ISSUE 124 I WINTER 2026

# From the Ground Up™

ADDING VALUE TO THE BUSINESS OF CROPPING

In this issue:

## Arable Awards

## FAR Strategy 2026-2031

## Sprayers 101

FAR®

# Contents


## INDUSTRY

3 Behind the scenes

4 A word from the CEO

5 A word from the Chair

7 More sign up for NZ Grown Grains

10 2026 Arable Awards

14 Arable farming family tilts more to livestock

## ENVIRONMENT

8 Carbon footprint of New Zealand grown animal feeds

20 Sprayers 101 Droplet size key to spray efficacy


## PEOPLE

32 Southland grower tour highlights added value

34 Learning the ropes

35 Arable Research Groups... they're there for you

## CEREALS

12 Grazing of wheat grain crops revived

26 UK expert to speak at CROPS

28 Oat project to evaluate new cultivars

## MAIZE

16 Protect your maize silage investment, says researcher

18 Winter cover crop nitrogen supply to maize silage

30 Fall armyworm: four years on

31 Collaborative approach

## NEW IDEAS

22 Be aware of drone spraying limitations, says expert

24 FAR's experience with drone application

## SEEDS

29 Fungicide timing key to protecting ryegrass seed yield

## EVENTS

27 CROPS 2026




# Behind the scenes

It's been a full-on year for arable growers, and overall, the conversational tone has not been cheery. Not that surprising given a horrible harvest, sky rocketing input costs and sluggish prices.

But beyond the despondency, there is still a great industry full of growers working hard to grow food, feed and seed for people and animals, here and overseas. Last night's Arable Awards ceremony, which brought nearly-500 staunch arable supporters together in one room, was a great reminder of that. And while there are only nine awards categories, and thus, nine winners, I think we can safely say that arable was the winner on the night!

Off-farm and away from the limelight there is plenty of other work underway to address some of the industry's current problems. FAR, Federated Farmers and industry and grower representatives are working together on projects ranging from cost of production models to inform grower decision making, to an arable industry code of conduct. Alongside this, FAR, with support from AGMARDT, is working with Dairy NZ and Beef + Lamb NZ to identify ways of delivering mixed-farm system information across all sectors. Watch this space.

Another important project is focused on better understanding of the needs of the pastoral sectors, particularly dairy, around arable feeds to supplement and complement pasture systems. We know we can grow great arable feeds, but we don't have good data on what pastoral farmers are looking for in terms of nutritional components, environmental impacts and delivery logistics. This won't be a quick or easy process, but we have already held one pan-sector workshop, so it is underway.

FAR has also had numerous discussions with Ministers and senior MPI staff around the importance of the arable industry. The penny seems to be dropping and we are seeing growing recognition of the role of arable as an 'export enabler'. We're the ones growing the pasture and forage crop seeds and the feed grain, maize and silage, we're the ones fattening the lambs and wintering the cows, i.e. we're an integral part of the pastoral system.

FAR's vision for the arable sector, is *A confident, resilient and profitable arable sector, producing trusted foods, feeds and seeds*. Rest assured that while we can't control the Strait of Hormuz, we, along with our industry and wider sector partners, are working hard on everything within our power, to bring this vision to life.

Anna.Heslop@far.org.nz

# A word from the CEO

As Steven Bierema has noted in his Chair's report, it's been a busy few weeks with the release of FAR's new strategy for the period 2026 – 2031 and our annual research and development forum. I have also had the opportunity to catch up face-to-face with the growers and other industry members who provide their time and knowledge through our network of seven Arable Research Groups (ARGs) across the country. Without the support of these volunteers, FAR could not do its work and we are deeply grateful for their support.

The new strategy will be the guiding plan for FAR over the next five years. We will check-in through that time to make sure it's still relevant, but, staying focused on how FAR can contribute to the arable sector's confidence, resilience and profitability is what we must do. Our research and the way we share results and other trusted information to growers, must deliver on this, and FAR and its staff are committed to ensuring this occurs.

In developing the strategy I have had the opportunity to meet with growers and other individuals and groups across a range of organisations involved in the arable sector. The challenges facing arable were made clear in these discussions, but importantly, so was a clear message of commitment to the sector and a strong desire to see it succeed.

Arable is also deeply connected to other food and fibre sectors in New Zealand through the nature of the mixed rotations and farming systems on arable farms. Over 90% of arable farmers have some form of livestock in the system, and many arable farms have important roles in lamb finishing, dairy grazing and the growing of annual horticultural crops such as potatoes, onions and processed vegetables. How we work alongside these other industries and their industry-good and commercial organisations to help bring a whole farm view to our work is a key objective for FAR, and this work is underway.

In addition to this direct connection to other food and fibre sectors through the farm system, the arable industry has a key strategic role in supporting the export livestock sectors through the provision of animal feed and the seed required for pasture renewal. Building a better understanding across industry and government of this important enabling role of the arable sector is something we're very focused on.

## Working in Wellington

FAR, Seed and Grain NZ and growers have met recently with senior Ministry for Primary Industries staff, so it was pleasing that at last night's Arable Awards, Associate Minister for Agriculture, Mike Butterick (who holds a special delegation for arable) confirmed the formation of an Arable Sector Forum to drive the development of a sector-led action plan.

He explained to the crowd of around 500 growers and other industry stakeholders, that "the forum will provide an opportunity for growers, processors, exporters, seed companies, researchers and industry organisations to work together and front-foot priorities to address the challenges facing the sector".

FAR looks forward to being a part of this group whose goals are closely aligned to our own strategy.

Scott Champion
CEO





# A word from the Chair

What is the purpose of FAR? It seems like a straight-forward question, but the answer may not be as obvious as we think.

The basic and reasonably well understood response is that 'FAR is an industry organisation funded to carry out applied research using funds collected via a levy on arable crops'. But once you get past that basic response it gets harder, as not all levy payers, industry partners and researchers have the same ideas and expectations of what FAR stands for and how it should deliver.

When FAR was formed in the mid-1990s it developed an approach of prioritising research and extension focused on productivity gains, later this focus broadened to include environmental stewardship and compliance. But the world keeps changing. In the face of different political expectations, different cost structures and different markets, we had to ask "does FAR's approach need updating? Do we need a new strategy?"

Over the past 12 months FAR CEO Scott Champion met and interviewed more than 200 people in order to gain an agriculture-wide picture of what FAR could, or should, look like.

Within the arable sector he talked to growers, researchers, ARG members, merchants and grain and seed firms; beyond the sector he talked to Federated Farmers, Dairy NZ, Hort NZ, Process Veg NZ, Beef & Lamb NZ, as well as Members of Parliament and staff from MPI and MBIE, universities and research organisations.

The discussions were frank, open and challenging. What was good, what was not so good and what should be expected.

These discussions formed FAR's 2026-2031 Strategy. This one-page document (see page 6) states FAR's vision for the arable sector and outlines the organisation's agreed purpose, goals, principles and values. This provides clarity for all as to what FAR is, what it stands for, what it intends to do and how it will deliver.

Two of the strategy's four goals, **Trusted research, development and innovation**, and **Extension with impact**, have been designed to contribute to arable farm success and deliver value to arable growers. **Building arable sector understanding** is aimed at making the sector more visible to and valued by others in agriculture and beyond, while the final goal, **An efficient and effective FAR** will focus on internal efficiency and agility.

It's a great document; the challenge now is to deliver. That will make FAR's purpose very clear.

Steven Bierema
Chair

# FAR Strategy 2026-2031

## Vision for the arable sector

***A confident, resilient and profitable arable sector, producing trusted foods, feeds and seeds***

## Purpose of FAR

***Connecting growers with science and information to support successful arable farms and a valued arable sector***

### Trusted research, development and innovation

*Goal - Contribute to arable farm success*

**We will…**

- **Engage growers** to identify research that matters
- **Prioritise research** for maximum impact from available resources
- **Partner with growers**, research providers and industry in New Zealand and globally

### Extension with impact

*Goal - Deliver value to arable growers*

**We will…**

- **Deliver results** promptly
- **Provide** trusted and timely information
- **Translate research results** to support practical on-farm decisions
- **Deliver to growers** through multiple channels and partners

### Building arable sector understanding

*Goal - A visible and valued arable sector*

**We will…**

- **Champion arable's contributions** to New Zealand farmers and society
- **Build a robust evidence base** to promote the value of our industry
- **Strengthen and align relationships** with government, commercial providers and other primary sectors

### An efficient and effective FAR

*Goal - A focused and agile organisation*

**We will…**

- **Be sound stewards** of grower investment
- **Monitor, evaluate and evolve** delivery to arable growers
- **Build** a connected and capable FAR team
- **Support and develop** our staff and grower and industry volunteers
- **Invest** in systems to improve efficiency and performance

## Principles

***Focused on growers***
***Enhancing arable community***

## Values

***Trusted · Independent · Curious***
***Collaborative · Engaged***



# More sign up for NZ Grown Grains

PM Christopher Luxon promotes the NZ Grown Grains logo with Canterbury arable growers.

Momentum continues to grow for the NZ Grown Grains campaign, with businesses ranging from distilleries to breweries, breakfast cereal makers and animal feed manufacturers signing up.

The distinctive black and white NZ Grown Grains logo is appearing more and more at bakeries, on products on supermarket shelves as well as on business vehicles and marketing.

