

# Kiwi innovation solving

We all know New Zealand does world-leading primary produce, but the technology to allow our farmers and growers to succeed from a distance is also setting the pace, **Victoria Hallum** explains

**N**ew Zealand has been using technology to overcome our distance to export markets for 130 years, since Thomas Brydone and William Davidson succeeded in getting frozen meat to market in pristine condition thanks to the refrigerated shipping consignments, beginning in 1882.

This turned sheep meat from an under-used by-product into a mainstay of the primary sector for the next century.

But that was then. What does New Zealand agritech have to offer the world in 2016?

In April this year Callaghan Innovation led a group of 23 New Zealand agritech companies and a handful of supporting organisations on an innovation mission to Silicon Valley and surrounds.

The companies got a chance to benchmark themselves against the ideas coming out of the biggest hotbed of technology-driven start-ups in the world. This really reinforced how special New Zealand agritech is and what our companies have to offer the world. The group realised just how well New Zealand agritech stands up against the competition, but also that they need to work quickly to build connections to the market and collaborate to achieve scale, so as not to lose out to lesser products.

One of the keys to the success of our agritech companies is that they are developing solutions to real problems affecting farmers, and working with farmers to get the solution right. And New Zealand has some of the most business-driven, agile and innovative farmers in the world. Having farmed a generation without subsidies, they have had to be.

In fact, many of our agritech companies are run by farmers.

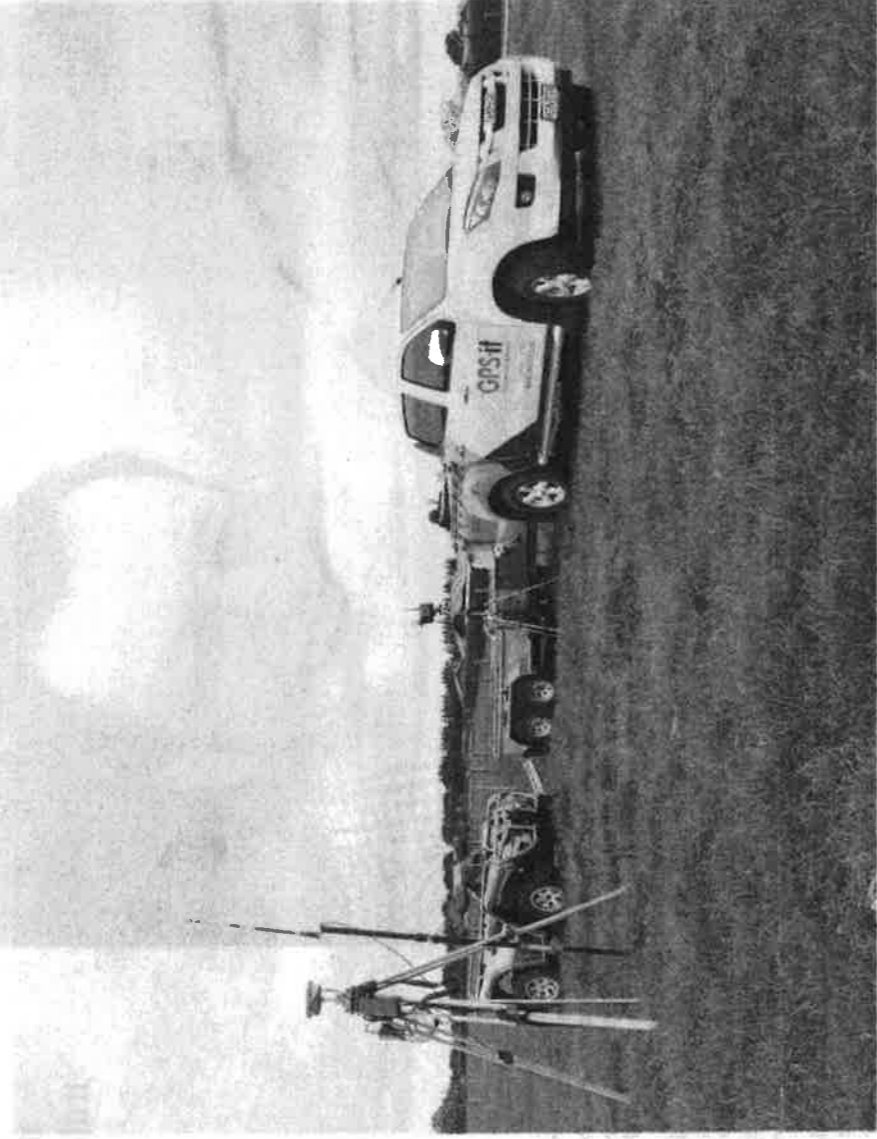
Take Agri Optics for example, Chief executive Craig McKenzie and his wife Roz farm Greenvale Pastures, an arable cropping farm near Methven. Agri Optics's SmartNFertiliser system uses innovative sensor technology to specifically target the pasture that most needs fertilising, helping farmers improve their nitrate usage efficiency.

