

AGRONOMY

SPECIAL ISSUE

News and agronomy advice for arable farmers

**FOCUS ON
INNOVATION**

Evidence-based
advice vital for a
changing industry

Digital tools to evaluate
solutions at scale

Trial insights identify
best techniques

No-shear sheep
boost biodiversity for
Shropshire farmer

Supporting future
business resilience

Evidence-based advice vital for a changing industry

Agriculture is a science-led, innovative industry. As we transition into a new era, extensive research and a nationwide trials programme is equipping Frontier's experts with the latest insights and providing UK farmers with proven, forward-thinking crop production solutions.

**"We're committed to
challenging assumptions
and investigating new and
alternative approaches."**



Dr Paul Fogg

"As a business built on technical expertise, we base everything we do on robust evidence and data," says Frontier crop production specialist, Dr Paul Fogg.

"It's a particularly interesting time for the industry, and we're committed to challenging assumptions and investigating new and alternative approaches. Relying on our own research means we can do this to scale, continually upskilling our advisors and supporting our farmer customers with the real challenges they face on farm."

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Assessing the bigger picture

Paul explains that Frontier's unique position means its teams can take a holistic approach to research. "We work with many industry stakeholders, so can comprehensively review all options on the table."

"This means our benchmarking is particularly thorough and we can include a wide range of products in our screening trials."

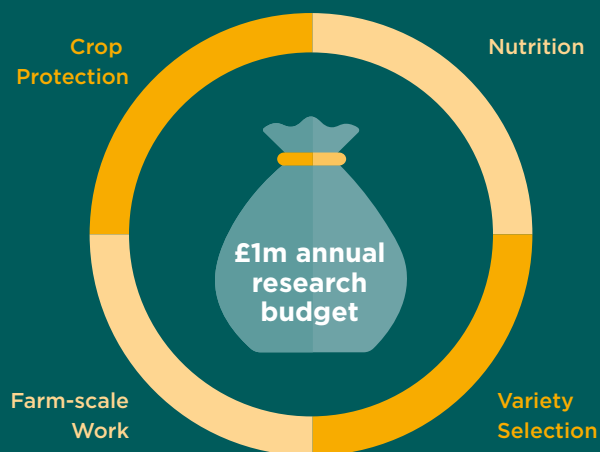


With any technology, solution or technique, Paul says Frontier evaluates its development journey, its benefits, and then any potential weaknesses. It'll then determine how best to assess performance through trials.

"Ultimately we're looking for uniformity and consistency of response," adds Paul. "Then we'll look at how to integrate that particular solution into the farm system, in a way that helps our customers to be sustainable yet productive."

Frontier's UK-wide trials network covers a range of research across all areas of sustainable crop production, including variety selection, nutrition, crop protection and farm-scale work on cultivation and rotation. An annual budget of around £1 million supports work from a plot scale to whole-farm systems across a range of sites. "In a typical year we could assess between 12,500 - 13,000 trial plots," says Paul.

Exploring sustainable solutions



Plot scale



Whole-farm systems

Benefits of farm-scale research

Larger trials bring wider scope around overall crop production and are key to developing integrated approaches.

Paul explains, "We've increased our on-farm trials. They can better compare various factors together amongst the inherent variability which occurs at farm, regional and national levels – such as soil type and environment. They cover a range of topics too, from establishment to crop protection, identifying which management techniques provide the best return on investment."

The expansion of on-farm trials, some of which have been running for more than 20 years, also boosts knowledge exchange between growers. Increasing use of digital information capture has also improved the effectiveness of large-scale research.

"We're always trying to extract and deliver more value from our trials and digital tools help support this, whether to assess nutrient use efficiency or soil health, or make straightforward comparisons in terms of crop health or yield," explains Paul.

