Annual Review

2025

LINCOLN AGRITECH LTD

Science that solves water, land and environmental challenges

Contents

Welcome

I'm pleased to introduce Lincoln Agritech's Annual Review, reflecting on the past year and our progress.

Lincoln Agritech continues to build on more than 60 years of research and development excellence. Over the past year, we have sharpened our focus and clarified how we present our work, aligning our efforts around two strategic priorities: Waiora – Water Security Solutions, and Bio-Resource Solutions.

These priorities reflect where we know we can make the biggest difference, developing the tools, technologies and knowledge needed to help industry and government respond to some of New Zealand's most important challenges.

Through Waiora, we're deepening our understanding of water systems under increasing pressure from climate change and population growth. This includes strengthening our predictive capability, expanding our modelling, and supporting better decisions about how water is managed and used.

In Bio-Resource Solutions, our work is focused on creating value from underused natural materials and developing technologies that support more productive and sustainable systems. This includes developing new materials from wool and plant biomass, advanced sensing tools for agriculture, and progressing methane mitigation technologies.

A core focus for Lincoln Agritech is turning research into real-world impact – creating new products, supporting new ventures, and contributing to New Zealand's capability in high-value manufacturing.

New Zealand has a real opportunity in this space. We continue to lag behind comparable economies in high-value manufacturing, and the need for science-led, commercially grounded solutions has never been greater.

Lincoln Agritech is well positioned to play a leading role in that future.

Travis Glare, CEO

01

Waiora Water Security Solutions

From water quality to flood management, our research focuses on the challenges that matter most to New Zealand's future. This work is building a deeper understanding of how water systems function, helping improve the management of both water availability and quality.

We bring together science, sensing and modelling to give farmers, councils, urban land users and communities better tools for decision-making. This year's work highlights how that research is being applied in practice, from understanding braided river systems and groundwater recharge to monitoring water quality and identifying emerging risks.

Braided Rivers

Braided rivers are critical to New Zealand's water systems, yet their dynamic nature makes them difficult to define and manage. Lincoln Agritech is improving understanding of these systems – from subsurface processes through to how river boundaries are defined and applied in practice.

Beneath the surface

A five-year MBIE-funded project completed in 2024 revealed for the first time how New Zealand's braided rivers behave beneath the surface. The research improved our understanding of how rivers recharge groundwater and how river management affects long-term water availability.

We have combined advanced technologies, including fibre optic sensing, satellite imagery, and underground mapping, to track how water moves through these systems.

The research shows that braided rivers actively shape the landscape and create shallow underground water stores, known as braid plain aquifers, that regulate how water moves between rivers and aquifers over time.

These findings highlight the importance of river management. Allowing rivers more space to move, and restoring natural river processes, can strengthen groundwater recharge and improve the reliability of water supply for farms, communities and ecosystems.

Project: Subsurface Processes in Braided Rivers – LVLX1901

Defining the edges

Because braided rivers are constantly shifting, traditional approaches to defining river boundaries are often inadequate. This makes these systems difficult to manage consistently.

Building on earlier work, Lincoln Agritech, in collaboration with the Waterways Centre at the University of Canterbury, developed a novel way of defining braided rivers.

Rather than relying on fixed lines on a map, this approach draws on multiple lines of evidence to reflect how rivers actually behave, capturing how they move over time and how they interact with surrounding landscapes including in the subsurface.

> **"This insight will help New Zealand councils quantify the environmental and economic benefits of different river management strategies."**
>
> Scott Wilson | Senior Hydrogeologist

A connected system

Together, these insights provide a clearer picture of braided rivers as connected, dynamic systems.

They enable more informed decisions about flood risk, land use and groundwater recharge – supporting more resilient and reliable water systems now and into the future.

Braided river management – in practice

In Hawke's Bay, we are working with regional partners to address declining groundwater levels using nature-based solutions.

Decades of well-intentioned river management, including narrowing river channels for flood protection and land use, have reduced the natural ability of rivers to recharge aquifers.

