Fostering data-driven robust rotations

By utilising a network of forward-thinking farms to identify where technology is best positioned to benefit agronomic strategies, Agrii is striving to quantify what value new innovation can offer the agricultural systems of today. *CPM* explores the company's Digital Technology Farms initiative.

By Janine Adamson

As the saying goes: with knowledge, comes power. Because through improved understanding, the opportunity to take control and influence the outcome of a situation has a greater chance of being realised.

For agriculture – an industry highly influenced by unpredictable externalities – being able to regain a level of control is arguably very desirable, even more so when success is now quantified by more than just yield.

Whether the goal is to improve margins, reduce the carbon footprint of a crop, or encourage on-farm biodiversity levels, the use of agronomic inputs is increasingly under scrutiny in a bid to secure a sustainable farming future.

For Agrii, a key component in addressing all of these challenges is harnessing the power of real-time data to not only provide economic and time-saving efficiencies, and therefore optimise input use, but to boost the knowledge of both

R&D screening process

Agrii's Innovations Technology Group focusses on evaluating, filtering and implementing new data-driven innovations to help identify what's relevant, says the firm's Jonathan Trotter.

Challenging convention
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farmers and agronomists.

This led to the company forming its Innovations Technology Group (ITG), explains technology trials manager, Jonathan Trotter. "The ITG is focussed on evaluating, filtering and implementing new data-driven innovations to help identify what's relevant to our teams and their farming customers," he says.

"The group consists of a range of individuals across Agrii – from R&D colleagues to crop specialists and agronomists – and has so far evaluated around 75 technologies including drones, sensors and software for a variety of crops."

DIGITAL TECHNOLOGY FARMS

As a means of facilitating the work of the ITG, Agrii launched its Digital Technology Farms (DTF) project in autumn 2023. The project involves a network of commercial farms to develop, trial and demonstrate technologies at a practical scale to determine their benefits in comparison with farm-standard practices.

The DTF currently consists of four sites across the country: the flagship Revesby Estate in Lincolnshire, Throws Farm in Essex, (Agrii's R&D Hub), Brotherton Farms in Johnshaven, Scotland, and Flightshot Farms in Horsmonden, Kent. "By creating a targeted and considered approach to selecting new technologies, we can help to increase their adoption rate and thereby unlock the benefits of the resulting data," says Jonathan.

"It's a means of identifying technology use cases, screening any potential issues and therefore de-risking data-driven decisions on farm."

For Agrii's UK digital agronomy development manager, Lucy Cottingham, a core principle of both the ITG and DTF is to challenge agronomic convention. "For example, farmers and agronomists have long used wheat growth stages as a basis for crop fungicide applications. However, with enhanced monitoring and greater insight, it could be possible to refine this further for year-round data-based decision making," she says.

"Equally for the agronomist, having that real-time data could be a way to evidence recommendations and justify spray applications in an ever-evolving regulatory climate."

Last year at Agrii's Revesby Estate DTF, the ITG used a range of new technologies to explore fungicide application timings, nitrogen rates and timings, NUE, as well as conducting a cost benefit analysis. This involved managing a winter wheat field throughout the growing season based on the various technology and data sources (known as field of tomorrow), compared with a traditional agronomic strategy (field of today).

As part of the disease control aspect of the work, a sophisticated weather station sensor and associated smartphone app were used for the field of tomorrow to monitor the crop and determine the in-season disease risk with a view to finessing fungicide recommendations.

This was used in conjunction with knowledge about the specific variety (RGT Highgrove) including its disease scores, plus information about fungicide product efficacy, explains Lucy. In comparison, the field of today involved conventional timings and chemistry according to standard farm strategy.

In terms of nitrogen, a Skippy Scout-powered drone was used in combination with Agrii's digital platform, Contour. "We used the Contour NDVI satellite imagery and Skippy Scout GAI measurements alongside one another to formulate a variable rate application plan for each timing," continues Lucy.

"Available nitrates were then tracked throughout the soil profile using PlentySense nitrate sensors to provide readings at three soil depths: 10, 20 and 40cm. The sensors work by quantifying the available nitrates in soil moisture and indicating where within the soil profile they are and at what concentration.

"This can then be used to understand whether excess nitrates have been applied or to visualise release patterns throughout the season."

Having analysed the data populated from the field of the future, Lucy says the results were in fact mixed. "The greatest benefit has been shown to be in nitrogen applications – using the data insights meant we could reduce rates on the lighter areas of the field.

"Equally, the NUE results proved to be the same for both the DTF-led approach and the farm standard (48% average). This means that while we spent less on nitrogen for the field of the future, we still achieved the same NUE yet it was more sustainable," she explains.