FAR general manager business operations Ivan Lawrie, a driving force behind the campaign, says that 35 businesses have signed up as licensees to use the logo, with another 25 awaiting confirmation.

These cover businesses throughout New Zealand, making both food and beverages and animal feed.

"Producers already using the logo include distilleries and breweries and their suppliers in the malting industry, specialty milling and baking, producers of rolled oats, snacks and breakfast products, edible oils and pasta as well as animal feed manufacturers and their supply chain members.

"There is also strong support from New Zealand grain and seed companies who are already using the logo on their products and marketing," Ivan says.

The website nzgrowngrains.nz contains links to all supporting businesses as well as other resources.

The Shortest Meal promotion on June 21 was widely supported, with consumers encouraged to create a meal using ingredients with the shortest travel footprint. More events are planned for the coming year. The campaign's social media presence is also gaining traction.

The campaign received a boost when licensees Monty & Sons, who source the durum wheat for their pasta making from the Wairarapa Grains Collective, won supreme champion in this year's Outstanding Food Producer Awards for their Radiatori pasta.

An industry event hosted by Gladfield Malt at their Dunsandel site in Central Canterbury to celebrate the NZ Grown Grains logo was attended by about 300 growers and industry people, including the Prime Minister Christopher Luxon.

"We are receiving a lot of enquiries regarding how the NZ Grown Grains campaign can help support the wider arable industry," Ivan says.


An event hosted by Gladfield Malt to celebrate the NZ Grown Grains logo was attended by about 300 growers and industry people.

Visit NZGrownGrains.nz

# Carbon footprint of New Zealand grown animal feeds


Updated greenhouse gas emissions profiles have been released for four New Zealand-grown arable animal feed crops.

The figures, which cover feed wheat, feed barley, maize grain and maize silage, all commonly fed to dairy cattle, are available in a report commissioned by FAR that uses real New Zealand arable grower data to generate the carbon footprints.

FAR CEO Scott Champion says the report is part of a larger FAR focus around supporting a better understanding of the arable sector and generating robust evidence to support the effective use of arable products, in this case in the context of animal feed.

"When New Zealanders think about end uses for wheat and barley, they often assume our grains are for human consumption in products such as bread or beer. However, 75% of the cereal grains grown in New Zealand are eaten by animals. New Zealand has a pasture based dairy system, but these products, along with feeds like maize grain and silage, are important supplements when pasture growth or available nutrients don't meet the cow's needs.

"We are working, with dairy, to understand the nutritional and environmental requirements of dairy systems, and how New Zealand arable growers can help to meet them."

He says the results are valuable for both the arable farmers who grow feed wheat, feed barley, maize grain and maize silage, and the dairy farmers who are their largest end users.

FAR commissioned the Ag: LCA team at the Bioeconomy Science Institute (BSI) (formerly AgResearch) to carry out this research as they are an independent research organisation whose methods are internationally recognised and widely used across the food and fibre sector in New Zealand.

Ivan Lawrie, FAR's General Manager, Operations noted that "we know from the questions we receive from both arable growers and dairy farmers that they are looking for this sort of information to help them to accurately calculate and then reduce their emissions. Using the Ag: LCA team at BSI means the figures stand up to industry and international scrutiny and the unique contribution of this work is that it uses real New Zealand arable grower data around management and yields to generate the carbon footprint".

## What were the numbers?

**Table 1.** Production-weighted national average cradle-to-gate carbon footprint for New Zealand grown dried feeds delivered to the point of storage (e.g. silo, bunker).

| Crop | Emission Factors | Weighted SD |
|---|---|---|
| Maize silage | 0.18 kg $CO_2$e /kg DM | ±0.04 |
| Barley grain | 0.21 kg $CO_2$e /kg grain (14% MC) | ±0.05 |
| Maize grain | 0.31 kg $CO_2$e /kg grain (14% MC) | ±0.08 |
| Wheat grain | 0.30 kg $CO_2$e/kg grain (14% MC) | ±0.02 |

MC = moisture content; DM = dry matter; SD = production-weighted standard deviation; $CO_2$e = Carbon dioxide equivalent.

## How were the numbers worked out?

A group of 23 arable growers from across New Zealand contributed their crop production and management information to this project. This data was used to create a national average carbon footprint for each of the crops selected using a life cycle assessment methodology.

For further information please contact Ivan Lawrie ivan.lawrie@far.org.nz

## FAQ

**What is a carbon footprint?**
A carbon footprint is the total amount of greenhouse gases released when a product is created.

**What are greenhouse gases?**
Greenhouse gases (GHGs) are gases that are present in the atmosphere and trap heat.

Greenhouse gases include carbon dioxide ($CO_2$), methane ($CH_4$), water vapour ($H_2O$), nitrous oxide ($N_2O$), ozone ($O_3$) and artificial chemicals such as chlorofluorocarbons (CFCs). The main GHGs emitted in the growing of annual crops such as cereals are: nitrous oxide ($N_2O$) and carbon dioxide ($CO_2$). Ruminant livestock (e.g. sheep and cattle) emit methane ($CH_4$).

**What are agricultural GHG emissions and how are they calculated?**
Typically the term "emission" refers to the loss of greenhouse gases that are generated during productive activity on farm.

**Carbon emissions:** A term typically used to describe greenhouse gas emissions in carbon dioxide equivalents. This term could be used to describe net or gross emissions.

**Gross emissions:** All greenhouse gas emissions created for a given activity or product. For a paddock of grain or seed this would include emissions created via operations such as cultivation, sowing, inputs (e.g. chemicals, fertiliser or irrigation), harvesting, storage and transport to a mill or other end user.

**Emission intensity:** Emission intensity is an estimate of greenhouse gas production per unit of product. A simple example is for arable feed production where net emissions for a business would be reported as kg $CO_2$-e, whereas emission intensity would be kg $CO_2$-e/t grain.

# 2026 Arable Awards

## Arable celebrates its best and brightest

Mid Canterbury seed growers John and Mel McCaw are 2026 Arable Farmers of the Year after being recognised as much for their industry leadership as on-farm performance.

As well as producing a diverse range of high-quality seed and cereal crops, they are recognised for their exceptional attention to detail, innovation, and commitment to advancing the seed industry.

Farming 560 hectares near Methven, the couple are involved in all aspects of the New Zealand seed industry. As well as specialising in herbage seed production (ryegrass and cocksfoot), the family owns McCaw Seeds seed dressing plant. John is also extensively involved in governance roles in the wider seed industry, including chair of Federated Farmers' herbage seed subsection.

On receiving the award John McCaw said that "if you had to take all the people I socialise with, work with and I respect the most and put them in one room you will have the 2026 Arable Awards dinner.

"The arable industry has had a couple of tough years, but this is an opportunity to push forward and make changes that will see the industry go from strength to strength in the future. Never let a good crisis go to waste."

It is important for the industry to stay positive and not talk itself down, John McCaw said.

The McCaw's also won the Seed Grower of the Year award, which qualified them for judging in the Arable Farmer of the Year.

## Cereal Grower of the Year

Cereal Growers of the Year Andrew and Amy Darling farm 500 hectares just south of Timaru.

Receiving the award, Andrew Darling said that "Amy is CEO and I'm the operations manager.

"There is nothing better than to grow a good crop of wheat. You have to do what you love and we love to grow a good crop of wheat."

He acknowledged the growers and rural professionals that had provided advice, either in terms of governance, finance or on-farm.

The judges said that Andrew and Amy Darling's focus on crop management, attention to detail, and continuous improvement have enabled them to consistently achieve exceptionally high yields. Producing crops at this level requires a combination of strong agronomic knowledge, careful planning, and excellent execution throughout the growing season. "Andrew and Amy have demonstrated a dedication to excellence that sets a benchmark for cereal production and reflects the strength of their farming operation," the judges said.

## Maize Grower of the Year

The Maize Grower of the Year award moved south for the first time, with the largest maize grain growing operation in the South Island, run by Mark Shera in Mid Canterbury, recognised.

Mark, who farms with his wife Leigh's parents, Neville and Andrea Chalmers, at Parkfields Farm, near Ashburton is actively working to build a consistent, long-term market for maize grain in the South Island and promote its use.

Parkfields Farm grows 250 hectares of maize as part of a 1,200-hectare arable operation. Supported by a significant dryer and silo complex, the business is recognised as the largest maize grain operation in the South Island, demonstrating both scale and commitment to crop production.

Parkfields Farm integrates cropping, livestock, grain drying, storage and year-round supply to customers, creating one of the most comprehensive maize production systems in the country.

The judges were particularly impressed by the scale and professionalism of the operation, the consistent maize yields achieved through careful hybrid selection and crop management, and the continuous focus on improving productivity, water use efficiency, and profitability.

## Innovation Award

Marty Skurr is a fourth-generation Canterbury farmer who has added value to his arable business through the development of Minchins Milling, an on-farm stone-ground flour enterprise. By growing, harvesting, milling, marketing and selling their own grain products, Marty and his wife Georgina have created a direct connection with consumers while championing New Zealand-grown grains and innovative value-add opportunities for the arable sector.

## Positive Environmental Impact Award

Lovett Family Farms, led by Daniel Lovett near Ashburton, has implemented a comprehensive approach to sustainable farming focused on improving soil health, water-use efficiency, and biodiversity. Through innovative practices, the family has built a resilient farming system while openly sharing its sustainability journey with the wider agricultural community. The large-scale operation grows wheat and barley, specialty seeds, carrots, onions, potatoes and peas.