Building on its research into braided river systems, we are exploring options on how restoring wider river corridors and natural processes can improve groundwater recharge over time.

By reconnecting rivers with their surrounding landscapes, this approach aims to strengthen water availability for irrigation, communities and ecosystems – demonstrating how research can translate into practical solutions for long-term water security.

Water Quality

Understanding how water quality is changing, and what is driving those changes, is central to managing New Zealand's freshwater systems.

Lincoln Agritech combines high-resolution monitoring with advanced data analysis to better understand complex river and groundwater environments.

Quarter-scale jet boat designed specifically for remote monitoring of waterways.

Understanding pressure on the Waikato River

The Waikato River is under increasing pressure from multiple environmental stressors, raising concerns about water quality and long-term supply.

Our work is building a clearer picture of how these pressures interact and what they mean for New Zealand's water security.

New monitoring capability, including a specialised survey vessel, has strengthened the ability to collect detailed, real-time data across the system.

Rising carbon dioxide, geogenic inputs and the spread of invasive golden clams are all influencing water chemistry in complex ways that are not yet fully understood.

Using high-resolution monitoring, we are tracking how these factors interact and identifying where risks are emerging. Early indicators suggest parts of the system may be approaching critical thresholds, where recovery becomes slower and more uncertain.

This work enables earlier detection of change, supporting more proactive management of water quality and helping protect long-term water supplies.

Read more in **The Waikato Times**

Project: Safeguarding Te Mana o te Awa o Waikato – LVLX2302

"This work supports improved water treatment and protects our drinking-water safety."

Adam Hartland | Senior Scientist

60% of monitored wells improving

Long-term insights from Central Plains Water

Nitrate contamination remains one of the most significant water quality challenges across Aotearoa.

Our team has completed a 10-year assessment of groundwater trends for Central Plains Water Limited (CPWL), the South Island's largest irrigation scheme.

Drawing on more than a decade of groundwater and surface water data, and supported by high-resolution monitoring technologies such as HydroMetrics sensors, the analysis provides a detailed picture of how water quality is changing over time.

The results show early signs of improvement. Over the past five years, 12 of the 20 monitored wells have recorded declining nitrate concentrations, suggesting that improved land and water management practices have a measurable impact.

The next phase will focus on why some areas are recovering faster than others, with the goal of targeting interventions more precisely and accelerating gains in water quality.

2025 CPW Sustainability report
Read more in **The Press**

Supporting Canterbury farmers with real-time insight

Across Mid Canterbury, farmers are taking a more active role in managing water quality, supported by real-time monitoring technologies.

Since 2022, the Mid Canterbury Catchment Collective has been using nitrate sensors to monitor streams, drains and springs. Developed by Lincoln Agritech and commercialised through HydroMetrics, these sensors provide continuous, in situ data – replacing traditional monthly sampling.

This shift from periodic sampling to real-time monitoring gives farmers a much clearer understanding of how water quality changes over time. It enables them to establish baselines, track seasonal patterns, and assess the impact of mitigation efforts such as riparian planting and wetland development.

More broadly, this work shows how accessible data can support catchment-led management – enabling farmers and communities to respond earlier and make more informed decisions about water quality.

HydroMetrics groundwater monitoring system

IRRICAD

Lincoln Agritech's IRRICAD™ software continues to play a key role in improving irrigation design globally, supporting more efficient water use and better system performance.

Now used in more than 100 countries, IRRICAD helps designers create irrigation systems that reduce water waste, improve productivity and support more sustainable land use. In 2025, the software reached a new milestone, expanding into its 101st country with a global user base of thousands.

The platform continues to evolve, with Version 22 released in 2025 and Version 23 nearing release. Ongoing development is focused on improving usability, expanding functionality, and supporting integration with modern irrigation systems.

Strong international demand continues, with 2025 marking one of the strongest years on record. The appointment of new reseller Agrowater has also expanded IRRICAD's reach across Europe and the Caucasus.

IRRICAD remains a foundation for our software capability, supporting more precise, data-driven irrigation systems and contributing to more efficient water use in agriculture worldwide.

