> *"We are just beginning to appreciate all the things digital technologies can do."*

Always learning on the digital journey

Innovation
Technology on Trial

In the first of a new series, *CPM* visits two farms in Agrii's new Digital Technology Farm network, each with a very different breadth of experience, to gather what they're hoping to learn from putting the technology on trial.

By Rob Jones

Precision farming technologies have been in use for several decades. This would suggest that farms with plenty of experience may already have answered the questions of those coming to it relatively fresh. But all businesses have different requirements of digital technology and the quest for answers can be a constantly evolving journey.

Digital experience

Bedfordia Farms can justifiably claim it's a business with more experience of precision farming than most. It's been using autosteer for the past 18 years, yield mapping since 2004, variable rate seeding for 12 years and was one of the first in the country to bring in advanced satelllite imagery.

This leaves Ian Rudge, Jonathan (JJ) Ibbett and their team in no doubt that digital technologies will be central to the future of their arable business. At the same time, however, in most cases they continue to be hard-pushed to quantify the value of 'going digital' in immediate return-on-investment terms.

"We have always prided ourselves in being custodians of the environment as well as quality food producers," says arable and operations manager, Ian. "Being as efficient as possible is also essential with a large and relatively complex business like ours. Equally, we want to do everything we can to enable all our people to work to the best of their abilities; and, importantly, appreciate their contribution to our success.

"We see precision and digital technologies having huge potential in all these areas. More accurate information used in the most effective way will undoubtedly help us farm even better and more sustainably."

Autosteer is a case in point. Ian believes it reduces fatigue, allows staff to concentrate on the task in hand and has speeded up operations. "What's more, by ensuring the boundaries of our operations are exactly where they're meant to be, it ensures we are spot-on in our environmental scheme compliance," he adds.

Ian Rudge (left) and JJ Ibbett have no doubts about digital technologies being central to the future of their arable business.

"With our soils and reliance on organic fertilisation, on the other hand, variable rate P and K is a something we've haven't found worthwhile. After a lot of trial and not a small amount of error in practical implementation, we are just getting to feel confident about

Farm Facts

Bedfordia Farms, Milton Ernest, Bedford

- **Soil Type:** Predominantly Hanslope Clay
- **Cropped Area:** 2150 ha
- **Enterprise Mix:** Wheat, OSR, winter beans, grassland, sow breeding and baconer finishing units
- **DTF trials:** Variable seeding, variable nitrogen and enhanced nutrition in winter wheat
- **Key trial hopes:** "We want well replicated field-scale evidence of where we are likely to get the best value-for-money in applying the digital technologies available."

Group 1 wheats have long been the mainstay at Bedfordia, averaging a very acceptable 9.5t/ha.

variable rate drilling. And we remain unsure about how to make the most of other technologies, including variable rate N."

While he knows the equipment offers a vast range of capabilities, Ian sometimes struggles to see the wood for the trees. "We can only do this by focusing on the areas that best seem to meet our needs and testing the extent to which they deliver in our own field-scale trials."

Good blackgrass control enables Bedfordia Farms to maintain a wheat/wheat/oilseed rape rotation as the basis of their 2150ha of combinable cropping. Five-year average yields across the Group 1 wheats that have long been their mainstay average a very acceptable 9.5t/ha. But, with OSR yields declining noticeably from their historic 3.9t/ha average, they are looking to winter beans as an additional break to reduce the frequency of OSR in the rotation.

"An average of 6.3t/ha from the 70 ha of beans we grew last year was very encouraging," comments Ian. "So, this season we've upped the area to 275ha. As the weather only allowed us to drill 65% of our planned winter cropping, we are also introducing a fair amount of spring barley into the rotation.

"This should be positive for our weed control efforts. But we try to avoid spring crops wherever possible as we're flat out at this time of the year fulfilling our commitment to utilise digestate from AD plants on the farm."

Together with Bedfordia Farms' two straw-bedded sow herds and large pig finishing unit, the digestate commitments mean up to half of the annual fertilisation is in the form of manures. So potash indices are never lacking. Added to this are soils which lock up phosphate, which may explain why the team have found little value in variable rate P and K.

"It's only in the past two years that we've been getting all our ducks in a row with variable rate seeding," reports assistant manager, JJ. "As well as the most accurate RTK guidance, we have centralised our whole data management on the John Deere system.

"We set up our drilling plans in Gatekeeper using the Contour platform, basing this on past experience, NDVI images and yield maps as much as soil variations. The plans are then automatically transmitted via the cloud to identical screens in our tractor cabs, all the hardware and software now working seamlessly with our four variable rate drills. All the field data is then automatically transmitted back via the JD Operations Centre.

"Importantly, everyone involved knows the system, understands how it works, has confidence in it and finds it easy to operate," he points out.

The drive behind precision at Bedfordia Farms is to give every area of every field the ability to produce to as much of its potential as possible. Variable rate drilling is seen as crucial in establishing optimum 260 plants/m^2 wheat populations. After which, individual areas of the crop can be managed to their own particular seasonal constraints.

Headlands now receive 20% more seed as standard and sowing rates are doubled in some parts of some fields known to suffer especially badly from slugs. While it's early days yet, this led to a visibly better foundation for last season's milling wheat crop, which went on to average 10.7t/ha.

"We have a lot of work to do to make the most of the more precise nutrition we believe will be another important step forward in securing robust yields from the most effective use of resources," observes Ian. "With higher levels of nitrogen associated with greater disease and lodging risk — and cost — our aim is to achieve the lowest levels of fertilisation necessary to deliver the yields we want."

