. It is critical to select plants that meet several criteria from ease of establishment to achieving animal production goals and tackling environmental challenges.

Farmers need evidence and the necessary information that gives them confidence to utilise different forage and farm system options and to invest resources in making a change towards creating a resilient hill country farming future. Evidence and information come from field trial data, case studies and modelling exercise regarding what forage to plant and how to manage it.

This component of HCF had several aims:

- Identification and collation of pasture/crop yield data and growth rate information,
- Evaluation and/or development of models to inform forage selection or predict legume yield for different land management units across New Zealand at farm and national scales,
- Consideration of the feasibility of using native shrubs as forage, including insights into the mātauranga Māori knowledge) of these forages, and
- Consideration of the feasibility of adapting the DairyNZ Forage Value Index (FVI) to sheep and beef farms through a case study approach.

Data was collected from forage trials on several research and farm locations around the country…

Data, including growth profiles of a range of forages (e.g. red, white, and subterranean clover, lucerne, plantain, chicory) growing as monocultures, mixtures and resident pastures, were collected from 18 research and commercial farms across New Zealand (our study sites).

This data was used to:

- Contribute to the AgYields national database, which also includes historic data. AgYields enables farmers to see which pastures and crops have been grown in their districts, how much they grew, and when, so they can select more resilient pastures and crops to suit their farm systems.
- Develop two models with contrasting complexity to simulate lucerne (*Medicago sativa*) yields across New Zealand. Twenty years of lucerne, soil and water data from Lincoln University were used in the development of these models.
    - The TGM (Thermal-Time-Based-Model) model – this was designed to target a farmer or farm-consultancy end-user interested in estimating local lucerne yields, and
    - The APSIM (Agricultural Production Systems sIMulator) - this is a process-based model used by researchers to develop a mechanistic tool that can explain forage production and environmental impacts due to climate and land use changes.
- Create resources such as the *Soil & Fertiliser* and *Molybdenum* fact sheet series and *Lucerne at Willesden* video series.

- Develop several case studies that showed the impact of increased areas of lucerne at Bog Roy station, flexible use for hogget mating at Willesden farm on Banks Peninsula, the impact of improved forages at Inverary station for summer moist environments and comparisons of resident and improved forages.

Find out more about the research conducted on our study sites here.

Find out more about the tools and resources that were produced as part of the HCF programme here.

Find the scientific peer-reviewed publications from this work in the HCF publications section below.

A wireless sensor network was established to enable daily farm scale mapping of soil properties in New Zealand's hill country…

More robust tools that can estimate pasture yields and determine the suitability of forage legumes in diverse landscapes were developed using data collected at the farm scale in New Zealand's diverse hill-country landscapes. Soil temperature and moisture dynamics data are particularly important as these micro-indicators are key drivers of many soil and plant processes.

Wireless sensor networks (WSN) accommodating hill country topography challenges were installed at six sites across New Zealand. At each site, the sensors were distributed to account for the variation in important topographic variables including elevation and aspect. This work is a world-first.

The sensor nodes were famously constructed by Jagath Ekanayake in his living room during New Zealand's first COVID-19 lockdown in April 2020, a feat which was noticed by the Smithsonian Institution in Washington D.C., USA.

Daily maps of soil properties were produced at a grid resolution of 30 m, showing that soil temperature and moisture can be mapped at the farm scale in New Zealand hill country.

Read the full report here.

Native shrubs as alternative forages…

Many farmers with steep erosion prone hill country are interested in revegetation with native species. Planting native plants can offer increased native biodiversity and provide erosion control. Farmers also want to know if native shrubs can be used as an alternative forage for livestock in hill country. Pilot trials were established in the Manawatu and Mahia regions to evaluate several different aspects of native shrubs including:

- Establishment, growth and forage value,

- Metabolisable energy content and digestibility analysis of the foliage, and
- Feed preference in sheep and economics of planting natives based on modelling.

In addition, to fully evaluate the potential of native shrubs as an alternative forage and for kaitiakitanga (stewardship) of the hill country a kaupapa Māori (Māori approach) was used.

Acknowledging the cultural diversity of indigenous knowledge is critical because traditional knowledge and perspectives of native plants is highly localised. This is reflected in the range of names given to various plant species by hapū and iwi in different rohe (districts/regions). For instance, the small woody tree *Melicytus ramiflorus* is known as mahoe, hinahina, moeahu, inaina, inihina and kaiwētā, depending on the location is it growing. This variation means that searching for ancestral knowledge must be broad to build a genuine understanding of native plants and their role. In this programme, we incorporated mātauranga Māori (Māori knowledge) of native plants and related tikanga (practice and traditions) associated with their use by engaging with a particular Māori community of interest (Wairoa District) in kanohi-ki-te-kanohi (face-to-face) wānanga (shared learning) and interviews.