100+ countries
thousands of users
version 23 launching soon

02

Bio-Resource Solutions

From bio-based materials to advanced sensing technologies, Lincoln Agritech is reshaping how natural resources are used and valued.

By transforming underused materials – including wool, plant biomass and agricultural waste – into high-value products, this work is creating new opportunities across materials, manufacturing and agriculture. Increasingly, these ideas are moving from research into real-world application.

“Guided by Mātauranga Māori and using native NZ plants, we can develop sustainable fibres that unlock revenue and support environmental wellbeing.”

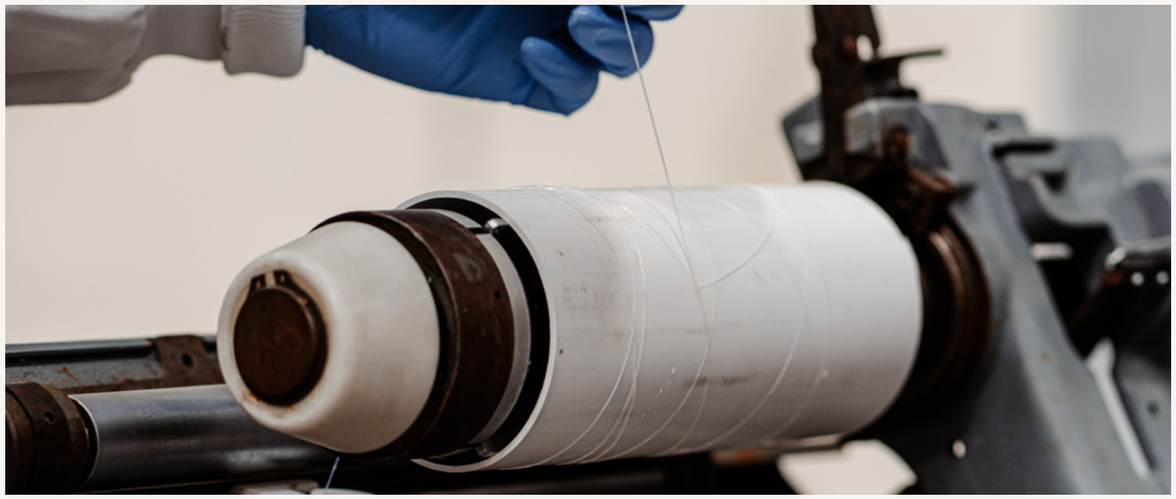
Rob Kelly | New Materials Group Manager

Unlocking value from wool

New Zealand is one of the world’s leading wool producers, but there is significant untapped potential in global markets.

We are addressing this by developing new ways to use wool as a high-value input for advanced applications.

With new tools and processes now in place, this work is progressing from research into commercial application, creating new pathways to lift the value of New Zealand wool.



Pigments derived from wool

New applications for strong wool are emerging as research expands how biological materials can be used in manufacturing.

One example is bio-based pigments derived from wool, developed by Wool Source and now used in commercial textile screen printing. The pigments provide an alternative to synthetic, or fossil fuel-derived colourants, with a high proportion of renewable content.

The work builds on the New Uses for Strong Wool programme, supported by Lincoln Agritech alongside industry and government partners.

Its application in a Kathmandu t-shirt range shows how these materials can integrate into existing production systems at scale.

This development highlights a broader shift, from low-value fibre to high-value, functional materials, opening new opportunities for wool in global sustainable manufacturing.

Read more

Wool in advanced manufacturing

Christchurch-based Wool Source and 3D printing filament manufacturer, KiwiFil, have developed the world's first commercial 3D printing filament coloured using wool-based pigments.

By converting wool into fine coloured particles that can be incorporated into products like 3D printing materials, the technology demonstrates how low-value wool can be transformed into a high-value input for emerging industries.

Our role has focused on supporting the underlying science and development of bio-based material systems that enable these applications.

WOOLSOURCE®

KiwiFil

From wool to personal care

We are also supporting the development of keratin-based products for personal care.

