> *“Data is integral to making good decisions”*

Crop production insights

Precision decisions

Whether it be on paper or more recently digitally, data collection has long been a key part of everyday farming. But how can growers use what they have at their fingertips to make better decisions? *CPM* finds out more.

By Charlotte Cunningham

There’s an old adage in farming that says if you can’t measure, you can’t manage, and with the rise of precision technology and more efficient ways of capturing farm data, it seems the value of doing so has really come to fruition of late.

In an era where farmers are continually under pressure to get more from less, and extreme weather patterns throw even the most well-thought out plans into jeopardy, making decisions based on insight rather than guesswork is vital, explains Ed Downing, national crop nutrition manager at Frontier. “The challenge many growers face is assessing how successful they’ve been with their crop management and subsequent production.

“A lot of the time, people base results on gut feelings. The problem with this is it’s harder to be sure how things like the weather have impacted production, and there are much more accurate ways of assessing this.”

Ed adds that in just one season, while individual fields might have been exposed to the same weather, growers could find significant differences in performance. He says this isn’t just likely to be in terms of yield and production, but also from a nutritional perspective as there can be a tangible variation in how crops have taken up and utilised nutrients.

“By measuring this and using data to make decisions there will naturally be learnings that can be taken into the following year, retested and monitored to see if changes have made an impact.”

Decision making

“Data is integral to making good decisions, and decisions and insight should be based on evidence. It’s all about incremental gains — there’s not likely to be ‘silver bullet’ gains for many growers, but actually it’s all of the small things added together which tend to make the biggest differences.

“We’re going to have to farm more efficiently and being able to identify exactly where and how to do that will be key.”

This is something Frontier has been aware of for some time, introducing the SOYL precision farming service more than 30 years ago. The SOYL platform works by using satellite imagery which shows crop biomass throughout the growing season, explains Simon Griffin, technical manager at SOYL. “This shows variation across the field and we receive this information on a week-by-week basis.

“We’re all about gathering insight from data — using data is going to become more and more important — both in terms of how we collect and how we interpret it and it’s going to become more integral to farm management decisions.”

Gleaning the most accurate data comes via gathering it from a number of sources, he continues. “This includes soil type and soil nutrient, yield data and grain analysis. Integrating that with other technology such as satellite imagery to measure crop growth is going to be key to accelerating progress and ultimately supporting the industry to advance and make more

Making decisions based on insight rather than guesswork is vital, says Ed Downing.

evidence-based decisions."

It's this grain analysis data source that Frontier and SOYL have been developing over recent years via its field grain analysis service which has recently been strengthened through the addition of a new nitrogen use efficiency metric. So what exactly is the field grain analysis service?

In a nutshell, it's based around analysing grain from individual fields, carried out by growers taking grain samples from trailers. The samples are then sent off for analysis and the results incorporated with other information, including yield and what nitrogen was applied.

This is different to the business' standard grain sampling service which signposts growers to the best target market for their harvested grain as a whole, based on its specifications.

Simon says the per-field approach gives growers greater insight into how efficiently fertiliser is being applied to their crops, as well as a deeper look at nutrient uptake and the efficacy of application rates. "Using samples of grain from individual fields, the analysis covers the full suite of key crop nutrients including nitrogen, sulphur, manganese, calcium, phosphorous, magnesium, zinc, iron, potassium, copper, boron and molybdenum.

"The benefits of having individual fields analysed not only allows you to receive guidance on nitrogen rates, you'll also find out your exact P and K removals from the grain so you can tweak any maintenance fertiliser applications. Additionally, you'll be able to understand if your crop was potentially deficient in any nutrients, both macro and micro."

This data can be overlaid with historic biomass and weather data to highlight typical performance when certain biomass stages are reached, says Simon.

Questioning performance

Although the grain analysis service doesn't provide all of the answers, what it does do is focus attention on specific fields and allows growers and agronomists to ask why they've performed differently to others, continues Ed. "It also gives pointers as to what you should be reviewing, for example, nitrogen rates and timings or perhaps it might be soil structure issues."

The new nitrogen use efficiency module adds to the existing service by producing a report which compares how much nitrogen was in the harvested grain with how much was applied to the crop to determine the overall efficiency levels, with colour-coding indicating the efficiency of the strategy, explains Simon. "An NUE score of less than 60% would indicate improvements could be made and that the current nitrogen strategy wasn't the optimum for that field."

Gleaning the most accurate data comes via gathering it from a number of sources, says Simon Griffin.

Ed continues: "We know that nitrogen isn't always the limiting factor to yield, so increasing rates when this is the case is obviously likely to result in more cost but without the results.

"But in some situations, it is, so in these ▸

View from the field

Among the farmers who have benefited from the field grain analysis service is Hampshire arable farmer, Julian Gibbons.

Farming in partnership with his brother Andrew, Julian is cropping 567ha, with a typical rotation including two break crops, winter wheat, winter barley and spring barley.

"We've used YEN Nutrition for quite a few years. For me, looking closer at nutrition and the results which come from that is a really good way of sense checking what you've done and highlighting if perhaps you ought to tweak things," he says.

"Especially when fertiliser prices went sky high, it emphasised the importance of looking closely at what you're doing and if your strategy is effective or not."

To strengthen this, Julian has more recently been trialling the new NUE metric within the SOYL system. "We're already doing variable P,K and N through SOYL — and have been for the past 15-20 years — so this seemed a natural extension and expands what we're doing via YEN."