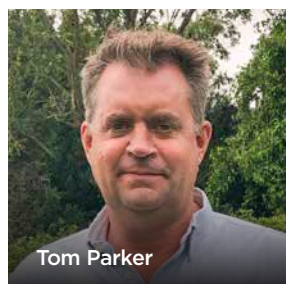
The importance of collaboration

Paul also stresses the value in shared learnings. "There's a huge benefit to inviting stakeholders and customers to see our trials first-hand," he says. "We have a shared objective to advance our industry and build sustainable food production systems."

"There's always a chance to see what we're doing around particular contracts, for example. Our summer demonstration events and winter meetings are an opportunity to discuss – even challenge results. We're particularly grateful to our host farmers, some of whom will see 500 or more visitors over a couple of days."

The dialogue at such events is always 'two-way', providing growers with the latest data while helping Frontier determine which issues or challenges need further investigation. "We're here to provide sustainable crop production solutions that make practical sense, particularly as agriculture evolves. Our recommendations come direct from the field, thanks to great collaboration between our people, farmers and other industry partners."

Digital tools to evaluate solutions at scale



Whether on replicated plots or on-farm tramline comparisons, reliable data is key. With so many factors to assess, digital tools are pivotal for comprehensive collection and analysis.

“The data we capture underpins our expertise and recommendations.”

“There was a time in our industry when digital technology was only really adopted by the more tech-savvy amongst us, but it’s now enabling everything we do,” says Tom Parker, head of customer digital solutions at Frontier. “With growers under increasing regulatory pressure, digital data analysis highlights opportunities and provides evidence to inform decisions.”

This is true in real-time farm scenarios and across Frontier’s own trials network. “The data we capture underpins our expertise and recommendations. This helps us collaborate with supply chains or industry partners, as well as support growers. Practical digital tools put the opportunity for meaningful analysis directly in their hands too.”



Tom explains that on farm, the key to assessing cause and effect is to record complete information. “It can be difficult to recall and record something you’ve already done. You can prevent data gaps, such as having cultivation records or logging grain samples.”



Stuart Alexander, regional business development manager at SOYL, adds: “It’s also important to assess data at the right time. Some farms often have huge quantities of data which isn’t always used to the greatest benefit. If it’s not reviewed in a timely manner, insights

can be months or even years out of date.”

Telematic data can be downloaded directly into systems such as MySOYL, where advisors and growers can review it together. “Finding time to analyse data can be difficult, but the financial benefits can be significant,” adds Stuart.

Combining spatial data such as satellite images with historic management records and yield maps is crucial too. Conducting trials on-farm can also help forward planning.

“Just as we may do, I’d encourage all growers to carry out tramline trials. That data can be analysed in platforms like MyFarm Analytics or MySOYL,” says Stuart. “For example, trying different nitrogen rates to compare application and yield data, or reducing insecticides, or trying a new variety. It’s a great way to test approaches that complement sustainable and environmentally conscious strategies.”

Mapping data can also identify consistently low yielding or underperforming areas which may be used more profitably for environmental options, as well as show which fields may have unused yield potential. Local weather stations can also provide valuable historic context.

Trial insights identify best techniques

Frontier's trials cut across all areas of sustainable crop production. Dr Paul Fogg looks at some of the highlights and conclusions from recent work.

"Many of our trials follow the same timetable as commercial farm operations. With weed management for example, the focus is ongoing black-grass control just as it would be on farm.

Given the loss of many actives, we're exploring more integrated control strategies. One example is the method of inter-row hoeing as a substitute for herbicides in crops such as oats.

We're also investigating the increasing presence of ryegrass (including resistance to flufenacet) and brome. Both are becoming more problematic as soil disturbance reduces, as well as resistance to ALS inhibitors and soft brome species now germinating in spring.