Through collaboration with Dr. Tom Nail Care, the team developed methods to test and validate how keratin improves nail strength, supporting the launch of a commercial product.

While small in scale, Dr. Tom Nail Care has expanded into Australia and there are plans to launch further overseas, demonstrating how advanced materials science can unlock entirely new markets for wool.

Listen here

Plant biomass and sustainable fibres

Lincoln Agritech is extending its work beyond wool, applying similar approaches to plant biomass.

Conventional fibre production is often resource-intensive, while demand for sustainable alternatives continues to grow. New Zealand's abundant plant biomass presents a significant opportunity to create additional value from existing resources.

By extracting and reshaping cellulose using lower-impact processes, this research is producing high-quality fibres suitable for a range of applications.

This has the potential to support new regional industries, strengthen export opportunities, and contribute to more sustainable global textile systems.

This research was supported by the Ministry of Business, Innovation and Employment (MBIE) [LVLX2409 and LVLX2101]

Waste to value

Unlocking new value from poultry waste

We have partnered with New Zealand's largest egg producers, Zeagold Nutrition Ltd, to add value to waste streams.

Zeagold generates large volumes of organic waste, including manure and end-of-lay hens. Managing this safely is complex, but it also creates an opportunity to unlock value by turning this waste into high-value fertiliser.

Through controlled field trials, we tested different composting approaches using poultry waste and carbon materials such as wood chip and plant matter. Trials showed strong results, with the process safely breaking down organic material and producing a nutrient-rich compost suitable for on-farm use or further processing into pelletised fertiliser products.

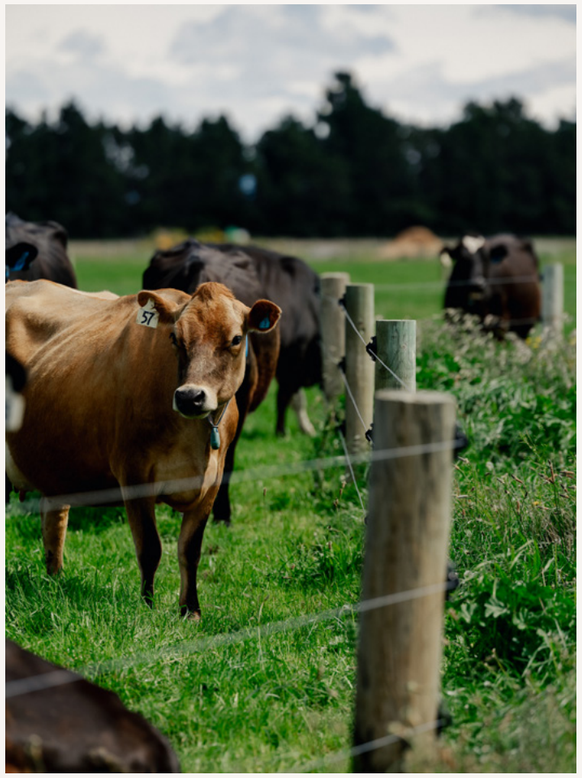
This creates a new pathway for waste that would otherwise require disposal, converting it into a useful and marketable input.

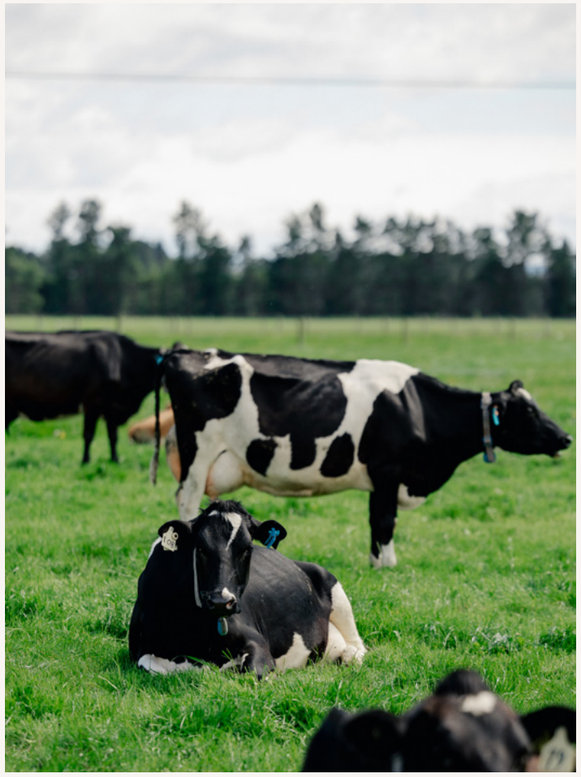
We will continue to support Zeagold as it scales up production and refines the product for market. The goal is to deliver a commercially viable solution that reduces waste, creates new revenue streams, and provides a locally made sustainable alternative to imported fertilisers.