## Agronomist of the Year

Sean Mulligan is an agronomist with PGG Wrightson Seeds who works closely with growers across Mid Canterbury, providing practical advice across a wide range of arable and vegetable seed crops. Known for his knowledge, passion, and collaborative approach, Sean is committed to helping growers achieve successful outcomes while actively contributing to industry initiatives, grower groups, and rural communities.

## Working Together

The SCID Rebuild Team brought together representatives from across New Zealand's vegetable seed industry to deliver a new Seed Crop Isolation Distance system under significant time pressure. Through exceptional collaboration, communication, and commitment, the team successfully rebuilt this critical industry tool, ensuring continued access to crop isolation information that supports high-value seed production and benefits growers and seed companies nationwide.

## Hall of Fame

Four people/couples were inducted into the Arable Industry Hall of Fame. These were John McKay, John McKenzie, Eric and Maxine Watson and the late Murray Kelly, who died earlier this year.

Murray Kelly was a senior research agronomist at PGG Wrightson Seeds, where he and his team researched and developed techniques to increase seed yields and improve production.

John McKay is managing director of South Pacific Seeds, which since producing its first crops in 1993, has grown to be New Zealand's largest vegetable seed production company.

John McKenzie has been a significant figure in New Zealand's pasture seed and forage industry for several decades. In the mid-1980s he recognised the opportunity to create a new proprietary forage seed business in New Zealand; this 'opportunity' became Agricom which was sold to PGG in 2005.

Following the sale, he played a central role in merging Agricom with other PGG Wrightson Seeds businesses, going on to hold senior roles in PGW. In 2019, PGW Seeds was acquired by DLF and he took on the role of Executive Vice President and CEO for Oceania.

Eric and Maxine Watson, who have farmed at Wakanui, near Ashburton, for over 30 years, have been the growers others aspire to be in terms of production, while being proactive and positive supporters of the arable industry.

They are best known for setting the Guinness World Record for wheat yield twice (16.791 tonnes per hectare in 2017 and 17.398 tonnes per hectare in 2020).

Eric is an arable innovator who has worked closely with researchers throughout his farming career.

L-R Eric Watson, Maxine Watson, John McKay, John McKenzie and Sherryn Kelly with John Foley (on behalf of late Murray Kelly).

Greendale farmer Earl Worsfold (left), and Quinn Kelliher in a "Skybolt" feed wheat crop grazed by lambs. Earl expects to shut up the paddock in late August for grain production.

# Grazing of wheat grain crops revived

**An increase in stock numbers has prompted Central Canterbury farmer Earl Worsfold to tap into a previously unrealised source of feed, by grazing lambs on a feed wheat crop before it is shut up for grain production.**

He was also encouraged by a seasonal worker on the Worsfold farm, Quinn Kelliher, who is completing a masters study at Lincoln University on the topic. Quinn's study, which is supported by FAR, is evaluating feed values versus the potential reduction in yield by adopting the practice.

The practice is not new and in the mid-1990s many New Zealand farmers grazed cereal grain crops. Since then changes in cereal agronomy, including earlier sowings and new cultivars, led to a marked increase in grain yields. This led growers to move away from the practice, perceived to be detrimental to yield. However, anecdotal evidence suggests more growers are again deciding to give it a try.

A "*grazing of the wheat grain crop*" project, funded by FAR and the Ministry of Agriculture in 2006, showed the practice has several benefits.

- "Free" grazing on wheat grain crops at a time when pasture feed is limiting. Wheat forage has been shown to give excellent lamb growth rates.
- Reduced need for fungicides, herbicides and plant-growth regulators. Grazing may remove diseased leaves and weeds and shorten the crop straw, reducing the risk of lodging.
- Market diversification of farming both wheat and lambs.
- Environmental gains of reduced reliance on agrichemicals and improved soil sustainability by incorporating animals in the cropping system.

The 2006 FAR report noted that practical knowledge on how best to graze wheat has been lost to a large extent. However, it is more widely understood that the growing point of wheat remains below grazing height well into late winter and early spring.

Earl Worsfold says it is the first time he has sown wheat with the intention of grazing it. "Skybolt" feed wheat was drilled on March 14 in an irrigated former garden pea seed paddock. "If we get a 12 tonne/ha crop I'll be happy."

It was first grazed in mid-May, followed by monthly grazings in June, July and August by a mob of 1000 lambs.

"You treat it like a ryegrass paddock, I suppose," Earl Worsfold says. He advocates crash grazing, going in and out fast with a big mob to ensure it is chewed down evenly. This reduces the crop from 1500 to 2000 kg/DM/ha to a residual of 600 to 800 kg/DM/ha.

"If you have an uneven crop once the stock leave the paddock, it will remain an uneven crop." He also needs to manage grazing around withholding periods for insecticides for aphids.

By mid-August, careful monitoring of plants is required, including stem dissection, so that grazing ceases before it can have a negative impact on growing points and yield. Earl expects to close the crop in late August, when he starts putting on liquid nitrogen to promote plant growth.

In terms of nitrogen management, in addition to a base/starter application, Earl applies liquid nitrogen during the growing season; about five passes of 43kg/ha each. Liquid allows for accurate placement via little and often applications, he says.

## Don't over-graze wheat plants, says grower

For more than 10 years, winter wheat paddocks at Silverton Pastoral in Manawatu have had a dual role of being grazed by lambs as well as being grown for grain.

The Abbiss family's mixed pastoral and arable farm near Feilding runs a big lamb trading and finishing operation through autumn and winter. Their cropping operation works in conjunction with livestock and includes wheat, barley and summer forages such as forage brassica and herbs.

"All our winter wheat here gets grazed by lambs, unless it is later sown and there is not enough herbage to warrant grazing," James Abbiss says.

The grazing window for wheat is from about 25 July to 25 August, with most paddocks grazed twice.

> *"A key is understanding the limits of grazing pressure and not over-grazing, or grazing in wet weather, which may damage the plants. "*

"A key is understanding the limits of grazing pressure and not over-grazing, or grazing in wet weather, which may damage the plants.

"When we have a dry week, we use a high stocking rate and graze it for a short period, then get off, so it can regrow and we can get a final graze, if required."

To ensure they are not grazing the crown of the plant, the residual is kept to about 1100 kg/drymatter/ha. Different cultivars provide different amounts of grazing depending on whether they are upright or prostrate.

"Total grazing days and grazing amounts depends on the season and sowing date. It's fairly simple. If we are having a cold, wet winter we don't get as much grazing."

If grazing is executed well, grain yields are not affected, James believes. Typical yields are between 9 – 11t/ha (all dryland).

"You don't want to overdo it or put too much pressure on it and affect yield, through reducing tillers and damaging the plant."

The practice is also reducing agri-chemical inputs. "We are finding we don't have to do the total fungicide package, generally we wouldn't have to apply a T0."

In the North Island there is generally a lot more biomass growth during the winter compared to colder areas, James says.

# Arable farming family tilts more to livestock

Like many mixed arable farmers, tight cropping margins have led the Worsfold family of Central Canterbury to increase the livestock component of their farming operation.

Known for growing cereals and particularly milling wheat, even the now largely retired Syd Worsfold, a former United Wheat Growers' chairman, recognises the need for change. Crop returns aren't keeping up with rising input and machinery costs, he says.

Instead, son Earl Worsfold is tilting the operation towards the more buoyant livestock sector.

Their knowledge of growing crops is now not just being applied to cereal and seed crops, but towards an increasing array of forage crops for livestock – bought-in trading lambs and the winter grazing of a neighbour's dairy cows.

At a FAR field day on their Greendale property near Darfield, Earl Worsfold says an advantage of mixed arable farms is their ability to be flexible and quickly pivot in response to market signals.

The Worsfold family farms 410 hectares, of which 270 ha has been leased from a neighbour for almost 20 years. The property is a mix of irrigated stony Lismore soil, particularly on the leased block, and heavy Templeton soil which is mainly dryland.

*"We used to crop all the Templeton soils, but in the last few years as cropping margins have tightened, we grow more lamb feed on that area and if it doesn't rain, we don't buy lambs, to lower our risk."*

The Lismore soil is cropped and used to graze dairy cows.

"We used to crop all the Templeton soils, but in the last few years as cropping margins have tightened, we grow more lamb feed on that area and if it doesn't rain, we don't buy lambs, to lower our risk."

Irrigation is sourced from a mix of Central Plains Water, a bore and a surface take from the nearby Selwyn River.

The Worsfolds have traditionally been cereal based, growing feed and milling wheat and feed barley. They also grow ryegrass and clover (red and white). Other crops include ryecorn, marrowfat peas and radish, swedes, kale and rape for seed.

Speaking at a FAR winter feed field day are (from left), Greendale dairy farmer Marc Lalich, FAR regional facilitator Donna Lill, mixed arable farmer Earl Worsfold and Hazlett Central Canterbury agronomy specialist Luke Visser.



Growing brassica seed crops, as well as forage crops such as kale and rape, means they need to be mindful about their cropping rotation to avoid soil borne diseases such as clubroot.

In recent years the biggest change has been in livestock numbers. Traditionally they finished 5000 lambs a season; this year numbers increased to 7000 and next year they plan to finish 10,000 to 12,000 lambs.

Their focus is short-term trade lambs. "Some may be only here for a week or a month. I know it costs a bit more to buy those short-term trade lambs but it lowers your risk of markets dropping away. In the summer you don't know where the schedule is going to end up. However, the outlook appears positive," Earl says.