Another example is BBC Technologies, which produces award-winning automation solutions for handling, sorting, packing and tracing delicate fruits and vegetables. BBC Technologies has a strong connection to farming, having been founded by one of New Zealand's biggest berry growers.

These human advantages are backed up by our wonderful geography. It's not just good for a film set; our mountains and plains, coastal and high country areas provide a range of farming and growing environments to test ideas, all within a space about the size of California. We also have a good regulatory environment, with a light-touch regulator which makes New Zealand a great place to test emerging technologies like drones.

The future is bright for agritech, because the problems that need solving are real, pressing and global. The world is calling out for more food to feed growing populations and needs to produce that with less negative impact on the environment.

Callaghan Innovation is working with agritech companies to help them take advantage of these opportunities. We know New Zealand innovations are world-leading but our companies need help with two key things: speed and scale. Agritech is a priority sector for Callaghan Innovation and our objectives for the sector can be summed up under these two headings.



The latest mapping product from GPS-it is able to show farmers any potential no-go areas for vehicles on their farm.

## Data solutions on the map

**Case Study: GPS-it: land mapping solutions for horticulture and agriculture**

GPS-it provides customised land mapping solutions, specialising in the horticultural and agricultural industries.

As pioneers in the mapping industry, GPS-it has rapidly embraced new technology, building customised agricultural software apps to provide data solutions.

When the Psa crisis first hit the New Zealand kiwifruit industry, GPS-it had over 1000 jobs booked, but were forced to shut down operations for six weeks as they were unable to drive their vehicles around orchards.

It was this that provided the impetus to find an alternate solution. GPS-it began using drones in 2011, allowing the company to quickly identify those areas of the orchards that needed to be checked.

### Speed

We are supporting New Zealand companies to accelerate their research and development (R&D) to get their products to market faster. The three main ways we provide this support are through grants to co-fund and de-risk R&D projects; innovation skills programmes to help businesses adopt the best business processes; IP management and planning; and by directly providing R&D services to New Zealand businesses from Callaghan Innovation's own team of applied scientists and engineers, including in key areas such as Internet of Things, sensing and automation, and robotics.

### Scale

We are working with companies to make sure they are connected with each other and the R&D capability in New Zealand so they can work together to seize opportunities, as

GPS-it's solutions help organisations collect and correct their spatial information, turning it into reports and maps that help to provide a complete picture. Applications of the technology range from maximising returns to kiwifruit growers by monitoring and measuring new Zespri varieties to assisting Forterra to prove the environmental performance and sustainability of dairy farms.

GPS-it's latest mapping product is able to show farmers any potential no-go areas for vehicles (such as quad bikes) on their farm, by automatically analysing the slope from 3D data captured by drones.

GPS-it took part in the New Zealand agritech mission to Silicon Valley earlier this year. One of the key things managing director of GPS-it, Matt Flowerday, learned on the visit was that New Zealand is already a world leader in

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agritech – but not so great at promoting it. “My big take home message was ‘speed and focus’, says Flowerday. “We need to have a clear focus what we are delivering – and to what markets – and move very quickly.”

This is in contrast to the United States, where agritech companies are very good at attracting funding, but some of the technology being developed is not as good as what's available in New Zealand.

Flowerday sees a clear opportunity for New Zealand to tell our story better and sell our technologies to the world, but time is of the essence.

“The challenge is that there is only a limited window before the rest of the world catches up,” he says.

“Especially with the amount of venture capital funding being poured into agritech in the United States.”

well as connecting them internationally with partners to ensure that the products and services they are developing are the right fit for market needs.

Callaghan Innovation is also supporting Sprout, New Zealand's specialist agritech accelerator. Each year Sprout selects eight agritech start-ups and these companies receive unparalleled access to New Zealand and global farming networks to validate and grow their businesses.