In terms of usability, Julian says the service is straightforward and requires minimal effort from his side of things. "We generally take samples from fields anyway as we harvest them, so it's just been a case of adding another sample bag to the collection; the lab only needs about 100g."

Looking at the results he's gleaned from the analysis, a few surprising deficiencies have been highlighted, notes Julian. "Interestingly, we're low on sulphur even though we apply bags of it. That makes one consider if there's something else to factor in, for example, is this due to application timing and the intense rainfall we've been having?

"Usually, we're putting it on with the first application, so are we losing too much of that now due to the weather?"

Julian adds that this has led him to look into the value of other sources of sulphur, such as polysulphate, as a better alternative which is released slower through the spring. "Or, there's the possibility of just applying little and often instead."

As well as this, Julian says he's found the field grain analysis to be a really useful way of trialling other technologies such as biostimulants. "We did this last year where we looked at different seed treatments — including biostimulants — and used the grain analysis data to really drill down to identify if and where we were seeing any benefits.

"Put simply, the technology allows you to look at what you've done and see if it's worked or not — something which will no doubt be hugely important to growers going forward."

Using the new NUE metric in SOYL has shown that Julian Gibbons' farm is low in sulphur, despite applying 'bags of it'.

The new nitrogen use efficiency module adds to the existing service by producing a report which compares how much nitrogen was in the harvested grain with how much was applied to the crop to determine the overall efficiency levels.

▸ scenarios increasing nitrogen rates will have an impact. By arming growers with the tools and technology that takes into account historic and current biomass and yield and then overlaying grain analysis from individual fields, we can really start to identify these opportunities with confidence. Being confident with what you're doing along with future retesting is vital."

When it comes to application programmes, growers can use the information to best determine whether more inputs are warranted in certain areas of the crop and, using variable rate technology, can go on to auto-adjust application rates to different parts of the field, adds Simon.

"In the trials that we've conducted — split tramline comparing variable rate with flat rate applications — we've found the best way of improving NUE is matching nitrogen inputs to crop yield potential. That's where we've continually achieved the greatest results."

New innovations

Having such an accurate way of measuring the impact of inputs could also give growers confidence to trial new technologies too, believes Ed. "We're seeing products like endophytic bacteria come to the market that are designed to colonise the plant and fix atmospheric nitrogen and deliver it to the crop. Obviously including this kind of innovation within the programme means growers gain an extra source of nitrogen and it's going to take time to understand how exactly these technologies will work on a commercial farm setting and how we can adjust all nitrogen sources as a result."

Using tools such as the new field analysis service from SOYL could help farmers do just that, he continues. "For example, growers could use it to look at how to manipulate nitrogen doses on top of new technologies and if/how that delivers into yield and grain.

"The more you're able to measure success, the more confident you can be with bringing technology into the programme."

Ed adds that Frontier is currently testing a product called Blotta Max which is designed to make phosphate more available to the crop. "We've had some success in terms of replicated trials and improved crop performance and yield," he says.

Crop production insights

CPM would like to thank Frontier for kindly sponsoring this article and for providing privileged access to staff and materials used to help put the article together.

"When conducting grain analysis something we've continually picked up is low levels of phosphate in grain — even when soil levels are deemed to be sufficient. We're still learning in terms of the level of confidence we place on these results because it's still early days compared with soil analysis. But in situations like this, bringing in a product like Blotta Max when you have evidence there's an issue with phosphate uptake, could make all the difference to overall crop performance."

Ed concludes that the service is a great starting point for growers at a challenging time for the industry. "The way we farm has and is going to continue to rapidly change. Precision feels like the direction of travel across the whole supply chain and while there may be apprehension that monitoring and measuring causes more work and cost for growers, it's actually a sure-fire way to ensure that efficiencies are being maximised which in the long run will only be a positive thing for both growers' time and the bottom line." ■

SOYL — Nitrogen Use Efficiency (NUE) Report — frontier

Client: Demonstration Farm
Farm Name: Demonstration Farm
Address: Farm Drive
Farmington
Farmshire
FA12 3BM
Report Date: 29/05/2024

Field Name	Market	Grain Yield t/ha	N Applied	N offtake	Wheat: Grain protein Other crops: Grain N			NUE - Nitrogen Inputs / Output Balance			Kg yield per Kg N		Surplus N Kg		N yield offtake compared to National av.		SCORE
					%	Interpretation	Score	%	Interpretation	Score	kg	Score	kg	Score	t/ha	Score	
Field 1	WW - Feed	9.65	190	177	12.31	Very high	2	93%	Close to mining	4	51	4	13	4	1.7	4	18
Field 2	WW - Feed	10.97	175	153	9.35	Low	3	87%	Great	5	63	5	22	4	3.0	4	21
Field 3	WW - Milling 13%	9.91	280	195	13.17	Optimum	5	69%	Average	3	35	2	85	2	1.9	4	16
Field 4	WW - Milling 13%	10.12	240	179	11.86	Very low	1	75%	Good	4	42	3	61	3	2.1	4	15
Field 5	WB - Feed	6.46	165	88	1.60	Low	3	53%	Ok	2	39	2	77	3	-0.5	2	12
Field 6	WB - Feed	8.96	175	149	1.95	Optimum	5	85%	Great	5	51	4	26	4	2.0	4	22

An NUE score of less than 60% would indicate improvements could be made and that the current nitrogen strategy wasn't the optimum for that field.