November and December are the only months when there are no lambs on the farm. While the top-weight lambs are only on-farm short-term before being drafted, mobs of smaller, slower growing lambs are carried over winter. During summer, lambs are drafted at a minimum 44kg liveweight; by the end of winter this lifts to about 50kg.

Specialist lamb finishing mixes, such as chicory and red clover, may be grown to boost lamb growth rates over summer.

With more farms in the Selwyn district being converted to dairy, increasing the area required for winter grazing, the Worsfolds' also plan to expand this from 30-40 ha to 70-80 ha. Crops grown for cows are fodder beet, kale and rape. They are also considering growing maize silage, following requests from dairy farmers.

Earl Worsfold says that while ex fodder beet paddocks are normally followed by a spring cereal crop, poor barley prices last year meant he opted to grow kale instead. After a dry start, summer rain meant this performed well, yielding 17.5 tonnes/ha.

Discussing gross margins for kale crops, Hazlett Central Canterbury agronomy specialist Luke Visser says that at $1800/ha, the Worsfold's kale crop was on the higher side in terms of cost to grow because of conventional cultivation.

In the region, kale generally costs $1500 to $1600/ha to grow and about $1200/ha for direct drilled on dryland with less nitrogen applied.

Based on a drymatter price of 38 to 42 cents/kg and yields of between 10 to 16 tonne/DM/ha, gross margins ranged from about $2000/ha to $5000/ha.

While insecticides were not required last season, predictions of hot, dry conditions meant growers should include two insecticide applications in their budget this season.

For fodder beet, a cost of $3400/ha to grow the crop on the Worsfold farm last year was around average, with costs typically $3000 to $3500/ha.

While fodder beet is known as a high yielding crop, a yield of 22t/ha is a realistic number for growers to budget on. "Don't get fixated on growing a 30t/ha crop," Luke Visser says. At a yield of 22t/ha, and price of 40 cents kg/DM, this returns a gross margin of $5400/ha.

Fodder beet.

Kale and fodder beet cost a similar amount to grow, on a cents per kg of drymatter basis, but as fodder beet is significantly higher yielding and can be sold as a standing crop to dairy farmers, it generates higher gross margins, Luke Visser says. While dairy grazing is great for cashflow for arable farmers this needs to be balanced by the impact this can have on soil structure and following crops.

## Relationship with dairy farmer

Neighbouring dairy farmer Marc Lalich has been winter grazing dairy cows on the Worsfold farm for the last five years.

"We have a good relationship that works for both of us," he says.

The grazing price is set in mid-May, not long before the cows arrive, based on market rates. "We don't set the price too early."

With the grazing block only a 400 m walk away, this eliminates the need for transport.

Marc and his wife Megan are 2026 Canterbury/North Otago Share Farmers of the Year. Sharemilking 685 cows at spring peak for Marc's parents at Greendale, their herd's winter grazing is split between 20 ha on the Worsfold farm and another 20 ha on another neighbouring farm.

After issues transitioning the cows on to fodder beet, the herd now grazes kale.

"We make sure the cows are full before they go on and feed them baleage, along with the kale, for the first three days. After that they are fine.

"Kale is easy for staff to manage with strip grazing and is a quality feed, complemented by straw and water," he says.

As the Worsfolds' lease the land there is not a lot of infrastructure, apart from the main water line down the centre of the lane, so Marc Lalich supplies his own water troughs and power. His staff are responsible for break feeding the herd, leaving Earl free to concentrate on managing his trading lambs.

The Worsfolds also grow fodder beet as a standing crop for another dairy farmer.

# Protect your maize silage investment, says researcher

Despite the cost of growing a maize silage crop rising about 30 per cent in the last four years, growers should not be tempted to cut corners which could result in a reduced yield, Corson Maize national research manager Mike Turner says.

"When you are growing a high-cost, high-input crop, doing the basics right is more important than ever," he told a FAR maize winter workshop.

His analysis shows that total maize silage costs, from spray out to covering the silage stack, rose from $4026 a hectare to $5143 a hectare from 2021-22 to 2025-26.

Fertiliser/lime and seed related inputs both recorded the biggest increase, at about 41 per cent.

"When costs are going up you need to protect that investment and yield at harvest."

> *"When you are growing a high-cost, high-input crop, doing the basics right is more important than ever."*

Base fertiliser increased from $450/ha in 2022 modelling to $850/ha now. "In comparison, the cost of a soil test is very cheap. So, if you are getting your fertiliser spend wrong, either too much or too little, it can have a big impact on costs."

When growers get the basics right, a higher yield dilutes their costs, Mike Turner says.

For example, a 17 tonne of drymatter/ha maize silage crop equates to 31.9 cents a kg of drymatter. At 25 tonnes/ha this falls to 21.7 cents/kg/DM and at 28 tonnes/ha 19.4 cents/kg/DM.

"Yield spreads cost across more kg of feed. This is the strongest reason for growers to protect crop establishment and the basics. Most costs in a maize silage crop are fixed. So, the only real way to offset that is to get a good yield."

When choosing a CRM hybrid for silage, growers need to be aware that while silage yields increase for longer-maturing hybrids, so can the risk, especially in environments at risk of dry and disease pressure.

Some growers are choosing a CRM out of habit, he says. "It is worth asking your seed supplier about what hybrid best suits your system.

"Shorter CRM is not about giving up yield potential, it is about providing a more reliable return and a less risky yield. A crop that finishes cleanly, dries down, stands well and meets the harvest window usually protects margin better than a theoretical top-yield option."

Predictions of a super El Nino weather pattern producing hot, dry conditions later this season means it is recommended that growers without good moisture-holding soils shorten their CRM to get their crop well into grain fill or dry down phase before it comes under too much pressure. Some hybrids can better cope with dry conditions later in the season. A lower plant population could also be considered, Mike Turner says.

FAR senior maize researcher Rene van Tilburg says that growers need to factor soil nitrogen into their input calculations and if they are applying more nitrogen than what their crop can take up, they are wasting money. "Maximise your soil N; use it or lose it."

Growers generally make some allowance for soil N, but often this is anecdotal and what they have always done, rather than being based on actual soil test results. Instead, growers should measure nitrogen supply rather than guess it and trust the result.

Growers are recommended to use a Mineral N test to determine soil N as well as a Potentially Mineralisable Nitrogen (PMN) test which indicates how much N may become available during the growing season. This allows side-dress N applications to be better matched to crop demand and soil N supply, improving profitability.

In a FAR maize grain production trial at the Corson Research site at Newstead, near Hamilton, large differences in soil N supply between plots in 2024-25 resulted in side-dress N inputs ranging from just 75 kg to 360 kg SustaiN/ha. Soil testing showed the soil supplied from $599 to $1016 worth of N at a SustaiN price of $1400/tonne.

Despite these large differences in N inputs, grain yields remained remarkably similar, with all treatments producing about 16 tonne/ha of grain. The result saved $446 to $805/ha if no allowance had been made for soil N, with the lowest SustaiN rate having one of the higher yields though not significantly so, indicating no yield penalty for using the soil N tools.

Growers, particularly on soils with good structure, can also consider their cultivation intensity, saving diesel and machinery costs and labour. FAR work shows no yield penalty moving to strip till or no-till on sites with high-quality soil. However, transitioning to strip-till or no-till has its challenges and for many growers, it may not be practical, Rene van Tilburg says.

Instead, eliminating a pass in a conventional system or reducing cultivation depth and subsequently increasing speed could be considered instead. "A key point when making any of these changes is to ensure a seed bed that will result in consistent seed depth and good seed to soil contact."

FAR trials show that the combination of reduced cultivation intensity and the use of Mineral N and PMN testing have the potential to save $300 or more per hectare, he says.

# Winter cover crop nitrogen supply to maize silage

*“There is big potential in legume N, but it’s not clear how to manage this well. So, it’s about understanding where the N is coming from, where it is going in the cover crop and soil, and how much the maize can access.”*

Sam McDougall.

Nitrogen supply from winter cover crops to the following maize silage crop has been an interest of Waikato-based FAR field research officer Sam McDougall for a while.

So, when he decided to complete a master’s degree at Lincoln University it was an obvious topic to choose.

“One of the reasons I wanted to do this research was that at FAR’s Tamahere research site we were getting interesting results, particularly from relatively small-yielding vetch crops, seemingly providing more nitrogen (N) in the maize than we could account for.

“This piqued my interest and I wanted to dig deeper.”

During his masters’ study this involved literally digging and measuring the roots and crowns of cover crop plants to determine N levels.

Grower interest in cover crops is increasing because of rising N costs, regulatory pressure and the financial need to maintain yields with less inputs.

“There is big potential in legume N, but it’s not clear how to manage this well. So, it’s about understanding where the N is coming from, where it is going in the cover crop and soil, and how much the maize can access.”

For the trial at Tamahere, a very low N site was deliberately chosen as this made it easier to estimate N fixation and soil N changes.

The cover crop treatments were annual ryegrass, crimson clover (an annual clover with good winter growth), tick bean and a chemical fallow.

In terms of management, the cover crops were direct drilled into stubble on 27 March, 2024. No N was applied. In September, cover crop growth above 7.5 cm was mown and removed from the trial, to simulate a maize silage system. Following cover crop removal, the trial area was then disced and power harrowed before maize planting on 16 October, 2024. A small quantity (20 kg N/ha) of N was supplied to maize in starter fertiliser.