An awful lot about the way we farm has changed since Messrs Brydone and Davidson packed The Dunedin off to the Northern Hemisphere. But New Zealanders' use of innovation to overcome distance to market and create products the rest of the world needs to feed itself is not one of them.

● *Victoria Hallum is Callaghan Innovation's manager of international partnerships*

## Efficiency through precision farming

**Case Study: Craig MacKenzie – Precision Agriculture Farmer of the Year**

Craig MacKenzie travelled recently to St Louis, Missouri, to receive the award of Precision Agriculture Farmer of the Year from the United States-based PrecisionAg Institute.

Precision agriculture involves the use of a range of techniques and technology to allow a targeted application of water and nutrients to match the requirements of crops. MacKenzie has applied precision farming practices since 1984 to his family's own farms, with a focus on maximising nutrient and irrigation efficiency for improved farm sustainability – both environmental and financial.

In 2010 he founded Agri Optics to provide precision farming tools and services to New Zealand farming systems, with a focus on field sensing and spatial data management solutions. He was also integral in establishing the Precision Agriculture Association of New Zealand (PAANZ), whose mission is to increase the awareness and use of precision agriculture technologies in land-based primary production systems.

MacKenzie believes that a large contributor to New Zealand's innovative culture in farming is due to us operating in a uniquely unsubsidised farming system.

This provides our farmers the ability – and a requirement – to adapt to changing situations. New Zealand's high value crops and produce require accurate inputs to maintain our international image and market advantage.

Farming is like all other parts of our society – just as we drive safer, more fuel efficient cars than in the past, we are now also using smarter technologies on the land.

Our farms have become more efficient and are using less inputs to grow a similar or greater amount of produce.

Technology – including the uptake of GPS – is helping to drive this, allowing farmers that adopt precision agriculture to have less impact on the environment than in the past.

“The use of this technology means that it is possible to avoid waterways and other sensitive areas and eliminate environmental impact,” says MacKenzie.

“This will continue to be the way forward as we need to meet the challenges of environmental and financial sustainability.”

MacKenzie's focus on the farm continues to be on utilising technology to run his businesses in a sustainable way.

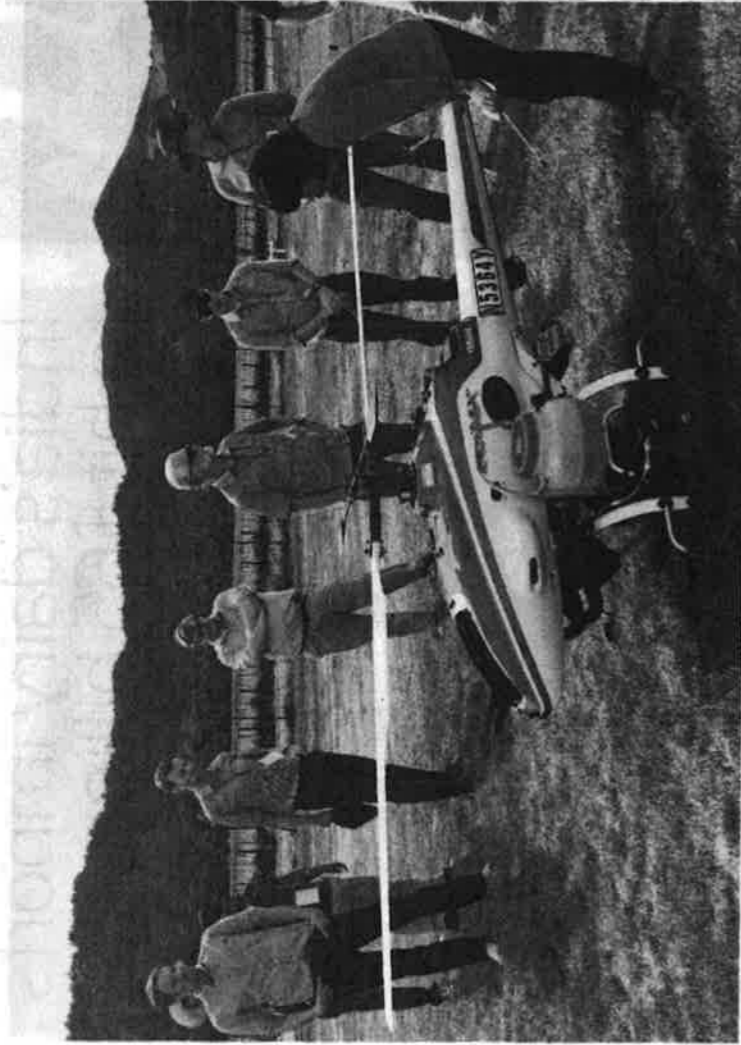
Having received the title of Precision Agriculture Farmer of the Year, MacKenzie hopes to increase the opportunities available to New Zealand farmers to ensure they continue to lead the world.