Precision novice

At Field Hall Farm on the southern edge of Uttoxeter, Rob Atkin considers himself a precision farming novice. But the more he uses them the more convinced he is that digital technologies will be crucial in a future of increasing economic and environmental pressures.

Together with the pig enterprises, the digestate commitments mean up to half of the annual fertilisation at Bedfordia is in the form of manures.

To aid compatibility, the whole data management at Bedfordia has been centralised on the John Deere system.

Working closely with Agrii agronomist, Nigel Francis, he has progressively been building digital agronomy into his family's arable and beef business over the past six years. This has been alongside a progressive reduction in cultivation, addition of spring barley and introduction of cover cropping across the farm to improve sustainability.

The whole farm was conductivity scanned by SoilQuest in 2014 to pinpoint particular ▸

Farm Facts

Atkins Farms, Uttoxeter, Staffordshire

- **Soil Type:** Running from Keuper marl clays to black silts
- **Cropped Area:** 365 ha
- **Enterprise Mix:** Wheat, OSR, spring barley, winter barley, winter beans, winter oats, cover crops, maize, grassland, beef finishers
- **DTF trials:** Variable nitrogen in winter wheat; variable seeding in spring wheat
- **Key trial hopes:** "We want to pinpoint the three or four elements of digital agronomy that will make the most difference for us."

Rob Atkin considers himself a precision farming novice but is convinced that digital technologies will be crucial for his farm's future.

▸ soil variations. Variable application to the mapped and soil sampled zones has since enabled the team to reduce their index-maintaining P and K use from around 40-50t to less than 20t per year. They've also made significant savings in lime use.

The family now have GPS with autosteer on their tractors; operate a fully automated Fastrac-mounted Knight sprayer; run a complete suite of Contour satellite imagery from Rhiza; and have just started variable rate seeding with a newly-acquired Amazone Cirrus drill.

"On top of the input savings, an average field size of just 5-6ha and very irregular boundaries make key elements of precision farming especially valuable for us," points out Rob who runs the business in partnership with his father, Peter and mother, Sharon.

"Auto shut-off on the sprayer, for instance, must save us 6ha of spray on every application across our 365 ha of cropping. With headlands making up a good third of our ground, improving their performance is essential if we are to push our wheat average beyond the 10t/ha mark and our OSR to more than 4.5t/ha. This is where we see variable rate fertilisation and sowing, satellite crop monitoring and yield mapping being especially valuable."

Digital agronomy is also seen as important in keeping a firm check on Field Hall Farm's number one arable challenge — brome; a problem Rob and Nigel have successfully got on top of over the past five years.

"Bromes can leap up and bite us badly if we give them half a chance," Nigel explains. "So, we have to keep our eyes peeled for any threat from them, anywhere at any time and deal with the problem promptly.

"The Rhiza system's facility to drop down 'digital pins' while we're field-walking or working throughout the year is invaluable. It means we can target our spraying, rogueing and other cultural controls so much more precisely.

"This is iimportant in our record-keeping too as legislation around IPM becomes more prevalent. And, as we build them up, the digital records are showing us exactly how much progress we're making and where we need to step up our efforts to keep a firm lid on things.

"Any pins Rob drops to highlight other weed, disease or pest concerns while he's working in the crop as well as areas of less good crop growth highlighted by the Contour NDVI or GCVI images are also really valuable in targeting our crop walking," he adds.

At least two thirds of the spring barley Rob grows each year in a flexible rotation with winter cereals and OSR or beans has a cover crop ahead of it. Although various mixes are being examined in the catchment sensitive farming work he is undertaking as a South Staffordshire Water trial farm, stubble turnips continue to be the favourite option.

Assisted by timely seedbed nitrogen, they consistently grow well from mid-August sowing — as soon as the previous winter cereal is off and its straw baled. Then, in a cost-sharing and grazing agreement with a local shepherd, they provide a valuable extra enterprise as well as additional fertility, soil structuring and brome control.

"Stubble turnips work well for us," reports Rob. "Apart from anything else, they allow us to get on the fields a good week earlier in the spring which can be really valuable for seedbed preparation.

"The satellite images clearly show the extent of the winter cover we are achieving. I can see this being valuable proof of the 'public goods' we are providing that'll come into the new Environmental Land Management Scheme.

"We are just beginning to appreciate all the things digital technologies can do. The key to making the most of them, though, is to understand exactly what the various images are telling us at each stage and how best to use this intelligence to inform our crop management.

"That way we can really improve the productivity of all but the last 6m of our headlands, for instance. We can also tailor our inputs far more precisely to the particular needs of each area of each crop through the season; more accurately predict crop potential to flex future management and marketing; make precision applications much easier to plan and implement; more accurately calculate our seed and fertiliser buying needs; and better monitor the success of the different cover cropping and other techniques we try." ■

Using digital technologies are seen as an essential part of pushing the wheat average beyond the 10t/ha mark at Hall Farm.

Using 'digital pins' helps Nigel Francis target spraying, rogueing and other cultural controls more precisely.

Technology on Trial

CPM is working with Agrii and Rhiza to gain the best possible insight into the pioneering Digital Technology Farm network set-up this spring with growers across the country to scientifically prove and improve key elements of digital agronomy on a field-scale.

Spanning a wide range of soil types as well as rotations and farming systems, the trial and demonstration network has embarked upon a programme of studies employing the ADAS Agronomics precision field data analysis and reporting model to secure the most statistically robust results

This series of articles looks behind the scenes at the digital journeys of the growers involved, the issues they have with current technologies, the future they see for them and what they most want to gain from their innovative initiative.

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