“That was the only N applied to the whole trial, to ensure that the maize got off to a good start.”

Trial assessments included soil mineral N tests down to 90 cm and crop dry matter and N% testing. “This gave me a way to monitor where the N is coming from and where it is going through the two crops over a whole year.”

Cover crop yields were 8.4 tonne DM/ha for tick bean, 3.4 t/DM/ha for crimson clover and 2.4 t/DM/ha for annual ryegrass which struggled from the low N.



The highest N was in the tick bean (285 kg) followed by 114 kg for crimson clover and 28 kg for annual ryegrass. Most of the N was in the shoot of the legume which was removed. All cover crops had a similar level of N in the crown and root.

The estimated legume N fixation from the atmosphere was 232 kg/N/ha, equivalent to $709/ha for tick bean and 139 kg/N/ha, or $425/ha for crimson clover. “So quite substantial numbers.”

The different winter treatments left different levels of soil mineral N for the maize. Annual ryegrass recorded only 12 kg/N/ha as it was very effective at scavenging soil N. Crimson clover recorded 37 kg/N/ha and tick bean 51 kg/N/ha. Fallow recorded the highest at 67 kg/N/ha.

Maize silage yield following the annual ryegrass was about 12 tonne/ha compared with about 20 t/ha for the others. This was due to the amount of soil Min N available and a lot more N was mobilised from the breakdown of crown and roots or organic matter in the crimson clover, tick bean and fallow treatments compared to the annual ryegrass.

“Fallow yielded more than 20 t/ha with just 20 kg N/ha applied to the maize. Basically, this shows how much N became available from the soil in one year. Leaching appears to have been minimal in this trial, so the majority of N made available through winter was also available to the maize.”

The cover crop and maize phases of the trial were combined to provide a trial N supply. The tick bean system supplied 289 kg/N/ha, equivalent to $888/ha, crimson clover 202 kg/N/ha ($617/ha) and annual ryegrass 55 kg/N/ha ($168/ha).

“The crimson clover shows that a smallish legume cover crop can supply substantial quantities of N.”

Sam McDougall acknowledges that growing annual ryegrass around maize silage is more of a known quantity compared with legumes.

Cover crop trial at Tamahere.

“Growing legumes while maintaining good feed values is a further challenge. In particular, feed quality in tick beans needs to be well considered.”

In the trial, feed quality of tick bean was only moderate by harvest, largely due to the long woody stems. Fungicide was also applied for chocolate spot (*Botrytis fabae*), adding to input costs.

Tick beans may also be more difficult to sell as a feed crop compared with the more traditional ryegrass and clover options.

## Key points

- The three winter cover crops contained the same amount of nitrogen (N) in crown and root material worked into the soil before maize planting.
- Legumes supplied 37 kg N/ha more than annual ryegrass to maize during the season. Fertiliser N can be reduced accordingly.
- Tick bean and crimson clover fixed 232 and 139 kg N/ha respectively from the atmosphere.
- The tick bean system (289 kg N/ha) supplied the greatest annual N, followed by crimson clover (202 kg N/ha). Annual ryegrass supplied the least (55 kg N/ha).

# Sprayers 101
# Droplet size key to spray efficacy

More than 300 growers attended FAR's Sprayers 101 workshops in August. Visiting Canadian spray experts Dr Tom Wolf and Dr Jason Deveau spoke at 12 events throughout the North and South Islands, covering 2000 km (not including flights) in the process.

Dr Tom Wolf (left) and Dr Jason Deveau.

Visiting Canadian spray experts Dr Tom Wolf and Dr Jason Deveau say that they advocate a coarse spray quality for general purpose spraying for efficacy.

"The value of larger droplets is huge as it opens a window of opportunity to spray in windier and hot and dry conditions. Windows of opportunity for herbicides and fungicides can be tight. Low-drift sprays can make it possible, and safe, to apply the treatment on time. A lot of research has gone into making sure that coarse sprays work," Tom Wolf says.

*"Based on the last 25 years of research, I have rarely encountered an efficacy problem with using a coarse spray for all pesticide applications, provided water volumes are sufficient."*

"Based on the last 25 years of research, I have rarely encountered an efficacy problem with using a coarse spray for all pesticide applications, provided water volumes are sufficient."

The pair held a series of spraying workshops with arable farmers in August organised by FAR.

In Western Canada, growers use a coarse to very coarse spray for the application of all herbicides, fungicides and insecticides. "Finer sprays can drift too much and evaporate too quickly."

An exception is horticulture where it is recommended that growers move one category down to a medium to coarse spray, allowing the finer droplets to move to hidden or shadowed parts of the canopy.

Adding more water to applications is of value when canopies are denser or when leaf area size grows as the crop matures. To gain coverage, adding water has yielded better efficacy than reducing droplet size. The added benefit is drift reduction, which widens the window of opportunity.

Tom Wolf notes that New Zealand grows world record yielding cereal crops and has much denser crop canopies than in Canada. "The only way you get coverage from multi-layered leaves at high density is to use more water.

"It is a mathematical reality that your crops require more water because of the greater leaf area."

In Canada, in contrast, a lack of close access to water means growers use as little as they can, at 100 litres/ha for herbicide and 150 for most fungicides. "We might need to truck water 30 km to the paddock."

Tom Wolf says he is excited to see the widespread adoption of pulse width modulation (PWM) in the industry, allowing users to change spray pressure and spray quality with no impact on application rate or travel speed. The introduction of nozzle switching from the cab also means the ability to employ the optimal atomiser for a specific situation.

"Our pesticides are remarkably robust and work across a wide range of droplet sizes. Being able to fine-tune that droplet size for local and changing conditions has been very valuable."

Timing is key in crop protection, and a great spray applied at the wrong time isn't as valuable as a mediocre spray at the right time, he says.

Western Canada's large scale means that arable farmers base their operations around 800 m by 1.6 km grids, known as a half section. The most common scale is 800 m by 800 m, known as a quarter section. "Everything we do is built on that."

Arable production has a natural winter break from November until April-May when the growing season restarts. During winter, snow falls are common and frosts can penetrate up to 1.5 m into the soil.

## Key takeaways:

- Droplet size is a trade-off: small droplets improve coverage and water efficiency, large droplets reduce drift. Your priorities will determine the your choice.
- Evaporation and drift disproportionately affect small droplets due to higher surface area to volume ratios and lower mass.
- Small droplets penetrate complex canopies and follow air eddies; larger droplets travel straighter and tend to hit the first objects encountered.
- Retention depends on leaf surface chemistry, droplet dynamics, and surfactants; small droplets often stick better but formulation matters.
- Use coarse to very coarse sprays at water volumes recommended on labels. Modern nozzles, air inclusion, and PWM help tune performance and cut drift.


Spray test paper.

# Be aware of drone spraying limitations, say experts

Agricultural spray-drones are an exciting new technology with a great deal of potential, but growers should be aware of current limitations for broadacre crop protection, say two visiting Canadian spray experts.

Dr Jason Deveau and Dr Tom Wolf of Sprayers 101 held spraying workshops with arable farmers in August organised by FAR.

"When it comes to spray drones, some of us are ignoring important fundamental principles that conventional application technology has proven time and again. As we explore their fit in large-scale crop protection, enthusiasm makes it easy to overlook some of the limitations in the technology," Jason Deveau says.

"Test and be critical. The rules around drift and efficacy do not change just because it is a drone."

> *"When it comes to spray drones, some of us are ignoring important fundamental principles that conventional application technology has proven time and again."*

Swath width is a fundamental factor in broadacre spraying. Knowing your swath width dictates your pass spacing, which supports a uniform application at the correct rate. "If you have a 24-metre ground-based boom, the swath width and spacing is 24 m. But it's not that easy with drones."

Drone swath width is harder to determine, and it changes with drone design, altitude, flight speed (to an extent), weather conditions and crop conditions. Swath width varies with flight speed, up to an estimated limit of about 10 metres/second. As a result, swath width increases as the drone accelerates at the start of a pass and decreases as it decelerates towards the end, potentially resulting in gaps referred to as "striping".

The operator can influence swath width by adjusting droplet size, flight speed and altitude, but there are factors that are outside their direct control. Therefore, it must be tested for each set of conditions.

For example, Canadian research has shown a ~25 per cent reduction in effective swath width for maize, wheat and soybean fungicide applications compared to swaths measured on open ground. Conversely, there are indications that herbicides sprayed on bare earth or sparse vegetation can produce an efficacious response beyond the measured swath width.

> *"Test and be critical. The rules around drift and efficacy do not change just because it is a drone,"*

Generally, slower speeds, more water and narrower pass spacing reduce productivity, but tend to improve results.

Rotary-wing drones carry relatively small spray volumes, spanning 10 litres for early models to 100 or even 150 L for large models, which means refills (and battery swaps) occur frequently. Large models have an 8-10-minute flight cycle, with refilling and battery swap taking up a quarter to a third of this time. Currently, the refill and swap represents the greatest chance for contamination and operator exposure, but there have been recent advancements that could automate this process.

Tom Wolf says that we are learning where drones belong in agriculture. "We are in a euphoric phase, where we are excited about the potential and try to put drones everywhere. I believe we will eventually withdraw from some areas and redeploy elsewhere."