“One of the things this award does is showcase the changes happening right across our agricultural industry,” he says. “It's great to have the global recognition that New Zealand agriculture is right up there.”

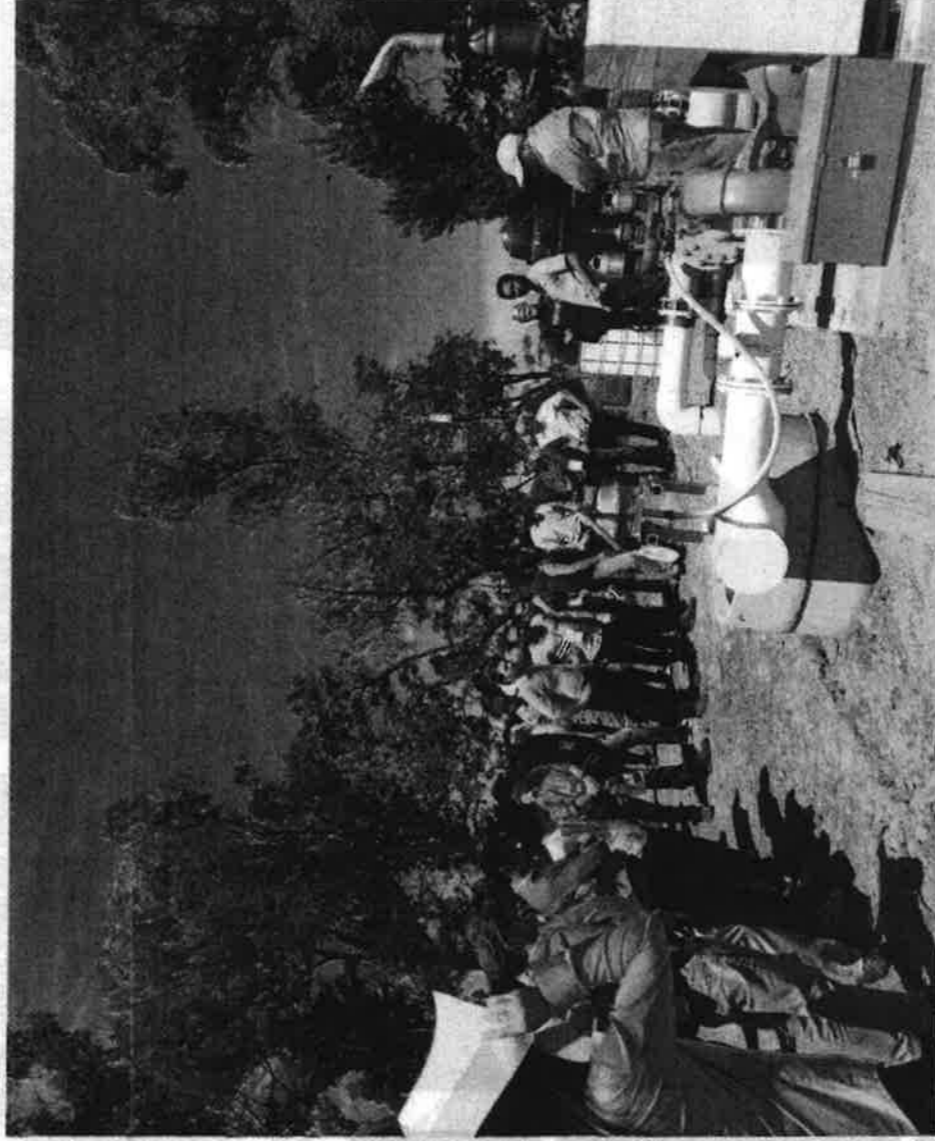
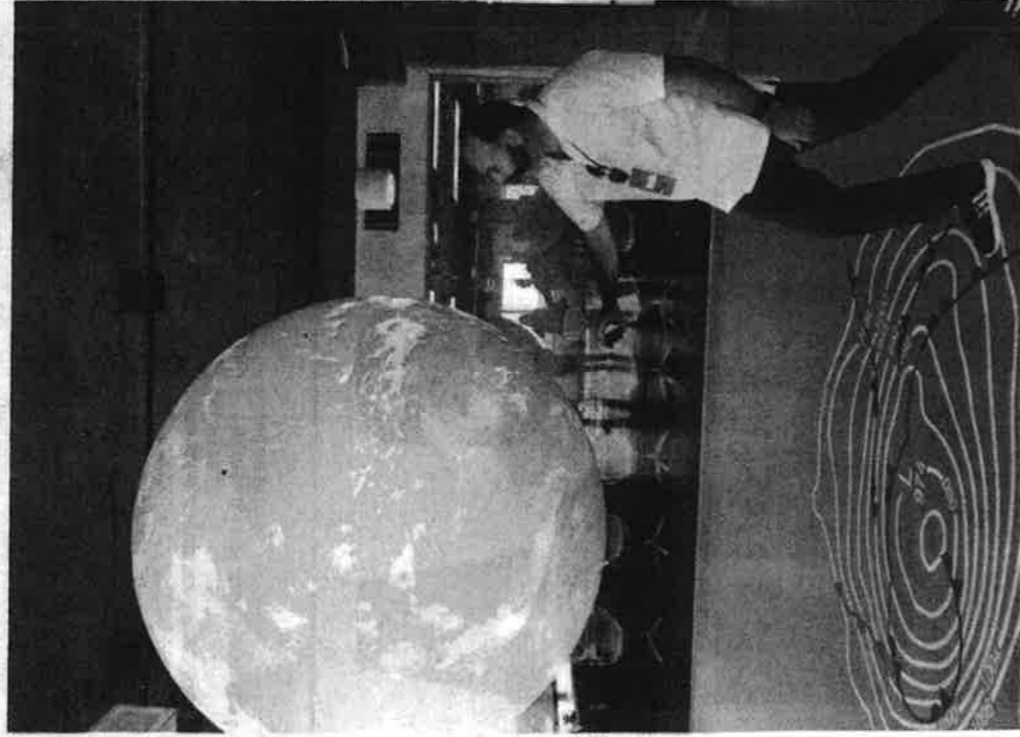
– Tim McCready