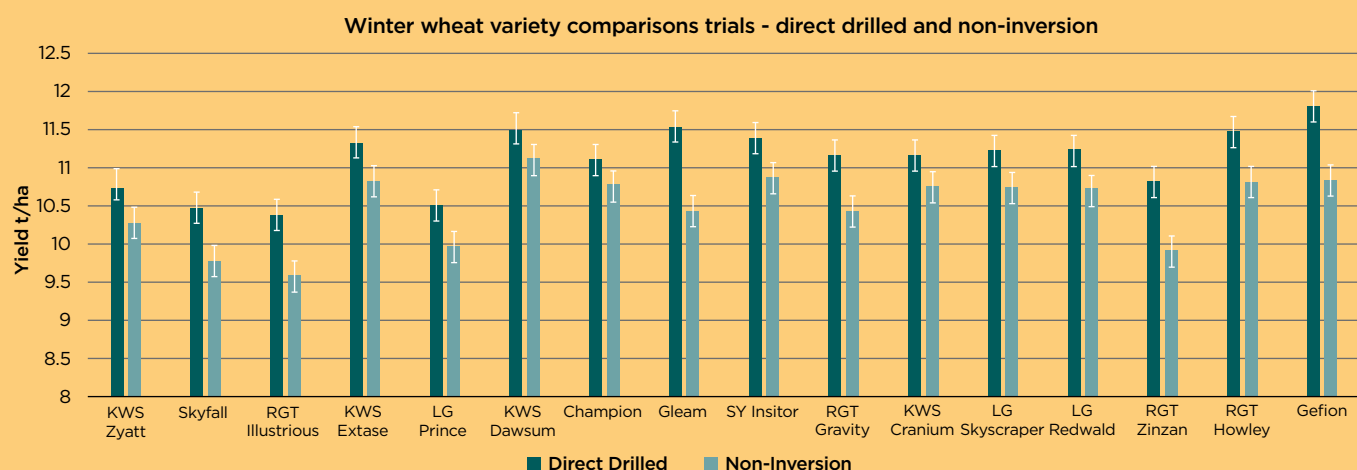
Establishment method trials

As many look to reduce soil movement, comparisons between direct drilling, min-till and reduced ploughing help inform longer term management - often from trials carried out over multiple seasons.

We have ongoing establishment trials in winter wheat and barley, with one wheat trial drilled on 10th October 2022 in Suffolk into Beccles series clay soil. The treatments compared a direct drilled crop (soils were lightly cultivated with a Terrastar rake prior to drilling) with a non-inversion treatment. The latter included two passes with a Kongskilde Vibroflex cultivator at 5-6 inches deep, followed by another pass with the Terrastar.

Yields ranged from 9.58-11.13t/ha in the non-inversion trial (mean yield was 10.48t/ha), while the direct drilled treatment saw yields between 10.36-11.85t/ha (mean yield 11.12t/ha). Gleam, RGT Zinzan, Gefion, RGT Illustrious, RGT Gravity and Skyfall showed yield gains of between 6.6-10.85% when direct drilled; whereas Champion, KWS Cranium and KWS Dawsum were between 3-4% lower yielding. The ranked order of most varieties was similar in both trials except for Champion and Gleam; Champion moved from a ranking of 10 when direct drilled to 5 for non-inversion, while Gleam switched from 2 to 11 respectively.

Specific weights were very similar irrespective of establishment technique. Thousand grain weights and grains per ear were highest in the non-inversion system, while normalised difference vegetation index (NDVI), plant establishment and final ear count were all higher for the direct drilled crops. These also saw higher protein levels; an average increase of 0.41% compared to the non-inversion treatment.