HARD TO IGNORE

Offering a compelling story, the trial results have since led the estate's farm manager, Peter Cartwright, to change his approach to nutrition for the farm's entire wheat area. "You can't ignore the cost benefits of variable-rate N that the DTF work has shown, so we're now going to use Skippy Scout drone AI software, Contour and variable rate nutrition across the estate," says Peter.

"We've learned a lot from being part of the DTF network already and are sure this will continue in the future. It's exciting to be part of such an important and forward-thinking project."

However in contrast, finessing the ▶

Applied findings
Following involvement with the DTF project, the Revesby Estate is now committed to using Skippy Scout drone AI software, Contour and variable rate nutrition across its farming area. Pictured: Peter Cartwright (L) and Jonathan Trotter (R).

De-risking

With many solutions coming to the market from start-ups – which aren't necessarily fully developed – Agrii aims to de-risk the screening process for growers, explains RHIZA's Sam Fordham.

▶ farm's fungicide strategy remains a work in progress, admits Lucy. "In ways the trial went against the curve meaning at the moment, we can't wholly rely on technology in isolation; disease management still requires an agronomist's input.

"But, this further supports the concept of an agronomist becoming an interpreter of data, and that they very much continue to have an integral role in crop management," she highlights.

Lucy believes the approach to fungicides was a significant factor towards a whole field yield difference of 1.1t/ha - in the favour of the field of today. These results were driven partly through a greening effect and other physiological benefits attributed directly to the use of traditional chemistry in the programme, but also as a direct result of technology not providing an accurate enough picture of what was truly taking place in the field, she says.

"While disease visually was low in field what was happening within the plant was something we couldn't see and that's where traditional fungicides outperformed our technology driven approach."

According to Jonathan, the ITG strives to work with innovations which are at a certain technology readiness level and that can be adopted short-term, rather than being at a proof of concept stage. He says the team then works alongside the solution's developer to improve and tweak the technology to ensure it's fit for purpose.

"This is how we add value and boost adoption rate," he comments. "A good example is Skippy Scout – we currently have more than 20 agronomists regularly using the drone as part of their advisory service and we hope to develop this further by integrating it formally with the Contour platform."

As for further down the line, the ITG hopes to bring PlentySense to growers within the next year, following at least two years of ground-truthing through the DTF project, adds Jonathan.

INFORMATION OVERLOAD

Even so, understanding new technology, tools or data, can be overwhelming, believes RHIZA's head of technical, Sam Fordham. "And with so many solutions coming to the market from start-ups – which aren't necessarily fully developed – Agrii aims to de-risk the screening process for growers," he says.

"Equally, technologies may come from academics or other sectors beyond agriculture. Without critical, practical farming knowledge behind them, there's a chance use cases may be missed, or the innovation is simply not farm relevant in the first place.

> ***"Having real-time data could be a way to evidence recommendations and justify spray applications in an ever-evolving regulatory climate."***

"So our work at the Revesby Estate demonstrates how collaborating with a commercial farming business has the potential to unlock these new technologies and improve understanding."

Working in parallel with the ITG and DTF project is RHIZA – Agrii's digital agronomy department. Part of the RHIZA remit is to continue developing the Contour web platform, highlights Sam.

"Contour is our vehicle to serve data to customers in a relevant way; enabling meaningful actions on-farm through putting data, decision support and planning tools into the hands of growers. Having taken off during recent years, Contour now covers around 1M hectares of land across the UK, of which 350,000ha is under variable rate planning, but there's still much more we can achieve with it."

According to Sam, with a goal of continuous development, Contour is evolving beyond just VR Planning. "The platform has the capacity to devise nutrient management plans, IPM plans, plus facilitate wider land management tasks.

"And, excitingly, Contour's next steps are to integrate with TELUS Agriculture's new farm management software platform, TELUS Crop Management (TCM), which will be available early 2026. This integration means the new technologies screened through DTF, such as Skippy Scout and PlentySense, will then feed into Contour.

"Agronomists and growers will be able to access real insights to help make better decisions when creating plans or recommendations."

Sam says seamless sharing of plans and data from Contour to TCM will allow for easy job management and should reduce the chances of having to enter data more than once. "We want to avoid data silos while also preventing growers from having to use an overly complex digital platform.

"If we can achieve this and therefore support growers to optimise their input use, the financial and environmental benefits will span far beyond just having a better crop," he concludes. ●

Climate resilient cropping

With weather extremes becoming more frequent, and challenging conditions now perceived as the norm, what can growers do to improve the resilience of their cropping approaches?

This series of articles, kindly sponsored by Agrii, aims to explore some of the different approaches to de-risking crop production – from making better use of nutrients and boosting NUE, to getting the most from plant genetics.

***CPM* would like to thank Agrii for providing expert insight into these topics, and for the privileged access to the individuals involved.**