# real world problems



From left: Checking out drone technology in Napa Valley; a panel discussion during the innovation mission – Rich Mahoney, Silicon Valley Robotics; Dan Bloomer, NZ Agonomist; Geoff Furniss, BBC Technologies; Andra Keay, Silicon Valley Robotics.



Simon Brown, Callaghan Innovation General Manager Accelerator Services, at Climate Corp (left), A group visits Tucker Almond Farms (above).

## Robotic technology – coming to an orchard near you

**Case study: Robotics Plus**  
Robotics Plus Ltd (RPL) is developing mechanisation, automation, robotic and sensor technologies for horticulture and other primary industries to achieve new levels of productivity.

In what some have called the "packhouse of the future", RPL's Robotic Apple Packer arranges fruit on trays for the best visual appeal, and proprietary algorithms co-ordinate the activity of several robotic arms, packing 120 apples a minute.

"The apple packer replaces the cost of up to three people per machine, with RPL operating a lease model that allows growers and packhouses to adopt the technology at the same basic cost as the labour it replaces.

"The key current challenge in New Zealand is around access to labour," says Tina Jernmen, chief executive of Robotics Plus' parent company PlusGroup Horticulture. She says "much of the labour needed for peak seasons must be imported each year, and this comes at a significant cost".

Another innovation, the QuadDuster assistive pollination system, was commercialised for RPL's sister company Pollen Plus.

Computer-controlled pollen dispensing and speed control on all-terrain vehicles ensures uniform pollen coverage, while a GPS system provides a map of pollination for growers. This service covers about 25 per cent of the New Zealand kiwifruit industry each year.

RPL has used New Zealand's agriculture industry as an incubator to develop its technology, but the company has begun to attract attention from other industries with scalability, labour, waste, hygiene, traceability and security challenges.

The Silicon Valley innovation mission emphasised to Jernmen that New Zealand is advanced in the technology it can offer the agricultural sector, and is a great agritech R&D hub for other markets. For Robotics Plus, the intellectual property they create here will be well-placed to springboard the company into labour intensive value chains around the world.



Computer-controlled pollen dispensing is being used in the kiwifruit industry.