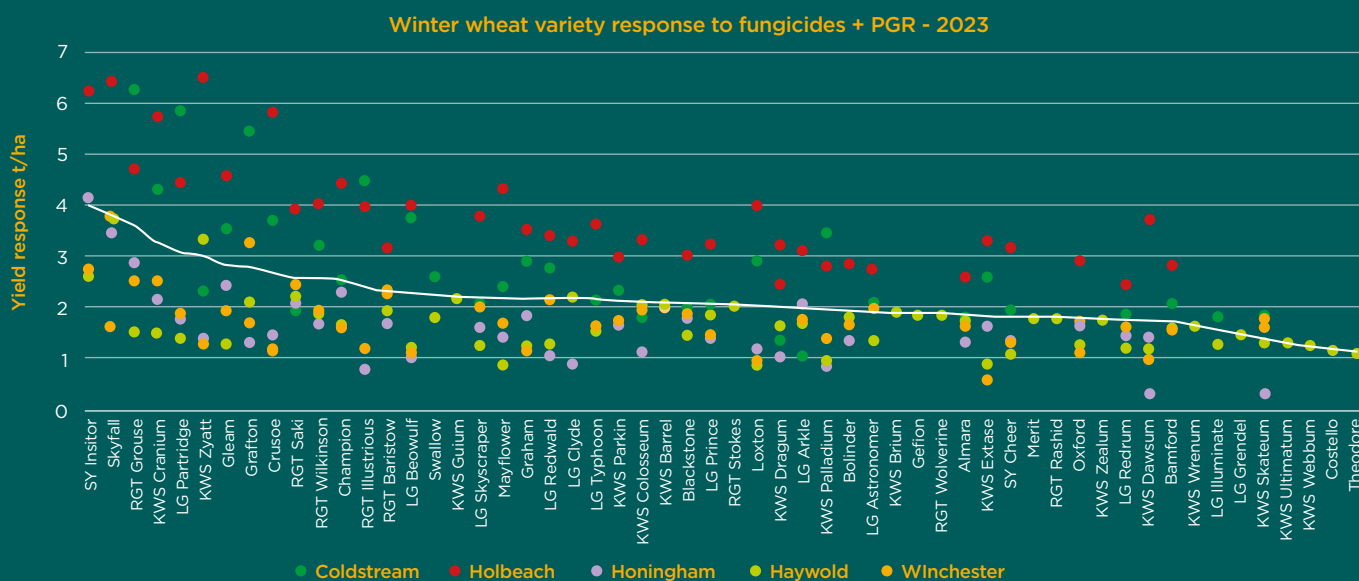
Variety performance trials

A core objective of our trials programme is to monitor existing varieties and screen new ones. Varietal traits are a fundamental component of integrated crop management in terms of disease, lodging risk and pest control, but positive traits in these areas must not affect their ability to meet end market requirements.

For example, we review wheat variety performance across different regions and assess which consistently perform in certain conditions. We typically have six or eight sites a year to review varietal responses to different treatments.

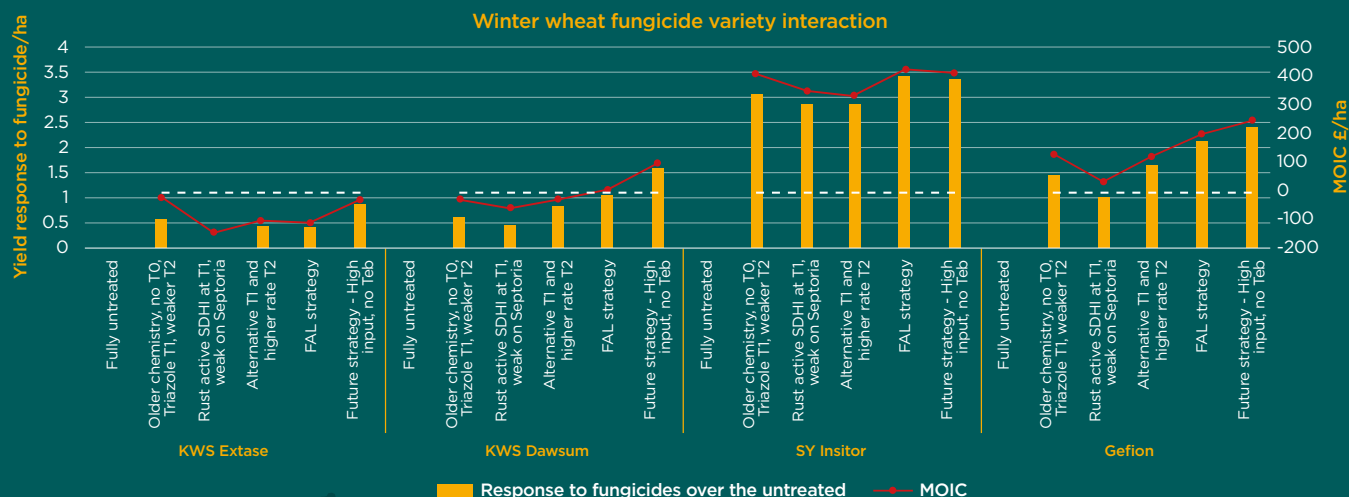
Fungicide interaction is another key focus, particularly with variety disease resistance and tolerance now more important for integrated crop management. We want to see how varieties with claimed resistance perform under field conditions, and whether there are other impacts to growth habit or agronomy.