The native species that were studied included:

- *Hoheria populnea* (Houhere),
- *Pittosporum crassifolium* (Karo),
- *Griselinia littoralis* (Pāpāuma),
- *Coprosma robusta* (Karamū),
- *Coprosma repens* (Taupata),
- *Melicytus ramiflorus* (Māhoe),
- *Pseudopanax arboreus* (Whauwhaupaku), and
- A shrub willow.

Initial analysis suggests that the Coprosma species have potential as a forage based on good survival rates, early growth and performance in feed preference trials with sheep.

However, one of the challenges farmers face when planting native shrubs is the cost of establishment, including purchasing and planting the shrubs, weed control, animal pest and stock control.

Find out more about this project here.

Find the scientific peer-reviewed publications from this work in the HCF publications section below.

Forage Value Index (FVI) for sheep and beef farms…

The feasibility of adapting the DairyNZ Forage Value Index (FVI) to sheep and beef farms was assessed using a case study approach. The sheep and beef FVI of perennial ryegrass cultivars were calculated using previously defined methods.

- The FVI was determined not to be feasible for sheep and beef farms. The reasons for this included insufficient appropriate data on ryegrass cultivars from hill country locations, pasture renewal challenges for hill country and ongoing cost and maintenance of the tool.
- It was decided that a tool that focused on species selection rather than cultivar was more appropriate. Modernisation of *ForageMaster* was actioned instead.

Evaluating the benefits of the programme for farmers…

To understand the value of the HCF programme for the hill country sector, the impact of a sub-set of the programme's outputs and accompanying interventions was estimated using the QUICK (Quantifying and Understanding the Impact of Capability and Knowledge) framework.

Assuming each of the assessed resources had a 30% chance of successful uptake, then the expected "present value" of the HCF programme's benefits was estimated to be:

- $85 million in a scenario in which the resources are made available to hill-country-farmers but not actively promoted to them (an 11 to 1 benefit-to-investment ratio),
- $100 million in a scenario with a limited investment in promotion and extension (a 12 to 1 benefit-to-investment ratio), or
- $110 million in a scenario with an increased investment in promotion and extension (a 14 to 1 benefit-to-investment ratio).

The modelling showed that profitability gains would account for 53% of the value created from the resources, followed by improvement in farmers' physical and mental health (18%), the health of their land (13%) and their resilience to adverse weather (9%).

Find out more about evaluating HCF programme benefits here.

Summary of achievements

Programme Outputs

Over the course of the entire programme, despite the challenges of Covid-19 lockdowns, there was numerous research outputs and engagement with farmers and sector stakeholders:

- Workshops and Hui - 16
- Substantive information sharing and advice (e.g. field days, conference presentations, meeting presentations, podcasts) - 130
- Non-peer reviewed published articles (e.g. articles, reports, fact sheets) - 104
- Conference proceedings - 36
- Peer reviewed published articles - 68
- Postgraduate thesis – 10

Capability development

The programme supported over 14 postgraduate students from Lincoln (8) and Massey University (2). 10 students have graduated, and 2 PhD and 2 master's students are in the process of completing their degrees. Graduated students include:

- 5 Honours
- 2 Masters
- 3 PhD

Other successes

- The HCF programme was a finalist at the 2023 New Zealand Primary Industries Awards — in the Teams and collaborations category. Though we did not win, becoming a finalist in this category paid tribute to all the collaborations and the teamwork that went into making the HCF programme.
- At the end of the programme, a presentation was given at the New Zealand Grasslands Association conference which provided an overview of the entire programme and its achievements. An overview of the programme and its

achievements was also published in the Journal of New Zealand Grasslands (Hill Country Futures—Resilient farmers and forages).

Contributors and Acknowledgements

Research providers

The successful completion of this programme was made possible in part due to the research providers who were instrumental in planning, managing and conducting the research.

- Beef + Lamb New Zealand
- Nature Positive
- Lincoln University
- Manaaki Whenua – Landcare Research
- Cameron Ludemann Consulting
- Latitude strategy and communication limited
- Massey University
- On-farm Research
- Plant & Food Research
- Scarlatti
- AgResearch (part of the programme)
- Ecosystem Consultants (part of the programme)

Thank you to…

- The ‘Resilient Farmers’ part of the programme would not have been possible without all of interview participants who took time out from their busy schedules to share their knowledge and passion for the future of the hill country with us. A special mention to the 11 farmers who allowed us to publish their Farming stories.

- The design of *FarmSalus* was a team effort among the social researchers, Beef + Lambe project management team with the wider HCF research team and the team at Nature Positive. During the development of *FarmSalus,* feedback was provided by farmers, rural professionals and organisations that specialise in wellbeing and/or rural health issues, including The Rural Support

Trust, Ministry for Primary Industries, FarmStrong, Catchment Leaders Forum, The New Zealand Red Cross and Safer Farms. Aspects of the research has also been integrated into some courses offered by Agri-Women's Development Trust.

- The 'Resilient Forages' part of the programme would not have been possible without the numerous farmers who supported forage trials and data collection to occur on their farms.

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