Composting piles at a controlled field trial.

Zeagold farm in Central Otago.

New ways to tackle agricultural methane





Work by the Green Futures Team is developing new ways to measure and reduce methane emissions from farming, with a focus on upcycling methane.

Using an electrochemical approach, methane can be converted into useful agricultural products such as formic acid or chemical industry precursors like methanol. This creates opportunities to reduce emissions while unlocking additional value from gas that would otherwise be lost to the atmosphere.

We are also developing tools to better measure methane emissions on farms, including in barns and milking sheds. These insights will help farmers and industry understand where emissions are coming from, and whether new technologies are delivering measurable results.

With recent MPI funding supporting an 18-month programme, the research is now moving from the lab onto farms, an important step in testing these technologies in the real world.

Together, these innovations will help the sector measure, manage and monetise emissions, while supporting a more sustainable and productive future.

Lincoln Agritech Ltd acknowledges the co-funding of this project by the Ministry for Primary Industries through the Climate Emergency Response Fund.

Engineering solutions for industry

A tool to improve pin-boning in King Salmon

There are two main types of salmon sold globally: Atlantic salmon and King salmon. New Zealand is the world's largest producer of King salmon, which presents unique processing challenges.

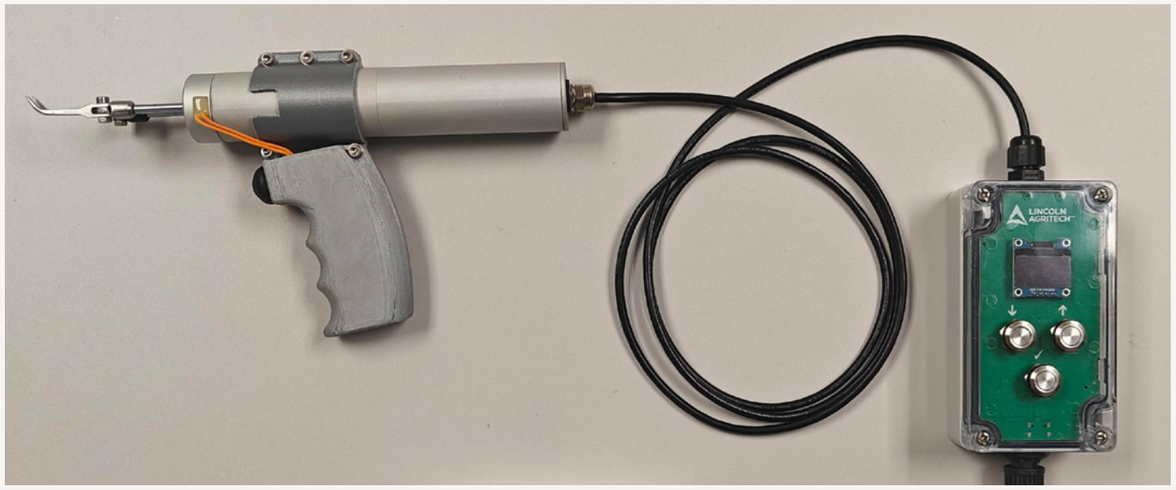
Unlike Atlantic salmon, where pin bones can be removed using automated systems, King salmon has smaller bones that must largely be removed by hand, a repetitive process more labour-intensive and physically demanding for workers.