These assessments have given us good knowledge of the underlying weaknesses of varieties like Skyfall and KWS Zyatt, allowing us to develop management strategies to maintain their performance. We are also investigating the opportunities that new varieties such as RGT Illustrious, KWS Palladium and Loxton offer.



Margin over input cost is an important metric for assessing the merits of different varieties. It can be easy to overspend on some options, while others will deliver notable benefits from a robust management strategy. However, knowledge of specific varietal strengths/weaknesses is fundamental to make sure inputs are appropriate.

Integrating the best genetic traits with the most appropriate fungicide programmes is essential for helping growers maximise return on investment. The trial below comprised four variety screens with different disease resistance profiles, with the results informing future management decisions.



Cover and companion crop trials

As the decrease in BPS starts to become more acute and with applications open for the Sustainable Farming Incentive, the use of cover and companion crops is increasing on many farms.

“It’s important to understand how to integrate them agronomically into the rotation.”

Maintaining green cover has direct benefits linked to soil health, nutrient capture and environmental protection, as well as supporting sustainable crop production objectives. However, it’s important to understand how they fit agronomically, and how they should be managed both in the short and long-term.

Screening herbicide effectiveness on different cover crops helps determine which mixtures may be suitable for different rotations, both in terms of destruction and weed control in following crops.



Knowing what can deliver 100% plant kill is as valuable as knowing what will survive. The work highlights wider management considerations too, such as needing short-term suppression of living mulches to ensure establishment of following commercial crops.

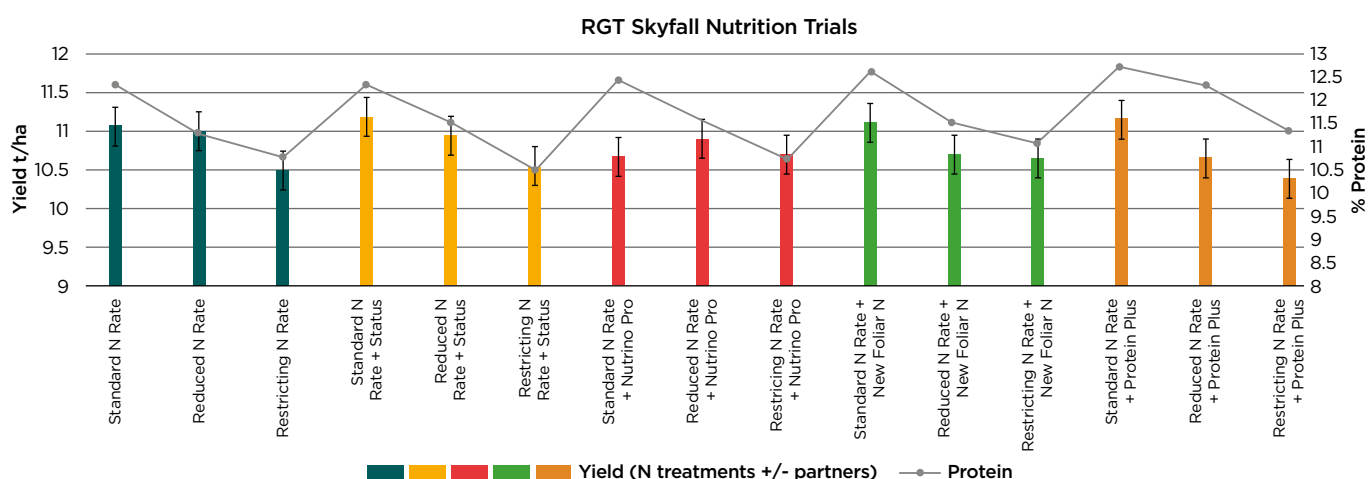
For companion crops, species selection depends on when the commercial crop is drilled. Berseem clover is fine planted in August or September, but offers limited value in October. Importantly, some companion crops like buckwheat are frost-sensitive, so don’t require a herbicide.