For example, advantages of drones include patch spraying, spraying in wet conditions and difficult terrain, and spraying close to obstacles a pilot wouldn't go near. Fruit trees, horticulture and forestry are areas where drones will find a place, with FAR involved in a Scion project in Rotorua researching drone spraying in forestry.

While unsure if drones could compete with ground sprayers for productivity, he says that some applications are promising, with topdressing of urea showing strong uniformity.

> *"It falls on the operator to understand the equipment, do testing and know their limitations."*

From a farming background himself, Tom says that if he was a farmer today, he would own a spray drone. "Not because I want to replace my ground-sprayer but to complement it and deploy it in certain key areas."

Jason Deveau says that it falls on the operator to understand the equipment, do testing and know the limitations.

"Because drones are so accessible, relatively cheap and easy to use out of the box, people that are offering the service maybe don't have an agricultural background or pesticide handling experience.

"As long as you recognise the limitations and ask critical questions about some of the claims, drone applications can be successful. We're excited to see where they find their niche in crop protection practices."

Sprayers 101 co-founders Jason Deveau, left, and Tom Wolf.

# FAR's experience with drone application

**Broadacre drone applications have been used by FAR at its Future Farm demonstration site at Chertsey for the last two seasons, with mixed results.**

Based on experience to date, FAR has decided to stick with ground-based applications for now, except in specific situations such as wet conditions or for spot spraying. While drone spraying technology is evolving rapidly, it is not expected to overtake ground-based sprayers in a broadacre situation in the near future, FAR researcher Owen Gibson says.

The 2.1 hectare Future Farm site compares best practice conventional arable farming side-by-side with a more experimental future-focused approach.

The site was planted in perennial diploid ryegrass 'Three60' on 10 April, 2025.

In the 2025/26 season, all inputs were applied by drone from spring onwards on the future-focused side to create a paddock without tramlines. Variable rate applications of some chemicals and nitrogen were also attempted, as well as flat rate applications.

Variable rate granular fertiliser application remains a good drone option, and uniformity has proven acceptable at the Future Farm site when conditions are suitable, Owen says.

*"Drones offer another tool in the application toolbox and are particularly useful in areas that are challenging for a ground sprayer but there are issues to consider."*

FAR technology manager Chris Smith says drones offer another tool in the application toolbox and are particularly useful in areas that are challenging for a ground sprayer but adds there are issues to consider. A drone flying 9 metre swaths at a height of 5 m does not necessarily deliver an effective spray swath width because many factors affect droplets before they reach the target. This makes an experienced, certified operator very important.

Growers must check agchem labels for products approved for aerial application. If a label says a product is for ground application only, it cannot be applied by drone.

Drones continue to get bigger, with agricultural models carrying up to 100 litres, while more licenced operators are setting up in business, Owen says.

"Start-up business packages are available where new entrants can buy a drone, battery, tendering system and complete a course to acquire an operating licence to spray on farm. This means some operators have limited experience.

*"The Future Farm trial is about us testing new technology, so this was a great opportunity to evaluate a technology that is increasingly being tried by growers, in a risk-free environment."*

"The Future Farm trial is about us testing new technology, so this was a great opportunity to evaluate a technology that is increasingly being tried by growers, in a risk-free environment.

"We've learned what drones can and can't do right now and will move away from wholesale drone use to remove tramlines for the time being, using them only to solve specific issues," Owen says.

### Pros of drone spraying

- Lower capital cost than a full-size ground sprayer, although operating economics depend on labour, logistics and utilisation.
- Useful where ground sprayers cannot operate, including wet areas, standing crops, steep ground or difficult terrain.
- No wheel tracks, soil compaction or crop damage from machinery.
- Suitable for targeted or spot applications where access is difficult.
- Drone technology is improving quickly, including tank capacity, swath control, atomisers and automation.

### Cons of drone spraying

- Limited payload and short battery life compared with ground sprayers and crewed aerial application.
- Lower broadacre activity; work rate depends heavily on tank size, ferry distance, refill systems and battery changeover.
- Spray drift risk can be high if droplet size, flight height, speed, wind conditions and swath width are not well managed.
- Effective swath width and deposition can be inconsistent, creating risks of overlaps, misses and variable application rates.
- Some pesticides are not labelled for drone or aerial application, so label compliance must be checked before use.
- Requires trained, experienced operators and careful mission planning.
- Less suited to high water volume applications where large spray volumes are required.

### Practical operator checklist

- Confirm the product label and application method.
- Confirm the product label allows drone or aerial application. If the label is unclear, seek clarification before applying the product.
- Check application rates, water rates and droplet size requirements.
- Confirm operator's qualifications and certifications are sufficient and current.
- Review weather, drift risk and sensitive areas.
- Confirm the operator has appropriate insurance for commercial aerial application work.
- What flight speed and height are they planning to achieve the right coverage?
- Maintain spray records and comply with assurance programme requirements.
- Inspect outcomes after application and verify coverage where appropriate.

# UK expert to speak at CROPS

**Scottish agronomist Adam Christie, who will be a guest speaker at FAR's CROPS event in November, says growers in his part of the world are also struggling with crop returns and rising input prices.**


Scottish agronomist Adam Christie.

"The universal feeling amongst growers is that they don't feel they are valued or being paid fairly for the crop they are producing and the risk they are taking."

As in New Zealand, the Iran conflict has spiked oil and fertiliser prices, adding cost and uncertainty for UK growers.

"In Scotland, we operate a high-cost system and without developing premium markets it is difficult to see how we can afford to stay in the game, without maximising yield and minimising cost," he said in an online presentation to FAR's annual R&D team forum.

Scotland's climate is too wet to achieve milling wheat quality standards, so wheat is distilled, made into biscuits or feed for livestock. Barley not suitable for malting goes into the feed market.

While Scotland is internationally known for its whisky, this market has fallen away due to changing drinking habits, he says.

Adam Christie is managing director of Scottish Agronomy, a farmer-owned co-operative which provides independent advice to its members. It is the largest manager in Scotland of the UK's Recommended List Trials, equivalent to New Zealand's Cereal Performance Trials (CPT), which assess commercial and pre-commercial wheat and barley cultivars for yield, grain quality and disease resistance.

The UK Recommended List (RL) for cereals and oilseeds conducted 485 trials in 2025. Over five years £23.4 million has been committed to the trials, funded by AHDB grower levy, plant breeders, maltsters and flour millers.

"It is a substantial spend for an industry where margins are incredibly tight. It is essential that it justifies that spend," he says.

While everyone talks about yields, growers also need sufficient quality to be able to sell their crop. Disease resistance is also key. "Every year we seem to face different disease pressures. Last year, yellow rust exploded in some varieties.

"It also depends on the risk profile of the grower. Some varieties are less prone to disease and lodging, so less risky to grow, but can be lower yielding."

Adam Christie says he believes there are excessive entries in the RL trials, with too many "me-too" varieties and varieties with no market.

"Five years ago, I would have said the RL was failing Scottish wheat growers. However, in the last two years that has changed completely and that would not have happened without the list.

"So, you could argue that RL is flawed but it is still delivering for growers on farms."

At CROPS, Adam Christie and FAR cereals researcher and CPT manager Jacqueline Straathof will discuss both trial programmes.

Another visiting UK speaker at CROPS is Philip Wright. An agricultural engineer and soil expert, he will discuss how to prevent and repair soil compaction.

CROPS will be held on November 25 at FAR's Chertsey arable research site, near Ashburton. Topics include feed footprints, grass grub management, white clover harvest, soil nitrogen measuring and monitoring and integrated pest management.



# CROPS Annual Expo 2026

## Chertsey Arable Site, 25 November

Planning is underway, and FAR, along with our valued sponsors, look forward to welcoming you to CROPS 2026, at the Chertsey Arable Site, Wednesday 25 November.

- ✓ International speakers
- ✓ New Zealand focused topics
- ✓ Lunch provided
- ✓ Good weather ordered
- ✓ Seed, feed, nitrogen, cereals and more
- ✓ Sponsors' sites and talks

CROPS is more than just a field day. It is a full day event which allows farmers to view demonstration plots investigating everything from cultivars to cultivation, and to see and hear the latest research findings from New Zealand and international experts. The aim is to provide every attendee with new information to take away and apply to their own farming operation.

For more information and to register

| Topic | Speaker |
|---|---|
| Arable feed footprints: from seed to feed | Dirk Wallace, FAR |
| Cultivar performance: making the most of genetics | Adam Christie, Scottish Agronomy; Jacqueline Straathof, FAR |
| Nitrogen use efficiency: does the SVS tool work? | Andrew Barber, SVS; Abie Horrocks, FAR |
| Managing compaction for improved profit | Philip Wright, Wright Resolutions, UK; Dirk Wallace, FAR |
| Pest management in mixed cropping rotations | Jo Drummond, FAR; Daniel Sutton, NZVeg |
| Where are the weeds? Mapping and managing | Chris Smith, Owen Gibson, FAR |
| Grass grub management: future options | Andrei Costan, FAR; Jo Townshend, Midland Seeds |
| Ag chem for minor use crops: a pathway? | Bruno Gatimel, A Lighter Touch; Andrew Pitman, FAR |
| Not all flowers are equal: which ones drive white clover seed yield? | Fiona Anderson, Sean Weith, FAR |

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# Oat project to evaluate new cultivars

A new FAR-led programme is evaluating the resilience of emerging oat cultivars across different environments and management practices in Southland and South Otago.

Starting this season, the project will run for three years.