We have partnered with Seafood Innovation Limited and Mt Cook Alpine Salmon to develop a hand-held tool to solve this challenge and make pin-boning easier and safer.

Over multiple development phases, the device was tested and refined in real processing conditions. Feedback from workers helped shape improvements to how the tool is held, how it operates, and how effectively it removes bones.

The latest prototype delivers stronger performance and improved ergonomics, helping reduce physical strain while maintaining product quality. It also has the potential to extend the time workers can safely carry out the task and improve overall processing efficiency.

This collaboration highlights our ability to deliver fast, practical solutions that directly address industry needs.



Prototype of handheld tool used to make pin-boning easier and safer.

We don't just do research for the sake of it — we are solving real world problems

Our innovative tool uses radar to measure fat depth.

Fat depth measuring tool

Lincoln Agritech has developed a new sensing tool to measure fat depth in animals, providing farmers with fast, objective data to support feed management and improve on-farm efficiency.

New Zealand's meat and dairy sectors generate more than $34 billion annually and rely on consistent product quality to remain globally competitive. One measurement that plays a critical role is fat depth, the layer of fat between an animal's skin and muscle, influencing both animal health and product value. However, current methods are often time-consuming, subjective, and difficult to apply at scale.

Our innovative solution uses radar to measure fat depth quickly and without contact. By transmitting radio waves and analysing how they reflect from the skin and underlying muscle-fat interface, the system calculates fat depth quickly and objectively.

The technology offers a significant improvement on existing approaches. It removes operator variability, reduces handling of animals, and enables measurement across large herds. This supports more informed decision-making and more consistent outcomes.

By giving farmers reliable, real-time information, the tool has the potential to improve feed use, optimise animal performance, and lift overall productivity.

A key milestone this year was securing partnership support with Mimeo Industrial, creating a pathway towards commercialisation. Work is now underway to bring the technology to market, with potential for integration into automated farming systems.

With commercialisation now underway, the focus is on refining the technology for deployment and expanding its use across the sector. Innovations such as this position New Zealand's primary industries to remain competitive, productive, and sustainable.

Advanced sensing and measurement

We use advanced sensing technologies to better measure and understand the physical properties of materials, environments and agricultural systems. This work can be applied to a range of applications, from agriculture to environmental monitoring.

Hay bale moisture measurement

Modern baling creates denser bales that are easier to store and transport, but much harder to test for moisture. Traditional moisture probes must be pushed into the bale by hand, which is physically demanding, increasingly inaccurate, and can cause injuries. Poor moisture readings are a serious risk, as damp bales can self-ignite and have caused major fires.

To address this, we are developing a new non-invasive bale moisture sensor, supported by AgriFutures Australia. Instead of inserting a probe, the sensor uses two rods placed on the outside of the bale to quickly measure moisture levels.

The new approach makes moisture testing safer, faster, and more reliable, especially for high-density bales. It reduces physical strain on operators, improves accuracy, and helps prevent fires caused by undetected moisture.

Fruit firmness testing

Fruit firmness is a key determinant of export quality, affecting shelf life, transportability, and market value. However, current testing methods are destructive and typically limited to small sample sizes, reducing confidence across entire batches.

We are exploring microwave sensing as a non-destructive approach to measuring fruit firmness. Early research shows a strong correlation between microwave signals and fruit firmness, creating the potential for real-time, inline measurement.

This could significantly reduce reliance on destructive sampling, minimise waste, and strengthen quality assurance for high-value export crops such as kiwifruit.

Snow and ice measurement

Building on decades of radar innovation, Lincoln Agritech's snow radar is being deployed to Antarctica for use by the Australian Antarctic Division.

The technology uses electromagnetic waves to measure both snow depth and the thickness of underlying sea ice, providing a detailed picture of ice structure.

Snow radar has previously been used to better understand Antarctic sea ice, including its thickness, an important factor in understanding changes in the climate system.