Crop nutrition

Crop nutrition (both macro and micro-nutrients) is fundamental to crop performance, but the environmental impacts of fertilisers must be considered. Nutrient use efficiency and alternative products like biostimulants need to be assessed and with recent market volatility placing the cost of nitrogen under the spotlight, it is critical to

continually evaluate existing and future crop nutrition products and strategies.

Soil management and condition are important for creating a resilient environment under which crops can deliver their potential too, while microbial technologies may have an increasingly crucial role to play.



The trial above shows some of the work we are doing in this area. At first glance, the data suggests there is no substitute for bagged nitrogen but in 2022, given the dry weather, even that wasn’t enough to meet milling spec. It’s important to note that the benefits of some of the treatments only became apparent once the crop had been processed through to bread.”

No-shear sheep boost biodiversity for Shropshire farmer

In a bid to improve sustainability, build soil health and boost biodiversity, many arable farmers are looking into new approaches such as integrating livestock. Shropshire farmer, Hayden Woolley, has a 4,000-ewe flock with 3,000 ewes self-shedding their fleeces. Now part of a wider business venture to support other farmers, could this revolutionise the way sheep are used in arable systems?



Hayden Woolley

“As a whole farm strategy it delivers in so many ways.”

Hayden Woolley's self-shedding flock doesn't require any shearing or fly control, meaning ultra-low labour requirements, reduced management and lower emissions.

“Like other farms we're always short of staff, so while we wanted the rotational benefits that come with sheep, we struggled with the amount of attention they required in terms of shearing, clipping etc.” explains Hayden.

“We now have a sheep without wool which reduces the necessary management input by 70-80%.”

With business partner, Ian McDougall - owner of advanced sheep reproductive technology business, Farmgene - Hayden has formed Low Footprint Lamb UK to import and trial genetics from around the world for UK conditions, with good environmental credentials.

Hayden adds: “We're looking to breed three types of sheep to complement each other, all without wool. Initial work identified genetics to improve an outdoor lambing maternal ewe. Our next step was to breed terminal rams to provide fast growth rates, improved carcasses and compliment the maternal line. Terminal and maternal rams are available for sale now and a third, more ambitious project has been started to develop breeding ewes that will lamb outside in autumn and fit in with arable cover crop and labour availability.”

This work involves looking at cover crops, grass and herbal leys as potential grazing options. Will Pratt, technical advisor at Kings Crops, explains the thinking behind crop selection.

“We wanted to find a solution which would improve soils, provide a return and benefit the farm business,” says Will.

“We compared the options of legume fallows and herbal leys. Although payment rates for legume fallows are higher, you can't graze them or cut them for forage. Also, in terms of black-grass control, a herbal ley is in the ground longer and is much more drought tolerant due to its deep rooting species.” Herbal leys also provide health benefits to the sheep, and Hayden points out that the crop needs to be managed by the livestock rather than the farmer. “If you put the right crops in the ground then the sheep do the work,” he says. “Ultimately we are changing the sheep to fit our system, rather than changing our system to fit sheep.”