The monitor paddock programme follows the success of a similar programme, run jointly by FAR and processor Pure Oil NZ, to improve grower management and yields of oilseed rape.

About 4400 hectares of oats are grown in New Zealand, mainly in Southland and South Otago, with a 40:60 feed to milling split.

FAR cereals researcher Andrei Costan says that at present there is an over-reliance on a single cultivar, “L5”.

“This is a case of putting all your eggs in one basket. Various case studies show that cultivars don’t necessarily degrade gradually and if there is a particularly bad season this can put a cultivar at risk.

*“By comparing emerging cultivars, the monitor paddock programme will give growers the confidence to adopt new cultivars, spreading that risk and adding resilience into the oat production system.”*

“By comparing emerging cultivars, the monitor paddock programme will give growers the confidence to adopt new cultivars, spreading that risk and adding resilience into the oat production system.”

A project advisory group has been established, which includes representatives from the Oat Industry Group (OIG), oat processor Harraways, the South Otago-Southland Arable Research Group and FAR.

The programme provides a framework to independently evaluate emerging cultivars. Ten monitor paddocks will be established each season on at least eight farms spread across Lumsden, Chatton and Clinton.

At least two growers will set up split paddocks comparing “L5” with a cultivar with new genetics, such as “Gardyne”, bred by the OIG. The remaining monitor paddocks will be sown as whole paddocks in either “L5” or “Gardyne”.

Proposed data collection includes a full paddock management history, soil testing for basic soil fertility, including mineral N and Potentially Mineralisable Nitrogen (PMN), dates of key growth stages (ie GS 30, 32, 39 and 61), disease assessments at GS 65 and 75, measurement of yield components and grain yield and quality.

Data collected from the first year’s results will influence how the project is run in later years, Andrei says.

Extension is an important aspect of the monitor farm project and will include an annual field day and technical report.






# Fungicide timing key to protecting ryegrass seed yield

SIRC
SEED INDUSTRY RESEARCH CENTRE

Effective fungicide programmes remain one of the most profitable management tools available in perennial ryegrass seed production.

Across 10 FAR field trials, run from 2017-18 to 2021-22, fungicides increased seed yield by an average of 77%, with the strongest responses coming from programmes that included applications at GS32, head emergence and flowering. These gains were strongly linked to the management of stem rust.

## Stem rust management

Dr Richard Chynoweth, from MRB, who was contracted to carry out the analysis, says that stem rust infection often develops during stem elongation, heading and flowering, i.e. when the crop is setting yield. If left unmanaged, it can significantly reduce photosynthetic area, weaken stems, limit seed fill and, in severe cases, lead to crop economic failure.

“But, like all plant diseases, stem rust disease pressure varies between seasons and host genetics, meaning that until now, decision making around the number and timing of fungicide applications has been tricky. That’s where this combined analysis of 10 Canterbury trials comes in.

“The combined data suggests that growers aiming to maximise seed yield and protect profitability, should consider an early, preventative approach to stem rust management rather than waiting for disease symptoms to become visible.”

Some key principles which growers should consider include:

**Keep an eye on turf cultivars:** Monitor high-risk turf cultivars closely, as they are particularly vulnerable to stem rust infection.

**Prevention:** Prioritise preventative rather than reactive fungicide programmes. Protecting yield potential is generally far more profitable than attempting to recover from disease outbreaks after they occur.

**GS32 matters:** A fungicide application at GS32 can protect early reproductive growth. Fungicide decisions should not wait until visible rust symptoms are widespread. Applying a fungicide at GS32 can provide insurance against early disease development and helps preserve yield potential before significant damage occurs.

**Flowering is important too:** Maintain disease protection through head emergence and flowering. In the trials, programmes that included applications at GS32, head emergence and flowering consistently delivered the best overall yields.

**Three-spray programmes work:** Untreated crops achieved only 56% of the yield produced by the best-performing treatments. One or two fungicide applications increased relative yield to around 87% of the best treatment, while three or four applications increased performance to approximately 95%. There was little difference between one and two applications, or between three and four applications. The biggest improvement occurred when programmes moved from two to three sprays.

This suggests that a robust three-spray programme is often sufficient to achieve most of the available yield benefit, while a fourth application should only be considered when disease pressure remains high late in the season.

**Post-flowering, not so much:** The combined analysis found no statistically significant yield increase from adding a flowering plus 14-day application to an already robust three-spray programme. However, researchers noted that there were relatively few direct comparisons available, making definitive conclusions difficult. Monitoring crops closely during grain fill remains the best guide for determining whether this additional investment is justified.

**Keep what works working:** At each key timing, use multiple mode of action mixes to improve disease control and support fungicide resistance management.

*This research was funded by the Seed Industry Research Centre*

**For more information**
contact sean.weith@far.org.nz
or find Herbage Update 84: Yield responses to fungicides in perennial ryegrass seed crops on the FAR website.

# Fall armyworm: four years on


Ash Mills

Four years since it was first detected in New Zealand, researchers and growers now know much more about management of maize pest fall armyworm.

When fall armyworm (FAW) arrived, there was considerable uncertainty, FAR's biosecurity officer Ash Mills says.

"Many assumptions were based on overseas experience. Four years later, we have a much clearer understanding of where the pest fits within our maize production systems and what remains unknown."

First detected in New Zealand in 2022, fall armyworm is one of the world's most significant maize pests.

"The challenge was that while there was a large amount of international information available, very little of it had been tested under New Zealand conditions."

Ash Mills leads a three-year MPI Sustainable Food and Fibre Futures (SFFF) long-term management project, supported by Vegetables NZ, which has six months to go.

The project focuses on five key questions: where the pest occurs, when it becomes economically important, how it can be managed, how it fits within existing maize pest management, and what research remains necessary.

"Our challenge was not simply to control fall armyworm, it was to understand its place within the wider maize ecosystem," he told the third annual FAW research workshop.

The first challenge was knowing where FAW was present and how populations changed over time.

To address this, the project established a national surveillance system combining pheromone trapping, field scouting and seasonal monitoring. It also developed identification guides, grower resources and the fallarmyworm.nz website to act as a central information hub.

"One important lesson emerged very quickly. Detecting moths (using pheromone traps) is relatively easy. Predicting crop damage is much harder.

"We also learned that effective surveillance depends on growers and advisers regularly inspecting crops, which remains one of the biggest practical challenges."

> *"Our challenge was not simply to control fall armyworm, it was to understand its place within the wider maize ecosystem."*

The project shows that FAW management needs to be incorporated into existing integrated pest management programmes, but timing is earlier than for other maize pests. FAW activity is most economically important during vegetative crop stages, where yield potential remains vulnerable.

"When larvae are detected early, management options are generally effective and straightforward. As larvae grow and move deeper into the plant, control becomes more difficult.

"This is why management decisions must be based primarily on crop scouting rather than trap captures alone." Other pest species, particularly corn earworm (*Helicoverpa armigera*), also continue to contribute significantly to economic losses in maize.

Volunteer maize and other host plants may also support populations between seasons.

While the SFFF project has nearly finished, there is still plenty of other FAW work going on at research agencies including the Bioeconomy Science Institute, Ash Mills says.

"We still don't fully understand how well fall armyworm overwinters in New Zealand or what drives seasonal population changes. Improving our ability to forecast outbreaks remains a key priority.

"Another important question is the frequency and origin of new incursions. Without frequent population genetic studies, we can't determine what proportion of the FAW population is the result of over-winter survival versus new arrivals from Australia. This has important implications for both biosecurity and insecticide resistance management," Ash Mills says.

BSI entomologist Scott Hardwick says that monitoring shows FAW produces three to four generations a year in the Far North, and in warmer regions such as Gisborne and the East Coast of the North Island. Southern regions produce only one to two generations.

Far North entomologist Jenny Dymock, who has monitored six FAW bucket pheromone traps and adjacent maize crops near Kaitaia for the last four years, advises maize silage and grain growers in the region to sow crops as early as possible. Crops sown in late-November and December, are at greater risk of feeding damage from second generation FAW larvae. The later they are sown, the greater the risk.

## Collaborative approach

The FAR-led SFFF fall armyworm long-term management project has spearheaded a collaborative approach amongst research agencies tackling how to best manage this recently arrived maize pest.

A key activity has been an annual FAW research workshop, established to promote collaboration between researchers and avoid duplicating effort.

The third workshop in July this year brought together almost 40 researchers, industry representatives and government partners, as well as Australian researchers, to review progress since *Spodoptera frugiperda* (FAW) was first detected in New Zealand in 2022 and to identify priorities for future research.

The workshop provided an opportunity to assess how understanding of FAW has evolved under New Zealand conditions, share the latest research findings, strengthen collaboration between organisations, and consider the direction of the long-term management programme beyond the SFFF project.

Topics included field observations, updates from Australia, genomics, an MBIE FAW trans-Tasman dispersal case study, the role of beneficial insects such as the parasitoid wasp *Cotesia ruficrus*, and IPM and resistance management.

Research shows that FAW should be considered part of broader caterpillar pest activity within maize production systems, reinforcing the importance of regular crop scouting and integrated management approaches.

While many of the immediate questions surrounding FAW establishment have now been addressed, the workshop identified several important priorities for the next phase of research. These include improving the ability to predict seasonal pest activity as well as overwintering and overseas migration, strengthening biological control, refining integrated pest management and economic thresholds, and developing practical decision-support tools for growers.