Emerging science and new capabilities

Synthetic microbes and soil health

More than one million hectares of land in New Zealand is considered unproductive but has been identified as suitable for native reforestation. Rejuvenation of these marginal soils provide the opportunity to enhance carbon storage and support healthy biodiverse ecosystems.

Lincoln Agritech is working to better understand how soil microbial communities contribute to nutrient cycling and support plant growth by going beyond identification of microbes present and focusing on the functions they contribute.

Using advanced DNA sequencing and analysis, the team is comparing marginal soils with soils from healthy native forests to identify the key microbial processes that support strong plant growth and carbon storage.

The research will explore the potential to restore these processes, in marginal soils by adding them to native seedlings before planting. This could help rebuild soil health, boost carbon-sequestration and improve the success of reforestation efforts.

By strengthening what happens below the ground, this work aims to support more resilient forests, increase carbon storage, and deliver long-term environmental benefits for New Zealand.

Project: Functional Synthetic Microbial Communities – LVLX2501

STELLA

Lincoln Agritech is part of the 14-partner STELLA Horizon Europe project, developing digital tools to detect plant diseases and pests earlier.

In Hawke's Bay, the team is piloting AI-powered disease detection in apple orchards. The trial combines spore samplers, drones and satellite imagery to identify fungal diseases before symptoms are visible.

Lincoln Agritech's contribution focuses on advanced sensing technologies and digital decision-support tools, helping growers manage diseases such as bull's eye rot. This disease often infects fruit during the growing season but only becomes visible after harvest, creating hidden losses.

By enabling earlier detection and intervention, the work has the potential to reduce crop losses, improve product quality and support more sustainable orchard management. More broadly, it demonstrates how integrated sensing and data tools can strengthen disease management and support decision-making across high-value horticulture systems.

This research was supported by the European Research Executive Agency (REA) [Project 101134750]

03

Our People

Mātauranga Māori and growing capability

Our approach brings together science and mātauranga Māori to better understand and respond to Aotearoa's environmental challenges.

Lincoln Agritech is proud to partner with **Pūhoro STEMM Academy**, a kaupapa established to empower rangatahi Māori to succeed in STEMM (science, technology, engineering, mathematics and mātauranga Māori). Through its long-term pathway model, Pūhoro supports students from secondary school through tertiary study and into employment, helping to grow the next generation of Māori scientists, engineers and innovators.

In 2025, we again partnered with Pūhoro STEMM Academy to host three interns – Tahliya Nissen-Locker, Lanae Cable and Te Taiaumihi a Kiwa Whatuira. Working alongside our teams, they contributed to real-world projects spanning sustainable materials, environmental systems and emerging technologies.

Their work ranged from exploring new fertiliser systems using organic waste streams, computational modelling for next-generation materials, and approaches to embedding mātauranga Māori within research.

This partnership reflects a longer-term commitment – not only to integrating different knowledge systems in our research, but to growing the next generation of Māori scientists and engineers.

Through initiatives like this we are helping to build a stronger, more diverse future workforce and supporting the next generation of Māori leaders who will contribute to addressing Aotearoa's environmental and technological challenges.

Tāniko pattern designed by our Kaiārahi Māori, Chaz Doherty

What we look like

LAL Staff Profile as of the 31st December 2025

NB: Short Fixed Term, Casuals, Students removed

Gender

19	Female
32	Male
1	Gender Diverse
9	Not disclosed
61	**Grand Total**

Employment Type

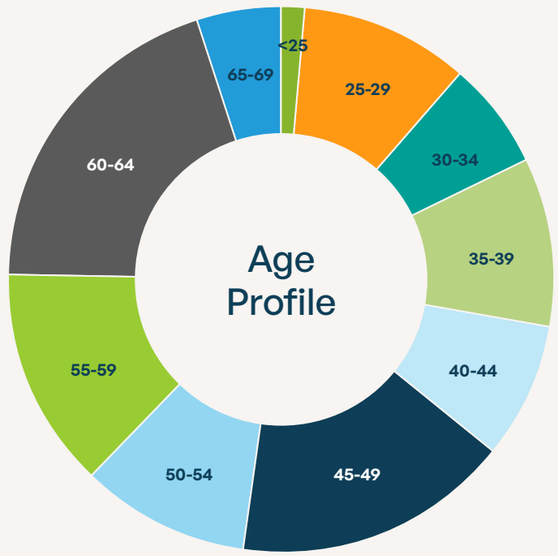
Part-time	Full-time
(24)	(37)