Self-shedding sheep on Hayden's farm

Nick Jones, agronomist at BCW Agriculture, explains the herbal ley meets GS4 requirements under Stewardship and SAM3 in the SFI, and it has simplified Hayden's rotation. “This year we've taken out oilseed rape and put in 60-acres of herbal ley.

“It's improving soil structure and organic matter thanks to the legumes, it's fixing up to 180kg of nitrogen per hectare and it's sequestering carbon. As a whole-farm strategy it delivers, and Hayden's work to test practical approaches involving livestock could offer a valuable solution for many arable farmers.”



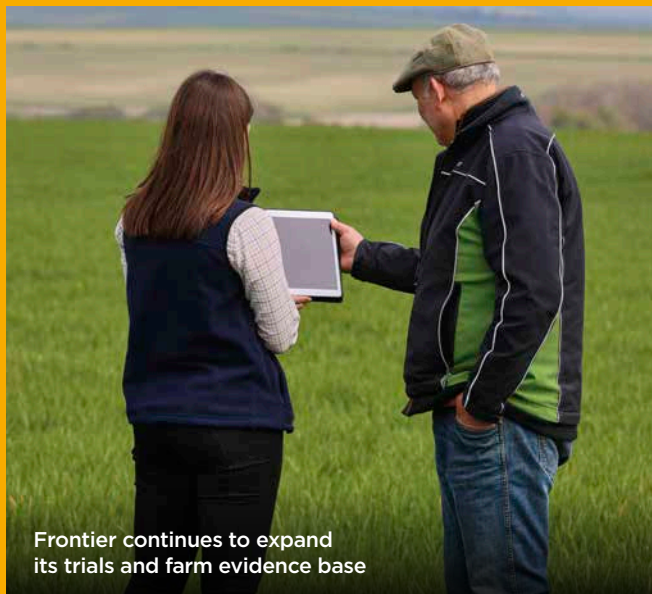
Supporting future business resilience

A benefit of trials is using the learnings to help future-proof farm businesses and prepare for upcoming challenges. To support its customers with the right solutions, Frontier is continually monitoring industry trends, impending challenges and proposed legislative changes.

A key driver is the move to support environmental measures and improvement, as demonstrated by the SFI in the UK and Europe's Field to Fork agenda. "It's not just about integrating options from the SFI and Countryside Stewardship, but also other priorities, such as feeding more people from less land," explains Dr Paul Fogg. "With the right data our teams can use their expertise to identify the best opportunities to boost gross margins on farm, while increasing production and making more space for biodiversity."

In order to meet these changing priorities Frontier has invested to expand its trial and farm evidence base. For example, in recent years it has created a flexible network of soil demonstration sites to understand how different agronomic practices affect diverse soil types and how that ultimately influences crop performance, sustainability measures and soil carbon balance. These developments continue to increase the complexity of interaction between different trials and projects.

"Many growers are looking for advice on integrating SFI options and as regenerative practices increase, farming is moving closer to a hybrid model that delivers both traditional agricultural products and conservation



Frontier continues to expand its trials and farm evidence base

benefits," adds Paul. "Our advisors understand this and our trials support this agenda."

Looking forward, issues such as water security and use of biostimulants and biopesticides will continue to require research, as will new developments such as hybrid cereal varieties and robust carbon footprinting.

Technical insights, trial results and expert, evidence-based advice is available in a number of formats. Growers can attend summer open days and winter meetings, as well as subscribe to Frontier's technical blog and YouTube channel. The latest editions of the AGRONOMY newsletter are always available online too.

- **Frontier's trials programme:** www.frontierag.co.uk/trials
- **Latest event listings:** www.frontierag.co.uk/events
- **Blog:** www.frontierag.co.uk/blog
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