FAR general manager, research, development and extension Andrew Pitman says that the SFFF project is a great example of FAR leveraging funds and activities. "One of the project's greatest strengths has been the willingness of researchers, industry and government agencies to work collaboratively, share data and build complementary research rather than duplicating effort."

# Southland grower tour highlights added value

Confidence in the future of arable farming was one of the strongest messages taken home by FAR's Mid-Canterbury 'Future Focused' Arable Growth Group following a five-day tour of Southland in late June.

The tour explored innovation, value-added production, technology adoption and business resilience across the region's arable sector. The group visited a range of leading farmers, processors, and food businesses to gain insight into the challenges and opportunities shaping the future of agriculture.

Despite ongoing economic pressures and increasing regulatory requirements, many of the Otago and Southland businesses visited expressed confidence in the future of arable farming. Participants were struck by the positive outlook of farmers who are investing in their operations, embracing technology and seeking new opportunities to add value throughout the supply chain.

"Farmers in Southland seem determined to innovate and invest in their operations to build resilience," said participant Sean Mulligan.

Throughout the tour, participants saw numerous examples of businesses adding value beyond the farm gate. Visits to Harraways, Gardyne Grains, Auld Farm Distillery and Craig's Poultry highlighted how growers and processors are creating greater resilience by taking ownership of more of the supply chain.

Rather than relying solely on commodity markets, these businesses are processing, marketing and branding their products to capture additional value and create new opportunities for growth. Many participants identified this approach as a key lesson from the tour and one that could help strengthen arable businesses in the future.

*"Farmers in Southland seem determined to innovate and invest in their operations to build resilience."*

"Value-add isn't necessarily about selling direct to consumers in the supermarket. It can come from looking a step up and down the supply chain and asking yourself where you can become the price setter," said participant Megan Fitzgerald.

The tour also highlighted the similarities between Southland and Canterbury farming systems, despite the regions facing different environmental challenges.

"A highlight for me was seeing the different challenges they faced with the conditions of wet soil and needing drainage instead of irrigation like back home. Yet they are still achieving good quality yields and profitability," said participant Quinton Pannett.

The tour reinforced that while challenges remain for the arable sector, there is also significant opportunity. By learning from innovative businesses and engaging with industry leaders, participants gained practical insights into building resilient and profitable farming operations for the future. The group thanked all hosts and organiser, FAR regional facilitator Donna Lill, who planned a successful and inspiring tour.

FAR's Mid-Canterbury 'Future Focused' Arable Growth Group on a five-day tour of Southland in late June.

# Learning the arable ropes

Catherine Harper, FAR graduate

Starting the FAR Graduate Programme 18 months ago was a big step into the unknown for me. My background is in dairy, but I discovered a real interest in plant science and crop production systems during my BAgSci studies at Lincoln University. That interest ultimately led me to the arable industry and applying for the FAR Graduate Programme.

> *"I'm incredibly grateful for the opportunities and experiences FAR has provided."*

At the time, I knew very little about the arable sector, which was one of the main reasons I wanted to join FAR. I saw it as an opportunity to learn as much as possible...and that is exactly what happened.

I learned a huge amount; from how research trials are planned and conducted to crop management, herbicides and the challenges growers are facing across the industry. It has been a particularly tough period for arable farming, and seeing those challenges first-hand gave me a real appreciation for the resilience and hard work of growers. It also made me proud to contribute to research that aims to support the industry.

One project I especially enjoyed was a biopesticide trial for grass grub control. Before working on the project, I hadn't realised the extent of damage that grass grub can cause in arable crops. Seeing that first-hand highlighted how significant this challenge will become as key chemical control options are lost. It was exciting to be involved in research exploring alternative solutions for the future.

One of the best parts of the grad programme has been the people. I loved getting out onto farms, walking crops, attending events and conferences, and talking with growers and others across the industry. Those conversations and experiences taught me a lot and helped me build valuable connections.

A real highlight for me was travelling to Perth for the Innovation Generation Conference. It was an incredible opportunity to meet other young people working in agriculture and hear different ideas and perspectives from across Australia and New Zealand.

I was also fortunate to complete additional courses and qualifications alongside gaining practical industry experience. As a graduate starting out, that combination has been incredibly valuable and has given me a strong foundation moving forward.

Looking back, I'm incredibly grateful for the opportunities and experiences FAR has provided. The programme has given me a broad understanding of the arable industry, helped grow my confidence, and given me a genuine appreciation for both the industry and the people within it.

Lastly, I'm incredibly grateful to everyone at FAR for the support, encouragement, and knowledge they shared with me throughout the programme. I feel really lucky to have been surrounded by such passionate, experienced, and down-to-earth people who were always willing to answer questions, share advice, and help me learn. While I've gained so much knowledge and confidence over the past 18 months, I've also genuinely had a great time working alongside everyone. The people are what made the experience so enjoyable, and the friendships, memories, and experiences I've had at FAR are something I will cherish forever.

Catherine Harper, FAR graduate.





# Arable Research Groups... they're there for you

Each FAR region has an Arable Research Group (ARG) made up of growers and industry personnel. ARGs act as a conduit for information on seasonal and regional issues and concerns and are elected by growers.

Current Arable Research Groups (ARGs) are listed below. Board members are noted as (B). Members of the Research Development and Advisory Committee are noted as (RDAC), Members Council as (MC) and Industry representatives as (I).

**Northern North Island (NNI)**

Chair: Grant Dixon (MC) 021 362 281
Andrew Reymer, Chris Pellow (RDAC), Colin Jackson (MC), Colin Mackinnon, Daniel Finlayson, David Robinson (I), David Wordsworth, Donald Stobie, John Austin, Mark Ernest, Martin Johnson (I), Rowland Tsimba (I), Simon Fookes (MC).

**South-Western North Island (SWNI)**

Chair: Paul Mackintosh (RDAC Chair, B) 027 446 3166
Adrian Noaro (MC), Brendon Williams, David McDonald, David Lee-Jones, Dion Fleming (MC), Douglas Giles, Hew Dalrymple (MC), James Abbiss (RDAC), Marcus Nitschke, Michael Abbiss, Tim Gorton, Tim Harris.

**Eastern North Island (ENI)**

Chair: Ed White - 027 243 7307
Craig Anderson, Ewan Powdrell, Hugh Abbiss, Hugh Ritchie (MC) Matthew Mackenzie (I), Nathan Williams, Patrick Nicolle, Paul Oliver, Simon White (MC), Toby Parker.

**Northern South Island (NSI)**

Chair: Matthew McEvedy (MC) 027 408 6193
David Birkett, Douglas Gough (MC), Earl Worsfold, Isaac Hull, Jim Macartney, Justin Inwood (I), Kirsti Lovie (RDAC, MC), Robert McCarthy, Roscoe Taggart, Simon Wright (Vice Chair), Sophie Green (I), Tom Adams (I) Val McMillan (B).

**Mid Canterbury (MC)**

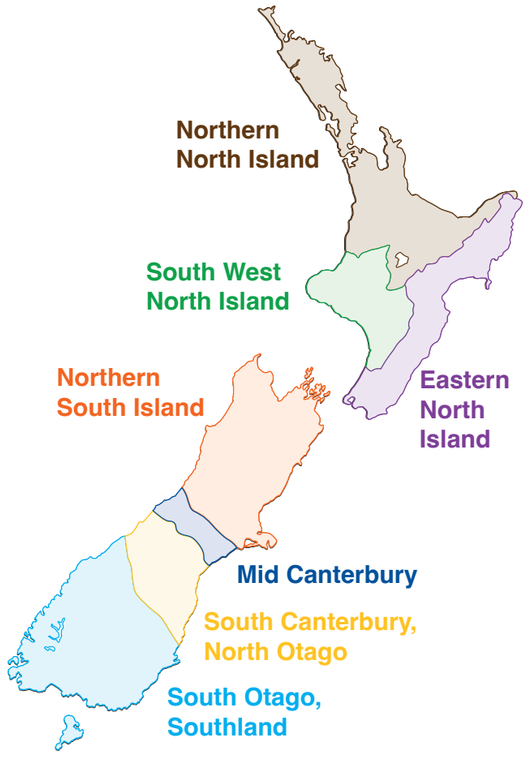
Chair: James Thomas (MC) 021 857 859
Angus McKenzie (MC), Brian Leadley, Deane Taylor, George Lilley (RDAC), Mark Tarbotton, Nick Sinclair (MC), Richard Sim, Sam Grant, Shane Butler (I), Simon Lochhead, Steven Bierema (B), Tim Brooker (I).

**South Canterbury / North Otago (SCNO)**

Chair: Andrew Darling (MC) 027 706 9881
Gary Talbot, Geoff Hayward, Graham Talbot, Grant Duff, Hamish Dunbar, Harry Washington, Henry Mitchell, Hugh Wigley (RDAC), Michael Porter, Nigel Rathgen (MC), Peter Hewson, Peter Mitchell (MC), Richard Porter, Roger Lasham (I).

**South Otago / Southland (SOS)**

Chair: Craig Whiteside (MC) 027 495 9079
Blair Drysdale (MC, RDAC), Craig Whiteside, Elliot Morgan, Howard Clarke (MC), Jarrod Lindsay (I), Jeremy Baird, Michael Gardyne, Mike Solari, Nick Hishon (I), Robbie Clarke, Robert Auld, Scott Rome, Steve Wilkins (MC).



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