Turnover

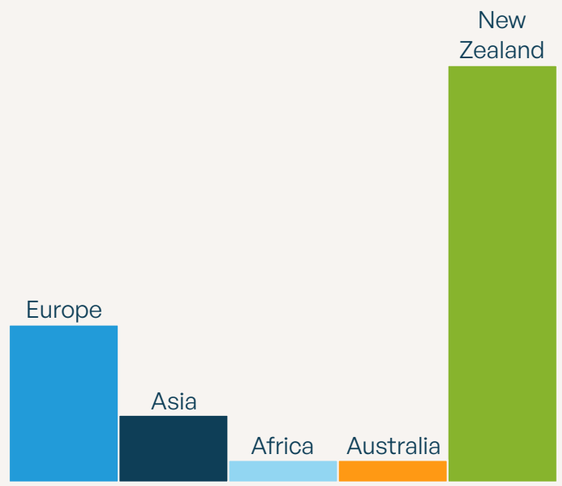
7 Departures (voluntary)

2 Appointments

Turnover for 2025 was 10.37%



Ethnicity



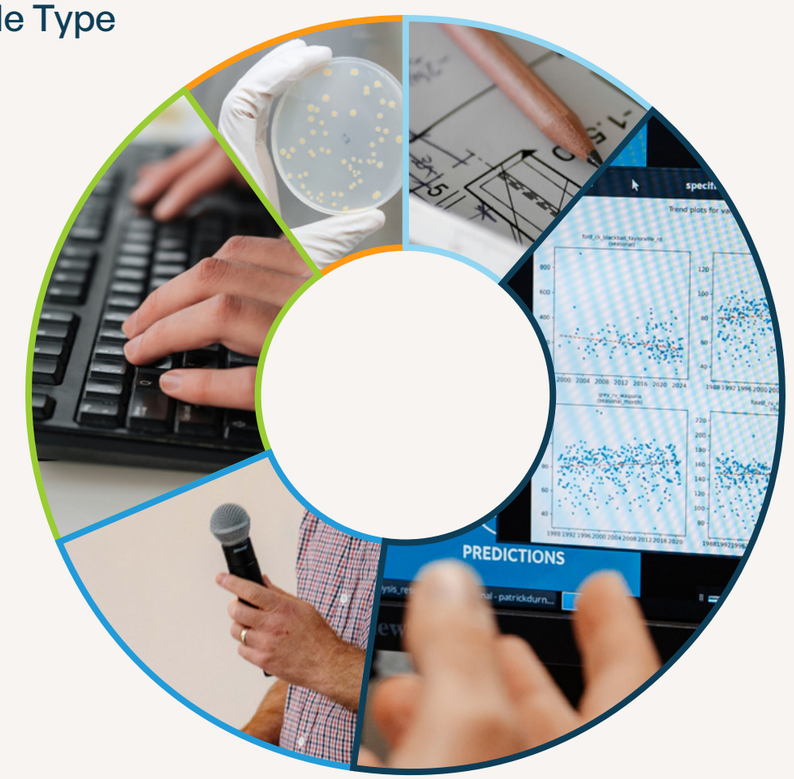
Tenure (Years)

<2	6
2-4	16
4-6	11
6-8	5
8-10	5
10-12	1
12-14	5
14-16	1
16-18	3
18-20	3
20-22	0
22-24	0
>25	5

Highest Qualification

15	Bachelors
1	Certificate
4	Diploma
4	High School
10	Masters
25	PHD
2	Trade Certificate

Role Type



Engineer

Scientist

Senior Management

Support

Technician

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